Effects of National Culture on Human Failures in Container Shipping:

The Moderating Role of Confucian Dynamism

1. Introduction

Over the past three decades, there has been a significant change in the supply of seafarers for international shipping operations. A new system, called the "flag of convenience" (FOC), emerged and has spread widely in the shipping industry. This allows ship owners to change their ships' registers from a national flag (e.g., the US, the UK, Germany or Japan) to an "open" flag (e.g., Liberia, Panama or the Bahamas) to get round the constraints of national regulations in recruiting low-cost and competent labour worldwide (Winchester and Alderton, 2003; Wu and Morris, 2006). This FOC system has led to a rapid decline in the supply of seafarers from traditional maritime places, e.g., North America, Western Europe, and Japan, and has given rise to new seafarer supply countries in Asia and Eastern Europe, e.g., the Philippines, India, China, Myanmar and Ukrainian (Lane, 2000; BIMCO/ISF, 2005). International ship owners have become accustomed to tapping the global labour market to recruit and retain qualified seafarers. For example, Håvold (2005) finds that Norwegian shipping companies employ seafarers from many countries and almost half of the total crews on board Norwegian registered vessels are foreigners. The popular nationalities of crew members on board vessels registered in Norwegian ship registers by the end of 1999 were Filipino (24.2%), Indian (5.2%), Polish (5.0%), and Russian (3.5%). The emergence of multinational crews drawn from different countries working on the same ship has important managerial implications for work safety in international container ship operations (Wu and Morris, 2006).

Container shipping services are cargo transportation services provided by liner

shipping companies whose cargo-carrying ships operate between scheduled, advertised ports of loading and discharging on a regular basis (Lu et al., 2005; Lu, 2007; Brodie, 1994; Lun et al., 2009). Lu and Tsai (2010) observe that container shipping is one of the world's most dangerous occupations. The sea is a potentially hazardous and dangerous working environment (IMO, 2006). Hanson (1996) reports that fatal injuries and drowning among Danish seafarers were 11.5 times higher than the average rate among Danish male workforce ashore over 1986-1993. Roberts and Marlow (2005) also find that the fatal accident rate in British merchant shipping between 1976 and 2002 was 27.8 times higher than that of the general workplace in Great Britain. According to UK Protection & Indemnity (P&I) Club (2005), the numbers of vessel accidents, hazardous incidents, and accidents to people on UK merchant vessels were reported as 319, 134, and 528, respectively, in 2004. A survey conducted by the International Maritime Organization (2005) reveals that 589 ships and 101 lives were lost in serious vessel accidents in 2004. Statistics from UK's P&I Club (2005) show that loss prevention claims made in recent years as a result of marine and port accidents attributable to human failures amount to approximately 53% of the total claims. Among the human failures, 21%, 16%, 11%, 4%, and 2% originate from deck officers, crew members, shore persons, pilots, and engineering officers, respectively. Human factor is one of the major causes for accidents in sea transportation. For instance, previous studies report that between 60% and 90% of the accidents in the sea or in the air are attributable to the ''human factor'' (Mars, 1996; Zohar, 1980).

Multiculturalism on board could be a factor influencing work safety on ships as cultural difference is very often considered a weakness in ship operations (Theotokas and Progoulake, 2007). Kahveci and Sampson (2001) observe problems related to

mixed nationality crews on board among culturally diverse crews. A study examining the problems of Filipino seafarers finds that 34% of the Filipino seafarer respondents encounter communication problems, which are induced by differences in language, attitude, and culture manifested among crew members (Philippine National Maritime Polytechnic, 2002). In addition, Progoulaki (2003) examines the impacts of multicultural crews on effective crew management and ship operations in Greek shipping companies.

A number of studies have suggested that safety culture or safety climate factors are associated with safety-related outcomes such as accidents or injuries (Glendon and Litherland, 2001; Håvold, 2005; Lu and Tsai, 2010; Mearns and Yule, 2008; Zohar, 1980). In the shipping context, Håvold (2005) confirms the importance of employee and management's attitude to safety and quality. Other studies have also found that employees' and management's attitude are the most important factor influencing safety behaviour (e.g., Zohar, 1980; Flin et al., 2000). Furthermore, Lu and Tsai (2010) point out the importance of safety climate and its effect on safety behaviour.

As shipping is a global business, Håvold (2007) and Lu and Tsai (2010) argue that national culture influences how people behave with respect to safety matters. There is a relative lack of research examining whether human failures are related to seafarers' perceptions of national culture dimensions in the container shipping context. Is national culture important for the occurrence of human failures? What are the key national culture dimensions in container shipping operations? How are they related to human failures? We attempt to answer these questions by examining the impact of national culture on work safety in container ship operations from the seafarer's perception. Specifically, we seek to study the impact of national culture on work safety in container shipping operations by comparing the behaviors of seafarers from

different national cultures. The findings will contribute to research on national culture theory and managerial practices of shipping operations.

Many researchers have proposed definitions and taxonomies of national culture (see, e.g., Hofstede, 1980, 1991; Child, 1981; Brislin, 1983; Triandis, 1984; Schein, 1985; Chow et al., 1999a). Among these, Hofstede's national cultural dimensions (1980, 1991) are one of the most widely used constructs in studies examining cultural effects. In recent years there has been recognition of a relationship between safety and national culture (Mearns and Yule, 2009; Helmreich and Merrit, 1998). Helmreich (1999) reveals that organizations need to recognize the influence of national cultural on the effectiveness of safety measures. Mearns and Yule (2009) examine the relationships between Hofstede's national cultural value dimensions, safety climate, and risk-taking behaviour in the workforce of a multi-national engineering organization operating in six countries. While the antecedents to national culture have been widely discussed in the operations management literature, relatively little research except Theotokas and Progoulaki (2007) and Håvold (2007) has been conducted on the relationship between work safety in shipping operations and national culture. Filling this research gap, we investigate in this study the influence of the major national culture dimensions on work safety in container shipping operations from the seafarer's perception.

Based on Hofstede's (1991) national culture dimensions, which include power distance, uncertainty avoidance, individualism/collectivism, masculinity/femininity, and Confucian dynamism/long-term orientation, we construct a theoretical model and develop a set of hypotheses to guide this research. This paper is organized as follows: We introduce the study and discuss the background in the first section. We develop the research model and formulate the hypotheses in the second section. In the third

section we discuss development of the research instrument, including the measurement constructs used in the survey, the sampling technique, and the research procedures. In sections four and five we present the statistical results from the exploratory factor analysis, confirmatory factor analysis, and hierarchical regression analysis performed to address the research issues. In the final section we draw conclusions from the research findings and discuss their academic and managerial implications.

2. Theory and Research Hypotheses

Previous cross-cultural studies on cultural effects have proposed definitions and taxonomies of national culture (Hofstede, 1980, 1991; Child, 1981; Brislin, 1983; Schein, 1985; Håvold, 2007; Burke et al., 2007; Theotokas and Progoulaki, 2007). Consistent with the literature (Chinese Cultural Connection, 1987; Bochner, 1994; Chow et al., 1999b; Burke et al., 2007), the Hofstede's theoretical constructs of national culture have been extensively validated and widely used in research on ship operations (see, e.g., Håvold, 2007; Burke et al., 2007; Theotokas and Progoulaki, 2007). We use Hofstede's construct to develop a research model to examine the effects of national culture on work safety in container shipping operations based on the perceptions of seafarers from China, the Philippines, and Taiwan.

Hofstede (1980, p. 25) defines national culture as "… the collective programming of the mind which distinguishes the members of one group or society from another …" Hofstede uses the data collected by questionnaire surveys from 117,000 employees in a multinational corporation (IBM) and its subsidiaries in 71 countries to examine national cultural differences. In his original study, Hofstede (1980) identifies four national cultural dimensions, namely power distance, individualism/collectivism, uncertainty avoidance, and masculinity/femininity. In an attempt to link national

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culture with economic growth, Hofstede and Bond (1988) add the fifth dimension, Confucian dynamism/long-term orientation. In line with this stream of research, we adopt these five dimensions as the key national culture elements that may affect human failures in shipping operations in our research model (see Figure 1). Some recent studies on the enhancement of work safety (Håvold, 2007; Burke et al., 2007; Theotokas and Progoulaki, 2007) also adopt these theoretical dimensions of national culture. We elaborate on the five national culture dimensions in the following.

