

## The Role of Authentic Leadership on Engine-room Resource Management (ERM) Team: an Empirical Study of Chinese Engine Room Seafarers

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### Abstract

As an important principle in Engine-room Resource Management (ERM), leadership in the context of ERM team especially authentic leadership did not receive enough scholarly attention. The aim of this study is to investigate the role of authentic leadership in ERM. As such, a web-based survey was conducted. Engine room seafarers of sixty-three Chinese merchant ships were selected as participants in our research and data were collected via questionnaires (n=447). After analyzing data by means of data analysis software, we examined our proposed hypotheses by multiple analysis methods. It was demonstrated that authentic leadership in leader is positively associated with both engine room seafarer psychological capital and job performance. Amongst, engine room seafarer psychological capital mediates the relationship between authentic leadership and seafarer job performance. Our findings suggested to maritime authorities and shipping companies that rating score weights in terms of leadership ought to be increased during the course of ERM evaluation given that the effect of leader authentic leadership on followers. Moreover, ERM training efforts with respect to leadership should also be enhanced.

### Keywords

Authentic leadership; Psychological capital; Job performance; Engine room resource management; Seafarers.

### 1. Introduction

Engine-room Resource Management (ERM) is an extensively adopted management method to accomplish marine ships' normal navigation by effectively utilizing and managing personnel resources, consumable resources, information resources and equipment resources in the engine-room [1]. Referring to Wu [1], the definition of ERM is revised for this study, and personnel resources management are taken as the principal content of ERM. ERM, in this study, are predisposed to signify the management towards seafarers in the engine room. To further prevent the merchant vessel accidents caused by the human factor, ERM was listed in the Manila Amendment to the International Convention on Standards of Training, Certification and Watch-keeping (STCW) as mandatory requirements for Seafarers by International Maritime Organization (IMO) [1]

Engine room seafarers play important role in maintaining the normal function of ships through meticulously managing propulsion machinery and providing the equipment of the vessel with sufficient power. Seafarers in the engine room are responsible for the maintenance and operation of the ship's machinery in a daily. The shipping industry is a safety-critical organization and seafarer is a safety-critical occupation [2]. There is previous evidence that leadership is closely associated with work safety in an organization [3] and research in different organizational backgrounds has substantiated the importance of leadership quality in promoting positive safety climate [4, 5] argued that the dimensions of leadership exhibit an influence on safety behavior of subordinates and can

predict injury rate. Hence, variables with respect to leadership have manifested as major predictors of safety climate [6]. Authentic leadership is presently considered to be one of relate mechanisms which may potentially elucidate how leaders in the safety-critical organizations demonstrate their commitment to safety [7]. Authentic leadership, which was proposed by Luthans and Avolio [8], is a process through which leaders can profoundly understand their own thinking and behavior patterns, and are regarded by others as being conscious of their own and others internal moral perspectives and advantages [9].

Research on safety-critical organizations shows that subordinates are increasingly likely to participate in open safety communications when they establish high-quality relationships with leaders, and leaders may be thus aware of how quickly they can construct trust relationship with followers [10]. Following this viewpoint, Borgersen [11] found that authentic leadership in captains is positively related to seafarer perceptions of the level of safety climate. Furthermore, Sætrevik and Hystad [12] also revealed that authentic leader could exert an influence on crew members subjective risk assessment and unsafe action though affecting followers situation awareness.

Psychological capital refers to a positive state of development which contains self-efficacy, resilience, optimism, and hope [13]. Hystad and Eid [14] suggested that crew's individual psychological capital benefits them from better handling working stressors in the sea and therefore improve their mental and physical health. They also pointed that leadership can be a method to increase seafarers' psychological capital. In addition, seafarer's psychological capital such as self-efficacy plays an important role in reducing human errors in ship operation so that the safety of navigation can be guaranteed [12, 14].

