

The shipper as the architect of contractual relations in access to natural gas networks

Marc-Kévin CODOGNET

MATISSE, Université Paris 1 Panthéon Sorbonne
&
ADIS-GRJM, Université Paris 11 Sud

marc-kevin.codognet@tiscali.fr

Website : www.grjm.net

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Abstract:

Transportation and contractual arrangements are in the kernel of the natural gas reform in Europe. Since third party can access to pipelines, those who wish to ship gas between two locations of a gas network have to arrange transportation services. Natural gas transportation is a set of contractual arrangements and has become a complex contracting process.

This paper aims at analyzing the typical economic functions of shippers in third-party access regimes in the natural gas industry in a transaction costs approach. Shippers provide and combine intermediation functions in transportation services markets: information management, matching, bundling and transactions guarantees. In this context, the shipper has appeared as a particular market intermediary specialized in transportation arrangements in the new regime of third party access in the natural gas industry.

Keywords: natural gas liberalization, third party access, shipper, intermediation, transaction costs

JEL codes: D23, L14, L95

Introduction

In the European Union, since August 2000, some natural gas users, mainly industrial and commercial consumers, have been free to choose new gas suppliers other than the incumbent supplier. Liberalization of the natural gas industry has introduced competition between natural gas suppliers and has broken former vertically-integrated monopolies forced to offer third party access (TPA) to their natural gas networks, which remain regulated natural monopolies, as in other network industries (Glachant [2002]). This new TPA regime has been completed with compulsory unbundling meaning that vertically integrated firms have been forced to separate competitive components (production and supply) from natural monopolies (transportation and distribution). Until the liberalization process, natural gas transportation was just an internal issue for the vertically integrated incumbent. Transportation and third party access to gas infrastructures have become complex contractual issues for those who wish to ship gas from one point of the networks to another point. In this new environment, the shipper has appeared as a new player besides transportation system operators (TSOs) who operates the gas infrastructures, distributors, gas suppliers, producers, traders and regulators. The shipper is an agent who arranges contractually the transportation of gas between at least two locations. In fact, he is the user of the transportation networks in order to convey his gas from one location to another one through an access contract with the transportation system operator, but he must complete this contract through other contracts with other players in order to respect and adjust its access contract with the TSO. The shipper can be integrated by producers, suppliers, industrial customers or electricity generators.

The first issues related to network access raised by economists were access pricing and discrimination issues. These two questions have been extensively studied in the literature (see for example Armstrong & Sappington [2003], Cremer & Laffont [2002], Cremer & al. [2003]). However, the hidden side of TPA regime lies in the new contractual issues of natural

gas transportation, because more contractual arrangements for transportation services have appeared in TPA regimes. Transportation services can be divided in two groups of complementary services: access services and ancillary services. On the one hand, access services are the basic services offered by the TSO to transport the shipper's gas between different locations of the system. On the other hand, ancillary services complete the access services in order to give flexibility tools to the shippers for tailoring transmission services. Shippers need to combine these complementary services to tailor transportation services.

In a transaction cost approach, we will analyze the shipper's economic functions - information management, matching and market clearing, bundling of services and transactions guarantee – and we will characterize the shipper as a particular kind of intermediary in transportation services markets. The paper is organized in three steps. First, we will show that transportation services combine several services. Secondly, we will explain why there are market intermediaries. Thirdly, we will exhibit the specificity of the shipper as a kind of market intermediary.

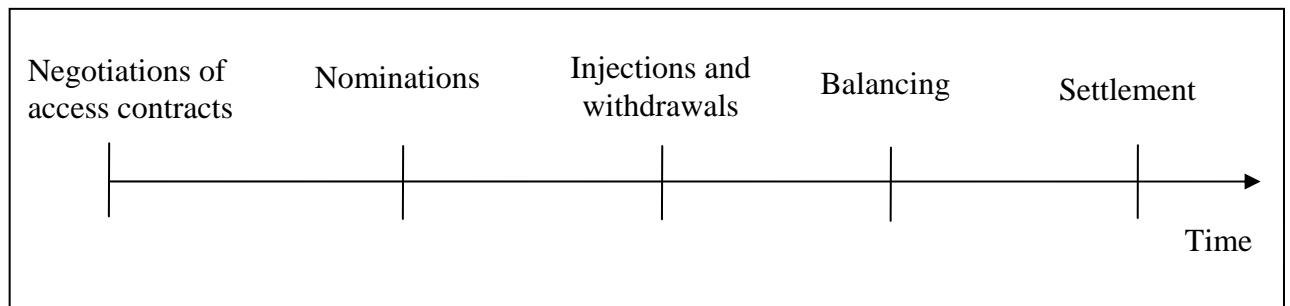
1. Transportation service as a bunch of services

