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Factors affecting E-HRM practices in Greek shipping management companies: the role of organizational culture, cultural intelligence, and innovation

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Abstract

HRM is forced to adapt and reinvent its practices towards more innovative and creative frameworks and models, due to the impetus technological developments in the modern business environment. The same applies to the elements of the organizational culture and corporate structure, which are decisive for the success of such initiatives. To undergo the shift to digital transformation, there is a need for human resource development professionals to invest in advanced competencies and capabilities. The scope of this paper is to examine the concept of digital innovation and HRM digitalization in the shipping industry and their relationship with corporate culture, intelligence, and leadership. Data were collected via a survey conducted in Greek shipping companies, and personal interviews with maritime professionals. Findings show that organizational culture and cultural intelligence are significant factors for digital innovation. Digital culture and digital leadership are proving to be important components in achieving this, whereas organizational cultural intelligence has a major impact on e-HRM. The present research contributes at both academic and policy level. In the former case it assists in bridging the gap in the maritime literature by examining digital innovation and e-HRM practices in the shipping industry along with the required skills for their development or enhancement. In the latter case the paper assists in the documentation of challenges maritime companies face in relation to digitalization practices and how policy makers can assist in their adoption.

Keywords: E-HRM, Shipping management companies, Organizational culture, Cultural intelligence, Digital, Innovation

Introduction

Going through an era characterized by intense digitization due to technological changes, digital transformation is present in most industries. Its applications affect every aspect of organizations i.e., processes and resources. As such shipping could not remain unaffected (UNCTAD, 2022).

The evolution of digital technologies is supported by many advantages, such as improved information sharing, decision-making, delivery times, price awareness,

communication, and customer satisfaction (Özkanlısoy and Akkartal 2021; Nikmehr et al. 2021). Digital technologies refer to Internet of Things (IoT), Artificial Intelligence (AI), Robotics, 3D Printing, Automation, Virtual Reality, Big Data (Nikmehr et al. 2021; Garcia-Arroyo and Osca 2019). Digitalization requires changes that are based on technological advancement and have an impact on business strategies (Lipsmeier et al. 2020). Digital innovation is the first step for organizations to be digitalized. Digital innovation, besides the development of new products or services, refers to the exploitation of the best available possible capabilities using new technologies or digital tools (Looy 2021; Fichman et al. 2014).

An essential factor for disseminating the importance and the advantages of digital tools is organizational culture. Schein (1996) defines organizational culture as “general pattern of mindsets, beliefs, and values that members of the organization share in common, and which shape the behaviors, practices, and other artifacts of the organization, which are easily observable”. It is the culture of the organization that sets and creates the general mindset of its personnel, thus, creating the environment to adopt and embrace changes, such as technological. To that end, digital culture and leadership can be assisting factors.

Another influential factor is cultural intelligence, which is defined as “a capability, which helps individuals to function effectively in culturally diverse environments” (Earley 2002). Studies have shown the positive and significant relationship between cultural intelligence and digital innovation (Yuwono 2021; Elenkov and Manev 2009). Organizations operating in the globalized and multicultural environment, such as shipping companies, need to develop capabilities to cope with culturally diversified personnel. This can be achieved through the development of cultural intelligence, which among other is the exchange, understanding and sharing of different views and knowledge. It has been documented that organizations and people with high cultural intelligence tend to be more innovative (Li et al. 2021; Ratasuk and Charoensukmongkol 2020; Fang et al. 2018).

The aim of the paper is to examine the factors affecting E-HRM practices in Greek Shipping Management Companies, focusing on the role of Organizational Culture, Cultural Intelligence, and Digital Innovation. Greek shipping companies have been selected as the population for the primary research and the testing of hypotheses. Focus of the research on a single national market might raise doubts over the generalizability of the findings, however, there are several factors that lead to the opposite direction. Shipping is a paradigm of global business (Harlaftis and Theotokas 2020), the most global of all industries (Tenold 2019). Greek-owned shipping companies are the leading power in this global business for the recent five decades, with an unprecedented rate of growth. The fleet operated by more than 560 companies (Naftika Chronika 2023) active in international freight markets, with a wide network of offices globally, consists of almost 5.000 ships with a dead weight tonnage of 393 million tons (UNCTAD 2023).

The rest of the paper is structured as follows. Section “Literature review and theoretical background” provides the theoretical background via a literature review on digital related works in the maritime industry which have led to the research hypothesis formation. The methodology section follows where the adopted process for collecting, classifying, and analyzing the data is presented. Finally, section “Results” provides the

conclusions and highlights the contributions of the study and suggestions for future research.

Literature review and theoretical background

Research on digitalization and digital innovation in maritime industry is considered as immature but of growing interest (Jian et al. 2022; Nikitakos and Lambrou 2007; Jenssen and Randøy 2002; Jenssen and Randøy 2006). Among the most recent studies is that of Emad and Ghosh (2023) reporting that the integration of skills such as artificial intelligence, machine learning, troubleshooting and the understanding of integrated systems will provide seafarers with an understanding of the underpinning technologies used by the systems and machinery they operate, enabling them to troubleshoot when needed. Such training will increase the efficiency in addressing system failures since no third party will need to be deployed on board to fix them, as the seafarers themselves will have such competencies.

Human resource development (HRD) is critical in the maritime industry in ensuring that the workforce is equipped with the skills and knowledge necessary to operate effectively and safely in a complex and continuously changing environment (Autsadee et al. 2023). Gena et al., (2020) have also focused on the HR practices in the maritime industry showcasing that they improve the performance and competitiveness of the maritime sector. According to Hansen et al. (2020), effective HRD can improve shipping safety and efficiency while also increasing customer satisfaction and competitiveness, while Divine Caesar et al. (2021) states that HRD programs address industrial skill gaps and shortages, ensuring that the workforce is properly trained and equipped to meet industry requirements. However, technological advancements and changing regulatory frameworks require businesses to adapt and upskill their workforce continuously via adopting sustainable practices (Rony et al. 2023). HRM practices can assist in the transition of operations to sustainability. According to Sumane et al. (2018) maritime companies can work towards their employees obtaining the knowledge and skills necessary to carry out sustainable practices via training and development programs. Along the same lines, Fawehinmi et al. (2020) states that sustainability focused HRM can enhance the success of maritime firms via improving environmental performance, reputation, and competitiveness.

In addition to sustainability, the increasing importance on safety and security are two factors that have always challenged HRM practices. The maritime industry has always been subject to risks related to accidents, piracy, terrorism, and cyber threats thus, making HRM practices key in assisting maritime firms in improving their performance against such risks (Autsadee et al. 2023). Digital innovation and its relationship with the factors of organizational culture, cultural intelligence, digital culture and leadership, with focus on Human Resource Management and more specifically e-HRM has been explored in the literature (Margherita 2022; Alshibly and Alzubi 2022; Farhan et al. 2021; Trenerry, et al. 2021; Annarelli et al. 2021; Iqbal et al. 2019a; Chuang and Graham 2018). E-HRM is defined as the application of information technology in performing HR activities (Strohmeier 2007). Bondarouk and Ruël, (2009) expand the definition and describe e-HRM as an umbrella term that “covers all possible integration mechanisms and contents between HRM and Information Technologies aiming at creating value within and

across organizations”, while along the same lines, Strohmeier (2020) considers the term a concept, which incorporates strategic alignment of digital technologies in the HRM.

