

FACTORS AFFECTING FEMALE STUDENTS' CHOICE OF MARITIME MAJORS

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Key words: gender culture belief, social information, female students' choice, maritime majors.

ABSTRACT

Gender equality has gradually become a prominent topic in the field of social science. However, for employees in traditional industries, such as sailors in the maritime industry, society has long held preconceived notions regarding gender as well as different societal expectations for different genders. In the current study, we explored the degree of influence of gender culture beliefs and social information on female students' choice of maritime majors. We conducted group discussions to formulate the study hypotheses and administered a questionnaire survey to 474 freshman and sophomore students at two marine-oriented institutes located in the north of Taiwan to collect data. Results of a regression analysis reveal two main conclusions: (i) The gender culture beliefs of female students in marine-oriented institutes are significantly and negatively related to the choice of a gender-atypical major, and (ii) social information from professional referents is critical in determining female students' choice of a gender-atypical major.

I. INTRODUCTION

Maritime majors have long been dominated by male students. Society has established a restrictive gender culture for sailors as well as different societal expectations for the genders (Dragomir and Surugiu, 2012). However, social changes and development have gradually highlighted the issue of gender equality, which has subsequently affected female students' choice of maritime majors. Concerning the maritime majors included in this study (e.g., merchant engineering and navigation), the percentage of female students in the academic years 2007-2014 increased by 2.2%.

In 1988, the International Maritime Organization developed the Strategy on the Integration of Women in the Maritime Sector

(IWMS) to secure women's jobs and development opportunities within the maritime industry using methods such as education, technology application, and knowledge transfer. Through many years of promotion and efforts, women's participation opportunities within the maritime industry have increased; however, the number of female sailors and development opportunities for women within the labour market are significantly lower compared with those of their male peers (Horck, 2010); the proportion of female sailors is less than 5% (Zhao, 1998). Baya (2015) identified that the employment and organisational contexts limit women's opportunities to become a sailor. However, the problem can be fundamentally solved through education. Furthermore, Smyth's (2005) transnational study indicated that the greater the gender segregation in higher education majors is, the greater the gender segregation in the workplace.

Previous studies have focused on gender-atypical career choices. For example, Chileshe and Haupt (2010) studied the psychological and background factors influencing career decisions. Rea and Strange (1983) studied factors affecting gender-atypical career considerations by women and their career choice. Some studies have focused on college students selecting non-traditional majors; the findings of such studies are used as a reference for educational policy intervention (Ma and Willms, 1999; Ayalon, 2003). However, few studies have focused on college students' choice of gender-atypical majors. Therefore, this study attempts to fill this research gap by integrating the extant literature and discussing factors influencing the choice of gender-atypical majors among female college students with maritime majors.

Among the aforementioned studies on the selection of gender-atypical majors, not many have incorporated social information processing (SIP). Different social information sources can influence employees' viewpoints and cognition at work, which can result in the formation of work awareness and attitudes.

Thus, this study focused on college students with maritime majors and analysed the relationships among gender culture beliefs, social information, and the choice of gender-atypical majors. The study objectives are as follows:

1. To verify the relationship between the gender culture beliefs of female college students with maritime majors and their choice of gender-atypical majors.
2. To verify the relationship between the social information of

female college students with maritime majors and their choice of gender-atypical majors.

II. LITERATURE REVIEW AND HYPOTHESES

1. Gender Culture Beliefs

While growing up, individuals continually receive information from the external environment. Therefore, through socialisation in a changing society, traditional gender culture beliefs have greatly influenced gender identity and evaluation. Harrison and Lynch (2005) studied factors affecting the development of athletes' gender consciousness. The findings revealed that family background, norms concerning gender role behaviour, and inspiration from discourses and female exemplars result in women's reflections on gender consciousness. This gender consciousness can subsequently result in self-cognition and self-change (Wood and Eagly, 2002).

In the process of role socialisation, women try to behave according to the objective role expectations from society and are influenced by the subjective formation of a gender role (Eagly, et al., 2000), both of which restrict the development of women's talents and potentials. In school education, women are influenced by traditional values and the traditional division of labour between genders where 'the woman takes care of the house, and the man takes care of the outside' (Harrison and Lynch, 2005), thereby developing gender culture beliefs associated with 'strong man, weak woman' and 'understanding wife and loving mother'. Weiner (1994) adopted the sociology of education perspective and stated that school curricula are one of the factors leading to gender differentiation where male and female students tend to participate in specific courses and fields. In other words, learning differences between men and women are not truly representative of a disparity between their personal potentials; rather, such differences are the results of segmented learning and curriculum design.