Transportation service has become a bunch of services tailored by each shipper according to his needs and available complementary services provided either by the TSO or by markets. Liberalization of European gas market has highlighted a new complex contracting process in which transportation is the kernel of the reform. Shippers tailor transportation services with several complementary services that they acquire either from the TSOs or on markets. The liberalization has also revealed that transportation services cannot be featured as a single service but as a modular combination of services customized by each shipper.

1.1. A new complex contracting process

Since internal coordination mechanisms of vertically integrated incumbents have been abolished, they have been substituted by explicit decentralized contractual arrangements based on rules organizing TPA regimes defined by regulators and legislators – definition of access services offered by TSOs, content of the network code or standard contracts and tariffs. The new contractual process can be split at least into five successive components and can be illustrated by the following timeline.

Figure 1: A typical TPA contracting process



First, the shipper and the TSO negotiate and sign the access contract. The network code or standard contract outlines the rights and responsibilities for all shippers and it specifies the process and conditions of gas injection and withdrawal in the transportation system. Because this contract is incomplete, some adaptation mechanisms must be set *ex ante* for the completion *ex post* of the transaction (Williamson [1996]) such as the mechanism of capacity allocation, nomination, balancing and settlements. Even if we are in a regulated TPA regime, the standard contract contains merely general principles; the shipper and TSO have to adapt this contract to the particular needs of the shipper by specifying the injection and withdrawal locations, the duration of the contract, the capacity reservation and other specific clauses.

Second, the shipper has to nominate gas flow according to his initial capacity reservation and available capacity published by the TSO. In this step, it informs the TSO through electronic interface. After sending his nomination, the TSO accepts or refuses his nomination according

to the actual available capacity and TSO's forecasts. The shipper can sometimes re-nominate just few hours before the actual gas flow in the system for adjustment purposes. As the TSO operates the gas system, he needs to assess *ex ante* the flow of gas on his system.

Third, the shipper injects in and withdraws gas from TSO pipelines. The TSO operates the system and measures the actual flows in his network for all the shippers.

Fourth, the TSO informs each shipper of his gas imbalance and he has the obligation to balance his gas either by purchasing or selling gas on the balancing market or by purchasing balancing services from the TSO. Finally, the shipper pays for access services, imbalances charges and other services.

This fragmentation has revealed that transportation is not only injection and withdrawal of natural gas in pipelines but also a more complex set of transactions between each layer of the gas industry. At each component of this process, each shipper needs to find the suitable services and he needs to articulate individually each component of this process through contracts with TSOs or other services providers. In this context, exchange of information is a crucial issue for an efficient functioning of TPA regime. TSO, services providers – such as hubs for example - and shippers must exchange information constantly through electronic interfaces, daily operations and routines. Each shipper must be informed about his position on the network and the TSO must know shippers' actions in the network in order to operate his network, to maintain the integrity of the network and also to charge each shipper for his actual use of the network. In fact, shippers and TSO are complementary for transportation arrangements.

The TPA contracting process reveals the incompleteness of the TPA transaction. This incompleteness is not due to maladapted market rules or designs but it is mainly intrinsic to the transactions because there is not only one transaction but a set of complementary sequential transactions. These transactions are surrounded by uncertainty about the gas flows

in the networks. It is quite difficult to forecast accurately the gas flows before the actual flow. In this context, the shipper plays an important role in order to combine transportation services.

