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The impact of maritime service quality on employee satisfaction by seafarers rank: evidence from a global survey grounded on ERG theory

Impact
of maritime
service quality

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Abstract

Purpose – This study aims to reveal the constituents of seafaring service quality (physical and social environment) and their effects on seafarer employee satisfaction (job satisfaction and turnover intention) and analyse any differences among seafarer ranks. Literature on service quality has overlooked the transportation sector and seafaring in particular.

Design/methodology/approach – Seafaring service quality is measured by the workplace environment constituted of physical and social environments. Two types of employee (job) satisfaction were explored: overall job satisfaction and turnover intention. This study is based on a unique, large survey based on the Existence-Relatedness-Growth (ERG) needs theory. An exploratory factor analysis revealed four physical environment factors (Ship conditions, Communication facilities, Nautical health and Living conditions) and four social environment factors (Social fit, Team cohesion, Ship company support and Intercultural environment). Multi-group regression analysis assessed the effects of seafaring service quality on employee satisfaction.

Findings – The social environment has stronger effects than the physical environment on job satisfaction but not on employee retention. Team cohesion has strong effects on employee retention, while social fit has stronger effects on overall job performance. Seafarer ranks showed significant variations. The physical environment matters for 2nd engineers' and cadets' job satisfaction but not for ratings, masters and chief officers. Team cohesion is significant to master, chief officer, engineer and cadet ranks but not for junior officers and ratings. Social fit has stronger effects on overall job performance than employee retention, particularly for ratings, cadets, master, chief officer and chief engineer ranks. Ship company support has the stronger effect on overall job satisfaction among all workplace factors; this is also observed across all ranks.

Research limitations/implications – Motivation theories like the ERG theory can help understand service quality and employee satisfaction in the maritime sector; future studies should examine more behaviour variables/constructs from these theories.

Practical implications – Maritime companies can offer better services to seafarers, who are considered as key workers, by customising their interventions to specific seafarer ranks and developing a supportive culture that improves seafarer well-being.

Originality/value – This study examined the overlooked topic of maritime service quality based on a large-scale survey grounded on ERG theory and reveals how the physical and social environment has different effects on seafarer job satisfaction and retention.

Keywords Maritime, Service quality, Workplace environment, Social environment, Seafarers, Employee satisfaction, Seafarer rank

Paper type Research paper



1. Introduction

In an increasingly volatile environment, employee (job) satisfaction in the transportation sector and especially the maritime sector is proven critical in attracting and retaining personnel. Severe truck shortages in the UK, the USA and other countries occurred during and post the pandemic outbreak while reports warn of forthcoming severe seafarers shortages (BIMCO, 2021). While there is rich literature in marketing and retailing on how to create a workplace environment to improve service quality and consumer satisfaction, e.g. literature on ServiceScape (Shahzadi *et al.*, 2018; Awad *et al.*, 2020), a review of the maritime literature, reported in the next section, revealed that, compared the marketing literature, the effects of physical and social environments on seafarers' job satisfaction are not well understood (Pun *et al.*, 2003). Furthermore, maritime companies do not offer the same service environment to all seafarers: the seafarer rank impact their duties and their working and living conditions; those working at the deck, either as masters or cadets, are exposed to different physical and social environment than those working in the engineering department. However, the effects of seafarer rank on job satisfaction are also ignored in the transportation/maritime literature, while few studies have examined service environment in the transportation sector (Izogo and Ogba, 2015; Usman *et al.*, 2021).

A seafarer, i.e. any person employed or otherwise engaged onboard a ship, is unique compared to other workers; thus, results from job satisfaction studies in other sectors, such as retail and manufacturing (Iaffaldano and Muchinsky, 1985; Allan *et al.*, 2018), cannot be directly applied to the maritime sector. One of the reasons for low employee (seafarer) retention in the maritime sector is attributed to their physical environment being stressful, while their social environment forced them into isolation or working with people from diverse cultures, away from families and friends for a prolonged time (Tavacioglu *et al.*, 2019). Ship company culture often makes things worse, with several reports revealing that seafarers sometimes are subject to unprofessional practices, such as unfair contracts, denial of shore leave and payment delays (McVeigh *et al.*, 2018).

Anecdotal studies on seafarers' job satisfaction have examined various determinants such as (i) working and living conditions, e.g. adequate light, space and ventilation (Ashkanasy *et al.*, 2014), and (ii) social factors, e.g. communication and bonds with colleagues of similar culture (Progoulaki and Theotokas, 2016). A ship crew mainly consists of seafarers coming from many countries and cultures; however, the impact of this inter-cultural diversity on seafarers' job satisfaction is under-researched. Many other social factors, such as social fit, team cohesion and ship company culture, have shown positive effects on job satisfaction in other sectors (Eisenberger *et al.*, 1997; Scott *et al.*, 1998; Lee *et al.*, 2004) and have not systematically examined in the transportation and maritime context. While it is rational to hypothesise that working and living conditions and social factors such as social fit and team cohesion differ among seafarer ranks, no prior study has examined the impact of physical and social environments on job satisfaction.

This study builds upon employee motivation theories (Herzberg, 1987; McClelland, 1987) and particularly on the Existence-Relatedness-Growth (ERG) needs theory (Alderfer, 1969) that argues that each employee is unique and has unique needs; when a company's workplace environment fulfils these needs, then the employees are satisfied. ERG needs theory has been widely adopted in job satisfaction studies (Arnolds and Boshoff, 2002; Kaplan *et al.*, 2018). Since seafarers at different ranks require different hard and soft skills and engage in various roles/activities within every ship, this would result in physical and social environments with different stress levels for different ranks. For example, the needs of a captain or master are different from those of a 2nd engineer or a rating. Therefore, the physical and social environment of different ranks should lead to different effects on job satisfaction and turnover intention. No prior study has examined these effects, yet knowing how the physical and social environment affect the job satisfaction of different seafarer ranks can have

significant practical implications. For example, ship companies, instead of adopting a “one-size-fits-all” policy, can design the physical place and develop a social environment in ways that fit the actual needs of seafarers of different ranks and ultimately improve their well-being. Instead, currently, reports indicate low job satisfaction among seafarers and high turnover rates, especially after the pandemic outbreak.

This study conducted a large-scale survey of about 1,600 seafarers, one of the largest surveys in the field. Exploratory factor analysis revealed four physical environment factors (Ship conditions, Communication facilities, Nautical health and Living conditions) and four social factors (Social fit, Team cohesion, Ship company support and Intercultural environment).

The research hypotheses were tested with a multi-group regression analysis having as independent variables the physical and social environment factors and two dependent variables (job satisfaction and employee turnover), controlled for the effects of various personal, company and ship factors. Each group corresponded to a seafarer rank; this study compares eight different seafarer ranks (i) Master, (ii) Chief officer, (iii) Chief engineer, (iv) 2nd Engineer, (v) Junior officer, (vi) Rating, (vii) Cadet and (viii) Other ranks, e.g. cooks).