Organizational culture, digital culture and digital innovation

Organizational culture is defined as *the way in which a company is organized and is based on shared perceptions, beliefs and values which are reflected in the behavior and attitude of personnel* (Schein 2010). It is the most principal factor that dictates how a company operates based on these fundamental characteristics. There are different types of cultures an organization may develop, but that does not mean that a company can't be characterized by more than one type. The most commonly and widely used types are *group*, which focuses on flexibility and change, *hierarchical*, having a stricter orientation towards stability, control, order and rules, *developmental*, supporting change, adaptability, and risk-taking, and *rational*, emphasizing on competitiveness, and productivity (Pantouvakis and Syntychaki 2021; Oh and Han 2018; Shin and Shin 2022; Tran 2020; Nazaria et al. 2017; Willar et al., 2016).

Organizational culture is the way a company thinks and acts to achieve its goals. Leadership can be a valuable tool to that end (Winston and Patterson 2006). Research in the field of organizational culture and leadership has supported a strong interrelationship between them (Belias and Koustelios 2014; Erkutlu 2012; Schein 1996). Thus, any change, let alone changes related to technology, requires an environment that favors innovation so that it can be implemented. Therefore, the development of a digital culture and leadership is becoming an important aspect of companies. Digital culture is defined as *the shared beliefs, understanding, and set of values of an organization, and its personnel, of the business activities in a digital domain* (Zhen et al. 2021), while digital leadership focuses on innovation and is a team-oriented, cooperative approach, where leaders' mindset and competencies to develop and use new technologies are fundamental characteristics (Oberer and Erkollar 2018).

Digital innovation is defined as *a product, process, or business model which can be new or can be improved using technological tools* (Looy 2021; Fichman et al. 2014). Digital Innovation is part of the digital transformation that a company wants to achieve. However, for its implementation, companies need to develop different strategies and create internal structures that will facilitate the transition (Looy 2021; Fernandez-Vidal et al. 2022).

Organizational culture is linked and influences many aspects of companies, effectiveness, strategy, behavior, communication, and decision-making (Xi et al. 2021; Gabel-Shemueli et al. 2019; Progoulaki and Theotokas 2010; Bravo et al. 2016). Studies have shown that organizational culture plays a crucial role in the digital transformation process of a company (Pradana et al. 2022; Looy 2021; Kane et al. 2015). Studies on digital culture support that it is a significant factor for digital innovation (Muller et al., 2019; Zhen et al. 2021; Snowball et al. 2022). In the shipping industry studies on organizational culture and digital transformation are in its infancy. A study by Shin and Shin (2022) showed that the most effective types of organizational culture which aid the development and usage of new technologies are developmental and rational. In the study by Fernandez-Vital et al. (2022) on European oil and gas companies concluded that companies willing to enter the digital transformation era should develop or enhance their strategies

and suggest corporate structure improvements, paving the way for further exploration of the role of corporate culture on the process of digital transformation.

Based on the above the following hypotheses are formulated:

H1 Organizational culture of shipping companies affects digital innovation.

H2 Digital culture and leadership of shipping companies influences digital innovation.

Cultural intelligence and digital innovation

Companies operating in a constantly changing environment need continuous development and enhancement of their competencies and skills to remain competitive. In the literature personnel is presented as an essential factor for any organization to operate effectively and efficiently. Considering the fast-technological changes of the business environment, human resource management constantly adapts and reinvents its practices via being more innovative and creative (Wongsansukcharoen and Thaweepaiboonwong 2023; Azizi et al. 2021; Cooke et al. 2021).

Organizational cultural Intelligence has emerged due to changes in the context of the global workforce (Crowne 2008). Organizational cultural intelligence (OCQ) can be defined as “*an organization’s capability to function effectively in culturally diverse environments*” (Lima et al. 2016). It is linked to many aspects of firms’ operation and performance, such as organizational culture, HRM practices-selection and recruitment, and decision-making, as it refers to the way firms can operate in a changing environment (Livermore et al. 2022). Furthermore, cultural intelligence is considered a useful tool for companies to develop an appropriate strategy to achieve organizational goals (Remhof et al. 2013). This presupposes the development and optimization of new and existing skills.

The fundamentals of cultural intelligence lie in adaptation and change. R  th and Netzer (2020) showed that cultural intelligence is a decisive factor for the enhancement of digital leadership, which supports digital innovation. Moreover, it has been supported that cultural intelligence plays a significant role in decision-making in the shipping industry (Pantouvakis and Syntychaki 2021).

Based on the above the following hypothesis is formulated:

H3 Shipping companies’ Organizational cultural Intelligence influences digital innovation.

Organizational culture, cultural intelligence and e-HRM

Digital technologies are developing at a different pace in different industries (Strohmeier 2020). Human resources need to take into serious consideration the new technological developments. To undergo the shift to digital transformation, there is a need for human resource development professionals to invest in advanced competencies and capabilities (Chuang and Graham 2018). Although different forms of digital technologies, such as HR analytics and e-HRM practices exist, for the improvement of organizations’ strategic role and decision-making, studies exploring them are in their infancy (Trenerry, et al. 2021; Annarelli et al. 2021). With the use of e-HRM, HR professionals are able to work

more strategically and efficiently since technology applications enable via web-based channels to monitor and proceed to the required adjustments for more efficient and effective HR management (De Alwis et al. 2022). In addition, the level of implementation of E-HRM reduces the demand for HR specialists since the use of technology minimizes human intervention (Lengnick-Hall and Moritz 2003).

Studies on different industries have examined the relationships between human resource management and digital developments (Radonjić et al., 2022; Ogbeidu et al., 2021; Eller et al., 2020). The human element is crucial for shipping companies and operations (Theotokas and Progoulaki 2007) and due to the vast technological changes should be redefined (Mallam et al. 2020). Several studies in the maritime field examine the human element in the digitalized environment and the required skills introducing by the e-HRM concept (Baykal 2022; Saha 2023; Mallam et al. 2020; Jo and D'agostini (2020); Jo et al. 2020). However, Tijan et al. (2021) suggest further empirical analysis is needed to investigate the relationship of HRM on digital transformation in the shipping sector with the factors of organizational culture and cultural intelligence.

Based on the above the following hypothesis are formulated:

H4 Shipping Companies' Organizational Culture impacts e-HRM

H5 Shipping Companies' Organizational Cultural Intelligence influences e-HRM

In summary, the above hypotheses aim at examining the degree *Digital Innovation* is influenced by Organizational Culture (H1), Digital culture and Leadership (H2) and Organizational Cultural Intelligence (H3) and the degree *e-HRM* is impacted by Organizational Culture (H4) and Organizational Cultural Intelligence (H5).

Research methodology

Measurement instruments

The purpose of this work is to examine if e-HRM practices as expressed in the literature are related and explained from factors such as organizational culture, organizational cultural intelligence, digital culture and leadership and digital innovation.

The measurement instruments used for this study appear in many studies in the service and transportation sectors. Table 1 provides the summary of the constructs and suggested measurement instruments.

Constructs have been evaluated on a 7-point Likert scale, with 1 implying strongly disagree and 7 implying strongly agree. Respondents were required to indicate the extent

Table 1 Constructs

Constructs under examination	Measurement instruments/suggestions
Organizational culture	Theotokas and Progoulaki (2007), Progoulaki and Theotokas (2010), Pantouvakis and Syntychaki (2021)
Organizational cultural intelligence	Da Silva et al. (2022), Pantouvakis and Syntychaki (2021)
Digital culture and leadership	Yopan et al. (2022), Martínez-Caro et al. (2020), Wasono and Furinto (2018)
Digital innovation	Bastidas et al. (2023), Khin and Ho (2018)
E-HRM	Iqbal et al. (2019a, b), Farhan et al. (2021)

Source: Authors

of their agreement or disagreement on different statements representing the constructs under examination.

