

# The challenges of digitalization and the use of data



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The de- and re-regulation of the different network industries is an ongoing process at national and global levels. As this process unfolds, ever new phenomena emerge. Yet, the question about the right mixture between market, economic, technical and social regulation remains wide open in all the network industries.

Selected academics and practitioners have been invited to Florence on June 24th 2016 at the [Annual Conference of the Florence School of Regulation](#) to discuss the latest developments in the regulation of different network industries, namely transport, energy, telecoms and water distribution. The fifth edition of the Conference on the Regulation of Infrastructures had a special focus on digitalization and the use of data, which is a topic that cuts across all network industries and is highly debated.

A key element of the Conference is the exchange between young researchers and experienced professors specialised in different fields. Building on the experience gained from the past editions, the ambition of this Conference is to stimulate interdisciplinary as well as cross-sectorial discussions on the regulatory challenges in the network industries. As the four sectors are not in the same stage of transformation and different countries are not in the same development phase, a big variety of different questions and different policy options have been discussed. However, the Conference also promoted cross-sectoral discussions and exchanges on the general issues pertaining to all sectors such as the complex interplay between sector specific and competition regulation.

10 papers have been presented in five round table sessions, each dedicated to one of the discussed industries. Moreover, all the research areas of the Florence School of Regulation (Communications and Media, Energy, Transport, and Water regulation) were present with a dedicated session, and they also all attended a joint session on cross-cutting issue. Some of the best papers presented at the 5th Conference on the Regulation of Infrastructures are presented in this issue of the Network Industries Quarterly.

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# Challenges of personal data for the competition law analysis

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**Abstract** - The paper argues for a better understanding of data economy by competition law authorities. Economic significance of personal data and their role in competition should be critically re-assessed for a more nuanced competition law analysis.

## Introduction

Although data have always played a significant role in competition (Feinstein 2015), the recent phenomenon of Big Data triggered an intense discussion about the role of data in the competition law analysis. The sheer amount and variety of data, new technologies and ever increasing speed of data processing seem to make the difference as, by contrast to the times past, data have become a key asset and input both for traditional and digital economy companies. Designing a suitable data-based business strategy allows companies to develop or sustain competitive advantages, and they invest significant means and efforts in it.

Among the different types of data, personal data are believed to be the most valuable from the economic point of view. Personal data are any information relating to an identified or identifiable natural person (Article 4 of the General Data Protection Regulation). Analysis of personal data allows companies to tailor their offers to a specific consumer: they can learn what consumers want and improve qualities of products respectively, develop new products, adjust pricing, optimize advertising, marketing and logistics, save costs by increasing efficiency and innovative capacity of a company.

The high value of personal data lies in its inherent link to a specific person, which provides a (virtual) access to one's private life. Therefore, personal data are subject to special regulation that limits and regulates their collection, processing and usage with the ultimate purpose to protect fundamental rights and freedoms (Article 1 of the General Data Protection Regulation). Against this background, interplay of personal data and competition could be seen as a digital reincarnation of one of the fundamental discussions on the collision of economic objectives of competition law with broader socio-political values (Lianos 2013). Hence, the challenge is the balancing of economic and non-economic values in the competition law analysis. In practice, both the Commission and the Court of Justice of

the European Union tend to exclude non-efficiency considerations from the competition law analysis, but take into account public interest objectives<sup>1</sup>.

Yet, the challenging task of finding the balance between the objectives of personal data protection and competition law does not address economic aspects of personal data. Firstly, strict requirements of data protection force companies to routinely anonymise all data upon its collection so that the person to whom the data refer cannot be identified either by the data controller or by anyone else. This process allows exploiting formerly personal data commercially without limitations of data protection. Secondly, in the process of data analysis even non-personal (anonymous) or anonymised data may reveal information that relate to an identified or identifiable person (re-identification). Thirdly, even if a company fully complies with the requirements of data protection rules, it still needs to comply with the requirements of competition law with regard to the competition-related use of personal data.

## Personal data and possible effects on competition law: theoretical analysis

Possible negative effects on competition that result from the uses of personal data can be summarized in the following three "theories of harm".