Findings indicate that seafarers’ overall job satisfaction is well explained ($r^2 = 0.572$) by the regression model. The physical environment has a significant effect on overall job satisfaction but little or negative impact on employee retention. The social environment has stronger effects than the physical environment on job satisfaction but not on employee retention. Ship company support has a stronger effect on overall job satisfaction across all ranks. Team cohesion has strong effects on employee retention, while social fit has stronger effects on overall job performance.

Seafarer ranks showed significant variations. Specifically, the physical environment matters for 2nd engineers’ and cadets’ job satisfaction but not for ratings, masters and chief officers. Nautical health is significant for the retention of both chief and 2nd engineers. Team cohesion is significant to master, chief officer, engineer and cadet ranks but not for junior officers and ratings. Social fit has stronger effects on overall job performance than employee retention, particularly for ratings, cadets, master, chief officer and chief engineer ranks. Ship company support has the stronger effect on overall job satisfaction among all workplace factors; this is also observed across all ranks, indicating the need for supportive company culture.

The next section reviews the relevant literature and develops the conceptual model. Then, the method section presents the research design, the development of scales, the operationalisation of variables and the analytical strategy. The subsequent section presents the results of hierarchical moderated regression analysis. The last section discusses the theoretical, managerial and policy implications, study limitations and recommendations for future research.

2. Literature review

2.1 Background and motivation

Employees are considered the most valuable asset in today’s business. Creating a working environment that motivates employees and fulfils their needs to improve their well-being has become a key business priority. Several theories have explored employee motivation, which can be classified into two categories: process-based and need-based. Process-based theories of motivation, such as equity theory, expectancy theory, and reinforcement theory, seek to understand the psychological processes underlying motivation (Van den Broeck *et al.*, 2019). For example, according to equity theory, fairness is a process of comparing inputs and outcomes of employee behaviour to other employees’ inputs and outcomes (Zhou *et al.*, 2020). Need-based theories of motivation posit those individual needs drive actions; needs can be fixed, acquired, or develop. The Herzberg two-factor theory includes two categories of needs

(i) hygiene factors, such as salary and working conditions, and (ii) motivators such as achievement, recognition, and growth opportunities (Herzberg, 1987). Similarly, Acquired-Needs Theory posits that individuals have stable needs either for (a) achievement, (b) affiliation, or (c) power; each need is satisfied by different workplace environment ('habitat') factors, e.g. social fit satisfies the employee need for affiliation and thus increases their job satisfaction (McClelland, 1987). ERG theory proposes three types of needs: Existence (i.e. working and living needs), Relatedness (i.e. belongingness, togetherness), and Growth needs (i.e. learning, personal/professional development) (Alderfer, 1969). The advantage of needs-based theories is that they reveal what employee needs are important so companies can create a workplace environment that prioritises those needs. This study focuses on how the workplace environment affects job satisfaction for seafarers of different ranks. Workplace environment consists of the physical environment and the social environment. Specifically, the physical environment should satisfy hygiene needs according to Herzberg's two-factor theory and existence needs according to ERG theory. The social environment includes motivators such as recognition (Herzberg, 1987) that satisfy employee relatedness needs, e.g. the needs for acceptance and social affiliation (McClelland, 1987).

Motivation theories have been criticised that do not explicitly consider the impact of contextual factors such as the country and industry; for example, Allan *et al.* (2018) meta-analyse studies related to work engagement, commitment, and job satisfaction and note that the results are only generalisable to a Western context; Jiang *et al.* (2012) in a similar meta-analysis suggest that employee turnover varies significantly depending on the industry. Indeed, recent reports indicate as high as 90% turnover in the US truck industry (Cassidy, 2021) and Caesar *et al.* (2015) note that, apart from the difficulty in recruiting seafarers, about 10% of officers plan to leave prematurely; these reports are prior to the COVID pandemic, which has since affected seafarers as key workers adversely. Therefore, since the workplace environment (physical/social) is so distinct in the maritime industry, findings from other industries should not be considered directly transferable to seafaring; thus there is a need to examine these factors in seafaring. Indeed, Mitroussi and Notteboom (2014) note that seafarers' needs have been largely overlooked by theory and praxis and only recently the seafarers' needs have come to the spotlight, e.g. the Maritime Labour Convention (MLC) was drafted in 2006 and entered into force in 2013.

The differences among seafarer ranks are also omitted in most studies. For example, Yuen *et al.* (2018)'s study of seafarers' job satisfaction focused on four determinant groups (rewards, stressors, job characteristics, and dispositional) without any reference to their needs. Mehdizadeh Dastjerdi *et al.* (2019) examine individual travel decisions in Copenhagen, Denmark and Kaplan *et al.* (2018) examine human needs in adopting bicycle sharing, both studies applied ERG theory. Guo *et al.* (2006) find that Taiwanese students would choose seafaring to fulfil their growth and self-esteem needs while Lu *et al.* (2018) find that graduates seek to work onboard to satisfy their social needs. However, the omission of how differences among seafarer ranks affect their job satisfaction is serious: the ship is a culturally diverse environment. Five countries (Philippines, Russian Federation, China, India, and Indonesia) dominate the around 1.9 million seafarer population serving around 74,000 vessels around the globe (BIMCO, 2021). There is a shortage of officers globally, with 190,000 of them coming from the European Union, while five EU countries (Greece, Norway, Poland, Croatia, and Italy) account for half of EU-certified masters and officers (EMSA, 2022). Job needs vary significantly among seafarer ranks (ILO, 2020): for example, Pauksztat (2017) find a different "working climate" between desk and engineer ranks in terms of rest, fatigue, and rest which affects their turnover.

Given the absence of a systematic study of seafarers' workplace environment impact on the job satisfaction of different seafarer ranks, the following two hypotheses linking physical/social environment with seafarer job satisfaction were formulated based on extant literature.

2.2 Physical environment

Working and living needs focus on the basic conditions necessary for human existence, including shelter, food, and health factors. In a ship environment, existence needs refer to three types of features: (i) physical features, which can be positive, such as adequate light, space, ventilation, plants, and direct window view or negative, like noise, heat, insufficient illumination, and lack of space (Ashkanasy *et al.*, 2014); (ii) workplace functionalities, such as communication tools to allow seafarers contacting friends and family, health safety processes, purposely designed recreational spaces (Elsbach and Stigliani, 2018), and artefacts to entertain themselves (Gu *et al.*, 2020); and, (iii) barriers/restrictions that constraint the environment-person fit, such as limited space, long working hours, i.e. less free time, and fewer recreational options (McVeigh *et al.*, 2019).

Several empirical studies have confirmed that working and living conditions in a ship environment often do not meet basic employee needs which reduces their job satisfaction: Pauksztat (2017)'s study entitled "*only work and sleep*" describes the adverse effects of circadian disturbance by ship environment on seafarers' health. Physical stressors and features, such as noise, lighting, dirt, and obstacles create an adverse working environment (Oldenburg and Jensen, 2019). Nguyen *et al.* (2014) interviewing 46 Vietnamese seafarers find that working and living conditions on-board ships are a key factor in seafarer retention. Chung *et al.* (2017) recognise that seafarers suffer from personal and work-related burnout due to adverse working conditions such as time zoning crossing, noise, and motion. Tavacioglu *et al.* (2019) find a negative correlation between burnout and job satisfaction among Turkish oceangoing seafarers. Accidents are also a major concern among seafarers and maritime students (Lu *et al.*, 2018). Caesar *et al.* (2015) review studies on determinants of seafarers' retention and find that working conditions are a significant one; further, workplace health and safety issues often cause seafarers quitting to landside jobs.