1.2. A set of complementary transportation services

In a liberalized natural gas industry, the TSO can no longer sell a complete bundled service of transportation. Each shipper must build complete transportation service according to his needs and to available services provided either by the TSO or by markets. He must purchase access services provided by the TSO and also optimize this service by using other services, when they are available. While the shipper is the contractual counterparty of the TSO in order to access to the system, he may also contract with other players for other services such as balancing or storage. In fact, two different groups of complementary transportation services can be distinguished: access services and ancillary services. Examples of these two types of transportation service are given in the following table.

Table 1: Examples of transportation services

		Types of transportation services	
		Access services	Ancillary services
Examples of services	Firm or interruptible services, short term or long term services	Storage, Balancing, Linepack, Parking, Loaning, Pooling, Load factor conversion, Quality conversion, Swaps, backhaul services...	

The access service is the basic service offered by the TSO to transport the shippers' gas between different locations of the network. Even if the terms of the access service are more or less standardized and regulated, the TSO can offer a menu of different services according to the length or the firmness of the service. The TSO can offer short term or long term access services and firm or interruptible services. Moreover, besides these access services provided by the TSO, the shipper can buy network capacity on secondary markets of unused capacity,

when capacity trade is allowed. When a shipper holding capacity does not use all or part of its capacity, it can resell it to other shippers, but he must inform the TSO about the change of capacity user. Hence, if a shipper wishes to purchase access services, he can choose between buying capacity from the TSO or from the secondary market. However, the shipper needs to fulfill *ex post* his balancing obligations¹ towards the TSO; otherwise, the TSO can charge him with financial penalties.

Ancillary services complete the access services in order to give more flexibility to each shipper for tailoring transmission services and to optimize the utilization of access services. There is a great range of ancillary services but the common feature of these ancillary services is that they are complementary to access services: these services include storage, balancing, linepack, parking, loaning, pooling, load factor conversion, quality conversion, swaps, backhaul services and so on (NERA [2002], Harris & Lapuerta [2003]). For instance, a shipper can buy storage capacity that permits him to inject excess gas when demand is low, and to withdraw gas from storage when demand is high². Ancillary services have been developed either by TSOs or by other gas players according to shippers' particular needs. The same array of services is not always available in all the countries at the same time because of the existence and the maturity of the markets. In general, ancillary services have been first created and managed by the TSO as an option of the basic access services. However, when the gas supply competition has become mature, specific markets appear for ancillary services and they give better incentives to shipper to minimize their costs. The example of the balancing services market in the UK illustrates this evolution. In 1996, the Network Code required each shipper to balance daily their inputs and withdrawals with a certain margin of tolerances. Moreover, Transco operated a 'flexibility mechanism' whereby shippers bid to

¹ According to balancing obligations, shippers have to match their gas inputs and outputs of networks on a daily or hourly basis.

² A more detailed presentation of other ancillary services can be found in NERA [2002], Harris & Lapuerta [2003] and EIA [2003].

buy or offer sell gas to Transco for balancing purposes. However, the UK regulator, Ofgem criticized the arrangement for its lack of shippers' incentives. In 1999, the New Gas Trading Arrangement introduced the On-the-day Commodity Market (OCM), a within-day market on which shippers can trade their imbalances. Tolerances were first reduced and then they were completely removed. This move from an administrative-based to a market-based mechanism enhances shippers' incentives and increases shippers' available tools to optimize their gas flow in the networks. The development of market and services has evolved simultaneously with TPA regulation.

Finally, within a decentralized industry, the shipper chooses himself in the range of available access services and ancillary services how to combine them in order to build tailor-made transportation services. Hence, a transportation service is not a standard service but a bunch of several complementary services created by each shipper to fit his needs.

2. Why are there market intermediaries?

In the liberalized natural gas industry, each shipper has to shape transportation services compound with several services provided by different players and has to intervene on different markets to combine them efficiently. The shipper is an intermediary on transportation services market. As the transaction cost literature has shown, market transactions are costly because of searching and negotiation costs incurred by markets participants, but also because of market uncertainty and opportunistic behaviors. However, markets intermediaries help to reduce transaction costs and also curb issues related to uncertainty and opportunistic behaviors. Furthermore, according to the economic literature on intermediation, intermediaries are assumed to fulfill four functions: information management, matching, bundling of services and transactions guarantee.

