
The role of agility and organisational learning culture in forming long lasting relations in shipping

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Abstract: The current study aims to introduce and examine the role of agility and organisational learning culture towards enhancing customer relationship quality at the corporate environment level. Using a sample of 17 ports internationally, the study results revealed that the ability of a firm to ensure a long-lasting quality relationship with its customers is directly and positively influenced by its agility and its learning culture. Following the organic view of the firm, this study advocates that, in order to establish strong and committed quality relationships, focusing solely on organisational learning is not enough; organisations should constantly and effectively adapt to changes in their external environment and reorganise their internal structures and systems or in other words be agile.

Keywords: agility; organisational learning; culture; relationship quality; shipping.

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1 Introduction

The current business environment is characterised by high unpredictability and fast – changing customer demands. For any service company, the success of effectively reorganising daily procedures and practices relies to a great extent on the quality of the human capital, employees' thoughts and behaviour, as well as on the dissemination of a learning culture inside the firm. In this vein, an organisational learning culture (OLC) creates an appropriate internal organisational environment, in which employees advance their knowledge and skills and become thus capable of contributing towards the development of systems and processes that are required for successful agility. Since the concept of agility among other things promotes flexibility and rapid response to customer demands (Marlow and Paixão, 2003; Ugboma et al., 2007), the joint deployment of a learning culture and agility implies quick and effective service performance as well as the development and maintenance of relationship quality (RQ) with the customers (Nguyen and Nguyen, 2010; Zhang et al., 2004).

In line with the behavioral or organic approach of organisation theory, the simultaneous examination of these concepts supports the view that appropriate firm structures should be developed that are free of rigidly and mechanistically applied procedures. These structures are evidently necessary especially in market environments characterised by high volatility and unpredictability (Vecchio, 2006). Although the port industry has already recognised the importance of quality in affecting customers' choice of ports and terminals, as well as the need for adjusting to external unpredictable changes, scientific research on these topics in the port service industry are still lacking (Chlomoudis and Lampridis, 2006; Pantouvakis and Dimas, 2013; Thai and Grewal, 2006).

Based on the above thoughts, the purpose of the current study is to investigate the degree to which ports develop links between the internal and the external environment in a knowledge – based way (Paixão and Marlow, 2003) as well as the role of “soft” resources in the efficiency of ports (Panayides et al., 2009). It also aims to test a set of hypotheses that confirm and extend the limited knowledge on the liaison among OLC, agility and RQ in the port industry as introduced by Pantouvakis and Bouranta (2017) who supported the fully mediating effect of agility on the OLC – RQ relationship drawing evidence however from a single port (Piraeus Port Authority) and specifically from employees in front – line positions. The current paper responds to the call of further examination of the interrelationships among the above mentioned constructs in the port sector internationally (Pantouvakis and Bouranta, 2017) using a sample of 17 world ports and thus providing more generalisable results.

This work further decides at this stage not to differentiate among port types and port governance models for three reasons; firstly because by its very definition an agile organisation should adjust its internal processes and structures in effective response to

environmental changes (Reed and Blunsdon, 1998). Following a holistic approach of the firm, we argue that there is no need for a universal style – or styles – of organising companies and ports – but rather situational constraints force open and flexible types of structure in response to every port regardless who owns or operates it or what internal structure for efficient service provision it follows (Sherehiy et al., 2007; Vecchio, 2006). The second reason concerns the ambiguity in the relevant port literature regarding the impact of ownership on the efficiency and performance of ports (Cheon et al., 2010; Cullinane et al., 2005a, 2005b). Finally, to further validate results without moderation considerations regarding port type or management model, we assess the efficiency of the ‘soft’ data by employing data envelopment analysis (DEA). By using OLC and agility as ‘soft’ inputs and RQ as a ‘soft’ output variable we produce a latent not observed (virtual) port incorporating observations from all ports under consideration. Those ‘soft’ efficiency targets of this virtual unit were defined as a percentage improvement and they eliminate any possible differences or managerial inefficiencies between ports and facilitate comparisons.

The remaining part of the paper includes the conceptual background and the research hypotheses, as well as the methodology used and the analysis of the results. Finally, the conclusions and managerial implications are presented in the last section.

2 Conceptual background

2.1 Organisational learning culture

The concept of OLC has been extensively studied in the relevant literature and it has been supported that it is a type of culture that integrates organisational learning as it targets to organisational improvement through supporting the acquisition of information, promoting the distribution and sharing of learning, as well as reinforcing continuous learning [Bates and Khasawneh, (2005), p.99]. According to Garvin (1993, p.80), OLC is also defined as “...an organisation skilled at creating, acquiring and transferring knowledge and at modifying its behaviour to reflect new knowledge and insights...”. For a firm, OLC facilitates efficient adaptations to challenging environments (Cunningham and Gerrard, 2000), self-transformation (Watkins and Marsick, 1993) and expanded capacity to shape its own future (Senge, 1990) and thus it significantly contributes to the continuous improvement of a firm.