2. Choice of Gender-Atypical Majors

In recent years, scholars have proposed factors influencing female students' choice of gender-atypical majors. Sagaria and Sagaria (1984) identified that female students at vocational high schools and colleges tend to choose majors that feature femininity. This education background, moreover, may indirectly affect female students' career choices, thereby limiting their future career choices and opportunities. Factors influencing female college students' choice of gender-atypical majors can generally be divided into internal and external factors.

1) Internal Factors

Internal factors affecting the choice of gender-atypical majors are concerned with women's equality because of gender differentiation as well as psychological factors that affect women's decision-making process. Charboneau (1990) reported that female college students who chose gender-atypical majors, compared with those who chose gender-typical majors, tended to have personality traits such as calmness, cautiousness, self-

determination, intelligence, frankness, and an experimental spirit. Betz and Fitzgerald (1987) proposed that personal competence, personality traits, and the attitude towards gender roles can affect individuals' career orientation and choices. Based on the findings of Betz and Fitzgerald (1987), Fassinger (1990) synthesised a model of female college students' career choices. The model showed that female college students' career orientation and choices are significantly influenced by not only their methodological competence and personality traits of independence, confidence, and spontaneity but also their attitude towards their gender role.

Gender differentiation is ingrained in traditional gender culture beliefs. The notion of 'understanding wife and loving mother' and the internalised value of 'strong man, weak woman' continue to influence women's attitude and behaviour, consequently shaping the collective behaviour of females. Correll (2001) studied male and female junior high school students and identified that performance differences in maths affected their choice of a major at senior high schools and universities. Moreover, teachers in the school expected male students to have superior performance in maths compared with their female counterparts. However, if female students also believe that male students are more competent in maths, they may begin doubting their own mathematical competence and, subsequently, tend to not choose maths-related careers; this also explains the reason for fewer female engineers and physicians. Based on the preceding discussion, the following hypotheses on the relationship between gender culture beliefs and the choice of gender-atypical majors are proposed:

- H1:** Gender culture beliefs are significantly related to the choice of gender-atypical majors.
- H1-1:** Female college students' gender culture belief in 'strong man, weak woman' is negatively related to their choice of gender-atypical majors.
- H1-2:** Female college students' gender culture belief in 'understanding wife and loving mother' is negatively related to their choice of gender-atypical majors.

2) External Factors

External factors are concerned with the various information sources, including family members, teachers and peers, and the current social atmosphere, that can influence women's choice of gender-atypical majors. Handley and Walker (1981) studied female senior high school students and reported that figures highly valued by female students, such as parents, teachers, and peers, can affect their choice of gender-atypical majors to some extent. Moreover, when more information sources are available in society, senior high school students tend to have positive attitudes towards gender-atypical majors.

Salancik and Pfeffer (1978) developed the concept of SIP on the premise that individuals tend to adapt attitudes, behaviour, and beliefs to their social context. This premise also explains that individual behaviour is the result of learning from and adaptation to behaviour, events, and information available in the social

environment. Individual attitudes and developmental needs are a function of the available social information, which is created through other people's behaviour and self-recognition and, subsequently, influences individuals. Jacobs (1995) mentioned that society uses channels, such as broadcast media, newspapers, textbooks, and people, to propagate norms regarding majors for men and women, respectively. Consequently, both men and women, in such a process of socialisation, tend to follow the principle of men and women choosing different majors. Therefore, women tend to major in subjects associated with humanities and medicine, whereas men tend to major in subjects that require critical thinking and analyses.

This study targeted students who are generally within a simple social context. Family is the major social context for students because students tend to have high degrees of interaction with their family members; therefore, social information from family is influential in terms of occurrence frequency and information content. In addition to family, information from teachers and senior schoolmates can possibly affect students' choice of majors. Based on the preceding arguments, relationships between social information and the choice of gender-atypical majors are hypothesised as follows:

- H2:** Social information is significantly related to the choice of gender-atypical majors.
- H2-1:** College students' social information from traditional sources has a significant negative relationship with their choice of gender-atypical majors.
- H2-2:** College students' social information from professional referents has a significant positive relationship with their choice of gender-atypical majors.
- H2-3:** College students' social information from model referents has a significant positive relationship with their choice of gender-atypical majors.