Several studies propose that seafarer rank differences are reflected in how their physical environment impacts their job satisfaction and turnover intention. Industry reports highlight violations of the Maritime Labour Convention 2006 (MLC), especially for low-rank seafarers, which indicate that seafarer rank should have an impact on seafarer job seafarer and turnover intention. Fotteler *et al.* (2018), investigating the views of 55 seafarers, compare two ranks (officer/non-officer) and three departments (deck/engineering/steward) and find that MLC improved job satisfaction more for non-officers than officers while the authors did not report about department differences. McVeigh *et al.* (2019) argue that the chief engineer of a ship, who has a management position and considerable onboard experience, has higher job satisfaction than second and third engineers. Yet, the impact of the workplace environment was not investigated. Haka *et al.* (2011) compare the workplace environment between Danish-speaking seafaring officers and non-officers and find no significant differences, which contradicts findings by similar reports (ILO, 2020). Apart from the officer and non-officer groups, no other ranks have been examined in previous studies systematically while this study examines eight different seafarer ranks.

Therefore, we hypothesise:

- H1a. The effects of the physical environment on job satisfaction differ among seafarers of different ranks
- H1b. The effects of the physical environment turnover intention differ among seafarers of different ranks.

2.3 Social environment

The social environment refers to the employee's social, professional, and interpersonal relationships with others in the workplace, typically with co-workers, supervisors, and fellow

crew members. Since seafarers work and live in a confined environment with the same people over a prolonged time, their social environment should include (i) work relations with other colleagues in the same group or department, i.e. team cohesion, (ii) social/interpersonal relationships with fellow seafarers, i.e. social fit, (iii) any support from the shipping company, and since seafarers come from diverse cultural backgrounds, (iv) the inter-cultural environment.

Team cohesion typically refers to a group of people committed to the task by pooling diverse knowledge and skills together (Tekleab *et al.*, 2016). Team cohesion can be observed in formal and informal teams and social networks, especially when working in adverse environments like a ship (Lee *et al.*, 2004). The greater the team cohesion the greater the sacrifice seafarers make when they leave their team or the maritime company; therefore, team cohesion should improve job satisfaction and reduce employee turnover (Mitchell *et al.*, 2001).

Social fit refers to the social relationships among employees, which differentiate their behaviour from other persons and expresses their individual identities (Yuen *et al.*, 2018). Social fit based on gender, age, ethnicity, race, or nationality can reduce alienation, workplace incivility, workplace insecurity, and subjective uncertainty by cohesion (Hogg, 2011), which makes employees feel among friends and family and ultimately improves their job satisfaction (Scott *et al.*, 1998). Therefore, the social fit should improve job satisfaction, especially in an isolated environment.

A supportive ship culture embraces employees, illustrates the sincerity and benevolence of the organisation towards its employees, and generates trust and employee commitment (Pantouvakis and Vlachos, 2020). When responsibilities are clarified to underperformers, they can correct their behaviour and job satisfaction improves (Acevedo and Yancey, 2011). A supportive organisational culture motivates employees to reciprocate by attaching and embedding themselves into the specific organisational setting (Eisenberger *et al.*, 1997).

Sætra (2015) notes that the shipping crisis in the 1980s encouraged the 'flagging out' of ships in low-cost countries resulting in diverse, international crews. Intercultural-environment can potentially protect seafarers from the negative effects of long-term isolation: seafarers feeling confident with fellow seamen from the same culture become less detached and isolated, thus avoiding burnout, withdrawal, and other negative effects of long-term isolation (Boswell *et al.*, 2014; Tavacioglu *et al.*, 2019). While diversity is praised in office workplace environments, a diverse intercultural ship environment may have divergent effects on seafarers. Progoulaki and Theotokas (2016) note that an intercultural environment can raise communication barriers among seafarers of different cultures, resulting in reduced team cohesion, which ultimately damages seafarers' morale and even leads to accidents.

Empirical studies have empirically examined various social environment factors.

Nielsen *et al.* (2013) find team cohesion to be a strong determinant of job satisfaction and seafarer retention in two Norwegian shipping companies. Regarding social fit, Lu *et al.* (2018) find that social needs motivate graduates to begin working on-board, thus meeting these expectations would make them satisfied while Yuen *et al.* (2018) surveying 166 seafaring officers find that social interactions can safeguard seafarers against burnout from monotonous jobs, single-person tasking, and work-family stress. Bhattacharya (2015), surveying 433 male, Indian, merchant, deck and engine officers, find seafarer engagement significantly and positively related to retention. However, Gu *et al.* (2020), sampling 294 merchant seafarers find that entertainment has no impact on turnover intention, which the authors attribute to the uniqueness of the maritime profession. Thomas* (2004) argues that a supportive culture is particularly needed for female seafarers, particularly in the form of support coming directly from leaders and line managers (Mitroussi and Notteboom, 2014).

Empirical studies report conflicting findings on the effects of seafarers' rank on their relatedness needs and job satisfaction.

Sengupta *et al.* (2019) surveying 351 Indian seafarers find that although they present significant differences among their tenure regarding autonomy, social support, and coaching, significant differences are found among their ranks (i.e. wipers, officers, engineers). Kim and Jang (2016) investigate mental health in South Korean marine officers using the Symptom Checklist-90-Revision and find that overall, they presented higher levels of disorders than the average population, in terms of pathology and psychiatric disorders; chief engineers have the highest job stress, followed by the third engineers; in general, the engine department display higher job stress than the deck department. On the contrary, McVeigh *et al.* (2018), interviewing marine officers of a large shipping company, find that ratings (i.e. mostly Filipinos in this case) had a better social life than officers due to their homogenous nationality, fixed mealtimes, and space to interact; as a result, ratings experience higher job satisfaction levels relative to officers/engineers. In a follow-up study, McVeigh *et al.* (2019) find that crew and caterers reported higher job satisfaction than officers/engineers and argue that seafarer rank significantly predicts job satisfaction.

Thus, we hypothesise:

H2a. The effects of social environment on job satisfaction differ among seafarers of different ranks.

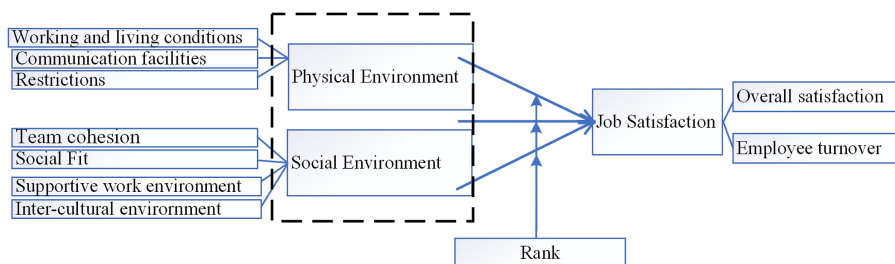
H2b. The effects of social environment on turnover intention differ among seafarers of different ranks.

