

# Contract Types, Institutional Distance and Operational Performance: Evidence from Global Trade Flows in the LNG Industry

Georgios Batsakis,<sup>1,2</sup> Andreas Robotis,<sup>3</sup> Christos Koulamas<sup>4</sup>  
and Fotios Zeritis<sup>5</sup>

<sup>1</sup>Alba Graduate Business School, The American College of Greece, Athens, 11 528, Greece, <sup>2</sup>Brunel Business School, Brunel University London, Uxbridge, UB8 3PH, UK, <sup>3</sup>Dublin City University Business School, Dublin City University, Whitehall, Dublin 9, Ireland, <sup>4</sup>Department of Information Systems and Business Analytics, Florida International University, Miami, FL, 33199, USA, and <sup>5</sup>NAKILAT (Qatar Gas Transport Company), Doha, 22271, State of Qatar

Corresponding author email: gbatsakis@alba.acg.edu

**In this study, we examine the relationship between contract types, institutional distance and operational performance in the context of cross-border trade in the liquefied natural gas (LNG) industry. Drawing on the buyer–supplier long-term relationships literature, we argue for a negative link between short-term contractual agreements and operational performance. Further, drawing insights from institutional theory, we contend that a high level of formal and informal institutional distance between the origin (i.e. supplier) and destination (i.e. buyer) countries reduces operational performance. We also argue that formal and informal institutional distance mitigates the negative effect of short-term contracts on operational performance. Finally, we draw on the role of ‘asymmetry in distance’ by examining the direct and moderating effect of both the relevance and direction of formal institutional distance. We test our assumptions using LNG global trade flows from 39 source countries to 44 destination countries over the 2008–2017 period (a total of 17,447 shipments). Our study extends our knowledge on the operational performance implications of buyer–supplier relationships and stresses the important role formal and informal institutional distance plays as a direct and moderating effect on this relationship.**

## Introduction

In the last couple of decades, a proliferation of academic research on cross-border buyer–supplier relationships is being observed (Autry and Golicic, 2010; Roh, Whipple and Boyer, 2013; Squire,

Cousins and Brown, 2009; Um and Oh, 2020). Extant research has primarily focused on factors affecting the quality and effectiveness of buyer–supplier relationships (Cousins and Lawson, 2007; Lui and Ngo, 2012; Stuart, 1997). For example, research has stressed the positive role trust and commitment play in this relationship (Ketkar *et al.*, 2012; Lane and Bachmann, 1996; Squire, Cousins and Brown, 2009; Xie *et al.*, 2010). Recently, research has shifted its attention to the adverse effect conflict and opportunism seem to have on determining the effectiveness of buyer–supplier relationships (Bai, Sheng and Li, 2016).

The aforementioned factors have been found to be compromised by the use and enforcement

We would like to express our gratitude to Kpler for granting us access to its database in order to process their data and conduct this research study. The views in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of their institutions and organizations.

[Correction added on 7th of November 2022, after first online publication: Figure 1 and hypotheses numbers have been updated in this version.]

of contracts. In general, contracts are an effective mechanism for providing safety and clarity when it comes to interorganizational conflict resolution (Zhou and Xu, 2012). Existing research – mainly drawing on transaction cost economics – has stressed the crucial role contractual agreements play in alleviating opportunistic behaviour in interorganizational relationships (Williamson, 1985; Zhou and Xu, 2012). More specifically, with respect to logistics and transportation costs, firms tend to rely on long-term contracts to secure stability and hedge against market volatility and high prices. Yet, this logic is nowadays challenged as more and more firms opt for shorter-term solutions. This phenomenon is particularly observed in the liquefied natural gas (LNG) trade. Although the majority of LNG trade utilizes long-term contracts, it is observed that nowadays firms also opt for shorter-term and spot trades, which now account for over one-third of the global LNG trade. This phenomenon is attributed to the ongoing review and revision process of contract price formulas (especially in the Asia Pacific region), as well as to escalating arbitrations to resolve disputes between parties on pricing terms (Finizio, Trenor and Tan, 2020). These ongoing revisions and disputes over long-term contracts have given rise to a debate on whether shorter-term or spot solutions are more efficient with respect to the operational performance of buyers and suppliers.

The explanation of the aforementioned phenomenon can be facilitated by the instrumentation of another body of literature which has acknowledged the important role institutions – formal and informal – play in constraining acceptable actions in economic exchanges (Christopoulou *et al.*, 2021; North, 1990; Peng, Lee and Wang, 2005; White *et al.*, 2013) and in supporting contract enforcement (Greif, 2005). The preference for long-term contracts over shorter-term solutions can be explained by the relative strength or weakness of buyer and supplier home country institutional regimes. While there has been a particular emphasis on widening the scope of applications of institutional theory in the supply chain management discipline in general, and in causal effects of operational performance in particular (Gupta and Gupta, 2019; Kauppi, 2013), there has been no clear evidence of how formal and informal institutional differences at the country level affect important operational characteristics pertaining to the buyer–supplier dyad. Most importantly,

there is no evidence of how formal and informal institutional distance moderates the relationship between contractual agreements and operational performance in cross-border trade.

Aiming at filling the aforementioned gaps in the literature, we explore a so far under-researched question, pertaining to the contingent effect of contract type on operational performance.<sup>1</sup> Our first contribution is that we examine the effect of different contract types on the operational performance in the buyer–supplier dyad. Our findings are of significance for the supply chain management literature because not only do we clarify the different types of contracts and their related changing dynamics, but we also examine their impact on a novel measure of operational performance (i.e. capacity utilization), which is both relevant and important for the industry under examination and beyond. Further, drawing on the increasingly important role of institutions in creating and sustaining firm competitive advantage (Peng *et al.*, 2009), we examine the effect of formal institutional distance (i.e. the extent of dissimilarity among the formal institutions of two countries) and informal institutional distance (i.e. cultural dissimilarity) in buyer–supplier cross-border relationships; we also assess the moderating effect institutional distance plays in the link between contract type and operational performance. Our second contribution is that we elucidate the differential effects of formal and informal institutions on the operational performance in the buyer–supplier dyad, which is a rather under-researched phenomenon in the supply chain management discipline. Our longitudinal, cross-country research setting adds further significance to the supply chain management discipline given that the majority of contract studies either treat institutions in a static manner or conduct their empirical examination in highly similar contexts (Bai, Sheng and Li, 2016).

We view our research contributions as novel, among others, because our study is contextualized in an industry substantially different from those in past studies that have tested similar research questions. Compared to other industries, the LNG industry is unique, but also appropriate to test such questions, as it is characterized by several

<sup>1</sup>In the context of our research, we measure operational performance as the tanker's capacity utilization, that is the extent to which a tanker uses its maximum storage capacity.

idiosyncrasies, as outlined below. We thus ascertain that the LNG context provides a more suitable research setting for a study that may reveal more unique insights (compared to all other studies) with respect to the standard theory expectations in the buyer–supplier literature.

To answer the aforementioned research questions, we utilize data on LNG global trade flows from 39 source countries to 44 destination countries over the 2008–2017 period. This study's research questions involve two interacting stakeholders (buyer and supplier) and the research aim is to comprehend both stakeholders' evaluation of this dyadic relationship as a true multi-stakeholder dyad, where the perceptions of both are discussed and considered (Roh, Whipple and Boyer, 2013). Accordingly, this study uses a dyadic (buyer–supplier) unit of analysis (Squire, Cousins and Brown, 2009).

## Literature review

Operational performance is viewed as a key indicator in the supply chain management literature. Extant research has shown that operational performance depends on a number of antecedents, such as governance modes (Cao and Lumineau, 2015), the extent of collaboration (Chen, Preston and Xia, 2013), the successful implementation of ISO certifications (Lafuente, Bayo-Moriones and García-Cestona, 2010), the use of digital or other artificial intelligence-aided software (Chang and Gurbaxani, 2012; Deepu and Ravi, 2021; Garg *et al.*, 2021; Kar, 2014) and other organizational factors (Um and Oh, 2020). Recently, research has been investigating the determinants of operational performance in the context of dyadic (Kar and Pani, 2014), triadic (Choi and Wu, 2009) and other multi-party relationships (Thomas *et al.*, 2016). Extant research has also stressed the importance of information and communications technology systems as a way to facilitate and improve operational performance under conditions of multi-party stakeholders (Allaoui, Guo and Sarkis, 2019; Jæger and Hjelle, 2015).

Research has stressed the role cognitive social capital plays in facilitating resource exchange between buyers and suppliers (Tsai and Ghoshal, 1998). Understanding behavioural norms and aligning the goals of the partner firm with these norms improves the possibility of synergies and

mitigates the likelihood of conflicts, which in turn can improve the odds of achieving better operational performance (Villena, Revilla and Choi, 2011). The existing literature puts particular emphasis on the role cultural similarity (or informal institutions) plays in shaping the effectiveness of buyer–supplier relationships with respect to operational performance. Research has also focused on the role legal frameworks play in buyer–supplier relationships and it has been shown that legal bonds between the two parties improve the effectiveness of relational capital and enhance operational performance (Carey, Lawson and Krause, 2011).