III. METHODOLOGY

1. Definition and Measurement of Variables

1) Gender Culture Beliefs

In this study, gender culture beliefs refer to general concepts including an increase in awareness because of gender consciousness as well as the internalised values and external behaviour. Based on Bih's (2004) study and after interviewing three female freshman students in a focus group from the Department of Merchant Marine at National Taiwan Ocean University, this study developed a gender culture beliefs dimension comprising two sub-dimensions, namely 'strong man, weak woman' (four questionnaire items) and 'understanding wife and loving mother' (three questionnaire items).

2) Social Information

The questionnaire items in the social information dimension are based on Hsieh's (2005) study on social information sources. These items were developed by interviewing the previously men-

tioned three female freshman students. The social information dimension was divided into three sub-dimensions:

- (1) social information from traditional referents, referring to expectations or suggestions from parents;
- (2) social information from professional referents, referring to recommendations or suggestions from teachers in schools; and
- (3) social information from model referents, referring to peers' or senior schoolmates' career experiences.

3) Choice of Gender-Atypical Majors

Items concerning the choice of gender-atypical majors were developed based on the literature on college majors. When students must choose their college majors and future careers, they tend to consider opportunities in career fields. Based on the related literature and in-depth interviews, this study constructed three questionnaire items:

- (1) My major corresponds with my future career development interests;
- (2) I chose my desired major; and
- (3) I chose this major because my grades were not sufficient for my desired college major (reversed item).

4) Control Variables

The control variables in this study were gender, grade level, age, parents' occupation (whether related to the maritime industry), and majors (merchant marine, merchant engineering, and maritime technology), and relevant information was collected using five questionnaire items.

2. Reliability Analysis

Cronbach's α is often used to test the consistency of items in the same dimension. The Cronbach's α value of each dimension in this study is as follows: 0.824 for 'strong man, weak woman', 0.711 for 'understanding wife and loving mother', 0.694 for social information, and 0.789 for the choice of gender-atypical majors, indicating that the reliability of this measurement meets the requirements of this study.

3. Research Target and Data Collection

This study involved conducting a questionnaire survey targeting freshman and sophomore students from the Department of Merchant Marine and the Department of Merchant Engineering at National Taiwan Ocean University as well as from the Department of Navigation at Taipei College of Maritime Technology. It therefore satisfies the definition of gender-atypical learning areas. We distributed the questionnaires to the target groups and received 474 valid questionnaires; of the respondents, 357 were male, whereas only 117 of them were from female college students.

IV. RESULTS

The coefficient of each variable is shown in Table 1. The

Table 1. Correlation matrix for major variables.

Variable	M	SD	1	2	3	4	5	6
Choices of majors	3.26	1.06						
Strong man, weak woman	1.81	0.67	-0.195*					
Understanding wife and loving mother	1.92	.061	-0.127	0.334**				
SI (traditional referents)	3.04	1.08	0.158	-0.030	-0.004			
SI (professional referents)	3.15	0.88	0.204*	-0.070	-0.136	0.450**		
SI (model referents)	3.27	0.92	0.177	-0.021	-0.109	0.340**	0.474**	

Table 2. Regression analyses for female students' choices of sex-atypical majors.

Dependent variable Independent variable	Dimension		
	Model 1	Model 2	Model 3
Control variable	Constant ²	Constant ²	Constant ²
'strong man, weak woman'		-0.195*	
'understanding wife and loving mother'		-0.127	
Information from traditional referents			0.158
Information from professional referents			0.204*
Information from model referents			0.177
R^2	0.080	0.119	0.126
ΔR	----	0.071	0.070
Overall F	2.451*	2.470*	2.252*

Note¹: * $p < .05$; ** $p < .01$; *** $p < .001$

Note²: Constant Control variables include gender, grade level, age, parents' occupation (whether or not related to the maritime industry), and majors.

two sub-dimensions of gender culture beliefs, namely 'strong man, weak woman' and 'understanding wife and loving mother' exhibit a significant positive relationship with the choice of gender-atypical majors among female college students ($r_{3,4} = 0.334, p < 0.01$). The three sub-dimensions of social information, namely information from traditional referents, information from professional referents, and information from model referents, also show a significant positive relationship with the choice of gender-atypical majors among female college students ($r_{5,6} = 0.450, r_{5,7} = 0.340$, and $r_{6,7} = 0.474$, respectively; $p < 0.01$ for all).