<Insert Figure 1 about here>

Dimension 1: *Power Distance*

Power distance refers to the degree to which people accept interpersonal inequality in power and organizational institutionalization of such inequality (Hofstede, 1991). Hofstede suggests that people who possess high power distance tend to prefer, or at least are more willing to accept, greater centralization of decision-making authority and participate less in decision-making processes (Merchant et al., 1995). On the other hand, subordinates possessing low power distance consider themselves to have the same rights as their superiors, and they expect to be consulted and to participate in making decisions that affect them (Child, 1981; Hofstede, 1980; Chow et al., 1999b). The organizational hierarchy is perceived as a structure of inequality of roles and established for convenience among organizational members with interdependence between superiors and subordinates (Hofstede, 1983; Flynn and Saladin, 2006). The safety research conducted by Helmreich and Merritt (1998) and Merritt (1998) suggests that there is a link between national culture and work safety. Their studies also find that power distance is one of the most important national culture dimensions affecting work safety. Håvold (2007) examines the effect of national culture on work safety in a Norwegian shipping company. Similarly, he finds a negative relationship

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between power distance and seafarers' safety attitude and behavior. A vessel operates in an unstable operating environment, which is liable to vessel accidents or failures. To mitigate risk, it is crucial for crew members to report any potential risks to the master for responsive decisions. A low power distance culture is favourable for crews to report potential risk factors. Accordingly, we propose that:

H1: Lower power distance as experienced by seafarers helps reduce human failures in container shipping operations.

Dimension 2: *Collectivism/Individualism*

This national culture dimension refers to the degree to which people are oriented towards acting as individuals on one hand and part of a group on the other hand (Hofstede, 1980). In nations with a collectivist national culture, an organization is viewed like a family. People in collective societies achieve satisfaction in well-recognized jobs, striving to preserve face and avoid shame, so as not to bring disrespect to their peer group (Hofstede, 1980; Flynn and Saladin, 2006). In contrast, individualism refers to the degree to which individuals are integrated into social groups. Hofstede (1980) finds that societies with a high degree of individualism have loose ties among social members - everyone looks after their own interests and those of their immediate family. Typical individualistic countries are Canada, the UK, and the US, whereas societies experiencing less individualism include Iran, Japan, and Taiwan, where people hold group values and beliefs and pursue collective interests.

In the context of shipping, Håvold (2007) examines culture in a Norwegian shipping company and finds that the individualism/collectivism dimension from Hofstede's model of national culture is a factor influencing employees' attitudes towards work safety. According to Triandis (1994), cultural differences such as

cultural complexity and tightness (i.e., the tolerance of little deviation from group norms) are key socio-cultural environmental factors influencing the individual system, which consists of the following variables: (1) perceptual selectivity, (2) cognitive patterns that emphasize comparison with a standard of excellence, (3) habits such as checking that a job has been done precisely as required by a blueprint, and (4) behavioral intentions such as asking for subordinates' advice. Individuals from individualistic countries determine personal standards on their own while individuals from collectivistic cultures are more likely to define their personal standards with reference to the group norm. Collectivism is a value that people in a society desire a close relationship with their in-groups and members of those in-groups. A collectivist culture includes a prominent emphasis on hierarchy, harmony, and saving face (Triandis et al., 1990). The shipping industry has some unique characteristics. For instance, the ship can be seen as a "closed" social milieu, where all the required competence is aboard. The official positions on a vessel can be divided into three different functional areas, i.e., deck, engine, and catering, with different competence requirements and assigned tasks (Håvold, 2007). Seafarers from the collective culture tend to follow the wishes, needs, and directions of others, rather than asserting their own impulses and predilections (Tafarodi et al., 1999). Chow et al. (2001) find that team members from the collectivist culture are significantly more satisfied with imposed, stretched safety performance standards as they show more concern for collective interests. Therefore, we argue that:

H2: Collectivism as experienced by seafarers helps reduce human failures in container shipping operations.

Dimension 3: *Uncertainty Avoidance*

Uncertainty avoidance focuses on how a society deals with unknown aspects of the

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future (Nakata and Sivakumar, 1996). Uncertainty avoidance is the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity, which leads them to support beliefs promising certainty and to maintain institutional norms for protecting conformity (Hofstede, 1985, p. 347). People from the uncertainty-avoiding culture try to minimize the possibility of uncertainties by strict rules and regulations, by safety and security measures, and, on the philosophical and religious level, by a belief in absolute truth. Shacketon and Ali (1990) find that people from the uncertainty avoidance culture are strongly and positively associated with formalization and motivation to acquire information such that the uncertainty during interpersonal communication can be reduced. In the social context characterized by high uncertainty avoidance, people tend to avoid ambiguous situations and are more conscious of rules and procedures. They prefer clearly designated lines of authority and appear to be more emotional, active, fidgety, and aggressive. Alternatively, the uncertainty avoidance culture at a low level would lead people to explore ambiguous situations, where they are more open to change and rely on their own views to determine what they should do (Bird, 2000). People from the uncertainty-accepting culture are more tolerant of opinions different from what they are used to and they try to have as few rules as possible; on the philosophical and religious level, they are relativists and allow many ideas to flow side by side (Hofstede and McCrae, 2004).

The uniformity of container shipping provides a favourable setting to conduct research on national culture. Broadly speaking, all the vessels are operated on similar technologies and encounter the same set of hazards. Moreover, technical standards for all the vessels are regulated through the requirements of the International Maritime Organization (IMO) and vessels are required to be inspected by classification societies. Furthermore, the required competence of the crew is regulated by an

international certificate system (e.g., Standards of Training Certification and Watchkeeping for seafarers) and the management systems of shipping companies have to satisfy identical requirements (e.g., the International Safety Management Code) (Håvold, 2007). Burke et al. (2007) report that uncertainty avoidance is an important factor influencing safety. Furthermore, Håvold (2007) finds that low power distance and high uncertainty avoidance are positively related to safety orientation in Norwegian shipping companies based on a correlation analysis. His findings show that seafarers from high uncertainty avoidance countries are more likely to follow orders and adhere to standard operating procedures. However, the links between national culture dimensions and work safety have not been validated. Thus, we hypothesize that:

H3: Uncertainty avoidance as experienced by seafarers helps reduce human failures in container shipping operations.

Dimension 4: *Masculinity/Femininity*

Masculinity is defined as "the degree to which a society is characterized by assertiveness (masculinity) versus nurturance (feminity)" (Hofstede, 1980; Nakata and Sivakumar, 1996). Masculinity refers to a preference for achievement, heroism, assertiveness, and material success, whereas femininity stands for a preference for relationships, modesty, caring for the weak groups, and quality of life (Hofstede, 1985). High masculine societies place a low value on caring for others, inclusion, cooperation, and solidarity. Cooperation is considered a sign of weakness. Career advancement, material success, and competition are paramount. Ringov and Zollo (2007) and Steensma et al. (2000) suggest that people from more masculine countries have a lower appreciation of cooperative strategies. Interestingly, there is evidence that low masculinity, as manifested in managerial attention to people and their

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interrelations, is conducive to work safety. Theotokas and Progoulaki (2007) find that people-related aspects, such as good communication, team spirit, trust, and low conflict between seafarers, are associated with superior safety performance. Tice and Baumeister (2004) also find that high masculinity is negatively related to work safety (Håvold, 2007). Following this logic, it is reasonable to posit that a higher level of masculinity will have a positive impact on human failures in container shipping operations. Accordingly, we suggest that:

H4: Masculinity as experienced by seafarers helps increase human failures in container shipping operations.