Job performance is an essential indicator in an organization, higher in which shows fewer mistakes been made. In the maritime field, it connotes the ship can maintain a safe working condition due to seafarers' human error decreasing. For seafaring occupation, it means quality and productivity as a result of fewer human errors. Job performance is a critical work outcome that may be associated with individual factors of seafarers, including authentic leadership and psychological capital. In addition, in the shipping industry, job performance has been indicated to be link to safety climate [15]and ship safety performance [16]. The abovementioned factors play an important role in ship safety. The promotion of seafarers' performance is conducive to improving the turnaround time of ships, the safety performance of ship operations, and meeting the efficiency requirements of ship-owners [16] For shipping companies, this enables to reduce substantial costs and ameliorate services. To achieve greater insight into the influence of authentic leadership experienced by seafarers on their performance, we introduce psychological capital to propose the relationship model regarding authentic leadership and job performance, which is shown in Figure 1.

**Figure 1** Conceptual model



Specifically, authentic leadership is projected to positive associated with subordinate seafarer performance and this linkage is mediated by follower psychological capital. Moreover, seafarer psychological capital is presumed to positively relate to their job performance.

Little was known about the role of authentic leadership in the ERM realm at the time we performed this study. The present study fills one of these literature gaps and explicitly quests to examine the impact of authentic leadership on engine room seafarer psychological capital as well as job performance. A review of previous research highlights the role of authentic leadership on elevating performance [17] and facilitating safety climate perception[11] Earlier studies have identified that authentic leadership was associated with job performance [17] According to Wang. [18] authentic leadership has an indirect effect on follower job performance. Nevertheless, an investigation of the effect of authentic leadership on job performance in the ERM is lacking. To our best knowledge, this

study is one of the initiations to explore the relationships between authentic leadership, psychological capital and seafarer performance in the ERM context.

The objective of the present study is to fill the gaps in the literature by investigating several consequences of authentic leadership, which are of particular relevance to employees in the engine room: psychological capital and job performance. There were three aims in this study. The first aim was to examine the effect of authentic leadership on engine room seafarer psychological capital and job performance. The second was to investigate the impact of engine room seafarer psychological capital on their job performance. And whether engine room seafarer psychological capital plays a mediating role in the relationship between authentic leadership and job performance is our third concern.

The remainder of this paper is structured as follows. Firstly, a review of existing theories on authentic leadership, job performance, and psychological capital are presented. Subsequently, the hypotheses regarding the relationship among authentic leadership, job performance, and psychological capital are put forward. And the hypotheses regarding the influence of the other two variables on job performance are also formulated. Following which, our sample and measure methods we used are described. After that, the empirical findings and the implication of results are discussed. At last, we point out the limitations of our study to shed some light on future research directions.

## **2. Literature review and hypotheses**

### **2.1 Authentic leadership and engine room seafarer's psychological capital**

Woolley, Caza, and Levy [19] argued that authentic leadership has a positive influence on psychological capital, with moderated by positive work climate. It is suggested that genuine leaders who behave in ways that cultivate subordinates' psychological capital contribute to promoting a sense of ownership in the organization that is considered to develop subordinates' resiliency and help to the improvement of followers' psychological capital [20]. Moreover, extant literature argues that authentic leadership can contribute to the growth of subordinates' psychological capital, thereby improving subordinates' self-efficacy by producing positive climate [21]. To date, the discussion of the effect of authentic leadership on follower psychological capital has been not specifically geared towards the situation of ERM team. Nevertheless, we believe that these situations are of particular salient for seafarers because the leaders' leadership skills impose enormous impact on the crewmembers [22]. Based on the above analysis, we posited the following hypothesis:

Hypothesis 1: Authentic leadership in leaders is positively associated with engine room seafarers' psychological capital.