This study employed a hierarchical regression to verify the aforementioned hypotheses. Table 2 shows regression analyses for female college students' choice of gender-atypical majors. In the analyses, gender, grade level, age, parents' occupation (whether related to the maritime industry), and majors were used as the control variables, whereas the choice of gender-atypical majors was the dependant variable. The independent variables in Model 2 were the two sub-dimensions of gender culture beliefs. The independent variables in Model 3 were the three sub-dimensions of social information. The results of the analyses are explained as follows.

1. Relationship between Gender Culture Beliefs and Choice of Gender-Atypical Majors

As shown for Model 2 in Table 2, the F statistic after regres-

sion analysis is 2.470 ($p < 0.05$), indicating the significance of the regression model. After exclusion of the control variables, the results indicate that in the gender culture beliefs dimension, the 'strong man, weak woman' subdimension has a significant negative effect on the choice of gender-atypical majors ($\beta = -0.195, p < 0.05$), whereas the 'understanding wife and loving mother' subdimension has no significant effect ($\beta = -0.127$). In other words, H1-1 is supported but H1-2 is not.

2. Relationship between Social Information and Choice of Gender-Atypical Majors

In Model 3 (Table 2), the F statistic after regression analysis is 2.252, showing statistical significance ($p < 0.05$). After exclusion of the control variables, the regression coefficient is $\beta = 0.158$ for social information from traditional referents (not significant); $\beta = 0.204$ for social information from professional referents ($p < 0.05$, significant), and $\beta = 0.177$ for social information from model referents (not significant). In other words, H2-2 is supported but H2-1 and H2-3 are not. The social information from professional referents has a significant positive relationship with rgw choice of gender-atypical majors. The results indicate that when more social information from professional referents (e.g., teachers at school) is provided, female students are more likely to choose gender-atypical majors. In other words, social information sources, to some extent, are related to female students' choice of gender-atypical majors.

Table 3. Effects of two-factor interaction on female students' choice of majors.

Variable	Choices of sex-atypical majors		
	Model 1	Model 2	Model 3
Female college students			
Control variables	Constant ^{Note2}	Constant ^{Note2}	Constant ^{Note2}
Step 2: Variables of major effect			
Gender culture beliefs		- 0.205*	- 0.186
Social information		- 0.228*	- 0.245*
Step 3: Interaction of variables			
Gender culture beliefs × Information from traditional referents			- 0.044
Gender culture beliefs × Information from professional referents			0.024
Gender culture beliefs × Information from model referents			- 0.243**
ΔR^2	0.080	0.157	0.222
R^2	--	0.076	0.066
Overall F	2.451*	2.893**	2.084*

Note¹: * $p < .05$; ** $p < .01$; *** $p < .001$

Note²: Constant Control variables include gender, grade level, age, parents' occupation (whether or not related to the maritime industry), and majors.

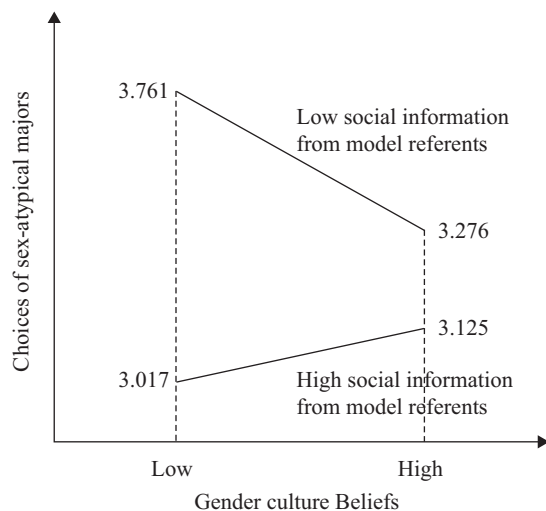


Fig. 1. Relation ship of gender culture belief and social information from model referents with choices of sex-atypical majors.

3. Interaction Analysis

For interaction analysis, 'strong man, weak woman' and 'understanding wife and loving mother' were integrated into a single gender culture beliefs dimension and the three sub-dimensions of the social information dimension remained unintegrated for two-factor interaction, to investigate their impact on the choice of gender-atypical majors (Table 3). As shown for Model 3 in Table 3, only gender culture beliefs and social information from model referents have significant interaction effects on the choice of gender-atypical majors ($\beta = -0.243$, $p < 0.05$).