Regarding its consequences, OLC provides many benefits and has been associated with both non-financial and financial outcomes. On the one hand, several authors have supported that firms that adopt an OLC philosophy foster and promote individual learning and development and respond more quickly and effectively to customers’ needs, thus creating a competitive advantage that is difficult for competitors to imitate (Goh and Ryan, 2008). Generally, OLC is linked with certain employee behaviours and attitudes, such as knowledge – sharing behaviours (Sorakraikitikul and Siengthai, 2014), knowledge creation (Song and Kolb, 2013) or employees’ level of normative commitment (Islam et al., 2014). Organisations that adopt a culture that encourages continuous learning tend to exhibit high career satisfaction among their employees (Joo and Ready, 2012) as well as increased team creativity (Joo et al., 2012). Moreover, the development of an OLC leads to the creation of an innovative culture, which then

promotes certain technical and administrative innovations (Kalyar and Rafi, 2013). The positive non-financial performance outcomes associated with fostering an OLC inside business organisations can also include enhanced customer satisfaction (Islam et al., 2014) as well as high product performance in terms of value to customer (Revilla and Knoppen, 2012). On the other hand, other studies highlight the link between OLC with financial results (Chien et al., 2015; Ellinger et al., 2002).

2.2 Relationship quality

According to an early definition [Smith, (1998), p.78], RQ is “...an overall assessment of the strength of a relationship and the extent to which it meets the needs or expectations of the parties based on a history of successful or unsuccessful events...”. Although research related to RQ has gained considerable momentum over the past years, the number and the nature of its dimensions lack a clear consensus as they seem to vary according to the field of application and the methodological objectives of each research. However, most authors conceptualise RQ as a higher-order construct composed of related but distinct dimensions, such as satisfaction and trust (Crosby et al., 1990) or trust and commitment (Morgan and Hunt, 1994). Moreover, other authors have utilised a more extended set of dimensions in order to best describe RQ and demonstrated that the latter can be decomposed into trust, business understanding, benefit and risk sharing, conflict and commitment (Lee and Kim, 1999), service quality, trust and affective commitment (Hennig-Thurau and Klee, 1997), or communication, long-term orientation, social satisfaction and economic satisfaction (Jiang et al., 2016). Finally, Lages et al. (2005) examined RQ from the organisational perspective rather than from the consumer/buyer viewpoint and proposed a multidimensional scale named RELQUAL. The RELQUAL instrument introduces four dimensions:

- 1 the amount of information sharing
- 2 communication quality
- 3 long-term orientation
- 4 satisfaction with the relationship.

RELQUAL is adopted in the current study since the proposed hypotheses were tested in a business-to-business environment. Moreover, recent studies have also utilised the RELQUAL scale in order to analyse for instance the effects of RQ on export performance (Ural, 2009).

In the literature stream and as regards the antecedents of RQ, it has been demonstrated that certain aspects of perceived service fairness can lead to RQ conceptualised as trust and commitment (Nikbin et al., 2016), whereas perceived service quality positively influences customer satisfaction (Hsu et al., 2016) and customer – company identification (Su et al., 2016), both of which constitute integral components of RQ. Furthermore, RQ can be significantly enhanced by implementing certain marketing activities (Al-Alak, 2014), whereas perceived value (Lai, 2014) and company image (Chen and Myagmarsuren, 2011) act also as antecedents of RQ. The establishment of strong RQ bonds with its customers can assist an organisation in ensuring strong repurchase intentions (Su et al., 2016) as well as loyalty (Lai, 2015).

2.3 *Agility*

Due to its abstract nature, the concept of agility has not been defined precisely in the literature yet. However, one of the most comprehensive definitions of agility is that of Prince and Kay (2003, p.307), who view agility as "...the ability to reconfigure itself in response to sudden changes in ways that are cost effective, timely, robust and of broad scope...". Although originally agility addressed the ability of a manufacturing system to respond to the rapidly changing needs of the marketplace (Yusuf et al., 1999), its importance to the service industry is also acknowledged. For a service firm, being agile is one of the most efficient ways to continuously meet customer requirements, expand its service portfolio, attain a competitive advantage and deal with the globalisation of the customer market. Most researchers argue that the main dimensions of agility include those of 'speed' and 'flexibility', while other authors stress that agility is characterised by certain attributes, such as 'high quality' and 'customised products or services'.