### **2.2 Engine room seafarer's psychological capital and job performance**

Though conducting empirical study on police leaders and followers, Walumbwa [23] concluded that subordinate psychological capital is positively associated with their job performance. Likewise, Abbas [24] suggested that psychological capital is negatively associated with turnover intentions and positively relates to job performance. The reason why subordinate job performance positively relates to their psychological capital can be considered a result of the mediating mechanism of subordinate job engagement. As Chen and Shu-Ling [25] noted that, subordinates psychological capital positively relates to their job engagement and job performance. And the relationship exists between subordinate job performance and psychological capital is mediated by subordinate job engagement.

Due to the seafarer's subject role in the ERM team, the individual seafarer's low psychological capital has potential to affect organizational performance in numerous ways. A seafarer low in psychological capital can be argued to be lack of motivation and consequently reluctant to achieve the management objectives in the engine room. As a consequence, they may inefficiently perform tasks. Therefore, a frustrated and emotionally-drained seafarer can be supposed to have little interest in complying with leaders and is thereby less motivated to make the management in the engine room consistent with the leaders' purpose. This may be the case, low in psychological capital results in the level of trust the seafarers have in the leaders decreasing, and group-level trust in leaders' management fully mediates

the relationship between psychological capital and performance [26]. As a result, seafarers' performance in achieving the management goals decreases. Rather, followers with higher psychological capital require less supervision and will be less dependent on leaders for guidance and routine assignment [27] Avey, Nimnicht, and Graber Pigeon [28] also noted in their research that subordinate psychological capital is positively associated with manager rated performance and objective performance outcomes.

Furthermore, follower psychological capital is also found to have a positive impact on team performance. For instance, Agarwal and Farndale [29] proposed that teamwork performance and creativity implementation positively relates to subordinate psychological capital. Therefore, ERM assignments, as a kind of teamwork, performance of which may also positively relates to seafarer psychological capital. This discussion brings us to our second hypothesis:

Hypothesis 2: Engine room seafarers' psychological capital is positively associated with their job performance.

The consequences of authentic leadership in leaders are not limited to affecting the seafarer's psychological capital. Moreover, an indirect effect is expected to be found in the influence of authentic leadership on seafarers' job performance. Stated another way, psychological capital is expected to works as a mediator and have a positive impact on job performance. An effective leader is of vital importance for the success of ERM and authentic leadership can be projected to transform into higher seafarers' performance via higher psychological capital of seafarers. Indeed, authentic leadership in leaders has a positive impact on subordinates' job performance [26] and psychological capital could moderate this relationship[18].

It is suggested that leaders' psychological capital were positively associated with follower psychological capital [23] and job performance [25]And Jensen and Luthans [30] noted that entrepreneurs as leaders, whose psychological capital were positively associated with their authentic leadership. Hence, we can infer that authentic leadership in leaders can improve seafarer job performance by improving seafarer psychological capital. Gupta and Singh [27] also found that leader who displays positive leadership behaviors are more likely to contribute to the growth of followers' positive psychological capacities and subordinates' level of psychological capital positively relates to their creative performance behaviors.

It is also noted that subordinate psychological capital is not only reinforce the positive effect of leader leadership behavior but also conducive to reduce the negative impact from leaders. For instance, perceived organizational politics negatively relates to follower job performance and psychological capital comprising self-efficacy and hope can act as a threat damper by decreasing the negative effects of politics on job performance [24]. As leaders in the engine room, their authentic leadership may not only build trust relationship with seafarers but also encourage seafarers to develop psychological capital, thus improving job performance. Overall, the third hypothesis is proposed as following:

Hypothesis 3: Authentic leadership in leaders is positively associated with engine room seafarers' job performance, and this relationship is mediated by seafarers' psychological capital.

### **3. Method**

#### **3.1 Data and Sample**

Given that seafaring occupation has the feature of high mobility, an online survey was adopted in this study. The survey consisted of three parts, each part is interpreted as follows. Part one describes the intention and background of this study and assures participants for the anonymity and confidentiality of this study. Part two provides demographical variables, such as age, sex, rank, education and marriage. Part three comprises of scale item which are utilized to rate three variables (i.e., authentic leadership, psychological capital and job performance). Questionnaire items were translated from English to Chinese and back-translated to assure consistency.