Dimension 5: *Confucian Dynamism*

Hofstede and Bond (1988) develop a fifth dimension of national culture, i.e., Confucian dynamism, based on a study of students in 22 countries around the world, using a questionnaire designed by Chinese scholars. Confucian dynamism at a low level implies a long-term orientation, which refers to the degree to which a culture focuses on the future (Bearden et al., 2006). People with a low level of Confucian dynamism are thrifty, hardworking, and persevering, while those with a high level of Confucian dynamism are respectful of tradition, fulfilling social obligations, and protecting one's face (Hofstede and McCrae, 2007). According to Nakata and Sivakumar (1996), the positive values of Confucian dynamism attributes include persistence, hard work, thrifty, shame, and regard for relationships. In the context of shipping, Håvold (2007) finds that there is a negative relationship between Confucian dynamism and safety orientation of seafarers on Norwegian-owned vessels based on Hofstede's original index. Several attributes of the Confucian dynamism such as face saving, shame, and respect for social status, are negatively related to work safety. Face is a ubiquitous concept and applicable in all cultures (Gudykunst et al., 1988).

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Face refers to the projection of self in a relational situation and, more specifically, it is the tension between a sense of threat from or consideration given to others and the claim of self-respect (Gudykunst and Nishida, 1993; Nakata and Sivakumar, 1996). Saving face involves preserving a person's dignity and social status. It is argued that an emphasis on the effects of certain actions or events on a person's own or another's reputation or status may have a negative impact on work safety (Nakata and Sivakumar, 1996). A potential risk may not be explored in advance when seafarers feel shame or respect the master's social status. Therefore, we postulate that:

H5: Confucian dynamism as experienced by seafarers helps reduce human failures in container shipping operations.

The study of Hofstede and Bond (1988) reveals five dimensions of national culture, four of which are correlated with Hofstede's (1984) indices of culture while the fifth is not. Bond (1987) interprets the fifth dimension of national culture (i.e., Confucian dynamism) as representing a range of Confucian-like values to explain the differences between Western and Eastern values. Accordingly, we seek to test the moderating effects of Confucian dynamism on the relationships between four of the national culture dimensions, namely power distance, individualism/collectivism, uncertainty avoidance, and masculinity/femininity, and human failures. In the context of shipping operations, seafarers would expect instructions from their supervisors and participate less in decision-making processes when they show social respect and status obligations. We suggest that seafarers who are from a high Confucian dynamism national culture, the strength of the relationship between power distance and human failures in container shipping operations is enhanced. Therefore, we propose the following moderation hypothesis:

H6: Confucian dynamism positively strengthens the relationship between power

distance and human failures in container shipping operations; specifically, high power distance will foster human failures as experienced by seafarers in container shipping operations when Confucian dynamism is high rather than low.

In addition, this study proposes that Confucian dynamism positively influences human failures in container shipping. The Confucian dynamism culture attaches more importance to stability by saving "face", respecting tradition, and reciprocating greetings (Hofstede and Bond, 1988). Face is threatened when a person feels disregarded due to criticisms or questions of ability from others. These attributes are particularly relevant to the collectivism culture and will have a greater long-term ethos towards relationships with colleagues and avoid chaos for organizational benefit. We suggest that when seafarers are from a high Confucian dynamism national culture, the relationship between collectivism and human failures in container shipping operations is enhanced. Therefore, we hypothesize that:

H7: Confucian dynamism negatively strengthens the relationship between collectivism and human failures in container shipping operations; specifically, high collectivism will lead to fewer human failures as experienced by seafarers in container shipping operations when Confucian dynamism is low rather than high.

An uncertainty avoidance culture suggests that individuals express a preference for long-term predictability of rules, work arrangements, relationships, and avoidance of risk taking, and that they expend more effort on planning to reduce uncertainty (Hofstede, 1984; Pressey and Selassie, 2006). Newman and Nollen (1996) point out that uncertainty is manifested in terms of clarity of plans, policies, procedures, rules, and systems. The attributes of the Confucian dynamism culture such as social respect, status obligation, and perseverance could help employees to follow rules and procedures and clearly designated lines of authority. Following this line of reasoning,

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for seafarers from a high Confucian dynamism national culture, the relationship between uncertainty avoidance and human failures in container shipping operations is strengthened. Therefore, we conjecture that:

H8: Confucian dynamism positively strengthens the relationship between uncertainty avoidance and human failures as experienced by seafarers in container shipping operations; specifically, high uncertainty avoidance will lead to fewer human failures in container shipping operations when Confucian dynamism is high rather than low.

The ship is a closed society. Crew members can be divided into different functional areas and organized in hierarchical command from the master downwards. Hence, formalization of tasks and team work are fundamental to shipping operations. Hofstede (1985) suggests that masculinity is a preference for achievement, heroism, assertiveness, and material success. People from a high masculine culture have a low attitude or behavior towards cooperating with others (Ringov and Zolle, 2007). This study argues that such attributes of Confucian dynamism as respect for tradition, fulfilling social obligations, and protecting one's face strengthen the relationship between masculinity and human failures in container shipping operations. Therefore, we suggest that:

H9: Confucian dynamism positively strengthens the relationship between masculinity and human failures in container shipping operations; specifically, high masculinity will lead to more human failures as experienced by seafarers in container shipping operations when Confucian dynamism is high rather than low.

3. Research Methodology

3.1 Research sample

We obtained the data for this study by administering a questionnaire survey to seafarers working on 124 vessels from 13 of the top 20 global container carriers in the world. These container carriers include APM Maersk, APL/NOL, CMACGM, Hapag Lloyd, MSC, Yang Ming, Evergreen group, Wan Hai Line, K-line, NYK, MOL, Hanjin, and Hyundai Marine. We randomly selected container ships at the Port of Kaohsiung in Taiwan. The Port of Kaohsiung, located in major trade routes - Eastern Asian coastal, Far East/Europe, and Transpacific service lines - has been ranked the top 12th largest container port in the world since 1980 (UNCTAD, 2008). The number of container ship crews ranged from 15 to 20 people per vessel. There were in general 18 crew members in a container ship. Eighteen questionnaires were sent to each vessel ($N = 2,232$), where the shipmaster was requested to distribute them to the entire crew. The first page of the questionnaire emphasizes that respondents are kept anonymous in our data reporting and analyses, and that their participation is voluntary. Once the questionnaire was completed, it was collected by the shipmaster and returned by DHL express. The data collection began at the start of March till the end of May 2008. We received completed questionnaires from 81 out of 124 vessels. Overall, 773 respondents from 13 countries took part in this study, but only in three countries we found more than 100 respondents, which included the Philippines (267), Taiwan (208), and China (133). We excluded small samples of respondents belonging to certain countries from our data analyses because they were far from being effectively representative of the study population. These respondents came from such countries as Myanmar (29), Korea (24), India (21), Russia (15), Ukraine (12), Japan (3), and others (59).

In statistics, stratified sampling is a useful method of sampling from a population when the researcher wants to study the characteristics of certain population subgroups

(Cooper and Schindler, 2003). We stratified the study samples based on the size of vessel. Table 1 illustrates the categorization of size of vessel that answered the questionnaire. The response rate ranges from 38.9% to 44.4%, with an average response rate of 41.7%. Upon excluding small samples from certain countries and the 43 vessels that did not respond, we obtained 608 usable questionnaire returns from the survey for data analyses. The response rate is 27.7%. Håvold (2007) achieves around a 70% response rate; however, the participants in this research are different from those in his study. The sample in Håvold's (2007) study was stratified according to vessel type, which included dry cargo, tank, and passenger vessels, whereas this study specifically focuses on seafarers who work on container ships. In addition, small samples with fewer than 100 respondents were excluded for data analyses in this study. This might explain why the response rate of this study is lower than that of Håvold's (2007) study.

We performed a chi-square test to assess whether a sample of 608 respondents taken from a population is similar to that population in terms of its breakdown among six vessel size categories. As shown in Table 1, the variance is not significant ($\chi^2 =$ 1.039, $df = 5$, $p > 0.05$). The results show that the distribution of frequencies based on the size of vessel in these samples is representative of the population distribution (Cooper and Schindler, 2003).