Apart from attempting to conceptualise agility, a lot of effort from various researchers has been devoted in the development of solid frameworks in order to illustrate its underlying dimensions. Although diverse in nature, most conceptual frameworks of agility stress the importance of an organisational culture which actively promotes the development of the human resource capital inside an organisation through training, educating and advancing the knowledge of employees. More specifically, in order for an organisation to be agile, specific attention should be given to four key strategic aspects, which include prompt response to customers' special needs, cooperation in order to boost competitiveness, effective organisation and fast adaptation to cope with environmental changes, as well as leveraging the impact of people and information (Goldman et al., 1995). On the other hand, Jackson and Johansson (2003) considered agility to be composed of four main dimensions: product-related change capabilities, change competency within operations, internal and external cooperation and finally people, knowledge and creativity. In a more recent study, Roberts and Grover (2012) conceptualised customer agility as consisting of two components, namely customer sensing capability and customer responding capability.

Irrespective of its underlying components, agility reveals an organisation's ability to respond promptly to the uncertainties of the external environment (Fayezi et al., 2015). Recent studies have mostly placed an emphasis on investigating the concept of agility and the potential interactions that arise with other organisational variables. A firm's agility is largely influenced by knowledge management processes inside a company and in turn impacts its organisational performance (Cegarra-Navarro et al., 2016). Specifically, it has been supported that agility has an effect on customer retention and operational performance (Shin et al., 2015) and ultimately contributes to increased competitiveness (Yusuf et al., 2014).

3 The triad: OLC, agility and RQ and their efficient use in the port industry

It is now widely acknowledged that in order to survive in the unpredictable business environment, the port industry should continuously strive to meet customers' changing needs and pursue customer satisfaction. Also, the fierce competition among the world's major ports has forced port authorities to shift their focus from heavily investing in port

infrastructure, such as berth length extensions, yard area expansions, deepening water depth etc. (Verhoeven, 2010), to more flexible and effective ways in order to facilitate business continuity, to ensure financial prosperity and to attain a competitive advantage (Pantouvakis et al., 2008). In other words, modern port organisations should concentrate their efforts not only on the tangible aspects of their operations or the ‘servicescape’ elements (the physical surroundings of a service organisation), but also on the development and adoption of market oriented management systems that are characterised by less formalised organisational structures as well as by the absence of rigid procedures and political influences (Notteboom and Winkelmann, 2001), which cumulatively lead to internal inefficiencies and decreased customer satisfaction.

As a result and in order to effectively respond to their customer needs, ports have to be agile (Marlow and Paixão, 2001). Port managers should set the foundation for the development of knowledge – based strategies and should constantly promote learning initiatives in order to better understand their customers, quickly respond to their requests and effectively adjust to the new conditions of the economic environment. By pursuing internal programs that lead to knowledge upgrading and encouraging a learning organisational culture, employees are able to improve their individual performance and subsequently internal (other employees or other links of the supply chain) and external customer benefits are realised.

In the literature stream, it is well – documented that through OLC employees in an organisation are able to advance their knowledge and skills as well as familiarise themselves with new technologies. As a result, they become more capable of meeting and satisfying the ever increasing customer requirements (Laudon and Laudon, 2006; Zhang et al., 2004) and consequently of developing and maintaining long-term relationships with clients characterised by trust and affective commitment (Santos-Vijande et al., 2005). Besides, Zhang et al. (2004) argued that a learning culture denotes the need of a firm to perform its services quickly and effectively and to ensure customer satisfaction. Furthermore, organisation learning and business process reengineering have a direct and notable impact on RQ and company results (Chang, 2007) and also there is a significant association between service quality and learning organisations (Cho et al., 2013).

From the above discussion, it can be seen that there exists a direct link between OLC and a company’s economic and non – economic performance outcomes. Traditionally, scholars have focused on quantitative indicators in order to evaluate a port’s performance (Marlow and Paixão, 2003), but the rapidly evolving business environment renders their sole use inadequate due to their inability to provide prompt feedback information (Eccles and Philip, 1992). Despite this fact, only a handful of studies have attempted to assess the relationship between OLC and nonfinancial outcomes, such as RQ in general (Chang and Ku, 2009; Nguyen et al., 2006) and a few in the port industry (Jin and An, 2011; Pantouvakis and Bouranta, 2013, 2017; Pantouvakis and Dimas, 2013). In the light of the above limited findings, the present research investigates the impact of OLC on a nonfinancial measure such as RQ by extending the findings of Pantouvakis and Bouranta (2017) from a single port to a number of ports operating internationally.

Hypothesis 1 OLC has a direct and positive effect on RQ in the port industry.