As the examination of e-HRM is in the initial stages its measurement methods differ. Most of the studies use mixed methods, with those having qualitative characteristics prevailing. Therefore, this study relied on instruments and methods on the literature (Baykal 2022; Jo et al. 2020; Margherita 2022; Alshibly and Alzubi 2022; Farhan et al. 2021; Trenerry et al. 2021; Annarelli et al. 2021; Iqbal et al. 2019a). For the present study the questionnaire suggested by Iqbal et al., (2019b) is used as a basis for analysis.

Organizational Culture (OC) and Organizational Cultural Intelligence (OCQ) have been measured based on the studies of Gambi et al. (2015), Lima et al. (2016), Shin and Shin (2022) and Pantouvakis and Syntychaki (2021). However, for the purpose of this study an additional refinement of the scale of OC was considered necessary. The items for measuring Digital Innovation (DI) are based on the studies of Bastidas et al., (2023) and Khin and Ho (2018). For Digital Culture and Leadership (DCL) the measurement presented by Martínez-Caro et al. (2020) are used. The reliability of the scales was satisfactory as seen in Table 2.

Research design

The present work uses as sample Greek shipping management companies operating ocean-going vessels. They are selected from a population of 560 companies (Naftika Chronika 2023), managing a fleet of 4,936 ships equaling 393 million dead weight tons of capacity, representing 17,4% of the global fleet (UNCTAD 2023). As seen, both the main characteristics of the companies forming the sample, as well as the size of the population where they come from allow the external validity of this research along with the generalizability of the findings and their potential applications.

The data for this study were collected through the distribution of a self-administered questionnaire to senior managers of shipping management companies as the purpose was to examine constructs that affect the way several dimensions related to Human Resources Management interact and affect e-HRM. The reason for addressing senior managers is because they are considered representatives of their organizations and contribute to decision-making (Yamak et al. 2014). It was considered crucial to direct the questionnaire to those shipping companies operating both Human Resources and Crew departments, whose responsibility is the management of employees ashore and onboard respectively. While Crew departments exist in most shipping companies, Human Resources departments primarily appear in companies operating large fleets with

Table 2 Cronbach's Alpha

Construct	Cronbach's Alpha
Organizational culture (OC)	.720
Organizational cultural intelligence (OCQ)	.909
Digital culture and leadership (DCL)	.907
Digital innovation (DI)	.961
e-HRM	.873

Source: Authors

large number of employees, as well as in companies, which regardless of the fleet size, adopt a more strategic approach to managing their human resources (Theotokas 2018). For the analysis of the companies according to their size, this study adopts the widely used methodology categorizing as large those companies operating more than 16 ships, medium those managing between six and 15 ships and small those companies operating up to five ships (Theotokas and Harlaftis 2009; Theotokas 2018; Naftika Chronika 2023). According to the latest data, the population is consisted of 89 (16%) large, 152 (27%) medium and 319 (57%) small shipping companies (Naftika Chronika 2023).

The questionnaire has been tested by professionals representing a broad spectrum of the maritime industry. Respondents were mainly from the human resource and crew departments. More specifically, human resource managers (30%), crew managers (23.33%), DPAs (3.33%), operations managers (3.33%) and others (30%). In terms of the profile of the companies participating 63% are large, 33% are medium and the rest are small. In addition, the sample reveals that 26.7% of the companies employ onshore more than 200 people, 16.7% employ between 101 and 200 employees, 6.7% employ between 81 and 100, 20% employ between 21 and 40, another 20% employ between 41 and 80, while 10% of them employ up to 20 employees.

Results

Exploratory Factor Analysis was conducted using the maximum likelihood method of extraction-principal component analysis, with the oblique rotation method being varimax. The reasoning for this is the aim to identify the factorial structure of the constructs (Hair et al. 2010). The results from this analysis are presented in Tables 13, 14, 15, 16, 17 in Appendix 1.

As presented in Table 3 all constructs reported an AVE above the 0.50 threshold supporting the convergent validity of their latent constructs while CR values are above 0.70 denoting good reliability (Cheung et al., 2023). Results indicate that e-HRM is explained by 3 factors, namely *data analysis* (5 items), *productivity* (3

Table 3 Convergent validity and reliability

e-HRM	AVE/CR
<i>Data analysis</i> (Factor 1)	0.635/0.999
<i>Productivity</i> (Factor 2)	0.671/0.859
<i>HR quality</i> (Factor 3)	0.647/0.785
Organizational cultural intelligence	
<i>Training</i> (Factor 1)	0.731/0.936
<i>Leadership</i> (Factor 2)	0.670/0.890
<i>Adaptability</i> (Factor 3)	0.752/1
<i>Inclusion</i> (Factor 4)	0.606/0.754
Organizational culture	
<i>Group culture</i> (Factor 1)	0.560/0.834
<i>Hierarchical culture</i> (Factor 2)	0.647/0.785
Digital culture and leadership	
Digital culture (Factor 1)	0.615/0.904
Leadership (Factor 2)	0.655/0.850

Source: Authors

items) and *HR quality* (3 items). Organizational Culture is composed of two factors, namely *group culture* (5 items) and *hierarchical culture* (2 items). Organizational Culture Intelligence is conceived by four factors, namely, *training* (6 items), *leadership* (4 items), *adaptability* (2 items), and *inclusion* (2 items). Digital Culture and Leadership is composed of two factors, *digital culture* (6 items) and *leadership* (3 items), while Digital Innovation is represented by *digital innovation* only composed of 3 items.

The mean scores for the items of the constructs under examination show the following:

1. Regarding organizational culture the hierarchical factor items “formalized procedures generally govern what people do” and “objectives and targets are clearly defined” have mean scores 5.43 (SD = 0.935) and 5.53 (SD = 1.167) respectively.
2. Group culture factor items “development of human resources and concern about employees are highly valued” and “our employees are encouraged to work as a team, take decisions, exchange ideas opinions, ideas and experiences with each other and their supervisors” report mean scores of 6.10 (SD = 0.923) and 6.03 (SD = 0.928) respectively. These results suggest that respondents perceive that their organization pursues unity and engagement.
3. In respect to organizational cultural intelligence, shipping companies’ representatives’ score high on leadership (i.e. “Top Management—onboard and ashore—knows relevant cultural values and religious beliefs” M = 5.57, SD = 1.406) and inclusion (i.e. “Top Management—onboard and ashore—has had extensive international experience”, M = 5.97, SD = 0.928) while the responses on training appear to be neutral. Similar appears to be the case for e-HRM responses as well. The mean score for each item is presented in Table 18 in Appendix 2.

To investigate the relationships between the constructs under examination regression analysis was used where the impact on digital innovation is examined against organizational culture and organizational cultural intelligence (Table 4).