The aforementioned review of the literature leads to the following conclusions: (1) operational performance is particularly relevant to the context of supply chain management; (2) dyadic (buyer–supplier) relationships and the commitment/trust characterizing them are important in determining the effectiveness of operational performance; and (3) cognitive (i.e. informal institutions) and legal dimensions (i.e. formal institutions) play a pivotal role in strengthening/weakening operational performance in the buyer–supplier relationship context. While the above relationships have been tested in the general supply chain management research, we cannot claim that this has been the case in the context of cross-border trade. Firms tend to rely on long-term contractual agreements in an attempt to alleviate opportunistic behaviour (Williamson, 1985; Zhou and Xu, 2012); at the same time, they cultivate a risk-sharing and reward-based culture between partners (Cooper and Ellram, 1993; Li *et al.*, 2007; Prajogo and Olhager, 2012). Parties involved in cross-border transactions share vastly different perceptions (cognitive or normative) that originate in substantially dissimilar legal contexts. As a result, buyer–supplier contractual relationships can affect operational performance, while institutional dissimilarity (i.e. formal and informal institutional distance) can signal whether such a relationship can improve or mitigate operational performance.

## Hypothesis development

### *Contract type (long-term vs. short-term contract) and operational performance*

A core driving force determining the success of buyer–supplier collaborations is the behaviour

and degree of dependence between partners, and most importantly, whether there is a sufficient level of trust among them (Camarero Izquierdo and Gutiérrez Cillán, 2004; Larsson *et al.*, 1998). Trust is considered a key factor in determining the behaviour of partners because it can reduce uncertainty and conflict potential (Gulati, 1995). We focus on the means that can build trust via the contract type.

In seaborne flows, short-term contracts are more susceptible to risk aversion and bounded rationality (Kavussanos, Visvikis and Batchelor, 2004), leading to lower operational efficiencies compared to more permanent contractual agreements. Transactions on the spot (i.e. short-term contracts) are highly vulnerable to opportunistic behaviour, as buyers can take advantage of periods of decreasing demand while suppliers can benefit from periods of increasing demand. These fluctuations will inevitably affect tanker operational efficiency. On the contrary, long-term contracts are viewed as more valuable to both suppliers and buyers. Through long-term contracts, LNG suppliers can obtain guaranteed capital upfront, which is required for forward-looking investments to support production, liquefaction and infrastructure-related activities. By securing long-term contracts, LNG buyers feel more reassured about the long-term supply needs of their business and their customers (Finizio, Trenor and Tan, 2020). Short-term dyadic relationships put a rather superficial and temporary emphasis on sustaining operational performance, while long-term dyadic buyer–supplier relationships are characterized by synergistic behaviour, thus leading to more enduring methods of assessing operational performance (Cao and Zhang, 2011). On the contrary, long-term contracts in the LNG industry are characterized by mutual trust, which sometimes is also enforced through mutual forbearance. Specifically, both suppliers and buyers are aware that they cannot randomly dispute the agreed terms and conditions of a contract because this would have a knock-on effect on their reputation, also affecting future trade conditions (Zhou and Poppo, 2010). Further, nowadays, many long-term contracts are being agreed based on allowing spot transactions to complement contracted trade. Such a contract clause provides added value to both suppliers and buyers when, for example, LNG capacity is either constrained or spot prices are

low<sup>2</sup> (Hartley, 2015). Such a mechanism provides more options and mitigates any ex-post inefficiencies resulting from – the sometimes tight and inflexible – long-term contractual agreements. This leads to an increased commitment to maintaining a high level of operational performance that will be mutually beneficial to both partners. We quantify the above rationale in the following hypothesis.

*H1:* Short-term contracts (compared to long-term contracts) in the LNG buyer–supplier relationships are negatively related to operational performance.

#### *The effect of formal and informal institutional distance on operational performance*

Given that both suppliers and buyers in the LNG industry are adversely affected by low operational performance, we ascertain that formal and informal institutions can appropriately describe the means these two different forms of control mechanisms utilize to improve operational performance. The LNG industry is a highly idiosyncratic industry because: (1) it is characterized by the existence of limited global suppliers, which make the operational efficiency and the significance of contractual agreements even more pronounced; and (2) tensions, disputes and arbitration in long-term contracts have been on the rise. These idiosyncrasies imply that differences in the regulatory context and the cognitive mindset of the buyer–supplier dyad can have an even more significant impact on their operational performance. Therefore, while we integrate theoretical mechanisms from institutional theory, we rely heavily on mechanisms characterizing the idiosyncratic context of the LNG industry.

Institutional theory suggests that countries differ on the basis of their formal institutions, such as laws and regulations (and the coercive power of these) and on the basis of their informal institutions, including norms and cognitions arising from differences in culture (Papageorgiadis *et al.*, 2020; Peng, Wang and Jiang, 2008). Legal systems across countries provide the required guarantees for the effective execution of a transaction and for

<sup>2</sup>In that case, suppliers can realize their contract obligations by a swap mechanism; similarly, when demand is low or spot market prices are high, buyers can dispose of surplus contracted capacity.

lessening potential conflicts in buyer–supplier relationships (Bai, Sheng and Li, 2016). When legal systems between two countries are too dissimilar, the operational performance in the buyer–supplier relationship is likely to be compromised by the vastly different expectations on how the rule of law is enforced and on how regulations are implemented, which in turn can lead to dyadic conflict and decreased operational performance. On the other hand, similarity in the formal institutions of buyer and supplier countries can decrease the possibility of legal disputes between the two parties because both are more likely to be familiar with the legal procedures of contract enforcement. As a result, risk over opportunistic behaviour is reduced, leading to better operational performance for the dyad.

LNG projects are traditionally characterized by a long chain of activities spread across two or more countries. While chain activities such as production and liquefaction are traditionally subject to the legal system of the supplier's country, other chain activities such as regasification are subject to the buyer's country regulations. Thus, unlike other industries which are potentially less affected by highly technical cross-border supply chain activities, discrepancies in the regulatory regimes of the two countries can severely affect the success of LNG projects (Jensen, 2003). LNG seaborne flows are characterized by recurring, frequent and standardized processes when it comes to the delivery of cargo. Accordingly, dissimilarity in formal institutions between buyer and supplier countries would require incremental learning and thus higher adaptation costs to compensate for different legal requirements (Kostova and Roth, 2002). This is specifically the case in the LNG industry, where at least four key chain activities determine the success or failure of a project (field development, liquefaction facility, tanker transportation and receipt/regasification terminal). Each of these activities is highly capital intensive (Jensen, 2003) and idiosyncratic to the local country context. Accordingly, lack of understanding of each regime's regulatory context can lead to delays across the chain of activities, which in turn can adversely affect the operational performance of the LNG project.

In addition to constraints associated with formal institutional distance, constraints can also stem from informal institutional dissimilarities such as cognitive and normative perceptions in a buyer–supplier relationship (Weber and Mayer,

2014). Such dissimilarities can lead to misunderstanding of contractual obligations and to interpretive uncertainty and information asymmetry (Wang *et al.*, 2016). LNG seaborne flows require frequent communication between buyers and suppliers to guarantee that lead times and fill rates are executed as efficiently as possible for both parties. Different cognitive mindsets in the buyer or supplier country can lead to diverging expectations requiring intensive monitoring processes or more systematic access to supplier information, which cause defensive behaviours (Heide, Wathne and Rokkan, 2007). Dissimilarity in informal institutions in the origin and destination countries of the buyer–supplier dyad can thus amplify the effect of misunderstanding in assessing and interpreting business-related information, and also limit acceptance (i.e. the ability to obtain legitimacy), thus having an adverse effect on the overall supply chain performance (Dong, Ju and Fang, 2016). We thus suggest the following hypotheses.

*H2a:* Formal institutional distance between the origin and destination countries in the LNG cross-border trade is negatively related to operational performance.

*H2b:* Informal institutional distance between the origin and destination countries in the LNG cross-border trade is negatively related to operational performance.

*The moderating effect of formal and informal institutional distance on the relationship between contract type and operational performance*

Formal institutional distance between buyer and supplier countries can further deteriorate any tensions in the buyer–supplier contractual relationship and nurture an environment of opportunistic behaviour because partners cannot fully trust each other (Ho, Ghauri and Larimo, 2018). Unlike other industries (which are less affected by global geopolitical developments and ongoing changes in institutional regimes), long-term contracts and their conditions in the LNG industry are more frequently disputed nowadays in the Asia Pacific region compared to the European region (admittedly, two geographic and economic regions with substantial differences in terms of the strength of their formal institutions). LNG suppliers and buyers in the Asia Pacific

region tend to more frequently trigger price review clauses, while their counterparts in the European region are more procedural and prudent when it comes to accepting a trigger condition to revise or dispute the terms of a long-term contract (Finizio, Trenor and Tan, 2020). These trigger conditions are stimulated by regional differences in formal institutions, as LNG suppliers and buyers are likely influenced by the regulatory context characterizing their home countries. As a result, many pricing disputes lead to arbitrations ultimately impeding long-term planning and adversely affecting buyer–supplier operational performance. The high level of risk and complexity accompanying the volatility of a high degree of formal institutional distance between the origin and destination countries of the buyer–supplier dyad can be mitigated through the adoption of a comparatively more flexible and easily adjusted strategy (Dong, Ju and Fang, 2016). Such a strategy involves shorter-term contracts characterized by greater flexibility, especially in times of increased political uncertainty and price volatility.