However, various authors argue for the impact of other organisational factors in the relationship between OLC and performance outcomes (Egan et al., 2004; Pantouvakis and Bouranta, 2013; Rose et al., 2009), such as a firm’s dynamic capability (Hung et al.,

2010). Specifically, Hung et al. (2010) supported that the association between OLC and firm performance is mediated by dynamic capability.¹ On the other hand, an agile company should be characterised by its ability to constantly develop knowledge and learning (Abdehgah and Safari, 2014; Gunasekaran and Yusuf, 2002), reflecting thus the close association between OLC and agility. Inside an organisation, implementing processes that foster knowledge management boosts agility and subsequently performance outcomes (Cegarra-Navarro et al., 2016). Since agility enhances customer service (Damen, 2001), the potential mediating role of agility between OLC and RQ emerges.

Agility enables ports to compete successfully in their business environment and to effectively tackle market uncertainty (Paixão and Marlow, 2003). In the port industry agility constitutes a knowledge – based strategy that strengthens the association between the internal, which includes the learning culture of a port organisation and the external business environment (Paixão and Marlow, 2003); the latter is formed as an interaction between the port and its customers. A recent survey in the corporate shipping sector explored the relationship between service quality, customer satisfaction, corporate agility and perceived price (Pantouvakis and Dimas, 2013). It was found that agility fully mediates assurance/empathy, tangibles and perceived price dimensions on customer satisfaction and partially mediates the relationship between reliability/responsiveness and customer satisfaction dimensions. In a different recent study, the associations between OLC, agility and RQ were investigated in the port sector and specifically in the Piraeus Port Authority (Pantouvakis and Bouranta, 2017). The authors corroborated the direct and positive relationship between OLC and RQ, while they also found support for the mediating role of agility in the previously mentioned link. However, the authors utilised data only from a single port industry, posing thus ambiguity in the generalisability of the results. Therefore, the current study follows relevant considerations identified in the literature (Pantouvakis and Bouranta, 2017) and provides extended evidence on the OLC – agility – RQ interrelationships in the international port environment addressing thus the concern for generalisation of the results.

Based on the previous discussion, the second and third hypotheses are formulated as follows.

Hypothesis 2 Agility has a direct and positive effect on RQ in the port industry.

Hypothesis 3 Agility partially mediates OLC to create RQ in the port industry.

3.1 Efficient use of the ‘soft’ resources (OLC, agility and RQ)

The concept of ‘efficiency’ is a key issue in the port industry (Cullinane and Song, 2002) and the need for sound comparisons among ports especially through benchmarking (Haralambides et al., 2001) has gained considerable attention in the relevant literature. It can be considered as the relationship between systems’ ‘outputs’ to the respective ‘inputs’ used and depicts the variations for the best production of an output for a given level of input. The rationale behind the need to estimate the efficiency of a port’s soft resources mainly lies in the fundamental role of ports as gateways to international trade and economic growth. Global economic growth is closely linked to port efficiency. Hence, it is imperative in the international market environment for ports to be able to compare and benchmark themselves against their competitors. Within such a competitive environment, a port’s RQ and efficiency measurement are considered as an essential

management tool for the port's administration authorities and as a determinant to the formulation of a port's strategies and operations. Thus, the strategic role of efficiency measurement is largely revealed and its importance for port managers is now a central issue in the port economics literature (Haralambides et al., 2001). This allows port management to understand the nature of inefficiencies by comparing the inefficient port with a subset of more efficient ports and identify areas for resource reallocation and improvement.

In the port industry sector numerous studies focusing on "hard" data, such as infrastructure development and costs are evident and certain measurement techniques have been developed. Among them one of the most commonly applied method for measuring port efficiency is the DEA technique, which has the advantage of handling many inputs and outputs simultaneously (Barros, 2006; Cullinane et al., 2005a, 2005b; Pantouvakis and Dimas, 2010; Rios and Macada, 2006). However little, if no attention has been devoted so far to analyse port efficiency, considering the 'soft' measures (Panayides et al., 2009) of OLC and Agility as inputs and RQ as an output measure, leading to the fourth hypothesis.

Hypothesis 4 OLC and agility are efficiently used from ports to create RQ.

4 Methodology

4.1 Measures

A structured questionnaire consisting of 31 items and split into three survey instruments that measure OLC (seven items), agility (ten items) and RQ (14 items) was used. Seven items were utilised in order to measure OLC. These seven items were adopted by the study of Pantouvakis and Bouranta (2017), who utilised a shorter version of the dimensions of the learning organisation questionnaire (DLOQ) instrument, originally developed by Watkins and Marsick (1997), in order to measure OLC in the port industry. The instrument identifies seven action imperatives of a learning organisation culture:

- 1 continuous learning
- 2 inquiry and dialogue
- 3 team learning
- 4 embedded systems
- 5 empowerment
- 6 connection to environment
- 7 strategic leadership.

In order to measure agility, following Sharifi's and Zhang's (1999) proposal we used a 10-item instrument, which is based on the four distinct capabilities that a company must use to achieve and maintain agility (responsiveness, competency, flexibility and quickness) and was adapted to the port sector by Pantouvakis and Dimas (2013).