Results suggest that digital innovation is affected by organizational culture significantly with $b = .658$ (sig. .001) and $\text{Adj } R^2 = 0.413$. This can be interpreted by the way shipping companies are structured. It appears that the beliefs and values prevailing in the organization are aligned with the way operations are handled, implying willingness to adopt new systems, especially digital tools, which will change standard procedures. Another important factor interpreting the perception and usage of such technologies is the way shipping companies perceive changes and are willing to adopt

Table 4 Regression analysis organizational culture, cultural intelligence—digital innovation

Independent variables	Dependent variable: digital innovation	
	Standardized beta	Adj R ²
Organizational culture	.658 (sig. .001)	.413
Organizational cultural intelligence	.533 (sig. .002)	.258

Source: Authors

Table 5 Regression analysis organizational culture types—digital innovation

Independent variables: types of organizational culture	Dependent variable: digital innovation Adj R ² = .413
Group culture	.592 (sig .001)
Hierarchical culture	.175 (ns .258)

Source: Authors

Table 6 Regression analysis organizational culture intelligence—digital innovation

Independent variables: organizational culture intelligence dimensions	Dependent variable: digital innovation Adj R ² = .361 (sig. .001)
Training	.113 (ns .423)
Leadership	-.169 (ns .281)
Adaptability	.320 (sig .001)
Inclusion	.673 (sig .038)

Source: Authors

them in their day-to-day operations. That is seen by the influence of organizational cultural intelligence on digital innovation with $b = 533$ (sig. 002) and $\text{Adj } R^2 = 0.258$.

To further investigate the types of organizational culture and organizational cultural intelligence, which mostly influence digital innovation a further regression analysis has been conducted (Tables 5 and 6). As seen in Table 6, group culture has a significant impact on digital innovation with $b = 592$ (sig 0.001) and $\text{Adj } R^2 = 0.413$. These results support the fundamentals of a group culture that focuses on flexibility and change and is based on participation and teamwork. These characteristics can be considered as drivers of digital innovation. Contrary to this, shipping companies with more strict and formalized procedures cannot pave the way for digital transformation observing low b values ($b = 0.175$).

Examining the organizational cultural intelligence dimensions, adaptability and inclusion appear to have a significant influence on digital innovation $b = 320$ (sig 0.001), $b = 0.673$ (sig 0.038) respectfully, and an $\text{Adj } R^2 = 0.361$ (sig 0.001), while training and leadership hardly appear to be of importance (Table 6). Organizations need to be adaptive to their environment, even more in the new digital era to be competitive. In addition, the concept of inclusion is also important as companies need to incorporate new tools and processes into their structures when innovative. Based on these results Hypothesis 1 (H1: *Organizational culture of shipping companies has an impact on digital innovation*) and Hypothesis 3 (H3: *Shipping companies' Organizational cultural Intelligence influences digital innovation*) are confirmed.

To investigate the factors affecting Digital Culture and Leadership a regression was used as presented in Table 7. The analysis has been based on the factors as these appeared from the EFA analysis. As such, Digital culture and Digital Leadership appear to explain Digital Culture and Leadership. As presented, organizational culture significantly affects digital culture and leadership with group culture having a bigger

Table 7 Regression analysis organizational culture types—digital culture and leadership

Independent variables	Dependent variable: digital culture and leadership	
	Digital culture	Digital leadership
Types of organizational culture	Adj R ² .323 (sig .002)	Adj R ² .568 (sig .001)
Group culture	.582 (sig .001)	.733 (sig .001)
Hierarchical culture	.067 (ns .682)	.099 (ns .451)

Source: Authors

effect ($b = 0.582/b = 0.733$) compared to hierarchical culture ($b = 0.67/b = 0.099$) on both Digital Culture and Leadership factors. Digital transformation requires that processes, behaviors and attitudes are aligned with digital transition.

The relation of digital culture and leadership on digital innovation is further exploited and presented in Table 8. As observed digital culture and leadership significantly influence digital innovation with a $b = 756$ (sig 0.001) and $Adj R^2 = 0.556$. Companies having in place processes to analyze information and communicate among employees, means that they have developed a digital culture which facilitates digital innovation. Furthermore, leadership styles of shipping companies play a key role in the adoption of change.

As seen in Table 9, digital leadership plays significant role ($b = 0.608$), since it is based on people's perception who aim at adding value to organizations and are distinguished by their competencies, knowledge, creativity, and collaboration. Based on these Hypothesis 2 (*H2: Digital culture and leadership of shipping companies influences digital innovation*) is confirmed.

Regression analysis was employed to investigate the relationship between e-HRM and organizational culture and organizational cultural intelligence. Surprisingly, organizational culture hardly has any significant effect on e-HRM, while organizational cultural intelligence has a significant positive influence (Table 10). Based on these Hypothesis 4 (*H4: Shipping Companies' Organizational Culture impacts e-HRM*) is rejected, while Hypothesis 5 (*H5: Shipping Companies' Organizational Cultural Intelligence influences e-HRM*) is confirmed.

Table 8 Regression analysis digital culture and leadership—digital innovation

Independent variables	Dependent variable: digital innovation
	Adj R ² .556 (sig .001)
Digital culture and leadership	.756 (sig .001)

Source: Authors

Table 9 Regression analysis Digital Culture and Leadership dimensions—digital innovation

Independent variables	Dependent variable: digital innovation	
	Standardized beta	Adj R ²
Digital culture	.873 (sig .001)	.753 (sig .001)
Digital leadership	.608 (sig .001)	.347 (sig .001)

Source: Authors

Table 10 Regression analysis between e-HRM and organizational culture and organizational cultural intelligence

Independent variables	Adj R ²	Dependent variable
Organizational culture .255 (ns .174)	.031	e-HRM
Organizational cultural intelligence .579 (sig. .001)	.312	

Source: Authors

Table 11 Regression analysis organizational cultural intelligence dimensions—e-HRM

Independent variables	beta/sig	Dependent variable	Adj R ²
Training	.641 (sig .001)	E-HRM	.361 (sig. .004)
Leadership	-.013 (ns .604)		
Adaptability	-.067 (ns .774)		
Inclusion	.103 (ns .670)		

Source: Authors

Table 12 Regression analysis organizational cultural intelligence types—e-HRM dimensions

Independent variables	Dependent variable: e-HRM dimensions		
	Data analysis	Productivity	Quality
Organizational cultural intelligence	Adj R ² .353 (sig .004)	Adj R ² .080 (ns .197)	Adj R ² .257 (sig .021)
Training	.569 (sig .003)	.417 (ns .053)	.532 (sig .008)
Leadership	.127 (ns .515)	-.224 (ns .338)	.057 (ns .782)
Adaptability	-.222 (ns .203)	.135 (ns .510)	.036 (ns .845)
Inclusion	.126 (ns .495)	.138 (ns .533)	.058 (ns .771)

Source: Authors

To explore further the factors of cultural intelligence that have influence on e-HRM additional tests were performed and are presented in Table 11. Results show that the only factor significantly affecting e-HRM is training. This outcome can be well understood as the process of digitalization and the application of new tools require employees to be well trained to operate properly and efficiently.

It is worth taking into consideration the fact that people from diverse cultures perceive changes and understand new operational systems differently. Especially for people working onboard vessels, it is vital for a common understandable training system to exist. These results are further confirmed examining the relationship of the Organizational Cultural Intelligence factors to e-HRM (Table 12). As seen training is the prevailing factor once again ($b = 0.569/b = 0.417/b = 0.532$).

Although overall results do not show a strong relationship between e-HRM and organizational culture, it is noteworthy that digital innovation is highly influenced by organizational culture and cultural intelligence. It is the enhancement of digital

technologies thus, digital innovation that contributes to the development of digital human resource management.

Conclusions

The purpose of this paper is to examine the concept of digital innovation and HRM digitalization in the shipping industry and their relationship with corporate culture, intelligence, and leadership. Data has been collected via a survey conducted in Greek shipping companies, and personal interviews with maritime professionals.

Findings on organizational culture, show that most companies share characteristics from several types. *Hierarchical* type focuses on stability and control, *group* emphasizes on participation and teamwork, *rational* highlights achievements and productivity and *developmental* describes risk-taking and change. Innovative technologies and digitalized procedures require changes in the way companies operate both in terms of human resources and general procedures. Group culture characterizes companies that are prompt and flexible to change and adapt to external influences. Examining Hypothesis 1 findings show that organizational culture has a significant impact on digital innovation with group culture affecting innovative initiatives most.