Informal institutional distance can also put strains on the buyer–supplier contractual relationship and its effect on operational performance. Dissimilarity in informal institutions is associated with differences in culture, language and political systems that overall shape the cognitive and normative behaviour of a society. In the LNG industry, political tensions and issues pertaining to geopolitics between the buyer and supplier countries can lead to more frequent pricing disputes over long-term contracts, which adversely affect operational performance (Jensen, 2003). For example, political risk severely affected Algerian LNG exports in the 1980s, leading to a drop of their capacity utilization to 23%. Variability in informal institutions can hinder the frequent flow of information between parties, or even lead to misconceptions (Williams, 2007). Dissimilarity in relational norms and cognitive perceptions in the buyer–supplier dyad can increase the likelihood of opportunistic behaviour (Zhou and Xu, 2012), thus leading to a higher level of operational uncertainty when opting for a long-term contractual relationship. This is particularly the case in the LNG industry, where buyer–supplier cultural differences may lead a party more frequently experiencing price reviews to push for a more informal approach to pricing, or even opt for a more flexible type of contract, such as a short-term or spot contract

(Speller, Lim and Li, 2018). Accordingly, when the informal institutional distance between the origin and destination countries of the buyer–supplier dyad is high, the two parties can mutually enhance their operational performance by adopting a relatively more flexible form of collaboration, such as a short-term contract. We quantify the aforementioned rationale in the following hypotheses.

*H3a:* Formal institutional distance between the origin and destination countries in the LNG cross-border trade will mitigate the negative relationship between short-term contract and operational performance.

*H3b:* Informal institutional distance between the origin and destination countries in the LNG cross-border trade will mitigate the negative relationship between short-term contract and operational performance.

Figure 1 depicts the conceptual model of our study and the hypothesized relationships.

*The effect of formal institutional distance: The role of relativism and direction*

Following recent developments in the literature with regard to the role, effect and treatment of institutional distance, we aim to extend our empirical analysis by joining the debate on direction of institutional distance (see e.g. Contractor, Yang and Gaur, 2016; Hernández and Nieto, 2015; Konara, Batsakis and Shirodkar, 2022). The aforementioned research has argued that the assumed symmetry in interpreting and estimating institutional distance has created an ongoing paradox, to a great extent unresolved, leading to spurious findings and inconsistent estimates. Institutional distance research has also debated the crucial aspect of ‘institutional relativism’, that is, whether and to what extent institutional quality is much stronger or weaker from one country to another. Our intention is to echo these important developments in the literature by further decomposing the concept of formal institutional distance.

Specifically, we argue that when the formal institutional regimes of both the supplier and buyer countries are relatively weak, decision-makers and managerial resources responsible for overseeing and coordinating the process of bilateral trade will be coerced to function under a relatively higher



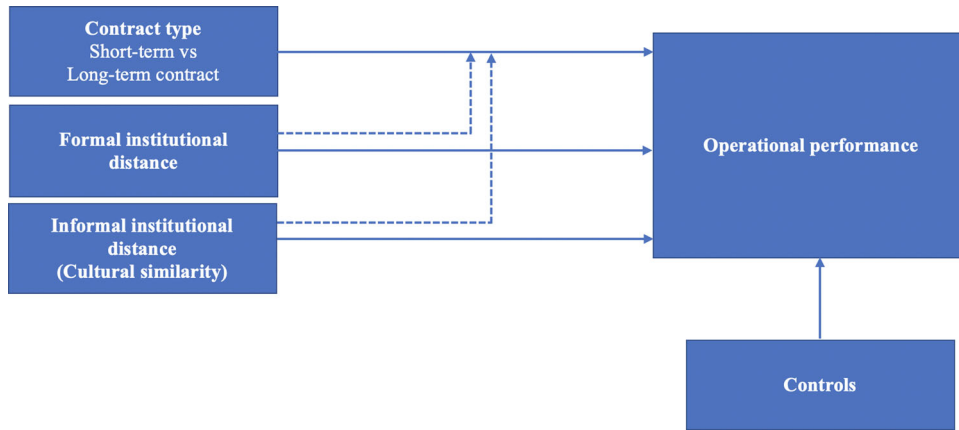


Figure 1. Conceptual model [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

level of uncertainty. Weak formal institutions are frequently related to a high level of corruption, over-reliance on non-market activities and political instability (Konara and Shirodkar, 2018). Such a toxic environment leads firms to incur higher than average transaction costs because traditionally lawful mechanisms, representing the business–government interface, are usually absent in these weak regimes and keep on failing (Cuervo-Cazurra and Genc, 2011). In the absence of strong formal institutions between the buyer and supplier countries, disputes over competition law, pricing disputes, hardship claims, and so on are likely to occur (Finizio, Trenor and Tan, 2020). Such institutional weaknesses are likely to negatively affect the operational performance of the partners. On the other hand, when the institutional quality of both the supplier and buyer countries is relatively high, such institutional weaknesses and market imperfections occur less frequently and are less likely to have a detrimental effect on partners' operational performance. We thus suggest the following hypothesis.

*H4a:* The negative effect of formal institutional distance on operational performance in the LNG cross-border trade will be stronger (weaker) when the origin and destination countries are both characterized by relatively weak (strong) institutional quality.

We further contend that buyers are relatively more cautious when a transaction involves a supplier originating in a weak institutional context. Such a (negative) distance is translated into limited

trust, higher adaptation costs and misalignment in terms of strength and effectiveness of supporting mechanisms to guarantee efficient monitoring of the transaction. In the LNG industry, European contracts are comparatively more formalized and legally binding than Asia Pacific contracts. The former are contextualized in a much stricter legal framework under which disputes and price revisions on a long-term contract cannot easily be triggered (Finizio, Trenor and Tan, 2020). The slower pace in deregulating and liberalizing the LNG energy market in institutionally weak supplier countries acts as an obstacle for the latter to improve their efficiencies and become more competitive in supporting buyers' interests. Accordingly, transactions originating from weak institutional contexts and oriented towards stronger institutional regimes will negatively affect operational performance. On the other hand, positive distance (i.e. transactions originating from strong institutional contexts and oriented towards weaker institutional regimes) is expected to have a less negative effect on operational performance because suppliers are surrounded by more stable institutional contexts, providing additional support and guaranteeing a relatively more secure transaction. We thus propose the following hypothesis.

*H4b:* The negative effect of formal institutional distance on operational performance in the LNG cross-border trade will be stronger (weaker) when the origin country has weaker (stronger) institutional quality compared to the destination country.

We argue that buyers are more likely to benefit from a high level of long-termism in their relationships with their suppliers (Dyer and Chu, 2000) only when shipments originate in and reach countries characterized by relatively strong regulatory regimes and stable formal institutions. Under such a context, long-term orientation can facilitate the transaction process between buyers and suppliers, who can both build a relationship based on mutual trust leading to reciprocal benefits (Wang, Siu and Barnes, 2008). In the LNG industry, stronger formal institutions can provide the required guarantees so that disputes about competition law and other issues linked to the wider regulatory (contractual) context (e.g. disputes over extensions and termination of contracts, disputes over the quality of gas delivered, disputes over supply shortfalls or interruptions) are mitigated for long-term contractual agreements, facilitating the cooperation of the two parties and enhancing their operational performance. In case of weak institutional contexts, long-term orientation can be detrimental because the contractual obligations of both partners cannot be sufficiently protected and enforced, leading to potential opportunistic behaviour. We thus propose the following hypothesis.

*H4c:* The moderating effect of formal institutional distance on the negative relationship between short-term contract and operational performance in the LNG cross-border trade will be stronger (weaker) when the origin and destination countries are characterized by relatively weak (strong) institutional quality.

We argue that short-term vs long-term contracts do represent different levels of commitment, providing buyers (and suppliers) with flexibility and options in view of weak institutional regimes. When the shipment is directed from an institutionally weak to an institutionally strong country, the transaction costs for the buyer will be substantially higher given the possibility of opportunistic behaviour. Suppliers (mainly originating in emerging markets), for example, can leverage their ability to frequently open pricing disputes resulting from price discrepancies in other markets by diverting or re-exporting LNG, or even make revisions in oil prices linked to the contractual price for LNG. This in turn coerces firms in the destination

country to limit their commitment (Tihanyi, Griffith and Russell, 2005) by opting for contractual agreements characterized by limited risk, such as spot transactions. In such a case, spot contracts can be a useful instrument of mutual forbearance and alleviation of opportunistic behaviour, leading to enhanced operational performance. On the other hand, when the shipment is directed from an institutionally strong to an institutionally weak country, the buyer can rely more systematically on trust mechanisms supported by the institutions of the country of origin, resulting in positive imprinting effects (Shirodkar, Konara and McGuire, 2017) and improved operational performance. We thus propose the following hypothesis.

*H4d:* The (mitigating) moderating effect of formal institutional distance on the negative relationship between short-term contract and operational performance in the LNG cross-border trade will be stronger (weaker) when the origin country has weaker (stronger) institutional quality compared to the destination country.