Finally for the measurement of RQ an adapted form of the RELQUAL instrument, which consists of 14 items and was developed by Lages et al. (2005), was employed. The

instrument reflects the intensity of information sharing, communication quality, long-term orientation and satisfaction with the relationship. The items in these instruments took the form of a seven-point Likert type scale (anchored on 1 = 'strongly disagree' through seven = 'strongly agree'), since seven-point scales are overall considered more optimal in questionnaire design (Krosnick and Presser, 2010) and have been extensively used in social sciences (Nikbin et al., 2016; Roberts and Grover, 2012). Generally seven-point scales are considered appropriate for the following reason. They are constructed as having a middle point and between the middle and end points there are two choices, which means that they do not offer too many answer options to the respondents nor too few (Al-Alak, 2014).

Finally, the last part of the questionnaire included questions on the demographic profile of the sample.

4.2 Sample

The context of the port industry constitutes a suitable environment to test the proposed hypotheses, since the attitude towards privatisation and less state control, increased technological costs and the liberalisation of world markets (Chlomoudis et al., 2003) render the development of a learning culture, agility and RQ essential for survival. These changes intensified competition and increased customer expectations, forcing the port industry not only to focus on the existing use of its 'hard' resources (infrastructure development and costs) but also to be more responsive and more effective to changing customer needs (Demirkan and Spohrer, 2010).

A convenient sample of 150 major international ports, regardless type or status in line with our position as expressed in the introductory section was initially selected to answer a structured questionnaire through Internet. Three e-mail reminders providing the questionnaire link have been dispatched asking their marketing or quality managers to participate in the survey and a usable sample of 17 ports has been collected from Asia (two), Australia/New Zealand (one), Europe (12) and finally South and Central America (two). Twelve of the ports handle less than 3 m Containers per annum, 2 are in the region of 3 m to 9 m and the rest 3 over 9 m boxes annually. Ten of them handle annually less than 50 m gross weight of tons of goods, 4 between 50 to 150 m tons and 3 over 150m tons. Finally 8 of them serve less than 2,5m passengers p.a., 4 from 2,5 to 10m passengers and 3 over 10m annually.

4.3 Analysis tools

In order to reveal the underlying structure of the three examined constructs (OLC, RQ and agility), exploratory factor analyses (EFA) were performed. Although validated measurement scales were employed from previous literature, it is common practice to use EFA in order to yield the unique factors for each theoretical construct and to ensure that no cross-loadings are evident. Moreover, due to the small sample size of the current

study, confirmatory factor analyses (CFA) could not be considered as an option for method analysis. After the refinement of the constructs, correlation and regression analyses were utilised in order to test the first three hypotheses and to establish the relationships among the constructs. Finally, the method of DEA was chosen to further validate the results and estimate the efficiency of the ports under examination, to define the production possibility set and accommodate for possible differences by comparing slacks in x-efficiency targets (Pantouvakis and Dimas, 2010).

5 Results and discussion

5.1 Assessing the dimensionality, reliability and validity of the instruments

Following the descriptive analysis of the data, an exploratory factor analysis (EFA) with principal component analysis and Varimax rotation was carried out for each instrument (OLC, agility and RQ) to extract the factors. As displayed in Table 1, the factor analysis of the OLC instrument revealed a one-dimensional factor that explains 64.2% of total variance.

Table 1 Exploratory factor analysis of OLC

<i>Descriptor</i>	<i>Factor 1</i>
<i>Learning organisation culture</i>	<i>KMO = 0.776. p = 0.000</i>
In my organisation, top management continually seeks for opportunities to learn.	0.905
In my organisation, decisions and practices are revised as a result of team thinking.	0.863
In my organisation, people spend time building relationships with each other and create a common understanding (culture).	0.828
In my organisation, people are rewarded for continuous learning.	0.802
In my organisation, people are encouraged and rewarded for taking initiatives.	0.751
In my organisation, working together with other stakeholders (e.g., local community, customers, suppliers, government) to meet mutual objectives is a common policy.	0.628

The one – dimensional nature of OLC emphasises that all organisational efforts point to the creation of a business environment that encourages and facilitates continuous learning and knowledge creation. Moreover, in a culture of organisational learning, all employees are given the opportunity to advance their skills and are rewarded for taking initiatives.

The agility instrument also revealed two factors, named as ‘responsiveness’ and ‘decisiveness’ and accounted for 76.6% of the variance, as shown in Table 2.

