

Vocational awareness and aspiration of seafaring students in Taiwan

Chun Pong Wong

*Department of Shipping Technology,
National Kaohsiung University of Science and Technology, Kaohsiung, Taiwan*

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Abstract

Purpose – This study aims to examine variables and factors in vocational awareness and attitudes that affect the vocational aspiration of seafaring course students who are potential future seafaring employees.

Design/methodology/approach – A literature review was conducted to identify factors that prompt students in seafaring courses to pursue seafaring careers, followed by a design of preliminary questionnaire questions to survey students' perception on the conditions of seafaring careers (i.e. vocational awareness) and their intention to pursue a seafaring career (i.e., vocational aspiration). A total of 744 seafaring course students in four Taiwanese universities completed a questionnaire developed according to the previous studies. A structured equation modelling was conducted in this research including model validity, goodness of fit, model correction and mediation effects.

Findings – With a model consisting of four factors for vocational awareness, three factors for overall attitudes and vocational aspiration as a dependent variable, the results showed that factors of vocational awareness and students' overall attitudes were significantly correlated, and the factors of overall attitudes exhibit strong mediation effects on vocational aspiration from vocational awareness. The results confirmed that the factors are important determinants for the vocational aspiration of students.

Originality/value – The findings of this study provide a comprehensive approach to understand students' seafaring aspiration for the universities, governments and shipping companies. Seafaring policies and management are discussed from the research findings.

Keywords Attitudes, Seafaring careers, Shipping navigation, Vocational aspiration, Vocational awareness

Paper type Research paper

1. Introduction

Taiwan is an island country with robust manufacturing industries that rely on shipping for cargo transportation. To support the shipping corporations in the country, there are many seafaring courses in vocational schools and universities who churn out qualified graduates to meet the needs of the industry (Ocean Affairs Council, 2006; Wong, 2010, 2012).

In the 20th century, there were no difficulties for the industry to recruit qualified navigation officers and engineers to work and live on ships with social isolation for the contract periods, because seafaring jobs commanded better remunerations and conditions than non-seafaring jobs. Since the turn of the millennium, however, the remuneration gaps between seafaring and non-seafaring jobs have narrowed while the sea conditions, threats of pirates, etc., have



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deteriorated, hampering more students in seafaring courses to pursue careers in the industry (Tsai and Liou, 2017; Westlander, 1994). Seafarers face regularly changing conditions and challenges, while staying away from families and friends for prolonged periods (Carotenuto *et al.*, 2012; Parkes *et al.*, 2005; Slišković and Penezić, 2015b). Besides, it takes years of studies and work to gain the experience, knowledge, skills, qualification and better remuneration and ranks, all the time bearing the high risks of working on ships and international waters. No wonder, recent data show that a percentage of graduates from the seafaring courses do not pursue seafaring careers (Tsai and Liou, 2017).

Through education systems, governments and educators aim to cultivate students with relevant and sufficient skills and prepare them for the future job markets, to support the industries and the economy. The goal of education is achieved when any students who complete all course requirements satisfactorily and pursue seafaring as careers. Therefore, the governments and the education establishments must adopt the right mix of practices to attract potential students to consider seafaring as a career before applying for the relevant courses.

Thus, the targets of the study are students in universities of marine technology who are studying for qualifications to work on commercial ships in the roles of navigation or engineer officers. It addresses the questions: 1) whether strengthening vocational awareness can reinforce vocational aspiration for more students to pursue seafaring careers? and 2) what factors influence vocational aspiration? (Ocean Affairs Council, 2006). With the results and variables and factors identified, it recommends that the government improves on the conditions of the seafaring jobs, and that the vocational educators improve practices in teaching and recruitments of new students in seafaring courses.

Vocational awareness refers to the understanding of the reasons, values, rewards, requirements, processes, etc., of a future career (Cherry and Gear, 1987; Ferrara *et al.*, 1985; Hyland, 2019; Jonathan, 1998; Yu *et al.*, 2010; Supper, 1981, 1990, 1994). Overall attitudes can be defined as a way of feeling, a manner of acting, personal perceptions towards a career. This term covers personal preferences or judgments such as good-bad, harmful-beneficial, pleasant-unpleasant, likable-unbearable, etc., and interests (i.e. career ambitions), motivation, etc., towards a future career (Ajzen, 2001; Hidi and Renninger, 2006; Pintrich and Schunk, 2002; Ryan and Deci, 2000; Deci *et al.*, 1991). Vocational aspiration can be defined as a plan and willingness to pursue a career (Ajzen, 1991; Burman, 2016; Sheldrake *et al.*, 2017; Super, 1963, 1981, 1990).