<Insert Table 1 about here>

The respondents held different positions on the ships. Those working on the deck included masters, deck officers, and deck ratings, whereas those working in the engineering department included chief engineers, engineers, and engine ratings. They are members of teams responsible for performing ship operations. Thus, they are all working interdependently in a team responsible for work safety on the vessel. Nearly

44% of the respondents had been working on the ship for ten years. Most of the respondents (51%) were between 30 and 50 years' old. A majority of the respondents believed in Christianity (47.4%), followed by Buddhism (17.1%), and Taoism (5.1%). However, nearly 31% of the respondents did not indicate their religion.

3.2 Measures

We adapt the measurement items for evaluating national culture mainly from prior research (see the Appendix). We conducted preliminary exploratory field research via in-depth, descriptive case studies of national culture projects to gather contextual knowledge for developing the measurement scales. We developed or refined all of the measurement scales according to the input from experienced seafarers comprising captains, chief engineers, and ratings. In addition, we validated the resulting scales with field pilot tests to ascertain their content validity, as well as construct reliability and validity. The Appendix presents the final measurement items employed for evaluating national culture and human failures.

Independent Variables:

We assess power distance using three items adapted from Hofstede (1980; 2001) and Nakata and Sivakumar (1996) (see Table 2). A high agreement with these items indicates that low power distance is perceived because society accepts that power in institutions and organizations is distributed equally. Seafarers could feel free to express their opinions and are comfortable with the shipmaster. The Cronbach-alpha is 0.646. It should be noted that a Cronbach-alpha value below 0.5 will provide a basis for questioning the measurement items' internal consistence. For a larger number of items, a Cronbach-alpha value between 0.5 and 0.6 will be too low; however, for a smaller number of items in the range between two and four, the obtained value is

acceptable for ensuring reliability (Menor and Roth, 2007; Nunnally, 1978).

We assess collectivism using four items adapted from Hofstede (2001) and Nakata and Sivakumar (1996) (see Table 2). A high agreement with these items indicates that seafarers' opinions tend to be consistent with those of others in their ship or group. Seafarers accord a high priority to the maintenance of harmonious group cooperating relationships. The item "I think cooperation with my colleagues is important" has two factor loadings greater than 0.5 and they are loaded on two factors. We removed this item due to a lack of interpretability of this solution. The Cronbach-alpha is 0.633.

We measure uncertainty avoidance using three items adapted from Hofstede (1980; 1994; 2001) and Nakata and Sivakumar (1996) (see Table 2). High scores on these items suggest that seafarers like to collect more information for planning and decision-making before taking actions. The Cronbach-alpha is 0.801.

<center><Insert Table 2 about here></center>

We assess masculinity using four items, which are again developed from Hofstede (1980; 1994; 2001) and Nakata and Sivakumar (1996) (see Table 2). High scores on the masculinity items indicate that self-recognition and career development are important issues in this national culture dimension. The Cronbach-alpha is 0.590.

Moderating Variable:

We measure Confucian dynamism using five items adapted from Hofstede and Bond (1988), Nakata and Sivakumar (1996), and Bond et al. (1987). High scores on these items suggest that seafarers perceive that social respect, social status, and perseverance are important issues. The Cronbach-alpha is 0.786

Dependent Variable:

We use the annual number of individual human failures occurring on board to operationalize the dependent variable of human failures. It should be noted that the measures of human failures can be calculated at different levels (e.g., individual, unit (ship), and company). The numbers of human failures per ship and per company could be obtained from a designated person in the shipping company or the Port State Control Data from the port authority. However, this study aims to examine the effects of seafarers' perceptions of national culture on individual human failures. Crews within a ship may come from different countries. We conduct the analysis at the individual level.

The actual reported data on individual human failures are very sensitive and confidential to shipping companies or seafarers. Self-reporting of human failures and perceptions of safety can offer alternative measures for determining workplace safety performance (DeJoy, 1994; Hofmann et al., 1995; Janssens et al., 1995). Workers' perception of safety is considered to be a useful indicator of safety performance (Borman and Motowidlo, 1993). Accordingly, we asked respondents to indicate the number of human failures they experienced on board the year before the survey. We define human failures as any error occurring on board at the individual level concerning ship operations such as handling, ballasting, or machine operations; concerning navigation such as collision, contact, grounding, or stranding; and concerning inappropriate equipment usage in general.

Control Variables:

We control for possible confounding effects by including various relevant control variables. We included the respondent's age, education level, and working experience in the regression models as control variables. Age is a commonly employed control to account for personal effects that may affect the hypothesized relationships. Education

level reflects the degree to which respondents understand the different national cultures, whereas a long working experience suggests that the respondent has abundant experience to avoid human failures.

3.3 Validity of measurement

Since all the self-report measures of national cultural dimensions and human failures in this study are collected using the same survey instrument answered by a single respondent, there exists possibility of common method variance that could bias the findings when both independent and dependent measures are obtained from the same source (Miller and Monge, 1986). This study examines such a possibility by conducting Harman's single-factor test (Podsakoff and Organ, 1986). For the survey, several factors, as opposed to one single factor, emerge and the first factor does not account for the majority of the variance. Moreover, nearly 65% of the respondents have been working on board for five or more years. Most of the respondents are probably the most qualified people on board to provide information on human failures. Accordingly, a substantial amount of common method variance does not seem to be present in this study (Podsakoff and Organ, 1986).

3.4 Procedures

Håvold (2007) investigated the impact of national culture and safety orientation by using a questionnaire survey based on a study of seafarers working for Norwegian shipping companies. The shipping companies in his sample used either English or Norwegian as the working language. He therefore conducted his research in Norwegian and English. Accordingly, we develop the questionnaire for this study in both Chinese and English. The original version was in English, which was translated into an equivalent Chinese version. The questionnaire was then back translated into

English. Similar to Håvold's (2007) study, we distributed the questionnaires to a contact person at each participating shipping company, which sent a package containing 18 questionnaires in English and Chinese to a container vessel. The package contained a letter addressed to the shipmaster on the vessel who would be responsible for handing out and collecting the questionnaires. We attached a DHL freight collected envelope in the package for used by the shipmaster to send the completed questionnaires directly back to us while the ship was calling at a port.

4. Analyses and Results

4.1 National level analysis

Although the data on human failures on ships were collected from individuals, we performed the analysis at the national level in this study. An analysis at the national level requires aggregation of the individual responses (the independent variables) to the national level. Therefore, for each national group, we calculated the mean scores of power distance, collectivism, uncertainty avoidance, masculinity, and Confucian dynamism. Table 3 presents the descriptive statistics and correlations of the study variables. The means of the five national culture dimensions were obtained from the respondents based on their reported nationality. Comparisons of the mean scores show that Chinese and Taiwanese seafarers have their highest mean scores on Confucian dynamism, followed by collectivism, masculinity, power distance, and uncertainty avoidance. Filipino seafarers display the highest mean scores on collectivism. Uncertainty avoidance receives the lowest mean scores for all the three national groups. High bivariate correlation coefficients between the dimensions of national culture indicate high potential of multicollinearity among them, which is hardly surprising given that previous research has reported strong relationships among the dimensions of national culture (Hofstede, 2001; Flynn and Saladin, 2006).

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<Insert Table 3 about here>

4.2 Confirmatory factor analyses

We performed a confirmatory factor analysis (CFA) of the collected data to assess the convergent and discriminant validity of the measurement items. Table 3 presents the intercorrrelations of the national culture dimensions. Examination of the patterns of item correlations and item-total correlations indicates that there are no deviations from the internal consistency and external consistency criteria suggested in the literature (Anderson and Gerbing, 1988). The CFA resulted in a $\chi^2 = 276.04$ ($p = 0.00$, $df = 109$). The CFA overall fit indices (GFI = 0.95, AGFI = 0.93, CFI = 0.94, and NFI = 0.90) all exceed the critical levels suggested in the literature (Bentler, 1980; Bentler and Bonett, 1980) and the standardized loadings are all significant. The CFA and reliability assessment suggest that the scales for the multi-item construct possess convergent validity. We examine discriminant validity by calculating the confidence intervals around the estimates of the inter-dimension correlations (i.e., Φ) (Anderson and Gerbing, 1988). If the confidence intervals do not contain the value of 1, discriminant validity is supported. Since none of the confidence intervals for the multi-items constructs contains the value of 1, we conclude that the national culture dimensions possess discriminant validity.