Overall, the conceptual framework of this study and the research hypotheses are depicted by Figure 1.

3. Methods

3.1 Research design and sampling

We tested the research hypotheses with a large-scale survey in 2019. Respondents were seafarers who were employed onboard mostly on merchant vessels than passenger ships when the survey took place. In total 5,000 seafarers were randomly selected globally via various crew agencies which also helped in distributing the electronic questionnaire and collecting 2,179 responses (44% initial response rate). However, 179 questionnaires were incomplete, 221 more questionnaires had a large number of missing values and 167 respondents answered incorrectly in the filter questions testing honest replies; all these questionnaires were excluded, resulting in 1,612 completed responses and an effective response rate of 32%. No systematic bias was found in incomplete/missing values questionnaires by testing seafarer demographics and comparing crew agencies' responses. Compared to similar studies (Pantouvakis and Vlachos, 2020), the response rate is slightly better despite the sample size being three to four times higher.



Source(s): Author's own creation/work

Figure 1.
Workplace
environment - job
satisfaction – seafarer
rank model

Most seafarers in the sample (95.2%) have been employed on a ship within the last two years. Almost all of them are male (99.3%), which is representative of the seafarer population (BIMCO (2021) reports that women account for only 1.2% of the 1.25 million seafarers globally); most of them were born between 1971 and 2010. Almost half of the respondents in the sample are Filipinos (49.1%), followed by Ukrainian (17.1%), Russian (15.9%), and Indian (11.2%) nationalities. Seafarers work mainly at the deck (57.4%) and the engine (37.2%). Regarding their rank, most of the respondents are ratings (36.8%), followed by junior officers (12.9%), masters (10%), chief officers/chief mates (8.8%), and chief engineers (8.5%).

3.2 Scales and operationalisation of variables

The operationalisation of variables was based on previous empirical studies. However, because (i) the key constructs of this study (job satisfaction, physical/social environment, team cohesion, social fit etc) were developed and tested in different than the maritime contexts, and (ii) the aim of the study was not to confirm those scales at maritime sector but rather to measure the impact of workplace environment on job satisfaction depending on seafarers' ranks, thus we decided not to operationalise the constructs with Confirmatory Factor Analysis (CFA). Instead, we applied a four-step procedure to uncover the structure of those constructs in the maritime sector; (a) we performed a pilot study on 50 seafarers to clarify the wording and the content validity of the constructs resulting in 12 items being excluded from subsequent analysis; (b) Three human resource managers from big maritime companies were then employed to verify the face validity of the questionnaire; (c) then, in line with Rossiter (2002), an Exploratory Factor Analysis (EFA) was performed with acceptable indices (reported in the next section) allowing us to reduce the variables into few factors (Hair, 2010); and (d) the factorial instrument was further tested by the use of a two-step hierarchical regression (described below) as suggested by Anderson (1993). A 7-item Likert scale was used for all behavioural measures except dichotomous or control variables (e.g. gender, nationality).

3.2.1 Dependant variable. Job satisfaction has been extensively studied as a multi-level construct, i.e. see meta-analyses by Iaffaldano and Muchinsky (1985) and Allan *et al.* (2018), but not there is no consensus about it in the maritime context. For example, Yuen *et al.* (2018) measure Job satisfaction with two questions "I am satisfied with my job" and "I am satisfied with my company"; Tavacioglu *et al.* (2019) use the Minnesota Job Satisfaction Scales that contain scales such as success, recognition, the manner of managers/supervisors, and payment. Exploratory factor analysis produced three factors (Table A.I-Appendix): Overall job satisfaction ($\alpha = 0.87$) and Turnover intention ($\alpha = 0.80$). Employee retention was calculated as the negative of Turnover intention. Total variance extracted (TVE = 61%), Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO = 0.831), and Bartlett's test of sphericity ($\chi = 9,750, p < 0.001$) demonstrate strong integrity of the factor solution.

3.2.2 Independent variables. Factor analysis produced a robust solution for workplace environment (TVE = 63%, KMO = 0.91, Bartlett's $\chi = 19,321, p < 0.001$) consisting of the following factors (see Table A.II in Appendix): Ship conditions ($\alpha = 0.90$); Communication facilities ($\alpha = 0.77$); Nautical health ($\alpha = 0.83$); Living conditions ($\alpha = 0.83$); and environmental stress ($\alpha = 0.32$). The last factor (environmental stress) was excluded from further analysis due to low reliability (α). Ship conditions relate to ventilation, temperature, and lighting. Communication facilities refer to the opportunities that seafarers have to communicate freely with the outside world including friends and family. Nautical health refers to food and nutrition, which is particularly important when employees live and work isolated for a prolonged time. Living conditions include hygiene, cleanliness of work areas, and recreational areas.

Another factor analysis analysed 26 items of social environment, many of them coming from Zhang (2010). A robust factor solution (TVE = 58%, KMO = 0.87, Bartlett's $\chi = 14,262,$

$p < 0.001$) (Table A.III in Appendix) that included four factors: Team cohesion ($\alpha = 0.82$), Social fit ($\alpha = 0.65$), Ship company support ($\alpha = 0.88$), and Inter-cultural environment ($\alpha = 0.85$). Social fit refers to the extent seafarers engage in social and leisure activities, which influence job satisfaction, particularly in confined spaces (Österman *et al.*, 2020). Team cohesion represents how the person fits the team including commitment, opportunities for development, and team performance. Ship company support refers to the organisational culture, provision, and rewards, which are considered strong predictors of job satisfaction (Lund, 2003). The intercultural environment reflects how confident and secure seafarers feel working with people of different cultures onboard.

3.2.3 *Control variables.* Control variables were classified in four categories: (i) Personal; (ii) occupational; (iii) ship; and (iv) company characteristics. Personal needs may affect seafarer rank needs; Occupational factors relate to seafarer rank, department, and experience and would affect job satisfaction; ship factors would relate to the workplace environment; company factors would impact job satisfaction.

3.3 Analytical methods

The analysis strategy included three phases: Firstly, before data analysis, item development was based on an extensive review of previous empirical studies and piloted with maritime experts. Non-response bias was evaluated, and no significant differences were found. The demographic profile of respondents was compared with the profile of seafarers.

Secondly, data analysis took place in three stages: (i) discriminant analysis among the control, workplace environment factors and job satisfaction variables for the overall sample; (ii) multi-group hierarchical regression analysis in two steps: (a) control variables; (b) workplace environment variables. Then, multi-group regression analysis was performed with each group to represent one seafarer rank; and (iii) sensitivity tests ensured the validity of findings: those include factor analysis using different extraction and rotation methods; Bartlett and Anderson-Rubin methods; collinearity tests using the variance inflation factors (VIF); Durbin–Watson outlier test; and bootstrapping regression models.