This study was conducted with the aid of a shipping company located in China which trades internationally. The survey was first sent to the human resource manager, especially those who

possessed onboard working experience for ascertaining readability and content validity. Then questionnaires were distributed by internal mailing system of the shipping company to 570 seafarers and leaders working on the 63 merchant ships, all-male. This company was operating while survey was conducted and work questionnaires administered at one time point to each participant. With the assistant of the liaison officers in the shipping company, the distribution and recovery of questionnaires were conducted in order corresponding to each ship's name. In this way, the responses of leaders were matched with the responses of their immediate subordinates.

Ascribing to the nature of cross-sectional study, which is subject to common method variance, a procedural remedy was adopted. This technique involves obtaining measures of the predictor (authentic leadership) and criterion variables (job performance) from different sources [31] In order to avoid common method bias, the engine room seafarers (management level) were asked to rate ordinary seafarers (operational level and support level) job performance. On the other hand, operational level and support level seafarers were asked to confidentially rate management level seafarer authentic leadership and their own psychological capital.

The web-based survey started on March 2, 2018 and ended on April 29, 2018. A total of 471 questionnaires were completed and returned, for a response rate of 82.6%. After invalid questionnaires were eliminated, leaving a usable research sample of  $N = 447$ . In total, 72.5% of the sample was categorized as ordinary seafarers (operational level and support level) and 27.5% classified as leaders (management level). The detailed demographical characteristic is shown in Table 1.

**Table 1** Demographics of respondents

Demographics	Frequency (n=447)	Percentage (%)
<b>Rank</b>		
Management-level personnel	123	27.5%
Operational-level personnel	186	41.6%
Support-level personnel	138	30.9%
<b>Marriage</b>		
Married	313	70.0%
Unmarried	134	30.0%
<b>Education</b>		
University or above	128	28.6%
College	159	35.6%
High school or below	160	35.8%

### 3.2 Measures

**Authentic leadership.** Authentic leadership was measured using 16-item scale developed by Walumbwa [32], which had been applied successfully in the context of seafaring [12]. Sample items include "My leader admits mistakes when they are made." Responses were collected using a five-point scale ranging from 1= strongly disagree to 5= strongly agree. The reliability coefficients of internalized moral perspective, self-awareness, relational transparency, and balanced processing appear 0.729, 0.733, 0.742 and 0.776, respectively. The overall coefficient alpha for present study was 0.83.

**Psychological capital.** Psychological capital was measured with the 12-item scale developed by Luthans [33] This scale was proven to have good reliability and construct validity [33]. Sample items include "I always look on the bright side of things regarding my job." Responses were collected using a five-point scale ranging from 1= strongly disagree to 5= strongly agree. The coefficient alpha of self-efficacy, resilience, optimism, and hope show 0.784, 0.785, 0.767 and 0.823, respectively. The overall reliability coefficient for this study was 0.87.

Job performance. Job performance includes task performance, interpersonal facilitation, and job dedication with reliability alpha reveal 0.821, 0.798, and 0.819. Job performance was measured with the 24-item scale adapted from Scotter and Motowidlo [34]. Sample items include “This follower can persist in overcoming obstacles to complete a task.” Responses were collected using a five-point scale ranging from 1= strongly disagree to 5= strongly agree. The coefficient alpha for current study was 0.81.

### 3.3 Results

The descriptive statistics for the variables in this study are shown in Table 2.

**Table 2** Mean, Standard Deviation and Correlations

	M	SD	1	2	3
1. Authentic leadership	4.01	0.62	1.00		
2. Psychological capital	4.13	0.59	.71**	1.00	
3. Job performance	4.07	0.60	.64**	.70**	1.00

Notes: \*\* $p < 0.01$ .