Table 2 Exploratory factor analysis of agility

<i>Descriptor</i>	<i>Factor 1</i>	<i>Factor 2</i>
<i>Agility</i>	<i>KMO = 0.747. p = 0.000</i>	
My organisation immediately understands and reacts to changes in a b2b environment.	0.902	
My organisation is flexible enough to successfully respond even to special or unusual customers' demands.	0.877	
My organisation has the sufficient technological and infrastructural ability to anticipate future customer needs.	0.869	
My organisation continually senses, perceives and anticipates changes in the external environment.	0.802	
My organisation has the strategic vision to seek, anticipate and respond to the market needs.		0.902
My organisation provides quality services.		0.781
My organisation has the flexibility to successfully meet all customers' requirements.		0.698

Table 3 Exploratory factor analysis of RQ

<i>Descriptor</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>
<i>Relationship quality</i>	<i>KMO = 0.672, p = 0.000</i>		
We believe that over the long run, our relationship with our customers will be profitable.	0.969		
Maintaining a long-term relationship with our customers is important to us.	0.908		
We are willing to make sacrifices to help our customers from time to time.	0.803		
Team members openly communicate while implementing the strategy.		0.929	
The strategy's objectives and goals are communicated clearly to involved and concerned parties.		0.872	
Overall, the results of our relationship with our customers are far short of expectations.			0.884
Our customers leave a lot to be desired from an overall performance standpoint.			0.882

As Table 2 reveals, the first extracted dimension of agility (responsiveness) highlights the ability of an organisation to respond promptly and effectively to its customers' special or unusual demands. Moreover, it addresses a company's ability to anticipate and react immediately to the changes in the external environment. On the other hand, the second factor of agility (decisiveness) precisely describes a business strategy that is centred on seeking and responding to market needs as well as on constantly providing quality services.

Finally, the RQ instrument revealed three factors, describing 'long term relationship orientation', 'communication quality with the relationship' and 'satisfaction with the relationship' and explaining 87.8% of the total variance after the deletion of some items due to multi-factor loadings.

It is apparent from Table 3 that the concept of RQ is first of all characterised by the establishment of a long – term relationship with the customers that is profitable and mutually beneficial for the parties involved. Moreover, the effective communication of the business strategy and goals to all involved members of an organisation is a crucial component of RQ, while ensuring that both sides are satisfied with the business transactions is also deemed important in forming a quality customer relationship.

The Kaiser-Meyer-Olkin and Sphericity statistics exceeded suggested cut-off points (0.5) in all cases (0.776, 0.747 and 0.672), thus indicating very good relationships among items and appropriateness for applying factor analysis (Hair et al., 2006). Further to that and to accommodate reservations on the small sample size (17 ports) to perform an EFA, three precautions have been introduced to the analysis: first, variables exceeding (or close to) 0.8 power loadings have been kept in analysis so to ensure practical significance and second at least 5 observations are used for every factor extracted per EFA analysis. As a final precaution, factor scores have not been used and instead the summations of all variables loading to every factor are utilised.

The Cronbach's alpha of the scale was calculated to check the reliability of the scale. Reliability was high, verifying the good scaling of the instrument. Convergent validity was also tested, by calculating the average variance extracted (AVE) by each factor, indicating that the variance for each factor exceeds the proposed cut-off point of 0.5. In examining the discriminant validity of the instruments, it was found that the square root of AVE was greater than the coefficient, which demonstrated discriminant validity between the constructs.

5.2 Testing the proposed hypotheses

Correlation analysis was used first to verify the hypothesised relationships among OLC, agility and RQ in two distinct ways: the first examining the direct relationships between OLC, Agility and RQ and the second introducing and examining the mediating effects of Agility in the relationship. Since the data exhibit normal characteristics and no serious (< 5%) missing data are evident, the maximum likelihood method (MLE) was selected to test the hypotheses, as it has been found to provide valid results even for very small samples (Hair et al., 2006).

A series of steps have been then followed to examine the possible mediating effect of agility on the OLC – RQ relationship (Cohen and Cohen, 1983) and the results are briefly described below: First, correlations among OLC, Agility and RQ have been examined for significance and results revealed statistical significant correlations between OLC and RQ (0.750), agility and RQ (0.583) but not significant results between agility and OLC indicating thus a non-mediating role for agility on the OLC – RQ link.

Following this, the direct relationship between the two constructs (OLC and RQ) has been tested. Results showed a statistically significant result (β value 0.750) with an $\text{adj}R^2 = 0.534$, thus establishing a direct link between OLC and RQ in support of our first hypothesis. Further a significant relationship between Agility and RQ (β value 0.583)

with an $\text{adj}R^2 = 0.295$ has been revealed arguing thus for a direct relationship between Agility and RQ in support of our second hypothesis.