2. Literature review

2.1 Factors for vocational awareness

While different terminology and methodology are used in the referenced literature for vocational decisions, five common factors are identified as listed in Table 1: competence (knowledge and skills), job security (work requirements), rewards and benefits (RB) (remuneration), environment and conditions (EC) (work environments) and social influences (SI) (external influences). Vocational awareness is a precursor for career counselling and development that influences career choices deeply (Cherry and Gear, 1987; Ferrara *et al.*, 1985; Hyland, 2019; Jonathan, 1998; Yu *et al.*, 2010). Separately, Super (1981, 1990, 1994) proposed that vocational awareness refers to subjective concepts on work requirements, rewards, environment and trends related to the chosen career. To make a decision on a future vocation, a person must consider many factors, including knowledge and skills, work requirements, RB, work environment and SI (Ford and Lerner, 1992; McGroarty, 1985; Mudhovozi and Chireshe, 2012; Slišković and Juranko, 2019; Spokane and Cruza-Guet, 2005; Tuan *et al.*, 2005). In addition, the awareness on (knowing) one's own capabilities and expectation is essential for a successful career (Lent *et al.*, 1994; Herr and Cramer, 1988; Holland, 1985; Yu *et al.*, 2010; Wise *et al.*, 1976).

Scholars	Arguments of the factor	Summarize factor
Wise <i>et al.</i> (1976) Super (1981, 1990, 1994) Helwig (1984) Wu and Lou (2010) Cherry and Gear (1987) McGroarty (1985) Ferrara <i>et al.</i> (1985) Holland (1985) Baartman (2018)	Knowledge, self-concepts Knowhow Previous work experience Work ability and work ethics Reading ability Career ability Vocational knowledge Vocational knowledge Knowledge as per the engage work needs	Competence
Broad (2016) Holland (1985) Helwig (1984) Cherry and Gear (1987) Šlišković and Penezić (2015b)	Explicit and tacit knowledge Vocational information Steady and aptitudes of the job Social and economic factors Nature and dynamic of job, changes in maritime sector	Job security
Westlander (1994)	Relatively rapid changes in the economic system	
Wise <i>et al.</i> (1976) Helwig (1984) Wu and Lou (2010) Tuan <i>et al.</i> (2005) Šlišković and Penezić (2015b) and Šlišković and Juranko (2019) Super (1981, 1990, 1994)	Value Financial needs Economic Factors, work welfare Science learning value Financial stability and security	Rewards and benefits
Helwig (1984)	knowledge on vocational environment	Job environment and conditions
Cherry and Gear (1987) Šlišković and Penezić (2015b)	Friendliness of co-worker, transportation available Career interventions Ratio between working and vacation days, and quality of days off, risk at sea	
Carotenuto <i>et al.</i> (2012)	loneliness on board, fatigue, multi-nationality, limited recreation activity, sleep deprivation	
Helwig (1984) Wu and Lou (2010) Cherry and Gear (1987) Ford and Lerner (1992)	Family's wishes Opinions of others Features of the school Transactions with their environment	Social influences
Holland (1997) Spokane and Cruza-Guet (2005) Tuan <i>et al.</i> (2005) Baartman (2018) Broad (2016) Shumba and Naong (2012) Mudhovozi and Chireshe (2012)	Environmental interaction and environmental characteristics On-campus learning environment Transfer from career to classroom Influence of family and teachers Influence of parents, teachers and friends	
Carotenuto <i>et al.</i> (2012) Jonathan (1998)	Separation from family Environmental impacts	

Table 1.
Factors of vocational
awareness

In a study on vocational awareness scale and career decisions conducted by high school students, [Helwig \(1984\)](#) proposed that the factors, in the order of importance level, are: job stability and security, vocational interests (preferences for certain tasks or activities), financial rewards, aptitudes (the capacity to do or learn something), friendliness of co-workers, transportation availability, previous work experience and family's influences. A study on predictability of vocational awareness for career decisions by students in child care courses ranks the key influencing factors (i.e. predictors) as: personal circumstances, personal capability and ethics, monetary rewards, work benefits and opinion of others ([Wu and Lou, 2010](#)).

[Baartman \(2018\)](#) studied how vocational students learn various types of knowledge from school-based and workplace-based learning environments and concluded that these two types of learning are complementary to each other. [Broad \(2016\)](#) proposed that vocational decisions are influenced by competence and SI. Competence refers to knowledge (declarative facts; explicit knowledge) and skills (procedural ability; tacit knowledge), and SI refers to the status of the intended vocation, as regarded by individuals or the society as a whole.

[Slišković and Penezić \(2015b\)](#) conducted a survey on career decisions of seafarers and identified the following positive factors: financial stability and security, ratio between working and vacation days, quality of days off and nature and dynamics of jobs. The negative factors include: separation from families, limited promotion opportunities, changes in seafaring jobs and danger and risks of shipping navigation. [Shumba and Naong \(2012\)](#) propose that for their career choices, medical students were influenced by factors including the family, self-efficacy, teachers and interest.

Based on the theories and propositions of reviewed literatures regarding the factors of vocational decisions, [Table 1](#) lists four factors for vocational awareness: competence and job security (CS), RB, EC and SI. The literatures reviewed are categorized against vocational awareness factors as listed in [Table 1](#).

2.2 Theories on overall attitudes

[Ajzen \(2001\)](#) surveyed academic papers and books on the subjects of Attitude constructs for students in the social and behavioural sciences courses, and stated: "According to the theory of planned behaviour, people act in accordance with their intentions and perceptions of control over the behaviour, while intentions in turn are influenced by Attitudes towards the behaviour, subjective norms, and perceptions of behavioural control". The term Interest refers to the relationship between a person and things. [Hidi and Renninger \(2006\)](#) defined Interest as: "the psychological state of engaging or the predisposition to reengage with particular classes of objects, events, or ideas over time." Furthermore, interest can be divided into short-term situational interest (state) and long-term personal interest (disposition).