2.1. Market intermediaries and transaction costs

Coase [1937] and Williamson [1985] pointed out that using markets involved *ex ante* and *ex post* transaction costs related to information searching, communication, negotiation, drafting, contracting, adaptation, disputes resolution, monitoring and commitments securing. Intermediaries can help to reduce costs associated with market transactions. In disintermediated markets, participants have to bear searching and contracting costs because of the great number of potential trading partners or products and services. They can spend a great amount of resources to acquire relevant but also irrelevant information. Intermediaries, who participate in many transactions, can reduce these costs and increase the gains for sellers and buyers by gathering, centralizing and processing available information about markets features. They improve market transaction by improving communication: they explore alternative ways to select prices and match buyers and sellers (Spulber [1999]). In fact, introducing intermediaries avoid problems related to “oversearching” expenses *à la* Kenney & Klein [1983]. In the same manner, they negotiate only once with many suppliers on the behalf of customers and bear only once negotiation costs. Moreover, they can spread their own searching and contracting costs over several transactions and centralization creates scale and scope economies; they also improve their expertise (Bailey [1998]).

Uncertainty about features of products (prices, quality, availability...) and trading partners increases also transaction costs and reduces an efficient resources allocation. In disintermediated markets, each potential trading partner has to find a suitable counterparty, but the likelihood of an unsatisfactory matching is greater than in intermediated markets (Cosimano [1996]). As Coase [1937] already remarked, the price mechanism is not enough in order to coordinate efficiently demand and supply. Intermediaries provide a central place of exchanges in decentralized markets and they have an information advantage over decentralized suppliers and buyers in order to better coordinate transactions in markets.

Hence, they can tailor the characteristics of the good or the service to better reflect buyer and seller preferences and they increase the likelihood of a suitable matching (Spulber [1999]). Intermediaries also provide liquidity on markets: they can hold inventories of goods or cash on one hand and on the other stand ready to sell to customers or buy from suppliers. They help to clear market, flatten demand and supply fluctuations and also reduce the risks of exchanges (Demsetz [1968], Spulber [1996]).

Finally, once the contracts have been formed, opportunistic behaviors can occur because of incomplete contract and bounded rationality (Williamson [1985]). Intermediaries can prevent and monitor contractual opportunism, such as adverse selection and moral hazard, and lessen contractual enforcement problems if they can make credible commitments (Bailey [1998], Gabre-Madhin [2003]). According to Spulber [1999], intermediaries serve as “market-commitment device”; they have several incentives to provide binding contractual commitments and to ensure transactions completion. Because of their long-term participation in markets and their involvements in multiple transactions, intermediaries have incentives to develop reputation and expertise for honoring transactions. As Biglaiser & Friedman [1994] pointed out, their incentives to sell lower quality good differ from individual suppliers, because they will suffer a loss of reputation and a loss of customers for all their future transactions. Intermediaries will serve as guarantors of the product quality through warranties and contract terms. Moreover, they have a greater incentive to invest in monitoring quality than individual market participant, since they buy and sell more goods (Biglaiser & Friedman [1994]). Besides investing in reputation, intermediaries may also be incited to develop expertise and invest in specific skills in writing contracts and monitoring performance (Biglaiser [1993]). In a nutshell, intermediaries have strong incentives that enable intermediaries to reduce the negative impact of opportunism and decrease transaction costs.

In the natural gas industry, transportation services markets have also the same transactional issues related to transaction costs and uncertainty and opportunistic behaviors. The complexity of TPA contracting process involves *ex ante* and *ex post* transaction costs for shippers and involves also uncertainty. They incur costs for searching, gathering and processing information about prices and features of services, for negotiation and for using markets and also for monitoring transactions. This markets have strong complementary and interdependency. Moreover, transportation service is a set of services and there are several complementary and sequential transactions. Shippers play an important role in the coordination of access and ancillary services and for an efficient functioning of TPA regime. As the other market studied in the economic literature, market intermediaries have appeared to alleviate transactional issues. In the case of natural gas transportation services markets, the shippers have appeared as an agent that can combine the services and facilitate the completion of transportation transactions.

2.2. Functions of market intermediaries

The economic literature has analyzed different forms of market intermediation³ and has defined a market intermediary as an economic agent that dedicates his production means to provide services aimed at facilitating coordination between suppliers or between them and customers (Brousseau & Pénard [2003]). Four main functions have essentially been identified: information management, matching and market clearing, bundling of services and transactions guarantee.