The mean of authentic leadership reported by the seafarers in the sample was 4.01 on our five-point scale and above the mean of 4. Likewise, seafarers reported high levels of psychological capital ( $M=4.13$ ) and job performance ( $M=4.07$ ). From Table 2, we can observe that authentic leadership positively and significantly relates to job performance ( $\beta=0.64$ ,  $p<0.01$ ) and psychological capital ( $\beta=0.71$ ,  $p<0.01$ ). Specifically, psychological capital was positively and significantly related to job performance ( $\beta=0.70$ ,  $p<0.01$ ). So it could be confirmed that authentic leadership was positively associated with psychological capital and job performance.

### 3.4 Test of the Hypotheses

This paper used multiple regressions to investigate the impact of authentic leadership, seafarers' psychological capital on seafarers' job performance, with considering demographic factors as the control variables. To test Hypothesis 1, a first regression model was computed. In our first model, authentic leadership was specified as independent variable and psychological capital was taken as dependent variable. Regression analysis results are shown in Table 3.

**Table 3** Results of regressions

	Model 1 Dependent variable: Psychological capital	Model 2 Dependent Variable: Job performance	Model 3 Dependent variable: Job performance
Authentic leadership	.283***		0.247***
Psychological capital		.346***	
Control variables			
Marriage	.043	.154	.075
Education	.032	.106	.167
Rank	.048	.131	.103
R2	.426	.445	.410
R2 adj.	.401	.429	.389
F	18.037***	19.766***	17.790***

Notes: \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

The results for our first model indicate that in conformity with the Hypothesis 1, the relationship between authentic leadership and seafarers' psychological capital is positive and statistically significant ( $\beta=0.283$ ,  $p < 0.01$ ). All of the control variables did not enter significantly into the regressions. In general, the model can be seen as statistically significant ( $F = 18.037$ ,  $p < 0.01$ ) and explains 40.1% of the variance in seafarer psychological capital.

We computed a second regression model for testing Hypothesis 2. In this model, seafarers' psychological capital was used as the independent variable and job performance as the dependent variable. The results are consistent with Hypothesis 2. Namely, positive relationship between seafarer psychological capital and job performance is statistically significant ( $\beta=0.346$ ,  $p<0.01$ ). As the same with the first model, this model is also statistically significant ( $F = 19.766$ ,  $p<0.01$ ). In order to test Hypothesis 3, a third model was computed. In this model, authentic leadership was used as an independent variable and the job performance was specified as the dependent variable. The results were in strong support of the Hypothesis 3. As the Hypothesis 3 noted, the results demonstrate that authentic leadership in leaders exert significantly positive influence on seafarer job performance ( $\beta=0.247$ ,  $p<0.01$ ). Likewise, the third model is statistically significant ( $F = 17.790$ ,  $p<0.01$ ).

To test the role of seafarers' psychological capital as a mediator in the relation between authentic leadership in leaders and seafarers' job performance, we followed the procedure proposed by Baron and Kenny [35]. Therefore, the regressions as following were computed, the results of the regression are presented in Table 4.

**Table 4** Test for Mediating Effect

	Psychological capital as mediator		
	DV: Psychological capital	DV: Job performance	DV: Job performance
Authentic leadership	.283***	.247***	
Psychological capital			.346***
R2	.426	.410	.445
R2 adj.	.401	.389	.429
F	18.037***	17.790***	19.766***

Notes: DV: Dependent Variable.

\*\*\* $p<0.01$ ; \*\* $p<0.05$ ; \* $p<0.1$ .

As can be seen from Table 4, psychological capital can be identified as a mediator in the relation between authentic leadership in leaders and seafarers' job performance: psychological capital is significantly affected by the level of authentic leadership. Furthermore, psychological capital significantly positively affects job performance. In the third equation, psychological capital has a significant impact on job performance. Consequently, the mediator role of seafarers' psychological capital can be confirmed by study sample.