Motivation is "about what gets an individual moving (energization) towards what activities or tasks (direction)" ([Pintrich and Schunk, 2002](#)). A leading theory in this field is the self-determination theory (SDT) proposed by [Ryan and Deci \(2000\)](#), which proposes that the basic psychological needs for competence, autonomy and relevance are the ultimate drivers of behavioural choices. People tend to behave in ways to satisfy these needs and avoid behaviours that threaten the fulfilment of these needs (failure avoidance). SDT offers a developmental perspective: motivation can be both externally driven or developed autonomously and leads to activities that successfully contribute (competence) towards self-selected (autonomy) and meaningful (relevance) goals. Furthermore, SDT proposes a continuum from pure externally driven behaviour (avoid punishment) to autonomous internally driven behaviour (intrinsic motivation).

Deci *et al.* (1991) published the self-determination perspective theory, which proposes that attributes that contribute to better results in education are an interest in learning, a valuing of education and a confidence in one's own capacities. Separately, Osborne *et al.* (2003) proposed that classroom environment and activities provide important influences for students to become interested in scientific topics. Tsai and Liou (2017) researched recruitment management for seafarers and concluded that factors that influence work performance of seafarers include work attitude, welfare and opportunity, loyalty and salaries.

Boxer *et al.* (2011) studied factors affecting performance of students and found that students whose performance is worse than expected show signs of test/performance anxiety and elevated behavioural/emotional difficulties. Savelsbergh *et al.* (2016) designed a multi-layered framework to study factors that influence attitudes and achievement of students in science and mathematics classes. The findings show that the influencing factors include relevance, interest, self-efficacy and subjective norm/normality (of scientists). Furthermore, relevance is divided into personal relevance and societal relevance, and interest is divided into classroom interest, leisure interest and career interest.

Some research papers on influencing factors in the fields of education, psychology, management, etc., have been referenced: motivation (Enache and Matei, 2017; Potvin and Hasni, 2014; Schommer, 1990; Tuan *et al.*, 2005; Virtanen *et al.*, 2014; Watt and Richardson, 2007, 2012); interest (Potvin and Hasni, 2014); relevance (Kind *et al.*, 2007; Potvin and Hasni, 2014; Schommer, 1990; Tuan *et al.*, 2005; Watt and Richardson, 2007, 2012); confidence (Bassot, 2019; Kind *et al.*, 2007; Schommer, 1990); self-efficacy (Bassot, 2019; Tuan *et al.*, 2005; Virtanen *et al.*, 2014); and anxiety (Bussing, 1999; Hong, 2010). These factors are grouped as overall attitudes for the quantitative research towards vocational awareness and vocational aspiration, as shown in Table 2.

2.3 Theories on the study model towards vocational aspiration

The factors that university students consider while choosing future vocations include work conditions, general attractiveness of the occupation, income and compensation, personal prospects or general relevance, long-term potential and job security, consistency with personal talent, education or ability, the type and nature of colleagues, prospects of maintaining long-term interest, opinion of friends and family, altruistic concerns and ethical considerations (Galotti and Kozberg, 1987; Burman, 2016). Sheldrake *et al.* (2017) studied career aspirations of students in science courses and concluded: "Developing students' attitudes, and hence their aspirations, through highlighting the applications and relevance of science to everyday life may be beneficial."

The career self-concept proposed by Super (1963, 1981, 1990) include subjective perceptions and personal attributes relevant to the chosen occupations. Besides, these personal attributes (properties) include individual interests, capabilities, personal traits and values. This is to say that one's attitudes affect the decisions on future careers. Ajzen (1991) developed the theory of planned behaviour and proposed that behaviour is deliberative and planned. Intention is cognitive expressions of an individual's willingness to execute specific behaviours, and they are the immediate antecedents of behaviours. Furthermore, there are three factors that determine intentions: attitude towards the behaviour, subjective norms and perceived behavioural control. In other words, both vocational awareness and overall attitudes should have positive influences over aspiration to pursue a career (vocational aspiration).