In relation to Hypothesis 2 on the role of digital culture and leadership on digital innovation in shipping companies' regression analysis results confirm that both play an important role confirming the specific hypothesis. This is attributed to the fact that since employees aim at adding value to organizations and are distinguished by their competencies, knowledge, creativity, and collaboration.

In terms of the companies' ability to adapt to multicultural environments results shows that most shipping companies are considerably adaptable as employees ashore and onboard have international working experience and interact with people and companies around the world. While examining Hypothesis 3 on the role of organizational cultural intelligence the dimension of *training* is of the outmost importance for digitalized processes. This was further indicated on the examination between the dimensions of organizational cultural intelligence and e-HRM (Hypothesis 5).

In relation to Hypothesis 4 and Hypothesis 5, with the former examining the impact of organizational culture on e-HRM and the latter the impact of organizational culture intelligence on e-HRM, regression analysis results show that organizational culture has almost no significant effect on e-HRM, while organizational cultural intelligence significantly influences e-HRM. Furthermore, results show that companies lean towards the development and implementation of innovative technological tools. This is apparent based on the results on the creation of market offerings, business processes or models which result from the use of digital technology. Considering the existence of digital tools for Human Resource Management, participants agreed primarily on the benefits emerging from service and work quality, but these tools are not fully exploited by HRM practices such as Training, Appraisal, Performance, Recruitment and Selection.

The results of this study provide significant insights to managers, which can assist their attitude towards digitalization. Among these insights is the fact that although the shipping sector is one of the most adaptable in terms of the general commercial aspect, when it comes to changes in the core of the operational aspect ashore and onboard it appears

to be lagging. Based on the results, leadership involvement enhances training in shipping management companies and is key in achieving higher levels of digital innovation, which can lead to e-HRM and digital HRM practices.

Lately the debate on digitalization monopolizes the interest in shipping companies and their partners, with questions on the required skills, competencies, and qualifications towards that end to be the focal point. However, companies do not pay much attention to lead, train and review and provide tools to their employees ashore and onboard. Nevertheless, steps have been taken towards supporting diversity via the integration of people with different genders, and cultures. Meanwhile, the sharing of information regarding technological developments within the company and the development of skills among employees is low. This is an indicator that work still needs to be done towards the understanding and familiarization of shipping management companies with innovative technologies, so that confidence in the advantages and benefits of such systems is built adding value to employees and to the companies as well.

The present research can be furthered by examining digitalization in shipping in non-Greek companies to investigate their perception on the issue. In addition, the constructs under examination can be examined in relation to specific organizational outcomes along with the examination of soft skills required for the implementation of digital technologies and e-HRM.

Appendix 1: Exploratory factor analysis results

See Tables 13, 14, 15, 16 and 17.

Table 13 Factor loadings per item (e-HRM)

Item	Data analysis (Factor 1)	Productivity (Factor 2)	HR quality (Factor 3)
e-HRM has increased the focus of managers and employees on their core duties		.847	
By using e-HRM, average effective hour loss is decreased		.828	
We use e-HRM for recruitment & selection processes		.783	
Since the implementation of e-HRM, average absentee rates have been reduced			.804
e-HRM guarantees errorless administration			.805
Using e-HRM gives us greater control over our work			.528
e-HRM is used to access information about the latest updates in the shipping industry	.751		
Managers use e-HRM for talent management	.701		
e-HRM is based on big data analysis	.926		
e-HRM is based on development of metrics that produce useful data	.754		
Data analysis is crucial task for e-HRM	.835		

Source: Authors

Table 14 Factor loadings per item (organizational culture)

Item	Group culture (Factor 1)	Hierarchical culture (Factor 2)
Formalized procedures generally govern what people do		.854
Objectives and targets are clearly defined; thus, success is achieved on the basis of winning and leading in the marketplace		.752
Our management style prioritizes and emphasizes conformity, predictability, stability, efficiency, and control	.708	
Development of human resources and concern about employees are highly valued	.626	
Our employees are encouraged to work as a team, take decisions, exchange and discuss opinions, experiences, and ideas with each other and their supervisors	.812	
Our management style is characterized by teamwork, consensus, and participation	.830	
Extraction Method: Principal Component Analysis		
Rotation Method: Varimax with Kaiser Normalization. A		
a. Rotation converged in 3 iterations		

Source: Authors

Table 15 Factor loadings per item (organizational cultural intelligence)

Item	Training (Factor 1)	Leadership (Factor 2)	Adaptability (Factor 3)	Inclusion (Factor 4)
Top Management—onboard and ashore—modifies its nonverbal behavior (gestures, time, and space orientation) when a cross-cultural interaction requires it				.775
Top Management—onboard and ashore—is confident working with people of other cultures				.782
Top Management—onboard and ashore—is confident handling the stress of working within new cultures		.723		
Top Management—onboard and ashore—checks accuracy of cultural knowledge when interacting with those from different backgrounds		.838		
Top Management—onboard and ashore—knows relevant cultural values and religious beliefs		.860		
The organization insists on avoiding expressions or words that can be considered offensive to people of different cultures, ethnicity, religion, gender etc		.847		
Top Management—onboard and ashore—has had extensive international experience			.818	
The organization is inclusive. It gives equal opportunity to employees regardless of gender, ethnicity, and so on			.914	
The organization offers training to facilitate cultural learning	.865			
The organization trains onboard and ashore top management on how to manage conflicts arising among people (crew) from different countries	.916			
The organization engages in cross-cultural learning through consistently reviewing its process and practices to learn and adapt	.774			
The organization has processes in place to facilitate cultural learning	.882			
The organization is committed to develop & enhance onboard and ashore top management competencies who is bi-cultural or multicultural in its skill set	.863			
The organization asks onboard and ashore top management for feedback after communicating with people from different cultures	.756			

Source: Authors

Table 16 Factor loadings per item (digital culture and leadership)

Item	Digital culture (Factor 1)	Leadership (Factor 2)
There is a clear orientation to digital technology changes inside the company's operations		.782
Digital innovation and change take part as a natural process within the company		.804
The organization invests in developing digital tools that facilitate operations		.841
The organization shares with the staff the digital strategy, taking into consideration their suggestions	.749	
Digital fluency is considered a key competency for every new entrant	.662	
In our firm, individual employees' digital competencies and contacts are identified and recognized by our leaders	.849	
In our firm, leaders develop trust in the employees' digital skills	.865	
In our firm, leaders provide necessary information to employees	.664	
In our firm, leaders act as digital learning guides and coaches	.885	
Extraction method: principal component analysis		
Rotation method: Varimax with Kaiser Normalization. A		
a. Rotation converged in 3 iterations		

Source: Authors

Table 17 Factor loadings per item (digital innovation)

Items	Digital innovation (Factor 1)
The organization often tries new ideas related to digitalization providing higher quality of digital solutions	.964
The organization often tries out the new trend to perform the task offering superior features of digital solutions	.965
The organization becomes innovative in its operations contributing to totally different applications of digital solutions	.965
Extraction Method: Principal Component Analysis	
a. 1 components extracted	

Source: Authors

Appendix 2: Mean scores

See Table 18.