#### 4. Discussion

We find that authentic leadership in leaders is positively related to seafarers' job performance through testing Hypothesis 3. This finding is in line with the study results on the relationship between authentic leadership and followers' job performance in other contexts. Moreover, our findings suggest that engine room seafarers' job performance is positively associated with their psychological capital (Hypothesis 2). Therefore, the positive effects of seafarers' psychological capital should be kept in mind when leaders in the engine room manage the follower seafarers. That is to say, we should attach importance to seafarers' psychological development and the leaders such as the chief engineer should pay attention to seafarers' psychological need in the course of ERM works. In particular, this study provided the evidence to support the role of authentic leadership in leaders on fostering subordinate seafarer psychological capital. This finding corroborates the previous prediction that authentic leaders promote their subordinates psychological capital development [20]. The positive relationship found between authentic leadership in the ERM and subordinate seafarer psychological capital offers empirical support for the organizational benefits emanating from authentic leaders.

The seafarers' marriage, education, and rank were classified as control variables, which did not enter significantly into the regression. This result suggests that marriage, education, and rank of the

seafarers do not appear to be key variables in affecting their psychological capital. It may be the case that marriage, education, and rank only play as demographic roles in this relationship and future research is expected to investigate this possibility. Further studies can also involve other variables and try to better explain the variance in seafarers' psychological capital. Other variables may pertain to specific personality characteristics of the seafarers as it may be the case that, for instance, seafarers with much more work experience on board may be more competent to satisfy job demands than seafarers with less on-boarding working experience. And research on managers of international joint ventures has suggested that managers with greater work experience are better able to cope with job demands than managers with little work experience [36] This result would contribute shipping company to optimize the selection of seafarers in engine room such as the fourth engineer and work as guidelines for the improvement and revision of specific training measures for engine room seafarers.

It is necessary to extend existing research on ERM team because the results for our second hypotheses verify the effect of the seafarers' psychological capital on their job performance. Up until now, there has been a lack of empirical research into the significance of the seafarers' psychological capital for their job performance, although the link between psychological capital and seafarers' job performance is worthy of exploring. This result enlightens researches on this relationship which has so far been not mentioned in the context of seafaring. Our study results suggest that authentic leadership has a positive impact on the seafarers' job performance by increasing seafarers' psychological capital. In other words, the gains in seafarer job performance associated with authentic leadership could be the result of increases in psychological capital among followers.

To the best of our knowledge, there has so far been scarce empirical evidence for connections between the authentic leadership and seafarers' psychological capital. In particular, there is a dearth of literature to analyze the influence of authentic leadership on seafarer's psychological capital. Moreover, we think there is a great necessity for research into above-mentioned relationship among other seafarers in the ship, such as the deck seafarers.

All in all, the results of this study provide a more profound depiction of the complicated relationships between authentic leadership, engine room seafarers' psychological capital, and job performance. Our study contributes to the extant literature on authentic leadership in the engine room which has not yet empirically analyzed the influence of authentic leadership in the field of seafaring. Our results also add to the existing research into factors that are seem conducive for ERM work, with providing empirical evidence for the significance of the chief engineer and second engineer's authentic leadership and seafarer's psychological capital.

## 5. Practical implications

Based upon the findings of this study, leadership is a fairly important principle of the ERM, which embodies at the impact of leaders authentic leadership on followers job performance and psychological capital. At present, the training and evaluation revolving around ERM has not differentiated key points from minor points things ever since, the assign scores of evaluation item or training items about ERM were determined by raters subjectively generally [37]. By this way, the non-technical skills (e.g., authentic leadership and psychological capital) of crewmembers are hardly possible to achieve promotion after so-called training. Our findings suggested that authentic leadership in the context of ERM team admittedly improve seafarer job performance via promoting seafarers psychological capital, meanwhile seafarer job performance is closely concerned to ERM team's objective. In this sense, this study contributes to current ERM training and evaluation in following respects: on the one hand, the priority weights of leadership in the ERM evaluation should be properly increased, which manifests in the assigning scores of leadership ought to be increased to a rational level. On the other hand, likewise, the priority weights of ERM training pertaining to leadership should be properly increased, which manifests in the training time and training complexities of leadership ought to be arrive at a rational level.