Table 2.
Factors of overall
attitudes

Scholars	Arguments of the factor	Summarize factor
Potvin and Hasni (2014)	Motivation	Motivation
Savelsbergh <i>et al.</i> (2016)	Subjective norm/normality of scientists	
Schommer (1990)	Mathematics learning motivation	
Enache and Matei (2017)	Motivations	
Tuan <i>et al.</i> (2005)	Achievement goal	Interest
Virtanen <i>et al.</i> (2014)	Motivation	
Watt and Richardson (2007, 2012)	Motivations	
Tsai and Liou (2017)	Environmental motivation	
Potvin and Hasni (2014)	Interest	Interest
Savelsbergh <i>et al.</i> (2016)	Interest	
Deci <i>et al.</i> (1991)	Interest in learning	
Osborne (2003)	Interest towards science	
Potvin and Hasni (2014)	Relevance	Relevance
Savelsbergh <i>et al.</i> (2016)	Relevance	
Schommer (1990)	Mathematics relevance	
Kind <i>et al.</i> (2007)	Importance of science, practical work in science	
Tuan <i>et al.</i> (2005)	Performance goal	Confidence
Watt and Richardson (2007, 2012)	Teaching engagement	
Tsai and Liou (2017)	Welfare and opportunity	
Schommer (1990)	Mathematics learning confidence	
Kind <i>et al.</i> (2007)	Self-concept in science	Confidence
Deci <i>et al.</i> (1991)	Confidence in their own capacities	
Bassot (2019)	Confidence	
Savelsbergh <i>et al.</i> (2016)	Self-efficacy	
Tuan <i>et al.</i> (2005)	Self-efficacy	Self-efficacy
Virtanen <i>et al.</i> (2014)	Self-efficacy	
Bassot (2019)	Self-efficacy	
Schommer (1990)	Mathematics anxiety	
Boxer <i>et al.</i> (2011)	Test/performance anxiety	Anxiety
Hong (2010)	Learning anxiety	
Bussing (1999)	Stress	

3. Methodology

3.1 Research framework and hypotheses

To study vocational awareness and attitudes of students in shipping navigation courses, and to identify factors (variables) related to vocational aspiration of the students, the following steps were taken:

- investigate factors for vocational awareness and overall attitudes regarding seafaring careers;
- design a questionnaire to survey the students' tendencies to pursue seafaring careers (vocational aspiration);
- analyse the correlation among vocational awareness, overall attitudes and vocational aspiration;
- analyse any mediation effect among vocational awareness, overall attitudes and vocational aspiration; and
- analyse the data model and identify key factors influencing the predicative power of factors of vocational awareness and overall attitudes on vocational aspiration.

As per the theories and concepts of the reviewed literature, [Figure 1](#) proposes a model of vocational aspiration to show the relationship among vocational awareness, overall attitudes and vocational aspiration. The dotted line between vocational awareness and vocational aspiration indicates that this correlation is subject to a mediation test.

Based on the research goals and findings from the literature review, the following hypotheses were proposed:

- H1.* Students' vocational awareness positively affects their overall attitudes of seafaring.
- H2.* Students' overall attitudes positively affect their vocational aspiration in seafaring.
- H3.* Students' vocational awareness positively affects their vocational aspiration in seafaring.
- H4.* Students' overall attitudes play a mediating effect in the relationships between vocational awareness and vocational aspiration.

3.2 Questionnaire design and data collection

Adopting quantitative empirical methods to conduct this study, the study starts with the review of relevant literature to identify theories over vocational awareness, overall attitudes and vocational aspirations. The results were used to compile a preliminary questionnaire with seven-point Likert scales for each question.

Following a preliminary survey, the returned samples were analysed through a process of item analysis, reliability assessment and principal factor analysis, using SPSS Version 18, AMOS Version 26 and STATAble. The formal questionnaire ([Appendix](#)) was produced following the removal of invalid questions and minor modifications.

3.3 Analytical method

This study adopts a structural equation modelling (SEM) technique to process multiple dependent variables simultaneously, estimate potential factors of multi-index measuring systems, enable dependent and independent variables to include measurement errors and to estimate the fitness of the overall models.

By contrast, conventional general regression analyses, such as those using SPSS software, involve mean estimates which contain errors therefore affecting the accuracy of the construct reliability tests and the validity of the factorial structures ([Bollen and Long, 1993](#)). Furthermore, SEM can better handle second-ordered constructs with two-stage complex models similar to the model for vocational aspiration adopted in this study.

4. Results of analyses

A total of 1,176 formal questionnaires were distributed to students in four Taiwanese universities that have seafaring courses. Except for 166 students who were taking

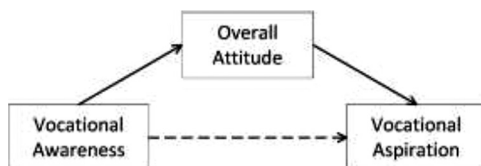


Figure 1.
Model of vocational aspiration

internship training on ships, the students in 29 classes were requested by the teachers or instructors to fill in the questionnaires during class time from April 2020 to July 2020. There was a total of 896 questionnaires returned; out of these, 122 were disqualified resulting in 774 valid returns (i.e. a 65.8% valid rate, well above the required 150 samples or 10–15 times the number of variables for meaningful SEM analysis). The valid samples were processed on IBM's SPSS AMOS software v.26.0 to verify that the constructs are valid and reasonable, model fit indices are acceptable and a mediation effect can be established among the three latent variables: vocational awareness (VAwa), overall attitudes (OAtt) and vocational aspiration (VAsp).

4.1 Confirmatory factor analysis for model validity and goodness of fit

The model of vocational aspiration (Figure 1) contains three second-order latent variables: VAwa, OAtt and VAsp. Among these variables, VAwa has four first-order factors (i.e. manifest variables): CS, RB, SI and EC; OAtt has three first-order factors: motivation and interest and relevance (MIR), confidence and self-efficacy (CSE) and anxiety (ANX); and VAsp has no first-order variables. The sample data were analysed using two-step modelling CFA methods on AMOS software, including model estimation, validity assessment, application of modification index and model trimming of items that show dependent errors. Table 3 shows the results of the analyses.