Table 18 Mean scores

	Mean score
<i>Hierarchical culture</i>	
Formalized procedures generally govern what people do	5.43
Objectives and targets are clearly defined; thus, success is achieved on the basis of winning and leading in the marketplace	5.53
<i>Group culture</i>	
Our management style prioritizes and emphasizes conformity, predictability, stability, efficiency, and control	5.57
Development of human resources and concern about employees are highly valued	6.10

Table 18 (continued)

	Mean score
Our employees are encouraged to work as a team, take decisions, exchange and discuss opinions, experiences, and ideas with each other and their supervisors	6.03
Our management style is characterized by teamwork, consensus, and participation	5.90
<i>Training</i>	
The organization offers training to facilitate cultural learning	4.17
The organization trains onboard and ashore top management on how to manage conflicts arising among people (crew) from different countries	4.57
The organization engages in cross-cultural learning through consistently reviewing its process and practices to learn and adapt	4.87
The organization has processes in place to facilitate cultural learning	4.43
The organization is committed to develop & enhance onboard and ashore top management competencies who is bi-cultural or multicultural in its skill set	4.67
The organization asks onboard and ashore top management for feedback after communicating with people from different cultures	4.33
<i>Leadership</i>	
Top Management—onboard and ashore—is confident handling the stress of working within new cultures	5.13
Top Management—onboard and ashore—knows relevant cultural values and religious beliefs	5.57
Top Management—onboard and ashore—checks accuracy of cultural knowledge when interacting with those from different backgrounds	4.83
The organization insists on avoiding expressions or words that can be considered offensive to people of different cultures, ethnicity, religion, gender etc	5.50
<i>Inclusion</i>	
Top Management—onboard and ashore—has had extensive international experience	5.97
The organization is inclusive. It gives equal opportunity to employees regardless of gender, ethnicity, and so on	5.80
<i>Adaptability</i>	
Top Management—onboard and ashore—modifies its nonverbal behavior (gestures, time, and space orientation) when a cross-cultural interaction requires it	4.97
Top Management—onboard and ashore—is confident working with people of other cultures	5.97
<i>Digital culture</i>	
There is a clear orientation to digital technology changes inside the company's operations	5.83
Digital innovation and change take part as a natural process within the company	5.50
The organization invests in developing digital tools that facilitate operations	5.83
<i>Digital leadership</i>	
The organization shares with the staff the digital strategy, taking into consideration their suggestions	5.07
Digital fluency is considered a key competency for every new entrant	4.97
In our firm, individual employees' digital competencies and contacts are identified and recognized by our leaders	4.93
In our firm, leaders develop trust in the employees' digital skills	5.13
In our firm, leaders provide necessary information to employees	5.53
In our firm, leaders act as digital learning guides and coaches	4.63
<i>Digital innovation</i>	
The organization often tries new ideas related to digitalization providing higher quality of digital solutions	5.50
The organization often tries out the new trend to perform the task offering superior features of digital solutions	5.50
The organization becomes innovative in its operations contributing to totally different applications of digital solutions	5.23
<i>e-HRM</i>	
e-HRM has increased the focus of managers and employees on their core duties	4.63

Table 18 (continued)

	Mean score
By using e-HRM, average effective hour loss is decreased	4.93
Since the implementation of e-HRM, average absentee rates have been reduced	4.33
e-HRM guarantees errorless administration	4.50
Using e-HRM gives us greater control over our work	5.07
We use e-HRM for recruitment & selection processes	4.43
Managers use e-HRM to receive formal information about a wide range of issues relevant to the company & its operation	4.50
Managers use e-HRM for talent management	3.97
e-HRM is based on big data analysis	4.30
e-HRM is based on development of metrics that produce useful data	4.57
Data analysis is crucial task for e-HRM	4.87

Source: Authors

Abbreviations

AI	Artificial intelligence
AVE	Average variance extracted
CR	Composite reliability
DC&L	Digital culture and leadership
DI	Digital innovation
EFA	Explanatory factor analysis
e-HRM	Electronic-human resource
IoT	Internet of things
HRM	Human Resource Management
OC	Organizational culture
OCQ	Organizational cultural intelligence

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Author contributions

IT conceptualized the problem under investigation, structured the key model variables and proofread the document. IL has been evolved in the write up and the proof reading of the document along with the validation of the results and conclusions. AS developed the questionnaire design conducted the data analysis and drafted the first version of the paper. JP assist in the questionnaire design and collection of data. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

The authors declare that they have no competing interests.

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References

- Alshibly HH, Alzubi KN (2022) Unlock the black box of remote e-working effectiveness and e-HRM practices effect on organizational commitment. *Cogent Bus Manag.* <https://doi.org/10.1080/23311975.2022.2153546>
- Annarelli A, Battistella C, Nonino F, Parida V, Pessot E (2021) Literature review on digitalization capabilities: co-citation analysis of antecedents, conceptualization and consequences. *Technol Forecast Soc Change* 166:120635
- Autsadee Y, Jeevan J, Rosni Bin Othman M, Haqimin Bin Mohd Salleh N (2023) *J Marit Res* 2(2):148–161