4. Findings

4.1 Discriminant analysis

Discriminant analysis revealed that the correlation between the control variables was expectedly high, i.e. between age and experience ($r = 0.832^{**}$) and rank and experience ($r = 0.446^{**}$) (see Tables A.IV–A.XII in Appendix). Correlation coefficients among the independent variables were either not significant or had values below 0.3. Overall job satisfaction was the only dependant variable showing significant correlation coefficients with Ship company support ($r = 0.58$), Ship conditions ($r = 0.374$), Communication facilities ($r = 0.335$), and Social fit ($r = 0.323$).

Control variables (in Step I models) showed mixed effects across the job satisfaction constituents: Company size ($\beta = 0.14$ $p < 0.001$), Department ($\beta = 0.07$ $p < 0.01$), and Flag ($\beta = -0.12$ $p < 0.01$) showed significant effects on Payment satisfaction; Nationality ($\beta = -0.17$ $p < 0.001$) had a strong negative effect on Overall job satisfaction and was the only control variable to impact on Employee retention ($\beta = 0.14$ $p < 0.001$).

4.2 Workplace environment regression analysis

Table 1 presents the findings of the hierarchical regression analysis for the two dependent variables, F , r^2 , and Δr^2 values.

The workplace environment model (Step II) shows strong relation to Overall job satisfaction ($r^2 = 0.572$, $\Delta r^2 = 0.517$, $p < 0.001$; $F = 127.60$, $p < 0.001$) and less on Employee

Table 1.
Hierarchical regression
analysis: Seafarers'
workplace
environment impact on
job satisfaction and
retention

Variables	Overall job satisfaction		Employee retention	
	Step I	Step II	Step I	Step II
<i>I: Control variables</i>				
1. Age	0.13 (2.85)**	0.07 (2.44)**	-0.01 (-0.15)	-0.03 (-0.66)
2. Gender	0 (0.08)	-0.02 (-1.21)	0.01 (0.47)	0.02 (0.9)
3. Nationality	-0.15 (-5.56)**	-0.03 (-1.59)	0.15 (5.73)**	0.11 (4.79)**
4. Rank	-0.03 (-1.04)	-0.01 (-0.45)	0.13 (4.84)**	0.09 (3.78)**
5. Department	0.07 (3.02)**	0 (0.04)	0.06 (2.28)**	0.05 (2.18)**
6. Experience	-0.02 (-0.53)	-0.03 (-1.05)	0.04 (0.94)	0.06 (1.44)
7. Ship type	-0.03 (-1.3)	-0.03 (-1.78)	-0.07 (-2.9)**	-0.05 (-2.16)**
8. Company size	0.14 (5.59)**	0.04 (2.26)**	-0.03 (-1.02)	-0.01 (-0.34)
9. Ownership	-0.02 (-0.74)	0 (-0.04)	-0.02 (-0.74)	-0.03 (-1.33)
<i>II: Physical Environment</i>				
10. Ship conditions		0.18 (9.99)**		-0.02 (1.04)
11. Communication facilities		0.14 (7.8)**		-0.05 (2.16)**
12. Nautical health		0.12 (6.68)**		0.03 (-1.17)
13. Living conditions		0.01 (0.29)		-0.1 (4.26)**
<i>III: Social Environment</i>				
14. Social fit		0.26 (14.34)**		-0.11 (4.84)**
15. Team cohesion		0.11 (6.45)**		0.44 (-20.07)**
16. Company support		0.45 (22.74)**		0.06 (-2.31)**
17. Inter-cultural environment		0.19 (11.1)**		0.06 (-2.76)**
F value	11.30***	127.6***	13.29***	40.44***
Adjusted r ²	0.054	0.572	0.064	0.294
Δr^2	0.06 ***	0.517***	0.07 ***	0.232***
Note(s): *** denotes $p < 0.001$, ** denotes $p < 0.01$, * denotes $p < 0.05$; I: Step I, II: Step II				
Source(s): Authors' own creation/work				

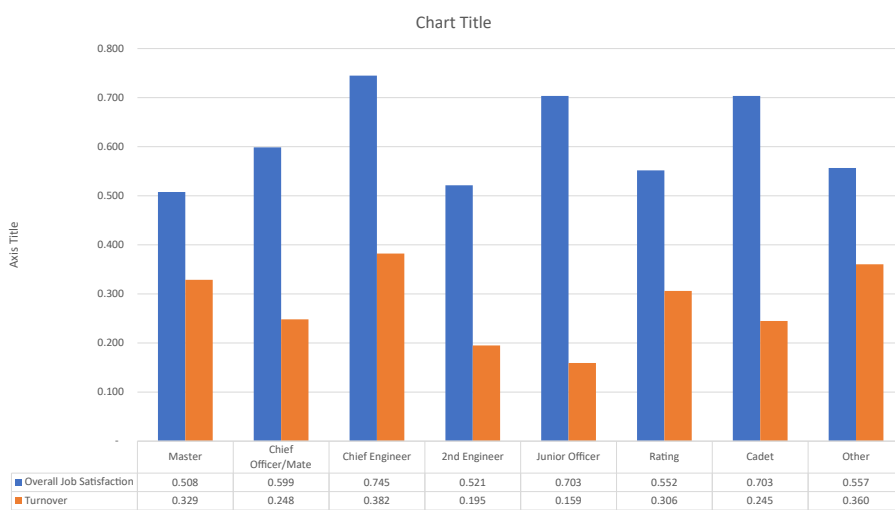
retention ($r^2 = 0.294$, $\Delta r^2 = 0.232$, $p < 0.001$; $F = 40.44$, $p < 0.001$). These findings are supported by the results in Step I where only control variables enter the model: the impact of control variables on Overall job satisfaction ($r^2 = 0.054$) and Employee retention ($r^2 = 0.064$) is significantly lower than the impact in Step II. Taken together, these findings indicate that the workplace environment model is robust. However, Among workplace environment factors, the social environment variables (Social fit, Team cohesion, Ship company support, Intercultural environment) showed the higher impact (beta coefficients) on job satisfaction and employee retention but opposite strengths.

Specifically, Ship company support ($\beta = 0.45$, $p < 0.001$) and inter-cultural environment ($\beta = 0.19$, $p < 0.001$) impacted more overall job satisfaction than Employee retention ($\beta = 0.06$ and $\beta = 0.06$ respectively) while Team cohesion affected more Employee retention ($\beta = 0.44$, $p < 0.001$) than Overall job satisfaction ($\beta = 0.11$, $p < 0.001$). The effect of Social fit was negative on Employee retention ($\beta = -0.11$, $p < 0.001$) and stronger on Overall job satisfaction ($\beta = 0.26$, $p < 0.001$). Ship conditions ($\beta = 0.18$, $p < 0.001$), Communication facilities ($\beta = 0.14$, $p < 0.001$), and Nautical health ($\beta = 0.12$, $p < 0.001$) had significant but lower effects than social environment factors on Overall job satisfaction while living conditions had no significant effect. The physical environment had a little or negative impact on Employee retention.