The columns of model estimates show values: regression weights (estimates), standard error of estimate, critical ratio (*t*-values) and *P* (significance of correlations). The *P* column shows three asterisks for all of the variable, indicating that for each variable, the probability that a null hypothesis being true is less than 0.001, therefore the alternative hypothesis (that the variable is significant in the model) is most likely (>99.9%) true.

The convergent validity method verifies the validity of each factor in the model. The columns list standardized regression weights, squared multiple correlation, composite reliability (CR, which should be >0.7) and average of variance extracted (AVE, which should be >0.5) (Fornell and Larcker, 1981). The model fit indices columns list the indices of model fit, including χ^2 (chi-square), degree of freedom (df), χ^2/df (normed chi-square), goodness of fit (GFI), adjusted GFI (AGFI) and root mean square error of approximation (RMSEA) which should be <0.08 for the model to be assessed as having an acceptable good fit with the sample data.

For the first-order factor of ANX, the CR value in the convergent validity study was 0.602 (<0.7), and the AVE value was 0.340 (<0.5). Besides, the value of χ^2/df for the factor MIR was 6.39 which is slightly outside of the preferred range (<5). Considering the support of literature and the significance of ANX and MIR over vocational choices, it was decided to keep these factors for the study. Apart from these two first-order factors, the values for the other first- and second-order factors all fall within the ranges of good model fit, indicating that the constructs of VAwa, VAtt and VAsp are within the guidelines and requirements of confirmatory factor analyses.

4.2 Structural equation modelling analysis results

The values produced through these tests are mostly within the ranges specified for the SEM analyses. However, in the multivariate normality test, one variable came up with a skew value >1, seven variables that came to have kurtosis values >7 and a multivariate critical ratio value reached 118.196, much greater than the theoretical CR <5 (Kline, 2011). As these values do not match the normality of multivariate analysis and may cause errors relating to under-estimated parameters or chi-square values, a bootstrap method was adopted to modify the indices.

Model estimates			Convergent validity		CR
Factor	Regression weights	SE	CR (t-value)	Standard regression weights	
Competence and job security (CS)	a1	1		0.72	0.52
	a5	1.030	18.319	0.81	0.65
	a6	1.172	18.310	0.80	0.64
	a12	1		0.71	0.50
	a14	1.184	17.996	0.88	0.77
Job environment and conditions (EC)	a15	0.854	17.985	0.74	0.54
	a18	1		0.90	0.81
	a19	0.981	354.666	0.89	0.80
Rewards and benefits (RB)	a20	0.959	35.969	0.90	0.81
	a22	1		0.63	0.40
	a23	1.78	17.333	0.89	0.80
Social influences (SI)	a24	1.726	17.696	0.83	0.69
	CS	1		0.91	0.82
Vocational awareness	EC	0.78	14.501	0.76	0.58
	RB	1.11	18.301	0.77	0.60
	SI	0.73	13.196	0.72	0.52
Confidence and self-efficacy (CSE)	b26	1		0.72	0.52
	b27	1.075	18.943	0.81	0.65
	b30	1.240	18.294	0.76	0.57
	b33	1.053	15.587	0.63	0.40
	b37	1		0.53	0.28
Anxiety (ANX)	b43	1.018	7.275	0.70	0.49
	b48	0.912	8.197	0.50	0.25
	b40	1		0.81	0.65
Motivation and interest and relevance (MIR)	b41	1.012	24.392	0.82	0.67
	b42	1.06	24.325	0.82	0.67
	b47	0.934	21.292	0.65	0.42
	b49	0.843	18.563	0.73	0.53
	CSE	1		0.95	0.91
Overall attitudes	ANX	0.448	7.482	0.47	0.22
	MIR	1.273	11.763	0.95	0.90
	c51	1		0.92	0.84
Vocational aspiration	c52	1.076	41.140	0.94	0.88
	c53	0.941	33.891	0.84	0.71

(continued)

Table 3.
CFA results of model estimates, convergent validity and model fit indices

Table 3.

	Convergent validity AVE	χ^2	df	χ^2/df	Model fit indices GFI	AGFI	RMSEA
Competence and job security (CS)	0.605	0	0	–	1	–	–
Job environment and conditions (EC)	0.609	0	0	–	1	–	–
Rewards and benefits (RB)	0.804	0	0	–	1	–	–
Social influences (SI)	0.626	0	0	–	1	–	–
Vocational awareness	0.629	292.535	50	5.851	0.938	0.903	0.079
Confidence and self-efficacy (CSE)	0.537	6.176	2	3.088	0.996	0.980	0.052
Anxiety (ANX)	0.340	0	0	–	1	–	–
Motivation and interest and relevance (MIR)	0.591	31.949	5	6.39	0.983	0.949	0.084
Overall attitudes	0.675	145.807	41	3.556	0.967	0.946	0.058
Vocational aspiration	0.812	0	0	–	1	–	–