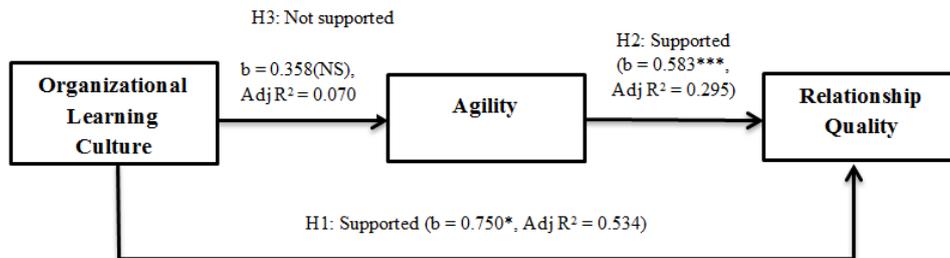
However, when Agility was brought into the equation the link between OLC and RQ β value reduced to 0.358, is not statistically significant ($t = 1,487$) and has an almost negligible $\text{adj}R^2$ of 0.070. Results hence do not support a full or partial mediation effect of Agility to the OLC – RQ link, thus rejecting any mediation considerations of Agility on the OLC – quality (RQ) link, strongly advocating for an independent variable outcome. A final regression analysis including both OLC and Agility as independent variables on RQ has been performed.

The final relationship (OLC, Agility \rightarrow RQ) presents a very good explanatory ability with an $\text{adj}R^2 = 0.630$ (better than OLC alone) and standardised β coefficients 0.621 for OLC and 0.360 for agility. Tested relationships outperform the single influence of every variable on RQ supporting thus the combined effect of both when forming RQ in the port industry.

Table 4 Regression coefficients

Relationships	Coefficient	Adj R^2	Hypothesis	Result
Organisational learning culture – agility	0.358 (NS)	0.070		
Organisational learning culture – relationship quality	0.750*	0.534	Hypothesis 1	supported
Agility – relationship quality	0.583***	0.295	Hypothesis 2	supported
OLC – agility – RQ	$b_1 = 0.358$ (NS) $b_2 = 0.583$ (***)	Adj. R^2 (1) = 0.070 Adj. R^2 (2) = 0.295	Hypothesis 3	Not supported
OLC, Agility – RQ	(0.621***, 0.360*)	0.630		

Figure 1 Hypotheses



5.3 Estimating the efficiency of the ‘soft’ variables (OLC, agility and RQ)

Based on the results of the above regressions, the DEA technique to measure the efficiency of those ‘soft’ variables (OLC, agility and RQ) is then applied (Norman and Stoker, 1991; Wang et al., 2005) to reliably define the ‘production possibility set’, which contains all feasible input – output correspondences of the production process operated by the port in question. The use of the dependent variable RQ as output and independent

variables OLC and Agility as inputs seems to overcome the inefficiencies of DEA, since the data have already been studied and the relationships among them were statistically grounded. The efficiency ratings are then estimated based on the output-maximisation method under variable returns to scale. The table below (Table 5) presents the efficiency scores of 17 ports under study, compared with one another in terms of OLC, Agility and RQ and the effort (distance) they require in order to become efficient (frontier).

Table 5 Efficiency scores and targets for soft variables

<i>Name</i>	<i>EFFICIENCY</i>	<i>Observed OLC</i>	<i>Target OLC</i>	<i>Observed agility</i>	<i>Target agility</i>	<i>Observed RQ</i>	<i>Target RQ</i>
A1	100	36	36	43	43	47	47
A2	100	33	33	34	34	44	44
A3	95.37	34	35.65	41	42.99	42	44.04
A4	97.16	38	36.51	39	40.14	44	45.29
A5	89.82	34	37.86	42	46.76	38	42.31
A6	86.44	38	43.96	48	55.53	38	43.96
A7	90.48	37	39.7	37	40.89	39	43.11
A8	100	22	22	25	25	35	35
A9	89.9	31	34.48	38	42.27	36	40.05
A10	93.07	35	37.61	42	45.13	41	44.05
A11	99.63	25	25.09	45	42.87	39	39.14
A12	90.91	26	27.44	28	30.8	32	35.2
A13	87.78	39	44.29	41	46.71	39	44.43
A14	96.3	26	24	26	27	22	35
A15	100	12	12	42	42	30	30
A16	88.81	34	38.28	39	43.91	37	41.66
A17	84.51	22	26.03	39	46.15	26	32.98

In order to obtain support for our fourth hypothesis, a straightforward run of all 17 ports was then performed. The x-efficiency targets were added for all variables and for all inefficient cases. Corresponding targets (distances) were specified for each case and one virtual port (not really observed in practice) is then assumed, created out of the summation of all cases as well as their corresponding levels (slacks or targets) for improvement. The assumption of variable returns to scale prevented the model from yielding targets exceeding the maximum feasible scores for each case. Results support that by increasing 6% the OLC level of a port and by 7% its agility, a 9% increase in the overall RQ should be envisaged.