4.3 Seafarer rank multi-group regression analysis

The analysis of the workplace environment-job satisfaction model against seafarer rank revealed significant differences (Figure 2). First, the highest overall job satisfaction was reported by Chief engineers ($r^2 = 0.745$) and the lower by Masters ($r^2 = 0.508$). Chief engineers also reported higher employee retention ($r^2 = 0.382$) while junior officers had the lowest ($r^2 = 0.159$). The multi-group hierarchical regression analysis is reported in Appendix and its summary is in Tables 2 and 3.

Ship company support had the strongest effects on overall job satisfaction across seafarer ranks, particularly Cadet ($\beta = 0.58$, $p < 0.001$), Chief engineer ($\beta = 0.41$, $p < 0.001$), 2nd Engineer ($\beta = 0.40$, $p < 0.01$), Rating ($\beta = 0.38$, $p < 0.001$), Master ($\beta = 0.36$, $p < 0.001$), Chief Officer ($\beta = 0.35$, $p < 0.001$), and Junior Officer ($\beta = 0.21$, $p < 0.001$). On the contrary, Ship company support had overtly no significant impact on preventing Turnover except for Rating rank ($\beta = 0.10$, $p < 0.01$).



Source(s): Author's own creation/work

Figure 2.
Seafarer's job
satisfaction and
Turnover intention
by rank

Table 2.
Physical environment, social environment and job satisfaction: multi-group regression analysis by seafarer rank

Variables	Master	Chief officer	Chief engineer	2nd engineer	Junior officer	Rating	Cadet	Other
<i>I: Control variables</i>								
1. Age	0.01 (0.11)	-0.04 (-0.38)	0.13 (1.97)	0.06 (0.42)	0.07 (1.52)	0.02 (0.29)	0.08 (1.39)	-0.08 (-0.9)
2. Gender	0.03 (0.42)	0.04 (0.54)	-0.08 (-1.17)	-0.06 (-0.57)	0.56 (10.75)***	-0.02 (-0.77)	-0.19 (-3.12)**	-0.05 (-1.06)
3. Nationality	-0.04 (-0.56)	0 (-0.07)	0.44 (5.63)***			-0.01 (-0.24)	0.14 (2.01)**	-0.05 (-0.87)
4. Department	0.01 (0.09)	0.19 (2.03)**	-0.16 (-2.32)**	-0.1 (-0.63)	0.21 (4.7)***	0.02 (0.37)	-0.17 (-3.09)**	0.04 (0.68)
5. Experience	0 (-0.04)	-0.12 (-1.66)	-0.13 (-2.22)**	-0.15 (-1.48)	0 (-0.87)	-0.02 (-0.71)	-0.08 (-1.59)	0.07 (0.87)
6. Ship type	0.08 (1.07)	0.08 (1.12)	0.11 (1.84)	-0.02 (-0.13)	0.19 (2.45)**	0.07 (2.09)**	0.01 (0.08)	0.01 (0.24)
7. Company size	0.12 (1.57)	0.07 (1.05)	0.08 (1.36)	0.12 (1.26)	-0.01 (-0.17)	0.03 (0.89)	0.02 (0.38)	-0.01 (-0.24)
8. Ownership							-0.01 (-0.22)	-0.03 (-0.58)
<i>II: Physical Environment</i>								
9. Ship conditions	0.12 (1.53)	0.18 (2.65)**	0.23 (3.33)**	0.16 (1.3)	0.09 (2.03)**	0.12 (3.45)***	0.08 (1.31)	0.23 (4.44)***
10. Communication facilities	0.07 (1.01)	0.26 (3.42)**	0 (-0.02)	-0.01 (-0.14)	0 (-0.1)	0.2 (5.66)***	-0.02 (-0.34)	0.24 (4)***
11. Nautical health	0.24 (3.32)**	-0.01 (-0.1)	0.11 1.64	0.16 1.6	-0.18 (-2.3)**	0.1 (3.05)**	0.02 0.31	0.14 (2.43)**
12. Living conditions	0.15 (1.99)**	-0.03 (-0.37)	0.05 (0.83)	0.03 (0.33)	-0.04 (-0.83)	0.02 (0.58)	0.02 (0.32)	0.12 (2.04)**
<i>III: Social Environment</i>								
13. Social fit	0.27 (3.23)**	0.2 (2.72)**	0.21 (3.4)**	0.13 (1.19)	0.04 (0.79)	0.24 (7.21)***	0.34 (5.61)***	0.11 (2.07)**
14. Team cohesion	0.14 (1.75)	0.07 (1.01)	0.15 (2.51)**	0.29 (2.67)**	-0.01 (-0.21)	0.05 (1.55)	0.07 (1.06)	0.06 (1.14)
15. Ship company support	0.36 (4.23)***	0.35 (4.14)**	0.41 (5.83)***	0.4 (3.11)**	0.21 (4.22)***	0.38 (9.89)***	0.58 (8.44)***	0.29 (4.05)***
16. Inter-cultural environment	0.18 (2.54)**	0.14 (2.05)**	0.16 (2.57)**	0.1 (0.97)	0.07 (1.47)	0.16 (4.76)***	0.18 (2.66)**	0.11 (2.04)**
F value	8.177***	11.16***	15.64***	5.075***	23.69***	35.33***	18.71***	-0.05 (-1.06)
Adjusted r ²	0.527	0.665	0.735	0.505	0.705	0.560	0.757	-0.05 (-0.87)
Δr^2	0.029	0.067***	0.0	0.009	0.007	0.01 **	0.052***	0.04 (0.68)
Note(s): *** denotes $p \leq 0.001$, ** denotes $p \leq 0.01$, * denotes $p \leq 0.05$; I: Step I, II: Step II								
Source(s): Authors' own creation/work								