1. Information management: Information management is mainly related to information collection, aggregation, transmission and processing. In fact, intermediaries can make

³ For example, see Spulber [1996, 1999], Biglaiser [1993], Cosimano [1996], Rubinstein & Wolinsky (1989), Brousseau [2002], Brousseau & Pénard [2003], Wang [1999], Gabre-Madhin [2003], Baritoux et al. [2002].

information more accessible to consumers or suppliers thereby reducing searching costs on prices and product features. Even if Information management is costly for intermediaries, they can improve the quality of the information transmitted (Bailey [1998]). Intermediaries centralize, compile and filter information from the supply and the demand sides of markets. They reduce searching costs for customers and suppliers, because intermediaries benefit from their central place in markets and from scale and scope economies in aggregating information (Brousseau [2002]). In fact, intermediaries can facilitate the exchange of information by coordinating and translating the information between consumers and suppliers.

2. *Matching and market clearing*: Intermediaries help to match partners and clear markets, since they coordinate supply and demand. In imperfect decentralized markets, each party has to support negotiation and searching costs and has to find a satisfactory counterparty. However, since intermediaries centralize and have market information; intermediaries increase the likelihood of a satisfactory match between demand and supply thanks to their information collection and processing (Rubinstein & Wolinsky [1987], Gehrig [1993], Spulber [1996]). They reduce market uncertainties if each party must meet several potential partners before concluding a deal. Because intermediaries have information from the two sides, they can match more easily trading partners and reduce searching, learning and transaction costs when they centralize information (Spulber [1996]). Moreover, by holding inventories, they can increase market liquidity and create new opportunities for trade (Demsetz [1968], Cosimano [1996]).

3. *Bundling*: Intermediaries can bundle different complementary products or services in order to offer a new product or service. When intermediaries aggregate different services and products, they realize economies of scale and scope: they can spread transaction and product costs over a large number of products and over different products (Bailey [1998]). Bundling avoids redundant operations since intermediaries transact once with each service or product

provider and they become the only interface for customers. Intermediaries can offer either standardized or customized bundled products or services. In the former case, the services correspond to the services required by the average demand. Intermediaries benefit from low costs of assembling but customers can suffer from maladjustment. In the latter case, intermediaries offer customized packages that correspond to specific consumer needs. They adapt and adjust different services or products, because they cannot match demand with supply that fits it *ex ante* (Brousseau & Pénard [2003]).

4. Transactions Guarantee: Intermediaries can guarantee and monitor transactions in order to reduce uncertainties and alleviate imperfect information problems. They can control or guarantee the quality of products or payment to services providers in order to overcome moral hazard and adverse selection issues and enforcement problems (Spulber [1995]). They have strong incentives to ensure transactions completion such as long-term participation in markets and reputation. In order to enhance or maintain his reputation, an intermediary will attempt to avoid, prevent and monitor suppliers and buyers opportunistic behaviors. Because they have an information advantage, intermediaries can be incited to act as experts or as quality guarantors (Biglaiser [1993], Biglaiser & Friedman [1994]).

These four functions of market intermediaries – information management, matching, bundling of services and transactions guarantee – highlight the fact that intermediaries are required for overcoming markets imperfections and reducing transaction costs. Markets induce transactions costs for markets participant. Intermediaries can reduce transaction costs and solve issues related to opportunism and uncertainty by coordinating and centralizing exchanges. In the transportation services markets presented above, the shipper is a particular type of intermediary dealing with the same market issues.

3. The Shipper as an architect of contractual relations

In relation to the complexity of the contractual process of transportation services of TPA regimes, shippers assume and combine the same functions as markets intermediaries – information management, matching, bundling of services and transactions guarantee – and deal with transaction costs minimization, uncertainty and opportunistic behaviours.

3.1 Shipper's function in transportation services markets

The four functions of market intermediary - information management, matching and market clearing, bundling of services and transactions guarantee – can also be carried out by shippers in transportation services markets.