## Methodology

### *Research context*

The research context of our study is the LNG global trade flows undertaken by LNG carriers. LNG is frequently sold to countries located in continents other than the continent of extraction, necessitating the transportation of natural gas in liquid form via sea lines (Sönmez *et al.*, 2013). Recent geopolitical developments may necessitate this mode of transportation even when alternative land-based pipelines exist because the land-based pipelines may be closed for political reasons. Despite the fact that LNG transportation costs have decreased considerably recently – mainly due to technological innovations – trade via the LNG supply chain still incurs higher costs compared to the pipeline chain (Dorigoni, Graziano and Pontoni, 2010). As a result, one of the greatest challenges encountered by energy suppliers nowadays is the delivery of commodities in a timely and cost-effective manner. While a number of LNG suppliers are vertically integrated, effectively assuming full control of their production and distribution process (Bunn *et al.*, 2010), the global LNG trade is usually a multi-party process in



which the interests of the participants (i.e. buyers and suppliers) are not fully aligned. We assume that efficiencies in the global LNG trade are significantly determined by the type of contractual relationship between the LNG supplier and buyer. For all these reasons, we consider this research context to be a good setting to test our research questions.

### Dataset

Doing research on buyer–supplier contractual relationships in cross-border trade and the impact of institutions on this relationship requires access to data providing critical and accurate information on the type of contract and trade-related data (including origin and destination country and buyer–supplier characteristics among others). Driven by our research hypotheses, we designed an appropriate research methodology and identified data we consider relevant and effective in answering our questions. In so doing, we sourced our data from Kpler, a leading developer of ship-tracking software and analytics company utilizing an amalgamation of information from governmental databases, shipping registries, port authorities, ship agents, customs websites and broker reports. The database gathers, analyses and provides unique data on tanker traffic, focusing on import and export seaborne flows of LNG shipped across the globe in real time. The seaborne flows are analysed cargo-by-cargo, helping users tap into valuable information on hidden patterns and trends in the market. Overall, seaborne flows of LNG trade from 39 source (supplying) countries to 44 destination (importing) countries over the 10-year 2008–2017 period are covered. This diversified portfolio of source and destination countries allows us to efficiently test the direct and moderating effects of institutional distance, making the dataset an optimal research setting for testing our hypotheses. In total, 17,447 shipments/trade routes are analysed.

### Description of variables

Anecdotal evidence suggests that the goal of achieving high-capacity utilization<sup>3</sup> in the LNG transportation industry has been highlighted as

<sup>3</sup>Capacity utilization is defined as the extent to which a tanker uses its maximum storage capacity. It is the relationship between utilized capacity and maximum achievable capacity when storage capacity is fully used.

a crucial operational performance indicator by its major stakeholders. Specifically, high tanker capacity utilization has been highlighted as an important key performance indicator of financial health for the tanker charterer. As part of our study, and in order to validate this assumption, we interviewed senior-level operation managers and experts from several maritime corporations operating LNG-transporting tankers. The analysis of their responses confirmed our intuitive observation that capacity utilization is an important factor in the LNG transportation industry, further confirming our initial conjecture regarding the operational importance of capacity utilization in the LNG industry.<sup>4</sup> For the aforementioned reasons, we decided to use tanker capacity utilization as a proxy for *operational performance* (i.e. dependent variable). This variable is measured as the ratio of the LNG volume loaded in the originating country over the tanker's theoretical capacity. In supply chain management research, similar variables such as fill rate have been used to assess operational performance. For example, the percentage ratio of the number of units filled to the number of units ordered is a widely used measure of operational performance (e.g. Closs, Nyaga and Voss, 2010; Wan, Evers and Dresner, 2012).

Our first independent variable, *Spot*, is a dichotomous variable equal to 2 when the given transaction (shipment) in the buyer–supplier relationship is based on a spot market (rate), and 1 when the transaction (shipment) is recorded with a long-term contract (rate) (Dries et al., 2014). A spot market (short-term) rate is a one-time single-use rate quote valid for a short period of time issued at or near the time of shipment. Spot (short-term) and contract (long-term) rates are not mutually exclusive. Shippers under contract might, for example, use spot rates on less-travelled shipping lanes. A long-term contract (rate) is a fixed price valid for a predetermined period of time, negotiated with a shipper in advance of any freight moves. Shippers locking into long-term contract rates hedge against escalating rates and limited capacity.

Our second independent variable, *formal institutional distance*, is operationalized using Kaufmann's worldwide governance indicators

<sup>4</sup>More information regarding the questionnaire, the interviewees' professional background and their responses is provided in Appendix A.

(Kaufmann, Kraay and Mastruzzi, 2009). These indicators, denoting quality and strength of formal institutions, are among the most frequently used indices of formal institutional quality in the wider management and economics literature (Carney *et al.*, 2011; Lahiri, Elango and Kundu, 2013; Malhotra and Gaur, 2014). By considering the methodology applied by Kaufmann, Kraay and Mastruzzi (2009), we take into consideration six dimensions of governance for each country, that is, voice and accountability (VA), political stability and absence of violence (PS), government effectiveness (GE), regulatory quality (RQ), rule of law (RL) and control of corruption (CC). The amalgamation of these six indicators creates a composite variable (following the application of factor analysis). The absolute value of the distance between the home (origin) and host (destination) countries of the shipment accounts for the level of institutional distance between the two countries. In order to measure *informal institutional distance*, we construct a dummy variable titled *cultural similarity* equal to 1 when the recipient country and origin country belong to the same cultural cluster, and 0 otherwise (e.g. Li *et al.*, 2017, 2020). Data on cultural clusters were obtained from Ronen and Shenkar (1985, 2013). One of the main advantages of cultural clustering is that it covers a significantly larger number of countries than Hofstede's cultural dimensions (Shenkar, 2001).

We also use a number of operation and non-operation-related control variables. The first control variable, *Delivery*, is a dichotomous variable equal to 2 if the cargo is *delivered ex ship (DES)*, and 1 if the cargo is delivered *free on board (FOB)*. In case of DES, the cargo (LNG) has been priced ex-ship, where contract prices are equal to downstream prices minus gasification and other terminal and insurance costs. In case of FOB, LNG prices are known at the export terminal, where the buyer is the only responsible party for both shipping and insurance costs. FOB contracts provide buyers greater flexibility with respect to shipping costs, as well as the ability to exploit profit opportunities (Maxwell and Zhu, 2011), which in turn can positively impact operational performance. The second control variable, *Intermediaries*, is equal to 2 if there are agencies, shipbrokers, freight-forwarders and transport intermediaries intervening in the chartering process between ship owners and charterers, and 1 if no intermediaries are involved in the transaction (Gibson and

Wang, 2018). We consider that the absence of intermediaries will positively impact operational performance because the involvement of a third party in a transaction can increase opportunism in buyer–supplier relationships. The third control variable, *Trip duration*, denotes the total duration (in hours) between the origin and destination ports (Hennig *et al.*, 2012). We expect that trip duration will be positively related to operational performance, as a low-capacity utilization rate can be less problematic for shorter trip durations. The fourth control variable, *Tanker age*, denotes the age of the tanker at the time of the trip (Alizadeh and Talley, 2011). We assume that a relatively high tanker age will negatively impact operational performance. The fifth control variable, *Propulsion system*, is a dichotomous variable corresponding to the tanker's propulsion system; there are two kinds of propulsion system in our dataset – *steam* (equal to 2) and *no steam* (equal to 1) (Dere and Deniz, 2019). Steam turbine propulsion involves the usage of coal or other steam-generating fuels to propel the tanker; this can be a competitive advantage, potentially improving operational performance. The final control variable, *Tanker type*, is also a dichotomous variable and refers to the gas tank type of the tanker. The most commonly used gas tanks for LNG carriers are: (a) membrane type (equal to 1) based on a very thin primary steel barrier which is not self-supporting; and (b) spherical (Moss) type (equal to 2) tied to the hull structure which is self-supporting (Gonzalez and Pérez-Labajos, 2017). We consider the latter to be operationally more efficient and more likely to improve operational performance.

## Analysis and results

Since the values of the dependent variable are bounded between zero and one, ordinary least square will yield biased estimates (Scheraga, 2004). We therefore treat the proportional operational performance as a censored continuous variable and use a Tobit regression model to regress the operational performance against all other variables. As Long (1997) points out, this approach works best with no excessive amount of censoring as in our case, where out of 17,447 observations very few are close to zero. Given that our research covers a 10-year period (from 2008 to 2017), we control for time (year) effects to account

for time-varying effects. We also introduce home and host-region dummies (triads) to account for region-specific effects.

Table 1 presents the correlation table and descriptive statistics. Table 2 presents the Tobit regression estimates on the direct effect of spot (H1) and formal and informal institutional distance (H2a and H2b) on operational performance, as well as the moderating effect of formal and informal institutional distance on the relationship between spot and operational performance (H3a and H3b). In H1, we argued that spot (i.e. short-term contract as compared to long-term contract) should have an adverse effect on tanker operational performance. The results (Model 1, Table 2) confirm our conjecture, because the coefficient of *Spot* is negative and statistically significant ( $b = -0.0004, p < 0.01$ ). With respect to H2a and H2b, we hypothesized that a high level of formal and informal institutional distance between the supplier's and buyer's countries will deteriorate tanker operational performance; the findings (Model 1, Table 2) show that while there is a negative and statistically significant effect for formal institutional distance ( $b = -0.0001, p < 0.01$ ), the coefficient of *Cultural similarity* is statistically non-significant ( $b = -0.0004, p = n.s.$ ). Therefore, while H2a is confirmed, H2b is not. With respect to H3a and H3b, our premise was that a high level of formal and informal institutional distance will decrease the adverse effect of spot on operational performance because, in a context of increasing institutional uncertainty, firms will opt for more flexible short-term (i.e. spot) contractual agreements. In line with our expectations, the results (Models 2 and 3, Table 2) reveal that a high level of formal institutional distance has a positive moderating (i.e. mitigating) effect on the negative (adverse) relationship between spot ( $b = 0.0007, p < 0.01$ ) and operational performance, while a high level of cultural similarity further strengthens the negative relationship between spot ( $b = -0.0041, p < 0.01$ ) and operational performance. This implies that in conditions of high institutional distance (formal and informal), the operational performance of tankers can be improved with the use of spot transactions; H3a and H3b are thus confirmed.