Variables	Master	Chief officer	Chief engineer	2nd engineer	Junior officer	Rating	Cadet	Other
<i>I: Control variables</i>								
1. Age	-0.06 (-0.66)	0.24 (1.69)	-0.21 (-2.2)**	-0.13 (-0.7)	0 (0.06)	-0.05 (-1.22)	0.05 (0.54)	0.01 (0.07)
2. Gender							0.1 (0.9)	-0.1 (-1.65)
3. Nationality	-0.1 (-1.1)	0.04 (0.43)	-0.15 (-1.46)	-0.2 (-1.52)	0 (1.79)	0 (1.64)	0.02 (0.14)	-0.08 (-1.13)
4. Department	0.12 (1.41)	-0.13 (-1.35)	0.27 (2.37)**		-0.04 (-0.29)		-0.01 (-0.07)	-0.08 (-1.32)
5. Experience	0.06 (0.63)	-0.43 (-3.06)**	0.01 (0.08)	0.22 (1.09)	-0.12 (-1.74)	-0.06 (-0.94)	0.1 (1.08)	-0.05 (-0.51)
6. Ship type	0.15 (1.76)	-0.03 (-0.25)	0.04 (0.41)	0.04 (0.32)	-0.2 (-2.6)**	-0.01 (-0.21)	-0.05 (-0.45)	-0.03 (-0.45)
7. Company size	0.2 (2.29)**	-0.09 (-0.85)	-0.08 (-0.88)	0.01 (0.05)	-0.07 (-0.94)	0.09 (2.24)**	0.03 (0.29)	-0.1 (-1.5)
8. Ownership	0.12 (1.35)	0.25 (2.43)**	0.03 (0.36)	-0.16 (-1.27)	0.14 (1.1)	0.09 (1.33)	0.07 (0.69)	0.03 (0.41)
<i>II: Physical Environment</i>								
9. Ship conditions	-0.04 (-0.4)	0.18 (1.8)	-0.14 (-1.35)	-0.26 (-1.65)	0.11 (1.48)	-0.02 (-0.48)	0.15 (1.43)	0.07 (1.07)
10. Communication facilities	-0.02 (-0.24)	0.13 (1.12)	-0.08 (-0.8)	-0.05 (-0.35)	0.01 (0.11)	-0.06 (-1.52)	0.04 (0.4)	0.09 (1.24)
11. Nautical health	-0.15 (-1.72)	-0.01 (-0.05)	-0.21 (-2.07)**	-0.29 (-2.24)**	-0.06 (-0.84)	0.03 (0.8)	0.16 (1.54)	-0.12 (-1.63)
12. Living conditions	0.1 (1.08)	-0.04 (-0.34)	0.16 (1.72)	0.13 (1.04)	-0.08 (-1)	0.04 (0.99)	0.19 (1.71)	0.14 (1.99)**
<i>III: Social Environment</i>								
13. Social fit	0.1 (0.97)	-0.05 (-0.5)	0.2 (2.15)**	0.24 (1.73)	-0.03 (-0.39)	0.11 (2.48)**	0.18 (1.68)	0.03 (0.5)
14. Team cohesion	-0.44 (-4.75)***	-0.46 (-4.49)***	-0.36 (-3.86)***	-0.34 (-2.49)**	0.1 (1.28)	-0.04 (-0.84)	-0.41 (-3.39)**	-0.53 (-7.7)***
15. Ship company support	-0.05 (-0.35)	-0.14 (-1.08)	0.01 (0.11)	0.11 (0.68)	0.07 (0.91)	0.1 (2.47)**	-0.12 (-1.04)	0.04 (0.43)
16. Inter-cultural environment	-0.02 (-0.22)	-0.13 (-1.31)	-0.01 (-0.07)	-0.14 (-1)	0.14 (1.79)	0.09 (2.24)**	-0.02 (-0.14)	-0.14 (-2.11)**
F value	4.392***	2.839***	4.365***	1.954*	3.315***	12.95***	3.047***	6.243***
Adjusted r ²	0.345	0.265	0.389	0.193	0.196	0.307	0.265	0.351
Δr ²	0.031	0.038	0.025	0.034	0.047*	0.005	0.037	0.002

Note(s): *** denotes $p < 0.001$, ** denotes $p < 0.01$, * denotes $p < 0.05$; i: Step I, ii: Step II

Source(s): Authors' own creation/work

Table 3.
Physical environment,
social environment and
turnover intention:
multi-group regression
analysis by
seafarer rank

Inter-cultural environment also showed strong effects for Cadet ($\beta = 0.18 p < 0.01$), Master ($\beta = 0.18 p < 0.01$), Chief engineer ($\beta = 0.16 p < 0.01$), Rating ($\beta = 0.16 p < 0.001$), and Chief Officer ($\beta = 0.14 p < 0.01$). Similarly, Ship company support and Inter-cultural environment had only a significant, yet low, effect on Turnover intention except for Rating rank ($\beta = 0.09 p < 0.01$), thus both growth factors showed also identical effects on Turnover intention.

The social fit had significant effects on Cadet ($\beta = 0.34 p < 0.001$), Rating ($\beta = 0.24 p < 0.001$), Master ($\beta = 0.27 p < 0.01$), Chief Engineer ($\beta = 0.21 p < 0.01$), and Chief Officer ($\beta = 0.20 p < 0.01$). Social fit had the same pattern of effects on Turnover intention, it had only significant effects on Rating rank ($\beta = 0.11 p < 0.01$). However, Team cohesion had a different effects pattern, with stronger effects on Turnover intention and lower effects on Overall job satisfaction. Specifically, Team cohesion was the second significant factor, after Ship company support, for 2nd Engineers ($\beta = 0.29 p < 0.001$), who had no other significant factors to impact their overall job satisfaction. Team cohesion had also significant effects on Chief Engineers ($\beta = 0.15 p < 0.001$). Nevertheless, Team cohesion was the most key factor for Employee retention across all rankings, specifically: Master ($\beta = 0.44 p < 0.001$), Chief Officer ($\beta = 0.46 p < 0.001$), Chief Engineer ($\beta = 0.36 p < 0.001$), 2nd Engineer ($\beta = 0.34 p < 0.001$), and Cadet ($\beta = 0.41 p < 0.001$), while it had no significant effect on Junior officers and Ratings.

The physical environment showed varying effects across different ranks while no specific factor (Ship conditions, Communication facilities, Nautical health, and Living conditions) had any significant effects on Overall job satisfaction for 2nd engineers and Cadets.

5. Discussion

This study examines how seafarers' workplace environment impact on their job satisfaction and retention differs among seafarer ranks. Findings indicate that the workplace environment-job satisfaction model explains sufficiently seafarers' overall job satisfaction ($r^2 = 0.572$). There are significant differences among seafarer ranks with the social environment having stronger effects than the physical environment.

5.1 Summary and findings

The physical environment has a significant effect on overall job satisfaction but little or negative impact on employee retention, which can be attributed to the fact that seafarers work in ship vessels that are more or less the same; e.g. containerships. Thus, H1b is rejected. Ship conditions have the highest effect on job satisfaction followed by communication facilities and nautical health. Previous studies also found strong effects of workplace functionalities on job satisfaction (Ashkanasy *et al.*, 2014; Elsbach and Stigliani, 2018). Significant variations are observed between different seafarer ranks, thus H1a is accepted. Specifically, the physical environment matters for 2nd engineers' and cadets' job satisfaction but not for ratings, masters, and chief officers. Nautical health is significant for the retention of both chief and 2nd engineers.

The social environment has significant effects on job satisfaction, stronger than the physical environment; specifically, team cohesion has strong effects on employee retention, whereas the physical environment shows no effects, while social fit has stronger effects on overall job performance than ship conditions, communication facilities, and nautical health. Team cohesion helps employees to create links with other co-workers and fit better in physical, organisational, and social contexts (Tekleab *et al.*, 2016).

Seafarer ranks show a significant variation in social environment effects on job satisfaction but not for Ship company support and inter-cultural environment. Thus, H2a and H2b are partially accepted. Those effects are more notable in employee retention than overall job performance, for example, team cohesion is significant to master, chief officer, engineer, and cadet ranks but not for junior officers and ratings. Compared to team cohesion, the social

fit has reverse effects on job performance: social fit has stronger effects on overall job performance than employee retention, particularly for ratings, cadets, master, chief officer, and chief engineer ranks. Social fit reinforces links with other members of the crew while a positive intercultural environment promotes seafarers' occupational and narrative identities (Hogg, 2011). This finding is significant considering the adverse conditions seafarers face working on a ship for a prolonged time. Ship company support has the stronger effect on overall job satisfaction among all workplace factors; this is also observed across all ranks, indicating the need for supportive company culture.