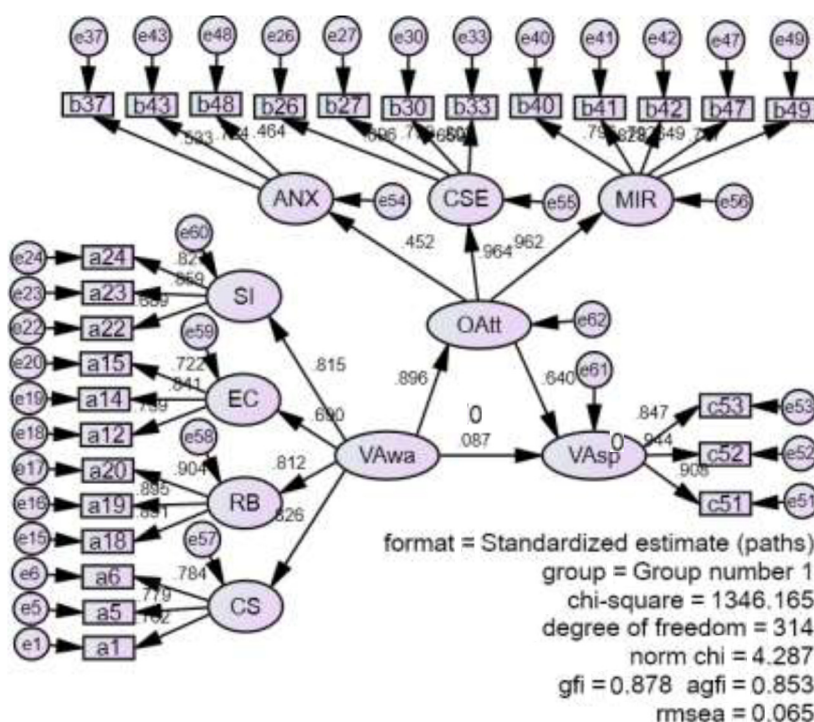


Figure 2.
SEM model of
vocational aspiration

Figure 2 shows the SEM model of the vocational aspiration factors produced with the AMOS software, and Table 4 shows the results of the Bollen–Stine bootstrap p -correction. In Table 4, most of the GFI values are within the ideal ranges and the P value being 0.000, indicating that the null hypothesis, H_0 is rejected, and the alternative hypothesis, H_a is most likely true. However, some of the values fall outside of the ideal ranges, including χ^2/df which is 4.287 (>3), GFI 0.878 (<0.9) and AGFI 0.853 (<0.9). While the misfits are shown by the enlargement of the chi-square values and the violations of multivariate normality, considering that the number of samples (774) is much bigger than the suggested minimum of 200, it was decided to improve the model through Bollen–Stine p -value correction method (Kline, 2011).

Determination index	χ^2	df	χ^2/df	GFI	AGFI	NFI	NNFI (TLI)	CFI	SRMR	RMSEA
Fit value	1,346.165	314	4.287	0.878	0.853	0.902	0.914	0.923	0.0575	0.065
Fit value with Bollen–Stine p correction	442.550	314	1.41	0.97	0.96	0.97	0.99	0.99	–	–
Ideal value	As small as possible	As large as possible	$<3-5$	>0.9	>0.9	>0.9	>0.9	>0.9	$<0.05-0.08$	$<0.05-0.08$

Table 4.
Assessment of fit of
the model: original
and after Bollen–
Stine p correction

The third row in Table 4 shows the fit values after Bollen–Stine bootstrap corrections, where the number of bootstrap samples was 1,000, and the average chi-square is 442.550, much smaller than 1,346.165, the chi-square acquired with maximum likelihood estimation. Other indices also improved to fit into the SEM standards, indicating a very good model fit to the data and the model is statistically significant.

4.3 Mediation analysis

Baron and Kenny (1986) proposed a four-step mediation test, and this test is adopted to verify a mediation effect on vocational aspiration from vocational awareness through overall attitudes, and to determine the strength of the mediation effect. The resulted values are listed in Figure 3: the models of mediation effect test.

Test 1: The effects of vocational awareness over vocational aspiration is confirmed to be positively significant, with a path coefficient of 0.657, *t*-values of 14.525 and a three-asterisk *P* value (<0.001). *H2* is therefore confirmed.

Test 2: The effects of vocational awareness on overall attitudes is confirmed to be positively significant, with a path coefficient of 0.896, *t*-values of 7.507 and a three-asterisk *P* value (<0.001).

Test 3: With both vocational awareness and overall attitudes included as direct factors for vocational aspiration, the effects of overall attitudes towards vocational aspiration remain highly significant, with a path coefficient of 0.650, *t*-values of 4.933 and a three-asterisk *P* value (<0.001).

Test 4: With both vocational awareness and overall attitudes included as direct factors for vocational aspiration, the effects of vocational awareness towards vocational aspiration became substantially insignificant with a path coefficient of 0.087, and *t*-values of 0.839.