Next, we examine the hypotheses linked to the role of asymmetry in formal institutional distance (i.e. H4a–H4d). We append the subsample analysis, which is based on the four different

Table 1. Correlation table and descriptive statistics

	1	2	3	4	5	6	7	8	9	10
1 Intermediaries	1									
2 Cargo type (spherical)	0.035	1								
3 Delivery (DES)	0.486	0.109	1							
4 Spot	0.461	-0.066	0.176	1						
5 Operational performance	-0.131	0.017	-0.065	-0.132	1					
6 Trip duration	0.230	-0.072	0.020	0.267	-0.097	1				
7 Tanker age	-0.091	0.356	-0.100	-0.094	0.008	-0.167	1			
8 Propulsion system (steam)	-0.062	0.372	0.108	-0.061	0.082	-0.246	0.397	1		
9 Formal institutional distance	0.153	0.199	0.012	0.176	-0.044	-0.076	0.122	0.077	1	
10 Cultural similarity	0.249	-0.017	0.119	0.151	-0.043	-0.052	-0.031	-0.050	-0.147	1
Mean	1.147	1.349	1.391	1.169	0.970	12.089	10.423	1.795	1.022	0.024
SD	0.355	0.477	0.488	0.374	0.073	8.544	7.945	0.404	0.655	0.152
Min	1	1	1	1	0.072	1	0.008	1	0.000	0
Max	2	2	2	2	1.000	207	41.926	2	3.005	1

Table 2. Tobit regression estimates on the contingent effect of contract types on operational performance

Dependent variable: Operational performance	Model 1	Model 2	Model 3
Delivery (DES)	-0.0001*** (0.0013)	-0.0001*** (0.0013)	-0.0001*** (0.0013)
Propulsion system (steam)	0.0002*** (0.0016)	0.0002*** (0.0016)	0.0002*** (0.0016)
Cargo type (Spherical)	0.0000 (0.0013)	0.0001 * (0.0013)	0.0000 (0.0013)
Intermediaries	-0.0002** (0.0021)	-0.0002** (0.0021)	-0.0002*** (0.0021)
Tanker age	-0.0000*** (0.0001)	-0.0000*** (0.0001)	-0.0000*** (0.0001)
Trip duration	-0.0000*** (0.0001)	-0.0000*** (0.0001)	-0.0000*** (0.0001)
Spot (H1)	-0.0004*** (0.0017)	-0.0017*** (0.0030)	-0.0003*** (0.0018)
Formal institutional distance (H2a)	-0.0001*** (0.0010)	-0.0002*** (0.0011)	-0.0001*** (0.0010)
Cultural similarity (H2b)	-0.0004 (0.0042)	-0.0002 (0.0042)	0.0010* (0.0060)
Formal institutional distance × Spot (H3a)		0.0007*** (0.0021)	
Cultural similarity × Spot (H3b)			-0.0041*** (0.0080)
Constant	0.1470*** (0.0100)	0.1466*** (0.0099)	0.1521*** (0.0102)
Observations	17,447	17,447	17,447
Log likelihood	21,117.790	21,177.840	21,128.720
Wald test	1388.820*** (d.f. = 23)	1519.677*** (d.f. = 24)	1412.457*** (d.f. = 24)

Note: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Two-tailed tests, normalized coefficients. Standard errors are reported in parentheses. Year, home and host region dummies are included but not reported for brevity.

subsamples.<sup>5</sup> The regression results are shown in Models 4–11 (Table 3). The results on the low–low subsample (Model 4) are consistent with H4a as the coefficient of formal institutional distance is negative and statistically significant ( $b = -0.0031$ ,  $p < 0.01$ ), while the coefficient size is approximately 30 times larger than that in the main analysis. The estimate on the high–high subsample (Model 10) indicates that the coefficient of formal institutional distance is positive and statistically significant ( $b = 0.025$ ,  $p < 0.05$ ), a result that aligns with H4a; while the effect is not weaker, it is shown that the relationship turns into a positive one. Regarding the estimate of the low–high subsample (Model 6), it is shown that the effect of formal institutional distance on operational performance is negative and statistically significant ( $b = -0.0002$ ,  $p < 0.01$ ), thus confirming the increasing impor-

tance of the effect of formal institutional distance on operational performance when trading from low to high-quality institutional regimes (H4b). Finally, the estimate of the high–low subsample (Model 8) indicates that the coefficient of formal institutional distance is positive, yet statistically non-significant ( $b = 0.0021$ ,  $p = \text{n.s.}$ ), a result aligned with H4b but not confirmed due to lack of statistical significance. Regarding the moderating effect, the coefficient of the interaction effect on the low–low subsample (Model 5) is positive, yet statistically non-significant ( $b = 0.0037$ ,  $p = \text{n.s.}$ ). The estimate on the high–high subsample (Model 11) indicates that the coefficient of the interaction effect is positive and statistically significant ( $b = 0.0142$ ,  $p < 0.01$ ), a result not aligned with H4c because the effect is not negative. As far as the estimate of the low–high subsample (Model 7) is concerned, we observe that the interaction effect is positive and statistically significant ( $b = 0.0005$ ,  $p < 0.01$ ), thus confirming the existence

<sup>5</sup>We choose the median as cut-off point for dividing countries into low and high formal institutional quality.

Table 3. Tobit regression estimates on the contingent effect of contract types on operational performance (subsample analysis)

	Model 4 Low origin to low destination subsample(H4a and H4c)	Model 5 Low origin to low destination subsample(H4a and H4c)	Model 6 Low origin to high destination subsample(H4b and H4d)	Model 7 High origin to high destination subsample(H4b and H4d)	Model 8 High origin to low destination subsample(H4b and H4d)	Model 9 High origin to low destination subsample(H4b and H4d)	Model 10 High origin to high destination subsample(H4a and H4c)	Model 11 High origin to high destination subsample(H4a and H4c)
Delivery (DES)	-0.0013*** (0.0049)	-0.0015*** (0.0050)	-0.0001*** (0.0014)	-0.0001*** (0.0014)	-0.0013 (0.0092)	-0.0013 (0.0091)	0.0003 (0.0051)	-0.0000 (0.0052)
Propulsion system (steam)	0.0013*** (0.0050)	0.0012*** (0.0051)	0.0000 (0.0019)	0.0000 (0.0019)	0.0019* (0.0082)	0.0025** (0.0082)	0.0011** (0.0051)	0.0012*** (0.0051)
Cargo type (spherical)	0.0002 (0.0072)	0.0002 (0.0072)	-0.0000 (0.0013)	0.0000 (0.0013)	0.0060* (0.0137)	0.0035 (0.0141)	0.0002 (0.0049)	0.0002 (0.0048)
Intermediaries	0.0001 (0.0072)	-0.0000 (0.0073)	-0.0003*** (0.0022)	-0.0003*** (0.0022)	-0.0008 (0.0110)	-0.0016 (0.0110)	-0.0027*** (0.0074)	-0.0022** (0.0076)
Tanker age	-0.0000 (0.0003)	-0.0000 (0.0003)	-0.0000 (0.0001)	-0.0000 (0.0001)	-0.0000*** (0.0007)	-0.0000*** (0.0007)	-0.0000*** (0.0003)	-0.0000*** (0.0003)
Trip duration	-0.0000*** (0.0002)	-0.0000*** (0.0002)	-0.0000*** (0.0001)	-0.0000*** (0.0001)	-0.0000* (0.0004)	-0.0000** (0.0004)	-0.0000*** (0.0002)	-0.0000*** (0.0002)
Spot	-0.0026*** (0.0050)	-0.0068*** (0.0094)	0.0002*** (0.0020)	-0.0010** (0.0049)	-0.0089*** (0.0090)	0.0009 (0.0219)	-0.0019*** (0.0055)	-0.0065*** (0.0095)
Formal institutional distance	-0.0031*** (0.0058)	-0.0041*** (0.0066)	-0.0002*** (0.0012)	-0.0002*** (0.0012)	0.0021 (0.0133)	0.0077* (0.0149)	0.0025** (0.0082)	0.0013 (0.0090)
Cultural similarity	-0.0007 (0.0083)	-0.0006 (0.0083)	0.0009 (0.0286)	0.0055 (0.0287)	0.0255*** (0.0204)	0.0234*** (0.0204)	-0.0084*** (0.0123)	-0.0085*** (0.0123)
Formal institutional distance × Spot	0.0037 (0.0120)	0.0037 (0.0120)	0.0005*** (0.0028)	0.0005*** (0.0028)	0.0005*** (0.0028)	0.0005*** (0.0028)	0.0142*** (0.0178)	0.0142*** (0.0178)
Constant	0.3871*** (0.0239)	0.3866*** (0.0239)	0.0851*** (0.0063)	0.0854*** (0.0063)	1.5093*** (0.1086)	1.4525*** (0.1083)	0.3504*** (0.0252)	0.3543*** (0.0252)
Observations	2627	2627	11,408	11,408	1019	1019	2393	2393
Log likelihood	2388.634	2390.417	16,422.280	16,434.570	942.428	949.669	2614.128	2619.575
Wald test	361.965*** (d.f. = 22)	365.979*** (d.f. = 23)	467.560*** (d.f. = 21)	493.162*** (d.f. = 22)	349.740*** (d.f. = 22)	369.313*** (d.f. = 23)	393.269*** (d.f. = 21)	405.941*** (d.f. = 22)