The above results have significant theoretical, managerial, and policy implications.

5.2 Theoretical implications

Employees, the most valuable capital in today's business, are largely overlooked in transportation and seafaring studies (Van den Broeck *et al.*, 2019). Despite the acceptance and empirical validation of motivation theories in explaining job satisfaction and turnover intention (Herzberg, 1987; McClelland, 1987; Zhou *et al.*, 2020), behaviour transportation studies are overtly atheoretical (Guo *et al.*, 2006; Mehdizadeh Dastjerdi *et al.*, 2019). However, this is a missing opportunity to apply concepts and empirical findings from rich literature in other contexts, like retailing, to the maritime sector, which would also help elaborate motivation theories to the maritime sector.

Criticism of motivation theories, including ERG needs theory, posit that they do not consider the impact of contextual factors such as industry and country (Jiang *et al.*, 2012; Allan *et al.*, 2018). The present study builds upon the existence and related needs of ERG needs theory (Alderfer, 1969), and related concepts from other motivation theories such as Herzberg's two-factor theory (Herzberg, 1987) and Acquired-Needs Theory (McClelland, 1987), to examine how satisfactory the impact of workplace (physical/social) environment meets the seafarers' needs. First, it relates existence needs to the physical environment and related needs to the social environment; prior studies have examined various factors without any theoretical framework, focusing mostly on working and living needs (Nguyen *et al.*, 2014; Pauksztat, 2017).

This study uncovers that social fit and team cohesion play a more important role than the physical environment. The social environment is more important for different seafarer ranks, indicating that crew diversity and ship manning play a more important role than the physical environment (Sætra, 2015; Lu *et al.*, 2018). Previous studies also find support for team cohesion, e.g. engagement and inter-cultural environment in reducing employee turnover (Bhattacharya, 2015). These findings are important since a rich literature on Servicescape emphasises the physical environment over the social interactions (Harris and Ezeh, 2008), although recently scholars call for an extended Servicescape model to include social and socially symbolic dimensions (Rosenbaum *et al.*, 2011). However, seafarers spend months confined in the same vessel, which can explain why the social environment is so important to them.

This study also clarifies the importance of ship company culture in supporting the seafarer's needs. A company culture that supports the social functioning of seafarers, such as entertainment (Gu *et al.*, 2020) and communication devices (access to the Internet, social media/networks) (Progoulaki and Theotokas, 2016), can reduce isolation and its negative repercussions, such as fatigue and depression. Seafaring is considered a painstaking profession with limited opportunities for growth, especially for low-paid ranks. Future studies shall examine how growth needs like learning and personal development can contribute to job satisfaction and retention.

6. Conclusions

Job satisfaction is particularly important for the maritime industry. The recent pandemic restrictions on travel and transit stranded about 400,000 seafarers from across the globe in

ships without a return-home day, which has brought “*a severe mental toll on my crew and myself*” as Captain Marzougui, an American merchant marine captain in command of a vessel between December 2019 and May 2020, who reported in the United Nations General Assembly on world maritime day on 24/09/2020 (UN, 2020). Even before the pandemic, employee turnover was high in transportation (Cassidy, 2021) and the maritime industry suffered from an increasing shortage of seafarers, in particular officers (BIMCO, 2021).

How can maritime and transportation companies best manage the job satisfaction of their employees? Findings from this study on the links between seafarer needs and job satisfaction provide significant insights to develop a workplace environment–job satisfaction model.

Not all employees are the same; human needs are unique to each person; thus despite working for the same company, ship and journey, this study found significant variations depending on seafarer rank, which can help maritime companies to adopt their human resources practices accordingly. Seafarers need task cohesion, social fit, a supportive ship culture and crew diversity; therefore, companies should prioritise these needs.

Employees may not have control over their workplace environment, but they can manage their inter-cultural environment and social fit; this can be proved especially beneficial in times of crisis, i.e. when something “goes wrong” and they have to stay seabound for extended periods like the recent pandemic. Social fit also has a strong impact on overall job satisfaction. Therefore, by controlling these two factors, seafarers would significantly increase their overall job satisfaction. Managing proactively seafarer needs reduces the moderating effects of stress on job satisfaction and employee retention. This is also confirmed by the extreme stress described by Captain Marzougui, a situation where seafarers were not prepared for producing excess stress that significantly impacted job satisfaction and turnover intention.

At the company level, companies can make their workplaces more attractive, particularly for young people, by working at three levels: (i) vessel physical environment, improving the physical, functional and health features of the workplace to improve working and living conditions; for example, modern ships can provide full noise isolation and allow performing most of the engine jobs distantly from the main engines in rooms usually above sea level; (ii) job design, by employee orientation, training, certification, equality and diversity that would facilitate social fit and crew diversity; and (iii) team cohesion, being a key determinant of job satisfaction, is in the control of companies via recruitment and job tasking. By taking these actions, maritime companies can improve the public image of seafarers to be more respectable and prestigious. For example, the Mediterranean Shipping Company (MSC) reported 98% crew retention attributing it to the strong feeling of “belongingness” of its crew (Jha, 2017). MSC trains regularly its seafarers with diverse programmes including professional development, coaching and 360-degree feedback and employs digital technologies onboard to improve day-to-day work.

This study suggests that the workplace environment–job satisfaction model can be a useful policy tool to assess the current situation and provide recommendations for future legislation; a key finding of this study is that not all employees are the same, and therefore, this type of analysis can help identify differences amongst different transportation workers.

The well-being of people, from workers in warehouses, lorry drivers, seafarers or employees in developing countries, has been largely ignored in maritime studies (McVeigh *et al.*, 2018). Although this study was based on a large-scale survey, more empirical studies are required to understand key workers’ needs and the impact of the workplace environment on job satisfaction in the transportation sector. Further, data collection in this study was not longitudinal; future studies can adopt a longitudinal research design to uncover the dynamics of the workplace environment and job satisfaction over time, especially with the increase of remote working.

As pointed out by other scholars too, still more theoretical research is required since most studies are atheoretical, with results being often mixed and contradictory (Lu *et al.*, 2018;

Yuen *et al.*, 2018). Building on this study, future research might seek to extend the ERG model to other transportation sectors and compare findings before, during and after the pandemic. The role of stress also requires further investigation as well as the role of other moderating or mediating factors such as personal traits and relational dynamics.

The scales used to measure the ERG constructs and variables are always subject to limitations and contextual interpretations; therefore, there is a need to test the model with more scales. Specifically, this study used exploratory factor analysis, while future studies may apply confirmatory factor analysis to validate these scales. Some items in the factor analysis (e.g. I consider my job rather unpleasant) indirectly convey the meaning of its factor, which is typical in factorial designs, yet this limitation should be investigated in future studies.

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Appendix

The Supplementary Material for this article can be found online.

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