The results of Test 1, 2, 3 and 4 confirm that with the addition of overall attitudes in the model, the effects of vocational awareness over vocational aspiration changed from significant to insignificant. However, the paths of vocational awareness to overall attitudes and of overall attitudes to vocational aspiration remain significant, indicating a strong mediation effect of overall attitudes on vocational awareness for vocational aspiration. Furthermore, the indirect path coefficient of vocational awareness over vocational aspiration is 0.573 (0.896×0.640), which is only 0.084 less than the direct path coefficient, 0.657, indicating that the mediation effect, while partial, is comprehensive. Thus, *H1*, *H2* and *H4* are supported. However, *H3* was not supported in this research.

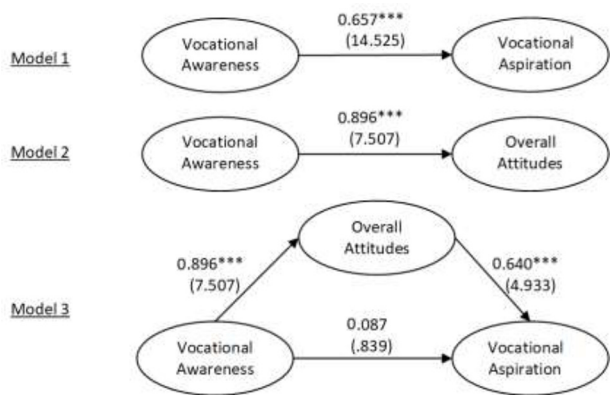


Figure 3.
Models of mediation
effect testing

5. Conclusions and discussion

This research aims to examine the relationships between vocational awareness, overall attitudes of seafaring and vocational aspiration from a maritime student's perspective. Resulted indicated that students' vocational awareness had a positive influence on their overall attitudes of seafaring, whereas overall attitudes of seafaring was positively related to the students' vocational aspiration. Specifically, this study found that students' overall attitudes played a fully mediation effort in the relationship between vocational awareness and vocational aspiration. However, the direct influence of vocational awareness on vocational aspiration was not supported in this research due to the mediating role of overall attitudes of seafaring. The results confirm and support the findings from the literature review.

The confirmation of hypotheses and observed effects of the factors of vocational awareness and overall attitudes over vocational aspiration have strong implications on how to improve vocational aspiration of the students in seafaring courses.

This research confirmed that vocational awareness (CS, RB, EC and SI) can improve students' overall attitudes of seafaring. In addition, students' overall attitudes (MIR, CSE and ANX) can reinforce students' vocational aspiration of seafaring.

There are four groups: governments, schools (educators), shipping companies (the industry) and students, each plays a role in the status of the shipping industry and has capacity and power to influence the factors identified in this study of the vocational aspiration.

Governments can formulate policies to bring about favourable conditions for investments, to stimulate market demands for shipping services and therefore to improve remuneration, benefits and work conditions for the employees in the industry. Furthermore, to enhance vocational aspiration of students in seafaring courses, the governments can enhance counselling services for students and citizens to be better informed of RB, EC, MIR, etc. and to alleviate negative impressions (ANX) on seafaring careers.

Schools (universities, colleges and other institutes) are responsible for nurturing future employees and talents for the industries and are ideally positioned to impact on each student's career aspiration. To strength the CSE, SI, MIR and RB will increase students' vocational aspiration. Therefore, school educators should provide the best possible curriculum and environment for students to learn vocational knowledge and knowhow, including skills on problem-solving, planning and execution (CS), to enhance on students' MIR and CSE and to mitigate ANX related to school work and seafaring careers.

This study suggests that shipping companies could endeavour to provide rewarding, safe and enjoyable work and living environment for their employees with generous benefits included in seafarers' packages (Tsai and Liou, 2017; Rai, 2019). Furthermore, they can provide better living conditions on ships and take better care of corporate social responsibilities which are critical to retain seafarers (Osipow *et al.*, 2000; Thai *et al.*, 2013). These practices will enhance factors including RB and EC and help to attract the best talented and well-trained employees and to provide stability and profitability for the shipping industry (Jonathan, 1998; Spokane and Cruza-Guet, 2005).

Students on seafaring courses are the subjects of this study; they should focus on their learning and prepare themselves for the challenges ahead of their careers. A seafaring career can be extremely fulfilling and rewarding provided that they: 1) understand their personal traits of student's MIR, 2) build up their skill sets on decision-making, planning and execution, to enhance their CSE, 3) comprehend conditions on ships and communicate with family and friends and 4) nurture positive attitudes and mitigate anxiety.

When the factors identified in this study are enhanced, the levels of vocational awareness and overall attitudes will improve resulting in stronger interest for seafaring students to

pursue seafaring careers (vocational aspiration). There will be more successful careers, better personal satisfaction and benefits for the industry and the economy.

In the process of the mediation effect analysis (Section 4.3), it was observed that students in shipping navigation courses with good academic performance do not necessarily have high vocational aspiration. This can be conjectured that students with higher grades tend to have more diverse aspiration and higher expectation and more options on work or further studies. Therefore, the schools should modify their recruitment policies to focus more on students with good vocational awareness and attitudes, rather than those with highest possible grades. This issue, of how to acquire most suitable students who will develop into capable seafarers and stay on the intended career path in the shipping industry, is a potential topic for future research.