Note: \*p < 0.10; \*\*p < 0.05; \*\*\*p < 0.01. Two-tailed tests, normalized coefficients. Standard errors are reported in parentheses. Year, home and host region dummies are included but not reported for brevity.

of a mitigating effect of institutional distance on operational performance when trading from low to high-quality institutional regimes. The estimate of the high–low subsample (Model 9) indicates that the coefficient of the interaction effect is negative and statistically significant ( $b = -0.0128$ ,  $p < 0.01$ ), a result providing additional support to H4d.

### *Sensitivity analysis*

In order to validate the accuracy of our findings, we proceed with a number of robustness tests.<sup>6</sup> First, we performed ordinary non-parametric bootstrap analysis to estimate the sampling distribution of the Tobit regression coefficients. The non-parametric bootstrap analysis allows us to estimate the sampling distribution of a statistic empirically, without making assumptions about the form of the population and without deriving the sampling distribution explicitly. Overall, 95% and 99% bootstrap confidence intervals for the Tobit regression coefficients and for the non-parametric bootstrap statistics are within acceptable levels. Second, we re-run the subsample analysis by using the mean as the cut-off point of the formal institutional distance variable. The results were largely consistent. Third, we use each of the six indicators used for the creation of the formal institutional distance composite measure individually and run separate regressions for each one of them. The results are consistent for all indicators but one (VA). Fourth, further to using cultural clusters to measure cultural similarity as a robustness test, we use Hofstede's five cultural dimensions and the formula suggested by Kogut and Singh (1988). However, due to the high number of missing values because of the large number of countries in our sample for which Hofstede's cultural dimensions do not exist, the regressions did not converge.

## **Discussion**

### *Contribution to the literature*

Our study deepens our knowledge of the role buyer–supplier contractual relationships play in determining operational performance. While

<sup>6</sup>All sensitivity tests are appended in the Supporting Information (see Appendix B, Tables B1–B10).

extant research has investigated the effect of governance mechanisms on buyer–supplier operational performance (e.g. Autry and Golicic, 2010; Liu, Luo and Liu, 2009; Um and Oh, 2020), this has not been the case for cross-border trade. We use the LNG industry, an industry characterized by the existence of limited global suppliers and by a commodity known for its lack of substitutability. This makes the operational efficiency for LNG trade and the significance of contractual agreements (and their terms) in this process even more important, because both sides (buyers and suppliers) aim at maximizing their benefits. Further, in the LNG industry, tensions, disputes and arbitration in long-term contracts between suppliers and buyers have been on the rise, giving space to a debate on which form of contractual agreement (shorter or longer term) is more beneficial. Our study contributes to the literature by proving that despite the increasing tensions and changing dynamics in the contractual relationships of an idiosyncratic industry like LNG, long-term contracts are still largely preferred.

Furthermore, our study strengthens some major notions in institutional theory within the wider context of supply chain management literature. While the role of institutions has been stressed in supply chain management, this has been solely based on the role of institutions in buyer–supplier relationships in a local context (Bai, Sheng and Li, 2016). Governments seem to simultaneously take the role of supplier and buyer of a commodity such as LNG. This provides an additional layer of importance attributed to the role institutions play in the LNG industry. Our study further contributes to this tenet by showing that operational performance in buyer–supplier cross-border trade is affected by the extent of dissimilarity of institutional quality characterizing both buyers and suppliers. We not only focus on the role of formal (regulatory) institutional distance, but also on informal (cultural) institutional distance (Weber and Mayer, 2014). Finding that formal institutional distance is a relatively more important determinant than informal institutional distance in an industry where governments have a comparatively active role allows us to contribute further to the buyer–supplier literature by showing that relationships shaped by regulatory frameworks are more significant than those nurtured by social and cognitive interpersonal relationships with respect to operational performance.



We show that regulatory and cognitive dissimilarity between parties in a dyadic relationship calls for more flexible and less binding forms of buyer–supplier collaboration. We thus extend knowledge in this under-researched area and contribute to institutional theory in supply chain contract governance by stressing the importance of institutional variation in shaping contractual agreements. Our research also accounted for the asymmetric treatment of formal institutional distance (Contractor, Yang and Gaur, 2016; Konara and Shirodkar, 2018) and the effect of institutional relativism (Hernández and Nieto, 2015). Our findings confirmed that institutional frameworks are more complex in nature – in the context of cross-border trade – when it comes to operational performance in general, and to capacity utilization in particular.

### *Managerial implications*

Our findings can be utilized by both management professionals and practitioners operating in the oil and gas industry. Buyers and suppliers committed to cross-border trade can utilize our findings to gain insights on the effect of different contract types on operational performance. Our findings can also improve the partner selection process based on the strategic role institutional quality plays. Our research provides useful insights towards explaining the conditions under which short-term contracts can be a relatively more efficient strategy. This is particularly the case when formal and informal institutional distance between origin and destination countries is high, and accordingly uncertainty and risk in cross-border transactions are prevalent. Our study showed that short-term contracts, although less efficient with respect to operational performance, are more prominent for cross-border transactions when cross-border institutional contexts are highly dispersed. Although long-term contracts are in general more efficient contractual agreements in cross-border trade, short-term contracts can become a more effective strategy when cross-border institutional distance is relatively high. Finally, given that capacity maximization is an important parameter (Sönmez *et al.*, 2013) and a crucial key performance indicator for most stakeholders in the LNG industry (see the Supporting Information), we argue that long-term contracts should in general be preferred by companies (owners,

charterers, brokers, buyers) to achieve the best possible operational performance in the long run.

## Conclusion

Our research was motivated by the increasing importance of contracts and institutions in buyer–supplier relationships, and their effect on the operational performance of firms engaging in cross-border trade. Firms can utilize our findings to make strategic decisions and corrections, mitigating the risks associated with both uncertain buyer–supplier relationships and dissimilar institutional regimes. That said, we must acknowledge that our findings are limited by the structure of our dataset codified according to prevailing standards in the shipping industry. Unfortunately, access to raw data is practically impossible if one wants to define and investigate the behaviour of non-standard variables in the shipping industry. Another limitation of our research is the omission of important control variables, such as the average charter rates for LNG tankers. Unfortunately, we did not have access to such information. Published reports show that the rates of both short and long-term trades have increased in the last couple of decades (The Lantau Group, 2018), which is an indication that charter rates have affected both contract types in a similar way. Future research should focus on applications of institutional theory to other aspects of supply chain management, such as resource allocation, production planning and inventory management, among others. Also, there seems to be an extensive untapped research area focused on the contingent effect of contract types on other important key performance indicators.

## References

- Alizadeh, A. H. and W. K. Talley (2011). ‘Vessel and voyage determinants of tanker freight rates and contract times’, *Transport Policy*, **18**, pp. 665–675.
- Allaoui, H., Y. Guo and J. Sarkis (2019). ‘Decision support for collaboration planning in sustainable supply chains’, *Journal of Cleaner Production*, **229**, pp. 761–774.
- Autry, C. W. and S. L. Golicic (2010). ‘Evaluating buyer–supplier relationship–performance spirals: a longitudinal study’, *Journal of Operations Management*, **28**, pp. 87–100.
- Bai, X., S. Sheng and J. J. Li (2016). ‘Contract governance and buyer–supplier conflict: the moderating role of institutions’, *Journal of Operations Management*, **41**, pp. 12–24.
- Bunn, D. W., M. Martocchia, P. Ochoa, H. Kim, N.-S. Ahn and Y.-B. Yoon (2010). ‘Vertical integration and market power: a