Our research results indicated that engine room seafarer psychological capital mediates the positive impact of authentic leadership on follower seafarer job performance. It reminds management-level seafarers that they should pay close attention to subordinate mental state when they manage personnel resources in the engine room. As Hystad and Eid [14] noted that, some qualities associated with positive psychological capital, such as self-efficacy, enable to prepare seafarers well to assist them in dealing with stressors resulting from on-board working condition. Given that the importance of seafarer psychological capital in the on-board environment, the ERM training and evaluation must take qualities associated with psychological capital which includes self-efficacy, hope, optimism and resiliency into consideration. More importantly, maritime authorities and flag state government should draft relevant training regulations and items corresponding to above-mentioned qualities in order to practically promote seafarer psychological capital.

## 6. Limitations and Future Research Directions

There are several limitations to this study. Firstly, unlike existing research on authentic leadership, we have focused on the authentic leadership in the ERM team, because this leadership style was considered to be of critical significance in the context of seafaring. Notwithstanding, it may be thought that other leadership styles of leader in the engine room such as chief engineer also have both individual and organizational consequences. Future studies are suggested to test how far diverse leadership styles have different effects for an individual leader and an individual seafarer's job performance. An interesting problem to researchers may be to identify the most effective approaches for ERM team to promote the level of authentic leadership in chief engineer and second engineer. Given the important role of authentic leadership in the ERM team and its association with seafarer's job performance, future studies that examines the interdependencies between these or other variables, such as seafarer burnout would also seem particularly meaningful.

Secondly, the relatively specific sample category implied that we had to restrict the number of control variables included in our model. When we controlled seafarers' rank, marriage, and education for our regression model, the results demonstrate that these variables explained well for the variance of job performance. Future studies should include other demographic variables such as length of service to better evaluate the relative importance of the leaders' authentic leadership and seafarers' psychological capital for seafarers' job performance. Future studies can also involve the entire ERM team rather than individual seafarer. Other variables can be included when a larger sample in term of size and category are obtainable. For example, the impact of cultural differences on the outcomes of authentic leadership should be taken into consideration. Because the number of seafarers in our sample was relatively low and all of them were Chinese, we could not investigate the effect of cultural differences for the relation between authentic leadership and seafarers' psychological capital and job performance. The seafarer occupation is considered as an international career. When seafarers in a ship are from different counties, the importance of cultural differences cannot be neglected. Thus, further studies that examine the cross-cultural dimension of authentic leadership in the ERM team are essential. Meanwhile, we notice that China, as one of largest countries in both land area and population, seafarers of which from various regions behave apparently different in terms of language, personality and other demographic characteristics. This research trait is distinct from studies which occurs in other countries and should be especially noted. As regards the measures for our variables, future studies are advised to integrate exploratory and qualitative methods into their research design for providing empirically based measures. A more general issue concerns common method bias. Despite that we have taken the steps suggested in related literatures [31] the level of psychological capital derived from seafarers' report may differ as a function of their self-reported perception of authentic leadership though their genuine psychological capital may not be associated with the actual experience of authentic leadership. Likewise, a similar problem arising in the evaluation of the seafarer's job performance should be noted.

The last limitation is relates to the specific seafarer sample. The samples used in our study were mainly selected from the engine room seafarers, all of whom serviced for Chinese shipping company,

and may thus limit the generalizability of our findings. Although our sample only included seafarers in the Chinese shipping company we consider that alike relationships can also be found among seafarers in other countries. Nevertheless, future studies should strive to build their analysis upon a larger sample included other crewmembers in international shipping company to available for generalization of the results. Also of note, although our study was cross-sectional essentially (i.e., the same variable is examined on only one time point for each participant.), longitudinal studies (i.e., the same variable is measured at different points in time for each participant) would be conducive to permit to better comprehending the development of the relationship between authentic leadership, seafarer's psychological capital, and job performance.

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