Despite that Cronbach-alphas below 0.70 are obtained on measures of low power distance and masculinity dimensions, there is considerable debate about the validity and reliability of Hofstede's cultural dimensions (Mearns and Yule, 2009). Nevertheless, for the data set of this study, our confirmatory factor analytical results find the Hofstede's five-factor solution an acceptable factor structure. Furthermore, the measure is sensitive enough to differentiate between different national groups on all cultural dimensions. For example, as shown in Table 3, the level of low power

distance in the Filipino seafarer samples (mean = 3.77) is slightly higher than seafarers from China (mean = 3.36) and Taiwan (mean = 3.35). There is more variability in the collectivism scores: Taiwanese seafarers (mean = 3.88) are significantly less masculine than seafarers from China (mean = 3.92) and Philippine (mean = 4.02).

Table 3 also shows the scores of lower power distance, uncertainty avoidance, masculinity, collectivism, and Confucian dynamism for the different national groups of seafarers, which are consistent with Hofstede and Bond's (1988) scores (HB's). The results show that Taiwanese seafarers have a propensity for uncertainty avoidance and masculinity, whereas Filipino seafarers lean more towards power distance, masculinity, and collectivism.

To evaluate the perceived differences of national cultures between Chinese, Taiwanese, and Filipino seafarers, we performed one-way analysis of variance (ANOVA). The results reveal no statistically significant differences for masculinity dimension at the 5% significance level. When comparing differences in national cultural dimensions, we find that power distance, uncertain avoidance, collectivism, and Confucian dynamism dimensions differ significantly among Chinese, Taiwanese, and Filipino seafarers at the $p < 0.05$ significance level (see Table 4).

<Insert Table 4 about here>

4.3 Hierarchical regression analysis

We employ the hierarchical moderated regression analysis to test the hypotheses. We follow the variance partitioning procedures suggested in Cohen and Cohen (1983) and Jaccard et al. (1990). As shown in Table 4, we conducted the analysis in several steps. First, we entered the control variables such as respondent's age, education level,

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and years of working experience into the regression (Model 01A). Second, we entered the national culture variables into the regression as a block (Model 01B). Third, we entered the main effects of the Confucian dynamism moderator variables as a block (Model 01C). If the interactions between Confucian dynamism and the other four national culture variables are significant, then there is evidence to support that there is a significant moderating influence of Confucian dynamism on the given national culture variables. Prior to the creation of the interaction terms in Models 01C to 04C, we mean-centre the independent variables to reduce the potential multicollinearity problem in regression analyses. Multicollinearity is a statistical phenomenon in which two or more independent variables in a multiple regression model are highly correlated. In other words, when two variables are highly correlated, they both convey essentially the same information (Aiken and West, 1991). Moreover, to examine multicollinearity, we calculate the variance inflation factors (VIF) for each of the regression equations. The maximum VIF within the models is 3.13, which is well below the rule-of-thumb cut-off value of 10 (Neter et al., 1990).

<Insert Table 5 about here>

This study proposes that lower power distance as experienced by seafarers helps reduce human failures in container shipping operations in the first hypothesis. As can be seen in Table 5, Model 01B (β = -0.17, $p < 0.1$) and Model 04B (β = -0.126, $p < 0.01$) show that the coefficients for human failures are negative and significant for the Chinese and Total groups, respectively. However, Model 02B and Model 03B show that the coefficients for human failures are negative but not significant. Thus, hypothesis H1 is partially supported in these two groups.

Regarding the effects of high collectivism on human failures as we posit in H2, the results of Model 01B (β = -0.283, $p < 0.05$), Model 02B (β = -0.254, $p < 0.1$), and

Model 04B (β = -0.19, p < 0.01) for the Chinese, Taiwanese, and Total groups, respectively, show that higher collectivism is associated with fewer human failures. The coefficients are negative and significant. However, the coefficient for the Filipino group in Model 03B is not significant. Similar to H1, hypothesis H2 is partially supported, too.

This study predicts the national culture dimension of uncertainty avoidance will have a negative influence on human failures. With the exception of Model 04B (β = -0.084, p < 0.05), the coefficients of Model 01B, Model 02B, and Model 03B for the Chinese, Taiwanese, and Filipino seafaring groups are negative but not significant, so H3 is not supported. As shown in Models 01B, 02B, 03B, and 04B, the coefficients for masculinity are not significant. Accordingly, hypothesis H4 that proposes a positive relationship between masculinity and human failures is not supported.

This study postulates the effects of Confucian dynamism on human failures. Results show that the coefficients of Model 01B (β = 0.194, p < 0.1) for the Chinese group and Model 04B (β = 0.084, p < 0.01) for the Total seafaring groups are positive and significant, contradicting the prediction of H5. Overall, these findings suggest that national culture partially influences human failures in the container shipping context.

Regarding the moderating effect of Confucian dynamism, in Model 02C for Taiwanese seafarers, the interaction between power distance and Confucian dynamism is positive and significant (β = 1.152, p < 0.1). To plot this interaction effect, we let Confucian dynamism take the values one standard deviation below (i.e., low level) and above (i.e., high level) the mean. Figure 2 shows the plot of the interaction. Consistent with hypothesis H6, Figure 2 shows a more positive relationship between power distance and human failures when Confucian dynamism is high. This reveals that seafarers possessing a high level of power distance are

associated with more human failures when Confucian dynamism is high rather than low. However, as shown in Model 01C, Model 03C, and Model 04C, the results indicate that the interaction between Confucian dynamism and power distance is not associated with reduced human failures. The coefficients of these models are not significant. Thus, hypothesis H6 is partially supported. In addition, as shown in Model 02C (β = -1.784, p < 0.05) and Model 04C (β = -1.714, p < 0.01) for the Taiwanese and Total seafaring groups, the coefficients for the interaction between collectivism and human failures are negative and significant as proposed by hypothesis H7. Consistent with the prediction of H7, the plots of this interaction in Figure 3 and Figure 4 show a less negative relationship between collectivism and human failures when Confucian dynamism is high. The figures also suggest that collectivism is associated with reduced human failures when Confucian dynamism is high rather than low. As shown in Model 03C (β = -0.753, p < 0.01) for the Filipino seafaring group, the interaction between uncertainty avoidance and Confucian dynamism is negative and significant. Thus, as plotted in Figure 5, uncertainty avoidance is associated with fewer human failures when Confucian dynamism is high rather than low. Thus, hypothesis H8 is supported. However, Table 5 indicates that the coefficients for the interaction between masculinity and Confucian dynamism for all the seafaring groups are not significant, so hypothesis H9 is not supported.

<Insert Figure 2 about here>

<Insert Figure 3 about here>

<Insert Figure 4 about here>

<Insert Figure 5 about here>

5. Discussion and Conclusion

Shipping is one of the most risky service industries. Although shipping companies attempt to assure work safety, they are not completely successful in eliminating human failures. We develop a theoretical model to explain the occurrence of human failures in the container shipping context and empirically validate the model. Theoretically, this study highlights the importance of national culture in explaining the occurrence of human failures on ships. We answer several important questions with regard to national culture in container shipping operations. First, what are seafarers' perceptions of national culture in the shipping context, and what are the perceived differences in the national culture dimensions between seafarers from China, the Philippines, and Taiwan? Second, our research illustrates how these dimensions influence the occurrence of human failures in the operations of vessels. In particular, this study examines and ascertains the moderating effect of Confucian dynamism on the relationships between national culture dimensions and human failures. To the best of our knowledge, this is the first study that provides empirical evidence on the importance of national culture in explaining human failures in work safety. More specifically, our study fills the gap in the literature that there is a void of studies explaining human failures from the perspective of national culture in container shipping operations.