- model-based analysis of restructuring in the Korean electricity market', *Energy Policy*, **38**, pp. 3710–3716.
- Camarero Izquierdo, C. and G. J. Cillán (2004). 'The interaction of dependence and trust in long-term industrial relationships', *European Journal of Marketing*, **38**, pp. 974–994.
- Cao, M. and Q. Zhang (2011). 'Supply chain collaboration: impact on collaborative advantage and firm performance', *Journal of Operations Management*, **29**, pp. 163–180.
- Cao, Z. and F. Lumineau (2015). 'Revisiting the interplay between contractual and relational governance: a qualitative and meta-analytic investigation', *Journal of Operations Management*, **33**, pp. 15–42.
- Carey, S., B. Lawson and D. R. Krause (2011). 'Social capital configuration, legal bonds and performance in buyer–supplier relationships', *Journal of Operations Management*, **29**, pp. 277–288.
- Carney, M., E. R. Gedajlovic, P. P. M. A. R. Heugens, M. Van Essen and J. Van Oosterhout (Hans) (2011). 'Business group affiliation, performance, context, and strategy: a meta-analysis', *Academy of Management Journal*, **54**, pp. 437–460.
- Chang, Y. B. and V. Gurbaxani (2012). 'Information technology outsourcing, knowledge transfer, and firm productivity: an empirical analysis', *MIS Quarterly*, **36**, pp. 1043–1063.
- Chen, D. Q., D. S. Preston and W. Xia (2013). 'Enhancing hospital supply chain performance: a relational view and empirical test', *Journal of Operations Management*, **31**, pp. 391–408.
- Choi, T. Y. and Z. Wu (2009). 'Triads in supply networks: theorizing buyer–supplier–supplier relationships', *Journal of Supply Chain Management*, **45**, pp. 8–25.
- Christopoulou, D., N. Papageorgiadis, C. Wang and G. Magkonis (2021). 'IPR law protection and enforcement and the effect on horizontal productivity spillovers from inward FDI to domestic firms: a meta-analysis', *Management International Review*, **61**, pp. 235–266.
- Closs, D. J., G. N. Nyaga and M. D. Voss (2010). 'The differential impact of product complexity, inventory level, and configuration capacity on unit and order fill rate performance', *Journal of Operations Management*, **28**, pp. 47–57.
- Contractor, F., Y. Yang and A. S. Gaur (2016). 'Firm-specific intangible assets and subsidiary profitability: the moderating role of distance, ownership strategy and subsidiary experience', *Journal of World Business*, **51**, pp. 950–964.
- Cooper, M. C. and L. M. Ellram (1993). 'Characteristics of supply chain management and the implications for purchasing and logistics strategy', *The International Journal of Logistics Management*, **4**, pp. 13–24.
- Cousins, P. D. and B. Lawson (2007). 'Sourcing strategy, supplier relationships and firm performance: an empirical investigation of UK organizations', *British Journal of Management*, **18**, pp. 123–137.
- Cuervo-Cazurra, A. and M. E. Genc (2011). 'Obligating, pressuring, and supporting dimensions of the environment and the non-market advantages of developing-country multinational companies', *Journal of Management Studies*, **48**, pp. 441–455.
- Deepu, T. S. and V. Ravi (2021). 'Supply chain digitalization: an integrated MCDM approach for inter-organizational information systems selection in an electronic supply chain', *International Journal of Information Management Data Insights*, **1**, art. 100038.
- Dere, C. and C. Deniz (2019). 'Load optimization of central cooling system pumps of a container ship for the slow steaming conditions to enhance the energy efficiency', *Journal of Cleaner Production*, **222**, pp. 206–217.
- Dong, M. C., M. Ju and Y. Fang (2016). 'Role hazard between supply chain partners in an institutionally fragmented market', *Journal of Operations Management*, **46**, pp. 5–18.
- Dorigoni, S., C. Graziano and F. Pontoni (2010). 'Can LNG increase competitiveness in the natural gas market?', *Energy Policy*, **38**, pp. 7653–7664.
- Dries, L., M. Gorton, V. Urutyan and J. White (2014). 'Supply chain relationships, supplier support programmes and stimulating investment: evidence from the Armenian dairy sector', *Supply Chain Management: An International Journal*, **19**, pp. 98–107.
- Dyer, J. H. and W. Chu (2000). 'The determinants of trust in supplier–automaker relationships in the US, Japan and Korea', *Journal of International Business Studies*, **31**, pp. 259–285.
- Finizio, S., J. A. Trenor and J. Tan (2020). 'Trends in LNG supply contracts and pricing disputes in the Asia Pacific region', *Oil, Gas & Energy Law Intelligence*, **18**, pp. 1–42.
- Garg, R., A. W. Kiwelekar, L. D. Netak and A. Ghodake (2021). 'i-Pulse: a NLP based novel approach for employee engagement in logistics organization', *International Journal of Information Management Data Insights*, **1**, art. 100011.
- Gibson, M. J. and Q. Wang (2018). 'Sanitary and phytosanitary measures in Chinese agricultural exports: the role of trade intermediaries', *Applied Economics*, **50**, pp. 3007–3015.
- Gonzalez, C. and C. A. Pérez-Labajos (2017). 'Typology of the gas carrier fleet', *Journal of Maritime Research*, **14**, pp. 97–103.
- Greif, A. (2005). 'Commitment, coercion, and markets: the nature and dynamics of institutions supporting exchange'. In C. Menard and M. M. Shirley (eds), *Handbook of New Institutional Economics*, pp. 727–786. New York: Springer.
- Gulati, R. (1995). 'Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances', *Academy of Management Journal*, **38**, pp. 85–112.
- Gupta, M. and S. Gupta (2019). 'Influence of national cultures on operations management and supply chain management practices – a research agenda', *Production and Operations Management*, **28**, pp. 2681–2698.
- Hartley, P. R. (2015). 'The future of long-term LNG contracts', *The Energy Journal*, **36**, pp. 209–233.
- Heide, J. B., K. H. Wathne and A. I. Rokkan (2007). 'Interfirm monitoring, social contracts, and relationship outcomes', *Journal of Marketing Research*, **44**, pp. 425–433.
- Hennig, F., B. Nygreen, M. Christiansen, K. Fagerholt, K. C. Furman, J. Song, *et al.* (2012). 'Maritime crude oil transportation – a split pickup and split delivery problem', *European Journal of Operational Research*, **218**, pp. 764–774.
- Hernández, V. and M. J. Nieto (2015). 'The effect of the magnitude and direction of institutional distance on the choice of international entry modes', *Journal of World Business*, **50**, pp. 122–132.
- Ho, M. H.-W., P. N. Ghauri and J. A. Larimo (2018). 'Institutional distance and knowledge acquisition in international buyer–supplier relationships: the moderating role of trust', *Asia Pacific Journal of Management*, **35**, pp. 427–447.
- Jæger, B. and H. M. Hjelle (2015). 'Handling multi-party complexities in container flows in the upstream oil and gas supply chain: potential lessons for an application to intercontinental container supply chains'. In *Proceedings of the 2015*