1. Information management: The shipper collects information about prices and other features of transportation services and markets. In a vertically integrated industry, information flows about nomination and balancing are internal between firm's departments. In a de-integrated industry, information is exchanged between TSO and shippers with particular sequential formal electronic mechanisms such as capacity reservation, nomination and balancing mechanisms. The shipper collects information about available capacity on primary and secondary markets, features of access and ancillary services, balancing position and so on. He centralizes this information for his own needs. Indeed, he must know what his customers' needs are. The shipper has also the obligation to provide information to the TSO concerning his capacity reservation, nomination and balancing actions but also about technical information such as the quality of the injected gas. For instance, Transco, that owns and manages the gas transportation system in the UK, has implemented an integrated set of computer systems (UK-Link) that provides the means of communication for shippers with Transco, such as gas-flow nominations, allocation and demand estimates. For the UK balancing market, EnMO operates a separate system for shippers. The shippers have to use

these computer systems in order to communicate information to Transco and to the balancing market but also to remain informed. This information collection and exchange aim to optimize their use of network service and the network management by the TSO. However, this function requires particular technical and specific skills that the shipper has to acquire. There is an entry costs to go into the shipping business linked to the information management learning process. As the shipper is involved in repeated daily transaction, he faces different information interfaces from which he has to select the relevant information. Information collection and processing from transportation services markets is an on-going daily task for the shipper. Moreover, TPA regulation is not a static regulation and new regulatory adjustments often occur. Shippers must remain attentive of regulatory changes even for small changes. Information management is one of the functions of a typical shipper in TPA regime.

2. Matching and market clearing: Shippers have to build transportation services according to their expected and actual needs. In each market in which shippers participate, they have to find either the suitable services or products or/and appropriated counterparties. Therefore, shippers do not only collect but also process the information they gather about markets prices and features. They have to acquire in each market services they need. For example, in the UK capacity rights markets, shippers can book entry capacity for several years, a month, a week or a day before actual flows according to the implemented mechanism of capacity allocation. Once information on markets prices and features collected, they acquire their capacity either from the auctions organized by Transco or from the secondary market. According to the available services, shippers will choose to buy either long term firm capacity or short term firm capacity or interruptible one. They have to match their needs with the available services. If they have excess capacity rights, they can sell them on the secondary markets⁴ as an interruptible capacity. However, they will have to match their needs on each interdependent

⁴ In the UK, unused capacity will be resold on an interruptible basis while the capacity holder retains title.

sequential market and not only in one single transportation service market. For instance, a shipper will have to acquire storage capacity and linepack services besides access services. He will have to coordinate his markets behaviors according to his positions on other markets. This matching process on different interdependent sequential markets increases the complexity to find suitable services. Shippers will have to select between different options and combinations whereas they do not have all the information about their actual gas flows. Even if shippers assess their needs *ex ante*, they are informed of their actual gas flows only *ex post* and they have to match their needs according to the available services. Matching is one other of the functions that the shipper must handle in TPA regime.

3. *Bundling*: In the liberalized natural gas transportation markets, shippers have to arrange individually transportation services by bundling different services, because transportation services are bunches of several services. Shippers have to combine them in order to find the best arrangement that fits their needs under technical, physical and regulatory constraints. Shippers need to process markets information to find the best bundling. Shippers rely on their expertise and experience in order to build transportation services. They need to develop know-how to combine efficiently services and to select the appropriate services. For example, in the capacity markets, shippers can choose short term or long term firm and interruptible access services. They can select a long term access services and buy short term capacities on the secondary market when they need more capacity than expected. Moreover, they can make arbitrage between firm and interruptible services. Their choices are not only based on their information but also on their past experience and expertise. Moreover, they can benefit from economies of scale and scope in this bundling process. In some markets, they will aggregate demand and supply for the same services, such as access services, and they will serve several final gas consumers. Therefore, as access services and ancillary services are complementary and interdependent, they can aggregate demand and supply of different services in order to

build transportation services. For instance, they will combine access services with storage and balancing services not only for one customer but for several ones. They will be able to pool unbalance from different customers that will avoid the use of several dedicated balancing and storage services. Scale and scope economies reduce transaction costs of shippers. However, consumers also reduce their costs because they will find a “one-stop shopping” for an array of services (Maister & Lovelock [1982]) that bundles access services and ancillary services. Bundling is also one the functions that the shipper needs to operate in a TPA regime.