- Azizi MR, Atlasi R, Ziapour A, Abbas J, Naemi R (2021) Innovative human resource management strategies during the COVID-19 pandemic: a systematic narrative review approach. *Heliyon*. <https://doi.org/10.1016/j.heliyon.2021.e07233>
- Bastidas V, Oti-Sarpong K, Nochta T, Wan L, Tang J, Schooling J (2023) Leadership for responsible digital innovation in the built environment: a socio-technical review for re-establishing competencies. *J Urban Manag* 12(1):57–73
- Baykal E (2022) Digitalization of human resources: E-HR. In: Research anthology on human resource practices for the modern workforce. IGI Global, pp 200–218
- Belias D, Koustelios A (2014) The impact of leadership and change management strategy on organizational culture. *Eur Sci J* 10(7):451–470
- Bondarouk TV, Ruël HJ (2009) Electronic human resource management: challenges in the digital era. *Int J Hum Resour Manag* 20(3):505–514. <https://doi.org/10.1080/09585190802707235>
- Bravo R, Matute J, Pina JM (2016) Corporate identity management in the banking sector: effects on employees' identification, identity attractiveness, and job satisfaction. *Serv Bus* 10:687–714
- Chuang S, Graham CM (2018) Embracing the sobering reality of technological influences on jobs, employment, and human resource development: a systematic literature review. *Eur J Train Dev* 48(7/8):400–416. <https://doi.org/10.1108/EJTD-03-2018-0030>
- Cooke FL, Xiao M, Chen Y (2021) Still in search of strategic human resource management? A review and suggestions for future research with China as an example. *Hum Resour Manag* 60(1):89–118. <https://doi.org/10.1002/hrm.22029>
- Crowne KA (2008) What leads to cultural intelligence? *Bus Horiz* 51(5):391–399. <https://doi.org/10.1016/j.bushor.2008.03.010>
- Da Silva LBP, Soltovski R, Pontes J, Treinta FT, Leitão P, Mosconi E, De Resende LMM, Yoshino RT (2022) Human resources management 4.0: literature review and trends. *Comput Ind Eng* 168:108111
- De Alwis AC, Andrić B, Šostar M (2022) The influence of E-HRM on modernizing the role of HRM context. *Economies* 10(8):181. <https://doi.org/10.3390/economies10080181>
- Divine Caesar L, Cahoon S, Fei J, Sallah CA (2021) Exploring the antecedents of high mobility among ship officers: empirical evidence from Australia. *Marit Policy Manag* 48(1):109–128. <https://doi.org/10.1080/03088839.2020.1762012>
- Earley PC (2002) Redefining interactions across cultures and organizations: moving forward with cultural intelligence. *Res Organ Behav* 24(2):271–299. [https://doi.org/10.1016/S0191-3085\(02\)24008-3](https://doi.org/10.1016/S0191-3085(02)24008-3)
- Elenkov DS, Manev IM (2009) Senior expatriate leadership's effects on innovation and the role of cultural intelligence. *J World Bus* 44(4):357–369. <https://doi.org/10.1016/j.jwb.2008.11.001>
- Emad GR, Ghosh S (2023) Identifying essential skills and competencies towards building a training framework for future operators of autonomous ships: a qualitative study. *WMU J Marit Aff* 22:427–445. <https://doi.org/10.1007/s13437-023-00310-9>
- Erkutlu H (2012) The impact of organizational culture on the relationship between shared leadership and team proactivity. *Team Perform Manag Int J* 18(1/2):102–119
- Fang F, Schei V, Selart M (2018) Hype or hope? A new look at the research on cultural intelligence. *Int J Intercult Relat* 66:148–171. <https://doi.org/10.1016/j.ijintrel.2018.04.002>
- Farhan AF, Salamzadeh Y, Richardson C (2021) The impact of E-HRM on employee productivity-mediating role of innovation. *Turk Online J Qual Inq* 12(6):5033
- Fawehinmi O, Yusliza MY, Mohamad Z, Noor Faezah J, Muhammad Z (2020) Assessing the green behaviour of academics: the role of green human resource management and environmental knowledge. *Int J Manpow* 41(7):879–900. <https://doi.org/10.1108/IJM-07-2019-0347>
- Fernandez-Vidal J, Gonzalez R, Gasco J, Llopis J (2022) Digitalization and corporate transformation: the case of European oil & gas firms. *Technol Forecast Soc Chang* 174:121293. <https://doi.org/10.1016/j.techfore.2021.121293>
- Fichman RG, Dos Santos BL, Zheng Z (2014) Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS Q* 38(2):329–354
- Gabel-Shemueli R, Westman M, Chen SAND, Bahamonde D (2019) Does cultural intelligence increase work engagement? The role of idiocentrism-allocentrism and organizational culture in MNCs. *Cross Cult Strateg Manag* 26(1):46–66
- Gambi LDN, Boer H, Gerolamo MC, Jørgensen F, Carpinetti LCR (2015) The relationship between organizational culture and quality techniques, and its impact on operational performance. *Int J Oper Prod Manag* 35(10):1460–1484. <https://doi.org/10.1108/IJOPM-12-2013-0563>
- Garcia-Arroyo J, Osca A (2019) Big data contributions to human resource management: a systematic review. *Int J Hum Resour Manag* 32(20):4337–4362. <https://doi.org/10.1080/09585192.2019.1674357>
- Gena B, Arief D, Tridoyo K, Nimmi Z (2020) Competitive advantage improvement strategy of container shipping industry: case of Indonesia. *Int J Shipp Transp Logist* 12(4):307–339. <https://doi.org/10.1504/IJSTL.2020.10023269>
- Hair JF, Anderson RE, Tatham RL, Black WC (2010) *Multivariate data analysis*, 7th ed. Prentice Hall, Englewood Cliff
- Hansen EK, Rasmussen HB, L'Utzen M (2020) Making shipping more carbon-friendly? Exploring ship energy efficiency management plans in legislation and practice. *Energy Res Soc Sci* 65:101459. <https://doi.org/10.1016/j.erss.2020.101459>
- Harlaftis G, Theotokas I (2020) Maritime business: a paradigm of global business. *Oxf Res Encycl Bus Manag*. <https://doi.org/10.1093/acrefore/9780190224851.013.184>
- Iqbal N, Ahmad M, Allen MM (2019a) Unveiling the relationship between e-HRM, impersonal trust and employee productivity. *Manag Res Rev* 42(7):879–899. <https://doi.org/10.1108/mrr-02-2018-0094>
- Iqbal N, Ahmad M, Raziq MM, Borini FM (2019b) Linking e-hrm practices and organizational outcomes: empirical analysis of line manager's perception. *Revista Brasileira De Gestão De Negócios* 21(1):48–69. <https://doi.org/10.7819/rbgn.v21i1.3964>
- Jenssen JI, Randøy T (2002) Factors that promote innovation in shipping companies. *Marit Policy Manag* 29(2):119–133. <https://doi.org/10.1080/03088830110078346>
- Jenssen JI, Randøy T (2006) The performance effect of innovation in shipping companies. *Marit Policy Manag* 33(4):327–343. <https://doi.org/10.1080/03088830600895485>
- Jian L, Guo J, Ma H (2022) Research on the impact of digital innovation driving the high-quality development of the shipping industry. *Sustainability* 14(8):4648. <https://doi.org/10.3390/su14084648>