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About the author

Chun Pong Wong (黃振邦) Prof Wong Chun-Pong received a PhD from National Kaohsiung Normal University in 2012 and acquired an MBA degree from National Sun Yat-sen University. He is an experienced Marine Master on cargo ships; his specialty includes ship handling and building and marketing, shipbuilding industry, ship handling, marine cargo operation, ship stability, etc. Currently, he serves in the Department of Shipping and Technology at National Kaohsiung University of Science and Technology, Taiwan. Chun Pong Wong can be contacted at: cp@nkust.edu.tw

Appendix

The Questionnaire for Vocational Awareness and Aspiration Study

With 7 options for most questions, the intensity of expression ranges from strongly disagree (1) to strongly agree (7).

Part 1. Questions on Vocational Awareness

(Competence)

- a1 I understand the contents of the subjects relating to general study in the school.
- a2 I understand the contents of the qualification examination for a license for shipping officers
- a3 I understand the contents of the internship on ships
- a4 I understand vocational requirements for the shipping officers on ships

(Job Security)

- a8 I know the demand and trend for shipping officers in current job markets
- a9 I know the career options for non-shipping jobs in the job market
- a10 I understand the limitation of non-seafaring jobs available after a seafaring career.
- a18 I know the type of career I want to pursue.
- a19 I understand the compatibility between my interest and a seafaring career.
- a20 I understand the progress and expectation on a seafaring career.

(Environment and Conditions)

- a11 I understand the living environment and conditions of seafaring jobs.
- a12 I understand the risks and difficulties of working on ships.
- a13 I understand the fixed terms of contracts for seafaring jobs.
- a14 I know that seafarers travel to and live in everywhere the ships go to.
- a15 I know that language skills is a prerequisite for seafaring jobs.

(Rewards and Benefits)

- a5 I understand general salaries and rewards for seafaring jobs
- a6 I understand general benefits and supports for seafaring jobs
- a7 I understand general differences in remuneration packages among seafaring jobs and non-seafaring jobs
- a16 I understand what I need to learn from my seafaring study.
- a17 I know my expectations from a seafaring career.

(Social Influences)

- a21 My family support my choice of a seafaring career.
- a22 My friends and peers support my choice of a seafaring career.
- a23 The school environment is helpful in my choice of a seafaring career.
- a24 Conventional concepts on seafaring careers affects my decision to pursue a seafaring career.

Part 2. Questions on overall attitude

(Motivation)

- b28 It will be easier to find a seafaring job if I do well in the seafaring and relevant studies.
- b40 My skills and capability will grow if I do well in the seafaring and relevant studies.
- b46 My family and friends will appreciate my effort if I do well in the seafaring and relevant studies.

(Interest)

- b30 I am interested on seafaring and relevant studies.
- b36 The on-ship internship program makes me interested on a seafaring career
- b42 The atmosphere and environment in the school makes me interested on a seafaring career.
- b47 The aspects of travelling overseas makes me interested on a seafaring career.
- b50 The types of work in seafaring jobs makes me interested on a seafaring career.

(Relevance)

- b29 Having good seafaring knowledge and skills can enhance my self-assurance.
- b34 Doing well in the seafaring and relevant studies helps in finding better paid jobs.
- b35 Having good seafaring knowledge and skills helps in winning recognition from others.
- b41 Having good seafaring knowledge and skills helps in winning recognition from friends and peers.

(Self-efficacy)

- b27 I study hard on seafaring and relevant studies.
- b33 I prepare for the contents of the classes on seafaring subjects.
- b39 I study the contents of the seafaring subjects after the classes.
- b45 I work hard to pick up skills in the practicum classes.
- b49 I participate actively in activities relating to seafaring studies and relevant topics.

(Confidence)

- b26 I am confident that I can do well in the seafaring and relevant studies.
- b32 I am confident that I can pass the examinations and vocational trainings in the school.
- b38 I am confident that I will be able to pass the examinations for the seafaring licence.
- b44 I am confident that I will be able to do the seafaring jobs well.

(Career anxiety)

- b37 I think dealing with fellow seafarers from different countries on ship is difficult.
- b43 I think there is a degree of danger and risk on seafaring jobs.
- b48 I know that I will be away from family and friends when I work on ships.

Part 3. Questions on Vocational Aspiration

- c51 I will pursue a seafaring career when I graduate.
- c52 A seafaring career matches my career plan.
- c53 I am willing to accept the difficulties and risks involved in a seafaring career.

Part 4. Questions on responder's details and backgrounds

- 1 School System: _____
- 2 Gender: ☐Male, ☐Female.
- 3 Internship Time: ☐0~3 months, ☐4~7 months, ☐8~11 months, ☐1 year and above.
- 4 Academic performance in percentage ranks from best ($\leq 10\%$) to worst (100%):
☐Top: $\leq 10\%$, ☐Good: $11\sim 30\%$, ☐Average: $31\sim 60\%$, ☐Below Average: $\geq 61\%$.
- 5 Household Income: ☐Very Good, ☐Good, ☐Average, ☐Poor, ☐Very Poor.
- 6 Seafaring family and relatives: ☐Yes, ☐No.