4. Transactions Guarantee: Transportation services involve several transactions with several counterparties: transactions with the TSO for access services and with other market players such as market operators or customers for access and ancillary services. These transactions occur in an environment featured by uncertainty and by information asymmetries. Shippers must guarantee transaction completion. Uncertainty affects gas flows assessment because when the shippers book and nominate capacities, they just have an expected amount of gas flow and they will have to adjust and refine their forecasts during the duration of transactions until the TSO informs them about their actual gas flow in the gas networks. Shippers need also to reduce adverse selection issues in markets when they have to buy services from different providers. Shippers will have to give guarantees to their customers but also to their services providers. They will have to guarantee to their customers that gas flows will match their needs and to their services providers that they will be paid.

One way to guarantee is to make credible commitment that they will complete all the required transactions on the behalf of their customers. These guarantees can combine financial commitments but also non-financial commitments such as specific investments or reputation. Financial guarantees can take the form of providing regularly financial information. Furthermore, the shipping business has entry costs. Shippers must invest in specific expertise for the gas transport through learning and experience. This expertise is

quite specific to the gas sector and cannot be easily redeployed without a loss of value. Shippers invest in specific knowledge but also in reputation because shipping is an on-going long term business. Shippers interact every day with others agents and they have long term perspective. Shippers have incentives to complete transactions and not to cheat: Regulatory sanctions (fines or withdrawal of shipper's licence by energy regulators) and loss of customers and value in a competitive environment. If they breach their contractual relationship in an opportunistic way, their survival could be threatened. The potential punishment for opportunistic behaviors could be large for shippers.

3.2 Shipper's peculiarities

The shipper is a particular kind of market intermediary in transportation services markets. As this the case on other markets with intermediaries, shippers facilitate transactions in transportation markets and help to alleviate transactional issues such as transaction costs, uncertainty and opportunistic behaviors. Shippers play an important role in the actual functioning of the transportation markets. Their existence in those markets can be explained as intermediaries in markets (see section 2.1). Moreover, the shipper plays like an architect when he deals with contractual arrangement. Shippers can be viewed as experts of natural gas transportation arrangements in the new TPA regimes. As an architect who is an intermediary expert in managing contracts for building a house or a skyscraper (Eccles [1981]), the shipper is an intermediary expert in managing and combining transportation access services. He has to build tailor-made services of natural gas transportation. The shipper has to develop specific skills dedicated to arrange transportation services.

For small or medium end-user customers, it could be very difficult for them to arrange their transportation services by combining access services and ancillary services. They would face great transaction costs to arrange their own transportation services because they would have

to develop know-how required to combine these services; they will also have to consume a lot of their times to arrange daily (maybe hourly) their transportation services⁵. For large customers, these costs can also be significant and they will have to choose between an inside or an external solution. Shippers are involved in many transactions and have several customers. They benefit from scale and scope economies when they centralize transactions, but they also improve always their knowledge.

Shippers are intermediaries that assume and combine the intermediation functions—information management, matching, bundling of services and transactions guarantee. In fact, in order to facilitate and arrange transportation services, they have to assume the four identified functions and combine them efficiently. These functions are sequential and complementary for the shippers even if they can be differentiated analytically. Information management, for instance, is linked to matching and bundling of services. The information collection will be processed in order to find suitable required services and to find the best arrangement for the shipper. The relationship between the four functions carried out by the shipper is also related to the complexity of the TPA contractual process and to the uncertainty surrounded the transactions.

In short, the shipper is an intermediary who has developed specific skills and expertise in order to arrange contractually transportation services in the natural gas network. He is a peculiar intermediary because he assumes and combines the four intermediation functions.

Conclusion

This paper has shed some lights on the economic functions of a typical shipper in the complex TPA contractual context with transaction costs issues. As an architect, the shippers have to deal with contractual arrangement but in order to arrange transportation services in

⁵Small customers should have to support costs also for organizing their gas supplies.

natural gas networks. The shipper has to combine the four intermediation functions – information management, matching, bundling of services and transactions guarantee – in order to facilitate the completion of transactions.

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