5.1 Implications

Several implications can be made from the key findings of this study. First, national culture is of one of the important factors influencing human failures in ship operations affecting work safety that must be taken into consideration by shipping managers. Each dimension of national culture seems to be related to a different degree of human failures in ship operations. By understanding the differences in national

culture, shipping managers and officers can develop effective action plans to reduce human failures in vessel management. This study finds that Filipino seafarers display the highest mean score on collectivism. This finding is consistent with those of Hofstede (1984) and Theotokas and Progoulaki (2007). This implies that Filipinos are more group-oriented, which facilitates the development a more co-operative environment when working with seafarers from different cultures. Chinese and Taiwanese seafarers have the highest mean scores on Confucian dynamism, followed by collectivism, masculinity, power distance, and uncertainty avoidance. This finding is hardly surprising because the Chinese-based culture, prevalent in such countries/places as China, Hong Kong, Singapore, and Taiwan, is regarded as characterized by the Confucian culture (Chow et al., 1999). The research findings of this study provide support for the beliefs that a high power distance society places a greater emphasis on hierarchy, and that there is an intense and pervasive emphasis on organizational hierarchy and face-saving in the Chinese-based culture.

The findings of this study also indicate that power distance and collectivism are negatively associated with human failures. These results suggest that low power distance might be good for work safety. The environment of shipping operations is dynamic. Thus, seafarers should report any factors influencing ship operations to the master to prevent accidents. Seafarers from a low power distance culture are inclined to participate in safety decision-making and report potential risk, so the risk could be avoided. Håvold (2007) finds that high power distance might be desirable for safety. He conducts a correlation analysis between Hofstede's (1980) original index, indexes derived from Hofstede's (1994) VSM model, and four "safety" factors including negative safety conditions at work and fatalism, positive safety conditions at work, attitude to safety improvements, and knowledge/competence. Håvold's (2007) study

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only confirms a significant statistical relationship between power distance and knowledge/competence; however, the effects of power distance on negative safety conditions at work and fatalism, safety conditions at work, and attitude to safety improvements are not found in his study. In addition, the "safety" factors used in Håvold's (2007) study seems belonging to a safety behaviour/attitude related dimension. This study uses the number of individual human failures as a dependent variable. This might explain the differences between Håvold (2007) and this study.

More importantly, this study indicates that Confucian dynamism interacts with power distance, collectivism, uncertainty avoidance, and masculinity in their effects on human failures. An important finding of this study concerning Taiwanese seafarers is that low numbers of human failures occur when the power distance and Confucian dynamism are congruent with each other (see Figure 2). Human failures also decrease for Taiwanese seafarers when Confucian dynamism is low and collectivism is high (see Figure 3). This implies that in container shipping operations where seafarers possess lower power distance or Confucian dynamism, fewer human failures can be expected. Considering all the seafarers, the result also indicates that fewer human failures are associated with low Confucian dynamism and high collectivism (see Figure 4). Another interesting result is that there are fewer human failures in container shipping where Filipino seafarers show high uncertainty avoidance, together with low Confucian dynamism (see Figure 5). This result suggests that Filipino seafarers are not willing to take risk when they lack safety information. Thus, complete or clear information from the master or ship owner is very important. This may increase seafarers' motivation and efforts to prevent human failures. However, we find no effect of masculinity on human failures regardless of the level of Confucian dynamism.

5.2 Limitations and future research

We discuss various limitations of this study, which provide meaningful directions for future research on this topic. First, the collection of data on human failures and perceptions of national culture in container shipping may be subject to bias in terms of seafarers' willingness to report and respond. Seafarers may be reluctant to report human failures because of potential personal repercussions and an interest in avoiding lawsuits against the company. Second, this study is limited to five national culture dimensions based on the studies of Hofstede (1994; 2001), Hofstede and Bond (1988), as well as Nakata and Sivakumar (1996). While a majority of previous studies have suggested that safety culture or safety climate factors can predict safety issues (Zohar, 1980; Cox and Cheyne, 2000; Glendon and Litherland, 2001; Mearns and Yule, 2009; Lu and Tsai, 2010), future research could examine the linkages between safety culture or safety climate, national culture, and safety performance. Third, future research should seek to explain how the national culture dimensions influence individual behaviors or attitudes, particularly behaviors or attitude that may lead to human failures, and try to define the characteristics of such safety behaviors. In addition, it would be valuable to study the differences in national culture at the individual level (e.g., similar occupation status, race, and religion) versus using culture as a sociological, group-based construct (Bearden et al., 2006). Fourth, this research focuses specifically on seafarers from China, the Philippines, and Taiwan. It would be valuable to collect data from seafarers from other non-Asian countries to obtain a balanced view of the relationship between national culture and human failures in container shipping operations. Finally, this study specifically uses Hofstede's national culture dimensions as a theoretical framework for explaining seafarers' human failures. It should be noted that Hofstede's (1980) framework has been criticized on

both empirical and theoretical grounds (Weber et al., 1996). Researchers may argue that national culture, in all its complexity, cannot be captured quantitatively and reduced to five variables. Others may criticize Hofstede's use of a single multinational corporation as a basis for his conclusions about national culture. Other criticisms include the compatibility of national culture and, its heterogeneity within any given country (Sivakumar and Nakata, 2001). Future studies may also be conducted by using the longitudinal approach to investigate the short- and long-term effects of national culture on container ship operations.