- International Conference on Transportation Information and Safety (ICTIS)*, pp. 661–668.
- Jensen, J. T. (2003). 'The LNG revolution', *The Energy Journal*, **24**, pp. 1–45.
- Kar, A. K. (2014). 'Revisiting the supplier selection problem: an integrated approach for group decision support', *Expert Systems with Applications*, **41**, pp. 2762–2771.
- Kar, A. K. and A. K. Pani (2014). 'Non-contractible value creation in buyer–supplier networks – a case study', *International Journal of Procurement Management*, **7**, pp. 493–507.
- Kaufmann, D., A. Kraay and M. Mastruzzi (2009). *Governance Matters VIII: Aggregate and Individual Governance Indicators 1996–2008*. Washington, DC: The World Bank.
- Kauppi, K. (2013). 'Extending the use of institutional theory in operations and supply chain management research', *International Journal of Operations & Production Management*, **33**, pp. 1318–1345.
- Kavassanos, M. G., I. D. Visvikis and R. A. Batchelor (2004). 'Over-the-counter forward contracts and spot price volatility in shipping', *Transportation Research Part E: Logistics and Transportation Review*, **40**, pp. 273–296.
- Ketkar, S., N. Kock, R. Parente and J. Verville (2012). 'The impact of individualism on buyer–supplier relationship norms, trust and market performance: an analysis of data from Brazil and the USA', *International Business Review*, **21**, pp. 782–793.
- Kogut, B. and H. Singh (1988). 'The effect of national culture on the choice of entry mode', *Journal of International Business Studies*, **19**, pp. 411–432.
- Konara, P., G. Batsakis and V. Shirodkar (2022). "'Distance" in intellectual property protection and MNEs' foreign subsidiary innovation performance', *Journal of Product Innovation Management*, **39**, pp. 534–558.
- Konara, P. and V. Shirodkar (2018). 'Regulatory institutional distance and MNCs' subsidiary performance: climbing up vs. climbing down the institutional ladder', *Journal of International Management*, **24**, pp. 333–347.
- Kostova, T. and K. Roth (2002). 'Adoption of an organizational practice by subsidiaries of multinational corporations: institutional and relational effects', *Academy of Management Journal*, **45**, pp. 215–233.
- Lafuente, E., A. Bayo-Moriones and M. García-Cestona (2010). 'ISO-9000 certification and ownership structure: effects upon firm performance', *British Journal of Management*, **21**, pp. 649–665.
- Lahiri, S., B. Elango and S. K. Kundu (2013). 'Cross-border acquisition in services: comparing ownership choice of developed and emerging economy MNEs in India', *Journal of World Business*, **49**, pp. 409–420.
- Lane, C. and R. Bachmann (1996). 'The social constitution of trust: supplier relations in Britain and Germany', *Organization Studies*, **17**, pp. 365–395.
- Larsson, R., L. Bengtsson, K. Henriksson and J. Sparks (1998). 'The interorganizational learning dilemma: collective knowledge development in strategic alliances', *Organization Science*, **9**, pp. 285–305.
- Li, C., I. Arikian, O. Shenkar and A. Arikian (2020). 'The impact of country-dyadic military conflicts on market reaction to cross-border acquisitions', *Journal of International Business Studies*, **51**, pp. 299–325.
- Li, C., F. C. Brodbeck, O. Shenkar, L. J. Ponzi and J. H. Fisch (2017). 'Embracing the foreign: cultural attractiveness and international strategy', *Strategic Management Journal*, **38**, pp. 950–971.
- Li, W., P. K. Humphreys, A. C. L. Yeung and T. C. E. Cheng (2007). 'The impact of specific supplier development efforts on buyer competitive advantage: an empirical model', *International Journal of Production Economics*, **106**, pp. 230–247.
- Liu, Y., Y. Luo and T. Liu (2009). 'Governing buyer–supplier relationships through transactional and relational mechanisms: evidence from China', *Journal of Operations Management*, **27**, pp. 294–309.
- Long, J. S. (1997). *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage.
- Lui, S. S. and H. Ngo (2012). 'Drivers and outcomes of long-term orientation in cooperative relationships', *British Journal of Management*, **23**, pp. 80–95.
- Malhotra, S. and A. S. Gaur (2014). 'Spatial geography and control in foreign acquisitions', *Journal of International Business Studies*, **45**, pp. 191–210.
- Maxwell, D. and Z. Zhu (2011). 'Natural gas prices, LNG transport costs, and the dynamics of LNG imports', *Energy Economics*, **33**, pp. 217–226.
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- Papageorgiadis, N., F. McDonald, C. Wang and P. Konara (2020). 'The characteristics of intellectual property rights regimes: how formal and informal institutions affect outward FDI location', *International Business Review*, **29**, art. 101620.
- Peng, M. W., S.-H. Lee and D. Y. L. Wang (2005). 'What determines the scope of the firm over time? A focus on institutional relatedness', *Academy of Management Review*, **30**, pp. 622–633.
- Peng, M. W., S. L. Sun, B. Pinkham and H. Chen (2009). 'The institution-based view as a third leg for a strategy tripod', *Academy of Management Perspectives*, **23**, pp. 63–81.
- Peng, M. W., D. Y. L. Wang and Y. Jiang (2008). 'An institution-based view of international business strategy: a focus on emerging economies', *Journal of International Business Studies*, **39**, pp. 920–936.
- Prajogo, D. and J. Olhager (2012). 'Supply chain integration and performance: the effects of long-term relationships, information technology and sharing, and logistics integration', *International Journal of Production Economics*, **135**, pp. 514–522.
- Roh, J. A., J. M. Whipple and K. K. Boyer (2013). 'The effect of single rater bias in multi-stakeholder research: a methodological evaluation of buyer–supplier relationships', *Production and Operations Management*, **22**, pp. 711–725.
- Ronen, S. and O. Shenkar (1985). 'Clustering countries on attitudinal dimensions: a review and synthesis', *Academy of Management Review*, **10**, pp. 435–454.
- Ronen, S. and O. Shenkar (2013). 'Mapping world cultures: cluster formation, sources and implications', *Journal of International Business Studies*, **44**, pp. 867–897.
- Scheraga, C. A. (2004). 'Operational efficiency versus financial mobility in the global airline industry: a data envelopment and Tobit analysis', *Transportation Research Part A: Policy and Practice*, **38**, pp. 383–404.
- Shenkar, O. (2001). 'Cultural distance revisited: towards a more rigorous conceptualization and measurement of cultural differences', *Journal of International Business Studies*, **32**, pp. 519–535.



- Shirodkar, V., P. Konara and S. McGuire (2017). 'Home-institutional imprinting and lobbying expenditure of foreign firms: moderating effects of experience and technological intensity', *British Journal of Management*, **28**, pp. 589–608.
- Sönmez, E., S. Kekre, A. Scheller-Wolf and N. Secomandi (2013). 'Strategic analysis of technology and capacity investments in the liquefied natural gas industry', *European Journal of Operational Research*, **226**, pp. 100–114.
- Speller, D., J. Lim and J. Li (2018). 'Oil and gas arbitration in the Asia-Pacific region'. In *Asia-Pacific Arbitration Review 2019*, May 25.
- Squire, B., P. D. Cousins and S. Brown (2009). 'Cooperation and knowledge transfer within buyer–supplier relationships: the moderating properties of trust, relationship duration and supplier performance', *British Journal of Management*, **20**, pp. 461–477.
- Stuart, F. I. (1997). 'Supply-chain strategy: organizational influence through supplier alliances', *British Journal of Management*, **8**, pp. 223–236.
- The Lantau Group. (2018). *Phase 2: Liquefied Natural Gas (LNG) Demand Projection, Procurement Strategy and Risk Management*. Washington, DC: The World Bank.
- Thomas, A., M. Krishnamoorthy, J. Venkateswaran and G. Singh (2016). 'Decentralised decision-making in a multi-party supply chain', *International Journal of Production Research*, **54**, pp. 405–425.
- Tihanyi, L., D. A. Griffith and C. J. Russell (2005). 'The effect of cultural distance on entry mode choice, international diversification, and MNE performance: a meta-analysis', *Journal of International Business Studies*, **36**, pp. 270–283.
- Tsai, W. and S. Ghoshal (1998). 'Social capital and value creation: the role of intrafirm networks', *Academy of Management Journal*, **41**, pp. 464–476.
- Um, K.-H. and J.-Y. Oh (2020). 'The interplay of governance mechanisms in supply chain collaboration and performance in buyer–supplier dyads: substitutes or complements', *International Journal of Operations & Production Management*, **40**, pp. 415–438.
- Villena, V. H., E. Revilla and T. Y. Choi (2011). 'The dark side of buyer–supplier relationships: a social capital perspective', *Journal of Operations Management*, **29**, pp. 561–576.
- Wan, X., P. T. Evers and M. E. Dresner (2012). 'Too much of a good thing: the impact of product variety on operations and sales performance', *Journal of Operations Management*, **30**, pp. 316–324.
- Wang, C. L., N. Y. M. Siu and B. R. Barnes (2008). 'The significance of trust and *renqing* in the long-term orientation of Chinese business-to-business relationships', *Industrial Marketing Management*, **37**, pp. 819–824.
- Wang, M., Q. Zhang, Y. Wang and S. Sheng (2016). 'Governance of local supplier opportunism in China: moderating role of institutional forces', *Journal of Operations Management*, **46**, pp. 84–94.
- Weber, L. and K. Mayer (2014). 'Transaction cost economics and the cognitive perspective: investigating the sources and governance of interpretive uncertainty', *Academy of Management Review*, **39**, pp. 344–363.
- White, G. O., J. Hadjimarcou, S. Fainshmidt and R. A. Posthuma (2013). 'MNE home country cultural norms and conflict strategy fit in transnational business contract disputes', *International Business Review*, **22**, pp. 554–567.
- Williams, C. (2007). 'Transfer in context: replication and adaptation in knowledge transfer relationships', *Strategic Management Journal*, **28**, pp. 867–889.
- Williamson, O. (1985). *The Economic Institutions of Capitalism*. New York: Free Press.
- Xie, E., Y. Li, Z. Su and H.-H. Teo (2010). 'The determinants of local suppliers' trust towards foreign buyers', *Management International Review*, **50**, pp. 585–611.
- Zhou, K. Z. and L. Poppo (2010). 'Exchange hazards, relational reliability, and contracts in China: the contingent role of legal enforceability', *Journal of International Business Studies*, **41**, pp. 861–881.
- Zhou, K. Z. and D. Xu (2012). 'How foreign firms curtail local supplier opportunism in China: detailed contracts, centralized control, and relational governance', *Journal of International Business Studies*, **43**, pp. 677–692.

Georgios Batsakis is Associate Professor of International Business at Alba Graduate Business School and Brunel University London. His research focuses on internationalization processes of multinational enterprises. He has published in journals such as the *Journal of International Business Studies*, *Journal of World Business*, *Global Strategy Journal*, *British Journal of Management* and *Journal of Product Innovation Management*, among others. In 2022 he was included in the Poets&Quants Best 40-Under-40 Business School Professors in the world.

Andreas Robotis is Assistant Professor of Operations & Technology Management at Dublin City University Business School, where he leads the business analytics specialism stream. His research interests include sustainable supply chains, demand forecasting and machine learning. He has published in journals such as *Production and Operations Management* and the *European Journal of Operational Research*.

Christos Koulamas is Professor and Ryder Eminent Scholar in the Department of Information Systems and Business Analytics at Florida International University. His research focuses on machine scheduling and supply chain management. He has published over 130 refereed articles in journals such as *Operations Research*, *Production and Operations Management*, *INFORMS Journal on*

*Computing, the European Journal of Operational Research, Decision Sciences, Operations Research Letters, International Journal of Production Research and Journal of Scheduling*, among others.

Fotios Zeritis is Head of Investor Relations at Nakilat (Qatar Gas Transport Company). Mr Zeritis holds a BA in Business Administration from the University of the Aegean, Greece and an MBA from Chapman University, USA. In addition, he has attended executive education programmes at Georgetown University, Thunderbird School of Global Management, The University of Chicago and Harvard University.

## Supporting Information

Additional supporting information can be found online in the Supporting Information section at the end of the article.