6 Conclusions and managerial implications

The concept of agility as a possible key competitive differentiator for port industry has already been acknowledged (Paixão and Marlow, 2003) in the relevant literature, highlighting the importance of effective and reactive responses and adaptations to external environmental changes. However, previous studies either adopted a purely

theoretical approach when examining agility issues in the port environment (Paixão and Marlow, 2003) or provided conclusions drawn from a single port authority (Pantouvakis and Bouranta, 2017). Therefore, this study aimed to extend the knowledge on the interrelationships among OLC, agility and RQ by using evidence from the international port industry.

Contrary to the study of Pantouvakis and Bouranta (2017), in which the mediating role of agility in the OLC – RQ was confirmed, the current study examined but did not find support for any mediation effects; instead it demonstrated that OLC and agility collectively contribute, as independent variables, in building up strong and enduring quality relationships with the customers. In our study, a possible explanation for the absence of mediation may be due to the international and diverse nature of our sample as opposed to the context of a single port authority in Pantouvakis' and Bouranta's (2017) study. It seems that in the international port environment, which is characterised by a variety of organisational systems, internal structures and management policies, the only way to achieve high levels of RQ is through the joint adoption of a learning philosophy and agile characteristics inside port organisations.

The study results indicated that for a service organisation, the development of strong and committed quality relationships with its customers is directly and positively influenced by its agility and learning culture. In other words, an organisation which fosters a culture of learning facilitates the dissemination of knowledge as well as supports the effective usage of this knowledge in order to improve internal organisational procedures and ensure long – lasting customer relationships. However, in order to maintain these quality relationships, flexibility, collaborative decision-making, customisation and rapid adjustments to environmental stimuli are required.

This study deviates from the mechanistic view of the firm and following the contingency theory, it demonstrates that decisions in the company's strategic level are strongly influenced by the dynamics of the external environment (Donaldson, 2001). In order to deal effectively with unpredictable environmental changes and ensure market and customer excellence, agility should be integrated with knowledge efficiency. Although the development of a learning culture is considered as an important tool in the pursuit of quality relationships, agility methods and characteristics have to be introduced and supported that enable instant or very rapid response to radically changing environments.

The findings of this research also have important managerial implications. First of all, executives in the top managerial positions should realise that different management approaches characterised by flexibility and less formality (Sharifi et al., 2001; Vecchio, 2006) should be followed during a port's daily operations. These management practices should be explicitly directed towards effectively reacting to external environmental changes and consequently port managers will be able to develop and provide more reliable services as well as to meet even the most special and unusual demands and requirements of their customers or the users of port services (Paixão and Marlow, 2003). This agility that is required to cope with unpredictability is closely associated with the port's technological and infrastructural abilities but also with the quality and expertise of the human capital. As a result, managers should constantly seek of investment opportunities that will upgrade their potential to offer superior services and will result in effectively seeking, perceiving and anticipating changes in the external environment, which is characterised by intensified competition among different ports.

As a consequence, the above approaches encourage the development of a learning culture and the introduction of agile characteristics inside any service organisation and subsequently a seaport and support innovation and tracing market changes more than simply obeying rules and just focusing on process improvements. Thus, employees should be encouraged to learn new skills, be alert to any external changes, be empowered and have the authority to make decisions (Lee and Song, 2010). In line with this, port managers should thus acknowledge the fact that agile abilities should be complemented with creating learning opportunities addressed to all employees. The successful development of the port industry and the effective execution of a port's strategy are largely based upon the human capital and knowledge management (Paixão and Marlow, 2003). An organisational culture that promotes continuous learning should be the primary concern of top management and senior executives should encourage and reward learning initiatives and skill advancements, not only focused on technical issues as it was the usual practice in the port environment (Beresford et al., 2004) but rather on intellectual and problem solving capabilities that have a direct impact on RQ. Only a port organisation which is characterised by a learning culture and an agile mindset will manage to create and maintain a strong, profitable and long – term quality relationship with its customers in an era in which a customer – oriented business strategy is imperative for a port's survival (Pantouvakis and Bouranta, 2017).

As with any research, this study is subject to certain limitations that may impact the interpretation of the results. Since the sample is limited to only 17 ports, future works could confirm the findings in a bigger sample in the same sector or in other sectors. Moreover, it may be of value to replicate this study by examining the relationships in the model on dyadic data (e.g., by asking employees and customers to rate RQ). Finally, future studies could also analyse the interrelationships among OLC, RQ and agility while investigating the influence of various moderating variables, such differences in the port governance, ownership structure or port management models.

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Notes

- 1 "A dynamic capability is the firm's ability to integrate, build and reconfigure 'internal and external competencies to address rapidly change environments" [Teece et al., (1997), p.516].