Acknowledgements

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Figure 1. The effects of national culture dimensions on human failures in container shipping operations.
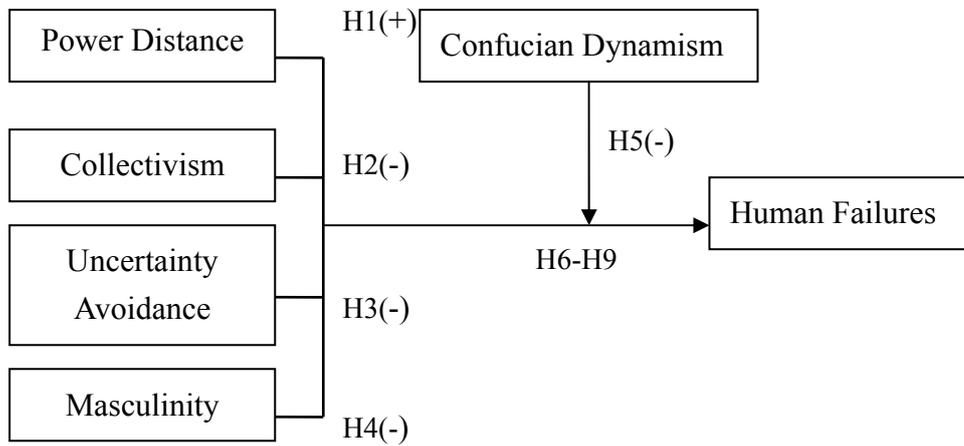
Figure 2. The effect of power distance on human failures by the level of Confucian
dynamism for Taiwanese seafarers.
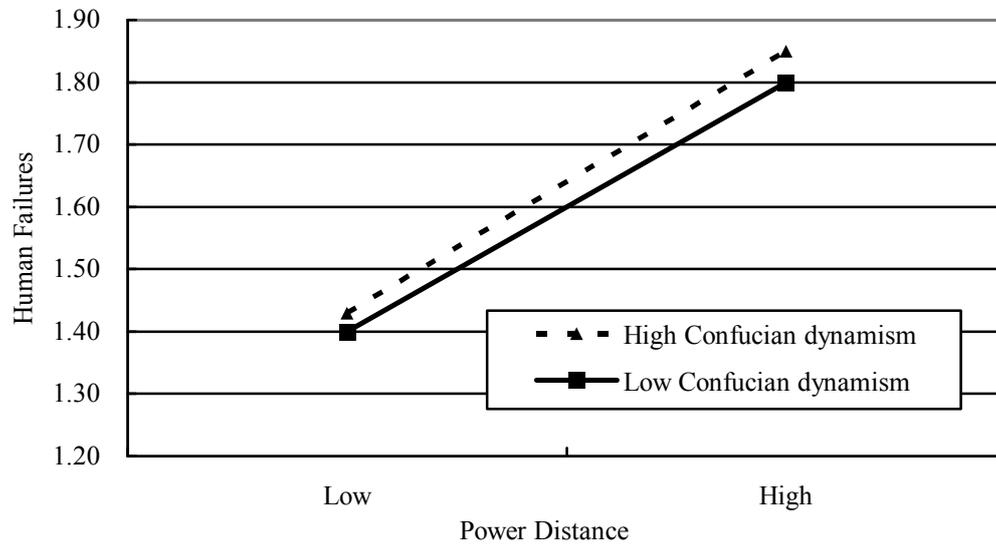
Figure 3. The effect of collectivism on human failures by the level of Confucian dynamism for Taiwanese seafarers.
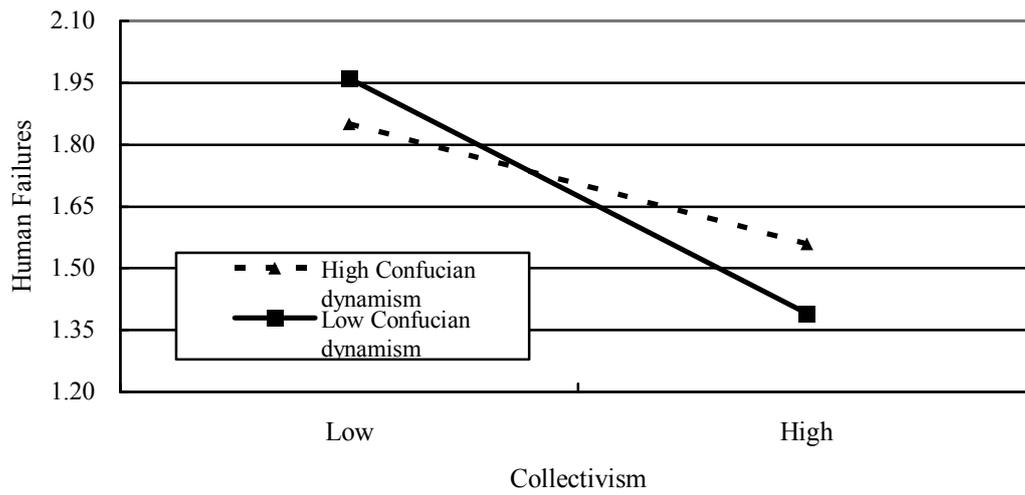
Figure 4. The effect of collectivism on human failures by the level of Confucian dynamism for total seafarers.
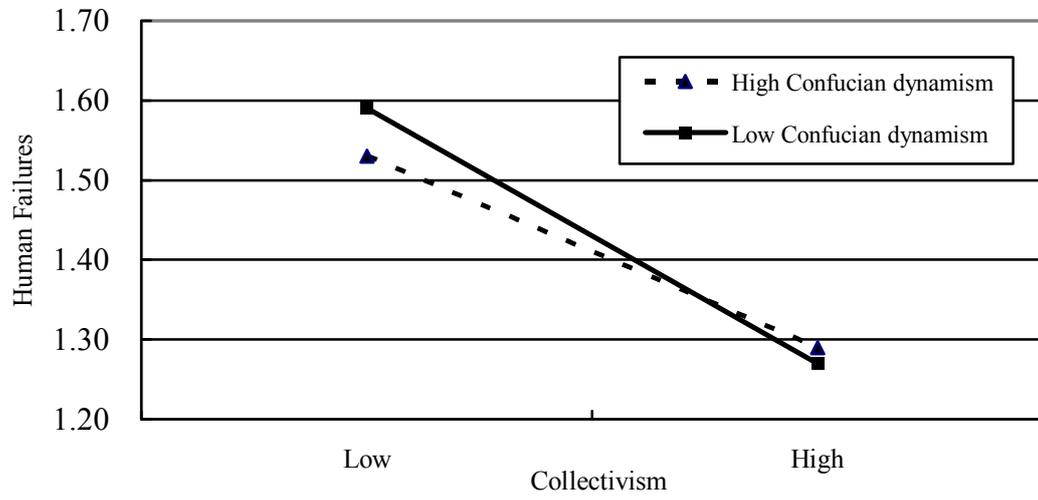
Figure 5. The effect of uncertainty avoidance on human failures by the level of Confucian dynamism for Filipino seafarers.
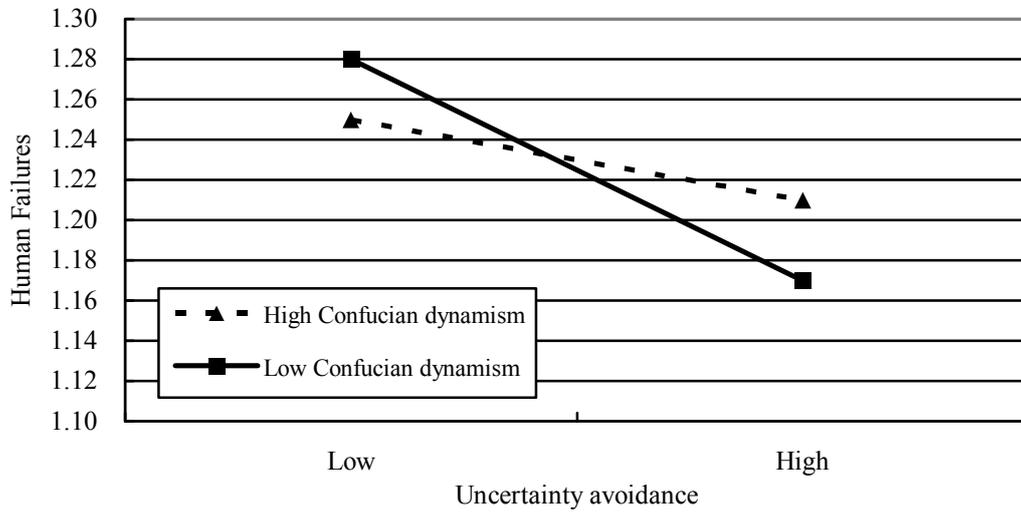
Table 1. Overview of sample size, response rates based on the size of vessel

Size of Vessel (in TEUs)	Number of Vessel	N	n	Response Rate
Less than 1000	8	144	56	38.9
1001-2000	15	270	118	43.7
2001-3000	7	126	49	38.9
3001-5000	15	270	114	42.2
5001-6500	22	396	159	40.2
Greater than 6500	14	252	112	44.4
Total	81	1458	608	41.7

Note: χ^2=1.039, degrees of freedom = 5, P = 0.959.

Table 2. Results of explanatory factor analysis with Varimax rotation ($N = 608$).

| Item | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
	PDI	UNA	MAS	COL	CON
I always feel free to express my opinions.	**0.783**	0.084	-0.003	0.150	0.014
I think people are equal in my society.	**0.709**	-0.002	0.224	-0.140	0.243
I feel easy and comfortable with the supervisor.	**0.681**	0.065	0.101	0.323	0.107
I think clear and detailed organization rules are important.	0.050	**0.806**	0.048	-0.109	-0.061
I like to seek more information for making decisions.	0.039	**0.842**	0.024	0.003	-0.130
I like to have elaborate planning before taking actions.	0.036	**0.822**	0.019	0.010	-0.226
I like self-recognition.	0.135	-0.154	**0.696**	0.079	0.115
I think altruistic action is not important.	0.089	-0.046	**0.616**	0.381	0.077
I stress quality of life less than developing a career.	0.088	0.216	**0.681**	-0.076	0.046
Advancing career is more important than developing good relationships with co-workers.	-0.008	0.101	**0.536**	0.089	0.318
I like to be instructed by the supervisor	0.427	-0.045	0.081	**0.601**	0.030
I think respect for rules and regulations are important.	0.057	0.001	0.147	**0.723**	0.288
I think cooperating with colleagues is important.	0.072	-0.070	0.132	**0.500**	**0.529**
I think loyalty to organization is important.	0.056	-0.068	0.013	**0.615**	0.389
I prefer a long-term outlook than seeking immediate benefits.	0.117	-0.051	0.076	0.127	**0.696**
I respect social and status obligations within limits.	0.068	-0.087	0.139	0.212	**0.741**
I think perseverance is important in my life.	0.166	-0.092	0.057	0.191	**0.746**
I keep large savings and find opportunities to invest.	0.078	-0.152	0.042	0.153	**0.597**
I think having a sense of shame is important.	-0.046	-0.139	0.239	-0.005	**0.670**

Note: a. PDI: power distance; UNA: uncertainty avoidance; MAS: masculinity; COL: collectivism; CON: Confucian dynamism
b. Measures for power distance are based on questions using a reverse scale.