- Jo S, D'agostini E (2020) Disrupting technologies in the shipping industry: How will MASS development affect the maritime workforce in Korea? *Mar Policy* 120:104139. <https://doi.org/10.1016/j.marpol.2020.104139>
- Jo S, D'agostini E, Kang J (2020) From seafarers to E-farers: Maritime cadets' perceptions towards seafaring jobs in the industry 4.0. *Sustainability* 12(19):8077. <https://doi.org/10.3390/su12198077>
- Kane GC, Palmer D, Phillips AN, Kiron D, Buckley N (2015) Strategy, not technology, drives digital transformation. *MIT Sloan Manag Rev* 6:66
- Khin S, Ho TC (2018) Digital technology, digital capability and organizational performance: a mediating role of digital innovation. *Int J Innov Sci* 11(2):177–195
- Lengnick-Hall ML, Moritz S (2003) The impact of e-HR on the human resource management function. *J Lab Res* 24(3):365
- Li J, Wu N, Xiong S (2021) Sustainable innovation in the context of organizational cultural diversity: the role of cultural intelligence and knowledge sharing. *PLoS ONE* 16(5):e0250878. <https://doi.org/10.1371/journal.pone.0250878>
- Lima JE, West GB, Winston BE, Wood JA (2016) Measuring organizational cultural intelligence: the development and validation of a scale. *Int J Cross Cult Manag* 16(1):9–31. <https://doi.org/10.1177/1470595815615625>
- Lipsmeier A, Kühn A, Joppen R, Dumitrescu R (2020) Process for the development of a digital strategy, 13th CIRP conference, 17–19 July, Naples, Italy. <https://doi.org/10.1016/j.procir.2020.05.031>
- Livermore D, Van Dyne L, Ang S (2022) Organizational CQ: cultural intelligence for 21st-century organizations. *Bus Horiz* 65(5):671–680
- Looy AV (2021) A quantitative and qualitative study of the link between business process management and digital innovation. *Inf Manag* 58:103413
- Mallam SC, Nazir S, Sharma A (2020) The human element in future maritime operations—perceived impact of autonomous shipping. *Ergonomics* 63(3):334–345. <https://doi.org/10.1080/00140139.2019.1659995>
- Margherita A (2022) Human resources analytics: a systematization of research topics and directions for future research. *Hum Resour Manag Rev* 32(2):100795. <https://doi.org/10.1016/j.hrmmr.2020.100795>
- Martínez-Caro E, Cegarra-Navarro JG, Alfonso-Ruiz FJ (2020) Digital technologies and firm performance: the role of digital organisational culture. *Technol Forecast Soc Chang* 154:119962
- Naftika Chronika (2023) Shipmanagement in Attica. 260, June–July, p 97
- Nazaria A, Atkinson P, Foroudi P (2017) Influence of national culture and balanced organizational culture on the hotel industry's performance. *Int J Hosp Manag* 63(3):22–32. <https://doi.org/10.1016/j.ijhm.2017.01.003>
- Nikitakos N, Lambrou MA (2007) Digital shipping: the Greek experience. *Res Transp Econ* 21:383–417. [https://doi.org/10.1016/S0739-8859\(07\)21012-1](https://doi.org/10.1016/S0739-8859(07)21012-1)
- Nikmehr B, Hosseini MR, Martek I, Zavadskas EK, Antucheviciene J (2021) Digitalization as a strategic means of achieving sustainable efficiencies in construction management: a critical review. *Sustainability* 13(9):5040. <https://doi.org/10.3390/su13095040>
- Oberer B, Erkollar A (2018) Leadership 4.0: digital leaders in the age of industry 4.0. *Int J Organ Leadersh* 6:66
- Oh S-Y, Han H-S (2018) Facilitating organisational learning activities: types of organisational culture and their influence on organisational learning and performance. *Knowl Manag Res Pract* 18(3):1–15. <https://doi.org/10.1080/14778238.2018.1538668>
- Özkanlısoy Ö, Akkartal E (2021) Digital transformation in supply chains: current applications, contributions and challenges. *Bus Manag Stud Int J* 9(1):32–55. <https://doi.org/10.15295/bmij.v9i1.1673>
- Pantouvakis A, Syntychaki A (2021) The role of shipping companies' organizational culture and cultural intelligence when selecting manning agencies. *WMU J Marit Aff* 20(3):279–308. <https://doi.org/10.1007/s13437-021-00236-0>
- Pradana M, Silvianita A, Syarifuddin S, Renaldi R (2022) The implication of digital organisational culture on firm performance. *Front Psychol* 13:840699
- Progoulaki M, Theotokas I (2010) Human resource management and competitive advantage: an application of resource-based view in the shipping industry. *Mar Policy* 34(3):575–582. <https://doi.org/10.1016/j.marpol.2009.11.004>
- Radonjić A, Duarte H, Pereira N (2022) Artificial intelligence and HRM: HR managers' perspective on decisiveness and challenges. *Eur Manag J* 6:66
- Ratasuk A, Charoensukmongkol P (2020) Does cultural intelligence promote cross-cultural teams' knowledge sharing and innovation in the restaurant business? *Asia-Pac J Bus Adm* 12(2):183–203. <https://doi.org/10.1108/APJBA-05-2019-0109>
- Remhof S, Gunkel M, Schlägel C (2013) Working in the "global village": the influence of cultural intelligence on the intention to work abroad. *Ger J Hum Resour Manag* 27(3):224–250
- Rony ZI, Mofijur M, Hasan MM, Rasul MG, Jahirul MI, Ahmed SF, Kalam MA, Badruddin IA, Yunus Khan TM, Show PL (2023) Alternative fuels to reduce greenhouse gas emissions from marine transport and promote UN sustainable development goals. *Fuel* 338:127220. <https://doi.org/10.1016/j.fuel.2022.127220>
- Rüth R, Netzer T (2020) The key elements of cultural intelligence as a driver for digital leadership success. *Leadersh Educ Pers Interdiscip J* 2(1):3–8
- Saha R (2023) Mapping competence requirements for future shore control center operators. *Marit Policy Manag* 50(4):415–427
- Schein EH (1996) Culture: the missing concept in organization studies. *Adm Sci Q* 41(2):229–240. <https://doi.org/10.2307/2393715>
- Schein EH (2010) *Organizational culture and leadership*, 4th edn. Wiley, New York
- Shin SH, Shin YJ (2022) The impact of organizational culture and strategy on shipping liner's awareness and utilization of the 4th IR technologies. *Marit Policy Manag* 49(1):78–96. <https://doi.org/10.1080/03088839.2020.1843724>
- Snowball J, Tarentaal D, Sapsed J (2022) Innovation and diversity in the digital cultural and creative industries. In: Arts, entrepreneurship, and innovation. Springer, Cham, pp 187–215
- Strohmeier S (2007) Research in e-HRM: review and implications. *Hum Resour Manag Rev* 17(1):19–37. <https://doi.org/10.1016/j.hrmmr.2006.11.002>
- Strohmeier S (2020) Digital human resource management: a conceptual clarification. *Ger J Hum Resour Manag* 34(3):345–365. <https://doi.org/10.1177/2397002220921131>

- Sumane S, Kunda I, Knickel K, Strauss A, Tisenkopfs T, Des los Rios I, Rivera M, Chebach T, Ashkenazy A (2018) Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture. *J Rural Stud* 59:232–241. <https://doi.org/10.1016/j.jrurstud.2017.01.020>
- Tenold S (2019) Norwegian shipping in the 20th century. Norway's successful navigation of the world's most global industry, Palgrave Studies in Maritime Economics. Cham, Palgrave Macmillan
- Theotokas I (2018) Management of shipping companies. Routledge, Oxon
- Theotokas I, Harlaftis G (2009) Leadership in world shipping: Greek family firms in international business. Springer, Berlin
- Theotokas I, Progolaki M (2007) Cultural diversity, manning strategies and management practices in Greek shipping. *Marit Policy Manag* 34(4):383–403. <https://doi.org/10.1080/03088830701539198>
- Tijan E, Jović M, Akstentijević S, Pucihar A (2021) Digital transformation in the maritime transport sector. *Technol Forecast Soc Change* 170:120879
- Tran LTT (2020) Online reviews and purchase intention: a cosmopolitanism perspective. *Tour Manag Perspect* 35:100722. <https://doi.org/10.1016/j.tmp.2020.100722>
- Trenerry B, Chng S, Wang Y, Suhaila ZS, Lim SS, Lu HY, Oh PH (2021) Preparing workplaces for digital transformation: an integrative review and framework of multi-level factors. *Front Psychol*. <https://doi.org/10.3389/fpsyg.2021.620766>
- Unctad (2023) Review of maritime transport 2023. Towards a green and just transition. United Nations, Geneva
- Wasono LW, Furinto A (2018) The effect of digital leadership and innovation management for incumbent telecommunication company in the digital disruptive era. *Int J Eng Technol* 7(2.29):125–130
- Winston BE, Patterson K (2006) An integrative definition of leadership. *International Journal of Leadership Studies* 1(2):6–66
- Wongsansukcharoen J, Thaweepaiboonwong J (2023) Effect of innovations in human resource practices, innovation capabilities, and competitive advantage on small and medium enterprises' performance in Thailand. *Eur Res Manag Bus Econ* 29(1):100210. <https://doi.org/10.1016/j.iiedeen.2022.100210>
- Xi M, Chen Y, Zhao S (2021) The Role of employees' perceptions of HPWS in the HPWS-performance relationship: a multi-level perspective. *Asia Pac J Manag* 38:1113–1138
- Yamak S, Nielsen S, Escribá-Esteve A (2014) The role of external environment in upper echelons theory: a review of existing literature and future research directions. *Group Org Manag* 39(1):69–109. <https://doi.org/10.1177/1059601113511663>
- Yopan M, Kasali R, Balqiah TE, Pasaribu M (2022) The role of digital leadership, customer orientation and business model innovation for IoT companies. *Int J Bus* 27(2):1–22
- Yuwono W (2021) Empirical analysis of intellectual capital, potential absorptive capacity, realized absorptive capacity and cultural intelligence on innovation. *Manag Sci Lett* 11(4):1399–1406. <https://doi.org/10.5267/j.msl.2020.10.034>
- Zhen Z, Yousaf Z, Radulescu M, Yasir M (2021) Nexus of digital organizational culture, capabilities, organizational readiness, and innovation: investigation of SMEs operating in the digital economy. *Sustainability* 13(2):720

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