After the interaction effect was tested and verified, it was represented using a figure (Fig. 1). As shown in Fig. 1, gender culture beliefs and the choice of gender-atypical majors have a positive relationship when female students receive more social information from model referents. By contrast, when female col-

lege students receive relatively less social information from model referents, gender culture beliefs are not sufficient to affect their choice of gender-atypical majors. This figure also illustrates that although gender culture beliefs may affect the choice of gender-atypical majors, they are not a decisive factor. Gender culture beliefs and social information can mutually interact and further affect students' choice of gender-atypical majors only when students receive positive social information. Conversely, if students do not receive positive social information, even if they have strong gender culture beliefs, they may tend to choose gender-typical majors corresponding with traditional social expectations.

V. CONCLUSION AND SUGGESTIONS

1. Conclusion

Concerning the relationship between gender culture beliefs and the choice of gender-atypical majors, the results reveal that the gender culture belief of 'strong man, weak woman' has a significant relationship with the choice of gender-atypical majors, whereas that of 'understanding wife and loving mother' does not. One possible reason is that all our survey respondents were college students who tend to internalise the social value of 'strong man, weak woman' through the process of attending different courses (e.g., maths), participating in college clubs, and having part-time jobs. Their gender culture belief of 'strong man, weak woman' is also evident in the analysis, thereby supporting the proposed hypotheses.

Regarding the effect of social information, the results indicate that among the three information sources, social information from model referents has a significant effect on the choice of gender-atypical majors. In other words, suggestions and information about diverse majors provided by teachers in schools have a significant positive effect on students' choice of gender-atypical majors. The information from peers, senior schoolmates,

and parents, nevertheless, had no significant effect in this study.

Furthermore, gender culture beliefs and social information from model referents have a significant interaction effect on the choice of gender-atypical majors. Fig. 1 shows that gender culture beliefs, with more social information from model referents, have a positive relationship with the choice of gender-atypical majors. When less social information is provided by model referents, the effect of gender culture beliefs on the choice of gender-atypical majors is not evident. However, social information from model referents remains crucial in the relationship between gender culture beliefs and the choice of gender-atypical majors.

2. Management Implications

This study analysed the choice of gender-atypical majors, focusing mainly on female college students and secondarily on male college students with maritime majors to provide explorative implications. In addition, this study involved conducting focus group interviews and a questionnaire survey as well as analysing data to verify the proposed hypotheses. The management implications derived from the results of this study are summarised as follows:

- (1) Sub-dimensions in social information have a significant effect on the choice of gender-atypical majors. Concerning social information from professional referents, suggestions and recommendations from teachers in school tend to have a positive effect on both male and female college students' choice of gender-atypical majors. With regard to social information from model referents, suggestions and recommendations from peers and senior schoolmates, and senior schoolmates' experience in maritime related careers, have a positive effect on male college students' choice of maritime majors.
- (2) The effect of all sub-dimensions of gender culture beliefs is weaker than expected, indicating that beliefs and values are difficult to change within a short period. However, social information is an important disturbance variable. Therefore, information and promotion from parents; teachers, peers, and senior schoolmates at schools; and governmental institutions are helpful in students' choice of gender-atypical majors.

3. Suggestions for Future Research

- (1) Concerning the gender culture beliefs dimension developed in this study, the 'understanding wife and loving mother' subdimension is not optimum because it is newly developed. Therefore, researchers could include additional related literature and interview a more focused target group (e.g., students of merchant engineering majors) to increase questionnaire items in this subdimension, thereby further developing the questionnaire.
- (2) This study targeted freshman and sophomore college students with maritime majors. Researchers who are interested in female college students' choice of on-board internship

and future careers can target junior and senior college students and thus delineate sequential choices from the college major to on-board internship to a career.

- (3) Most of the literature discussed in this study concerns women's gender-atypical career choices; therefore, we suggest that researchers in the future include more gender-atypical majors, such as civil engineering and electrical engineering, and discuss factors influencing female students' choice of college majors. Because both civil and electrical engineering majors are considered typically male-dominated fields, female students who want to major in or have their careers in either field may face certain obstacles. Factors influencing female students' choice of both majors are also worth discussing.

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