Table 3. Comparison of Hofstede and Bond's scores and this study and correlations at the national level of analysis.

	Chinese	Taiwanese	Filipino	1	2	3	4	5	6	7
1. Age[a]	1.67	2.86	2.05							
2. Edu[b]	1.81	1.82	2.02	-0.128***						
3. Exp[c]	1.80	3.10	2.39	0.820***	-0.094**					
4. Low power distance[d]	3.36	3.35	3.77	-0.038*	0.033*	-0.039*				
HB's score[h]	-	2.1	4.70							
5. Uncertainty avoidance	2.07	2.17	2.56	-0.005*	0.020*	0.010*	0.073*			
HB's score	-	1.55	2.80							
6. Masculinity	3.59	3.63	3.53	-0.010*	0.036*	-0.008*	0.300***	0.045*		
HB's score	-	2.75	3.2							
7. Collectivism	3.92	3.88	4.02	0.028*	0.043*	0.013*	0.385***	-0.119***	0.315***	
HB's score	-	4.15	3.40							
8. Confucian dynamism	4.20	4.07	3.98	0.049*	0.035*	0.039*	0.263***	-0.274***	0.366***	0.484***
HB's score	-	4.35	4.05							

Note:

[a]Measures for age are based on questions using an ordinal scale: 1 represents respondents less than 30 years old, 2 represents 31-40 years, 3 represents 41-50 years, 4 represents 51-60 year, whereas 5 represents more than 60 years old.

[b]Measures for the level of respondents' education are based on questions using an ordinal scale: 1 represents high school, 2 represents university/college, 3 represents masters' degree or above.

[c]Measures for the period of respondents' working experience are based on questions using an ordinal scale: 1 represents less than 5 years, 2 represents 6-10 years, 3 represents 11-15 years, 4 represents 16-20 years, whereas 5 represents more than 20 years.

[d]Measures for power distance are based on questions using a reverse scale.

[e]Significant at $p \leqq 0.01$, [f]Significant at $p \leqq 0.05$, [g]Significant at $p \leqq 0.10$, [h]HB's score = Hofstede and Bond's (1988) score (index/20).

Table 4 Comparison of differences in respondents' perceptions of national culture based on nationality

National cultural dimensions	Nationality						F ratio	Scheffe test
	China (1)		Taiwan (2)		Philippine (3)			
	Mean	S.D.	Mean	S.D.	Mean	S.D.		
Low power distance	3.36	0.80	3.35	0.80	3.77	0.61	25.53**	(1,3),(2,3)
Uncertainty avoidance	2.07	0.75	2.17	0.72	2.56	0.88	22.02**	(1,3),(2,3)
Masculinity	3.59	0.58	3.63	0.62	3.53	0.57	2.01	
Collectivism	3.92	0.59	3.88	0.60	4.02	0.46	3.89*	(2,3)
Confucian dynamism	4.20	0.45	4.07	0.59	3.98	0.41	9.16**	(1,3),

Note: Mean scores based on a 5-point scale (1 = strongly disagree, 5 = strongly agree); S.D. = standard deviation;
*represents significance level $p < 0.05$; **represents significance level $p < 0.01$

Table 5. Hierarchical regression analysis result (standardized β coefficients).

	Model 01 Chinese			Model 02 Taiwanese			Model 03 Filipino			Model 04 Total		
	Model 01A	Model 01B	Model 01C	Model 02A	Model 02B	Model 02C	Model 03A	Model 03B	Model 03C	Model 04A	Model 04B	Model 04C
Control Variables												
Age	-0.165	-0.123	-0.129	-0.071	-0.052	-0.143	-0.012	0.014	0.010	0.044	0.040	-0.011
Education	0.006	0.029	0.046	0.121[c]	0.111	0.097	-0.001	0.005	0.007	0.056	0.064	0.060
Experience	0.090	0.026	0.042	-0.094	-0.089	-0.16	-0.085	-0.093	-0.077	-0.071	-0.069	-0.029
Main effects												
PDI[d]		-0.170[c]	-0.021		-0.103	-0.943[b]		-0.009	0.426		-0.126[a]	-0.376
COL		-0.283[b]	0.363		-0.254[c]	0.850[c]		-0.018	0.503		-0.190[a]	0.908[a]
UNA		-0.006	-0.484		-0.105	-0.003		-0.074	0.675[b]		-0.084[b]	0.036
MAS		0.084	0.076		-0.061	-0.375		-0.002	-0.145		0.022	-0.360
CON		0.194[c]	0.540		0.109	0.242		0.099	0.975[b]		0.084[c]	0.576[a]
Moderators												
PDI × CON			-0.159			1.152[c]			-0.564			0.311
COL × CON			-0.912			-1.784[b]			-0.917			-1.714[a]
UNA × CON			0.470			-0.089			-0.753[a]			-0.105
MAS × CON			-0.001			0.544			0.161			0.561
F for the regression	0.725	1.900[c]	1.388	2.894[b]	3.528[a]	3.154[a]	0.778	0.796	1.635[c]	0.995	5.329[a]	5.598[a]
R^2	0.017	0.112	0.126	0.043	0.130	0.170	0.009	0.025	0.073	0.005	0.068	0.104

Note: [a]Significant at $p \leqq 0.01$, [b]Significant at $p \leqq 0.05$, [c]Significant at $p \leqq 0.10$

[d]Measures for power distance are based on questions using a reverse scale.

Appendix: Questionnaire

I.   Personal Information

1. How old are you?
   ☐ Less than 30   ☐ 31~40   ☐ 41~50   ☐ 51~60   ☐ More than 60 years' old

2. What is your nationality?
   ☐ Chinese   ☐ Greek   ☐ Indian   ☐ Iranian   ☐ Italian   ☐ Japanese
   ☐ Korean   ☐ Myanmarese   ☐ Filipino   ☐ Russian   ☐ Taiwanese   ☐ Turkish
   ☐ UK   ☐ Ukrainian   ☐ Vietnamese   ☐ Others (please specify):_____

3 What is your education?
   ☐ High school   ☐ University/College   ☐ Master's degree or above   ☐ Others:_____

4 Which is your religious extent?
   ☐ Buddhism   ☐ Christianity   ☐ Islam   ☐ Taoism   ☐ Others:_____

5 How long have you worked on board ?
   ☐ Less than 5 years   ☐ 6~10 years   ☐ 11~15 years   ☐ 16~20 years
   ☐ More than 20 years

II.   Measures and items for evaluating national culture and human failures

National culture measures[a, b]:

Power distance
  I always feel free to express my opinions. (R)[c]
  I think people are equal in society. (R)
  I feel easy and comfortable with the supervisor. (R)
Uncertainty avoidance
  I think clear and detailed organization rules are important.
  I like to seek more information for making decisions.
  I like to have elaborate planning before taking actions.
Masculinity
  I like self-recognition.
  I think altruistic action is not important.
  I stress quality of life less than developing a career.
  Advancing career is more important than developing good relationships with co-workers.
Collectivism
  I like to be instructed by the supervisor
  I think respect for rules and regulations are important.
  I think cooperating with colleagues is important.
  I think loyalty to organization is important.
Confucian dynamism
  I prefer a long-term outlook than seeking immediate benefits.
  I respect social and status obligations within limits.
  I think perseverance is important in my life.
  I keep large savings and find opportunities to invest.
  I think having a sense of shame is important.
Human failures measures:
  How many operational failures did you experience (e.g., ship handling, ballasting, operating machines, equipment usage etc) on board last year? _____

Note:
a.   All items are measured on a five-point scale, anchored by 1= strongly disagree and 5 = strongly agree.
b.   Item deleted after exploratory factor analysis.
c.   R indicates that a question uses a reverse scale.