First, some uses of personal data harm consumers due to degradation of quality of products, loss of privacy and discouraging of innovation. To begin with, the level of privacy and data protection can be considered a part of quality or a form of non-price competition (Jones Harbour 2007). It is diminishing as more user data are collected and if their processing and use are non-transparent, especially in two-sided markets (Stucke and Grunes 2015). Further, access to personal data is important for the improvement of products' quality and development of new offers. Companies

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<sup>1</sup> See, for example, Case C-309/99, Wouters, ECR(2002) I-1577; Case C-519/04, Meca-Medina, ECR(2006) I-6991.



that lack data access are in a competitive disadvantage, which may further convert into insufficient quality of their products and diminish incentives to innovate in terms of the improvement of the existing products and creation of new ones (Stucke and Ezrachi 2016).

Second, restrictions on availability of personal data may create barriers for entry of competitors. Undertakings well established in the market already have a competitive advantage or even an entrenched position, not least due to their knowledge of the market and their customers, which can be extracted from the data in their possession. New entrants also need access to such data, and relevant exclusionary practices of incumbents – such as locking in consumers, refusal to provide access or license – equal to barriers for entry (Stucke and Grunes 2015; van Gorp and Batura 2015), especially in two-sided markets where one side is a transaction market supporting the non-transaction market by monetizing user data (Filistrucchi et al. 2013). Moreover, harmful effects are felt by the whole market as restrictions may reduce effective competition and consumer choice and strengthen power of the incumbent.

Third, pre-emptive mergers that pursue the goal of eliminating potential competitors as early as possible may result in a loss of effective competition and consumer choice. They are likely to be perceived as a threat by potential new entrants. In the markets with a dominant incumbent, pre-emptive mergers may entrench or increase its market power (van Gorp and Batura 2015). Paradoxically, such practices may nevertheless encourage innovation as the large sum of money paid for a startup or a possibility of a lucrative career in a leading digital company provide a significant incentive.

### **Personal data and possible effects on competition law: practice and recent developments**

The practice of competition law analysis is lagging behind the theoretical developments, and only few elements of the presented theories of harm were considered in the analysis of the recent “data mergers” handled by the European Commission and the US Federal Trade Commission. For instance, in the mergers of Google/DoubleClick and Facebook/WhatsApp the authorities considered the implications of the transactions for the availability of data in the markets for online advertising and communications services, for market power as well as incentives of the merging entities to misuse (availability of) the combined datasets. Yet, the competition authorities failed to consider

privacy-based competition and impact of the transactions on the consumer choice in non-transaction side of multi-sided market (Jones Harbour 2007). Considerations about future use of data and level of data protection were insufficiently examined (Jones Harbour 2007) or dismissed as not falling within the scope of competition law<sup>2</sup>. In the acquisition of DoubleClick, the authorities failed to recognize a pre-emptive merger where Google bought the leading startup competitor that owned a superior data analytics algorithm for online ad-serving. Google’s developments were in a beta testing phase at that time<sup>3</sup>.

The described shortcomings of competition law analysis, however, are not symptomatic of the inability of competition law to deal with the challenges of digital economy. On the contrary, competition law is flexible and dynamic enough and equipped with necessary instruments to deal with data-based abuses as long as it, firstly, recognizes the economic relevance of data and, secondly, considers the specifics of digital markets and of data itself (Bundeskartellamt and Autorité de la concurrence 2016), which needs to be reflected in the practice of competition law analysis.

The practice needs to be more consistent in examining all sides of multi-sided markets, including the non-transaction markets with “free” products that are paid with personal data (Stucke and Grunes 2015; van Gorp and Batura 2015) and paying greater attention to the business models of the companies. Specifically, while personal data appear as an element of examination of markets for service of data analytics, it is not clear whether data are treated as an integral part of the data analytics service or an input in this service, whether it can be traded and be in a separate data market<sup>4</sup>. Instead, under the influence of data protection law, it is portrayed that personal data are collected and only sold as big data en mass. Yet, processes of data collection and data acquisition differ strongly. While some companies collect data as a by-product of their main activity (e.g. a mobile telecommunications company needs the number of the call recipient in order to be able to place the call), other do so purposefully (data brokers). While some companies sell different types of datasets (unstructured, semi-structured, structured), other obtain personal information of users in return for their “free” services. This reciprocity and the presumed equivalence of the values exchanged means that the data are in fact traded by users to a company, and a market for data exists on the level of their “collection”, not only when it is sold between companies.

<sup>2</sup> Press release of 03.10.2014, accessed 2 September 2016.

<sup>3</sup> Case Google/DoubleClick, No COMP/M.4731 of 11.03.2008, para. 191.

<sup>4</sup> See Case Telefonica/ Vodafone/ Everything Everywhere, No COMP/M.6314 of 04.09.2012 and Case Publicis/Omnium, No COMP/M.7023 of 09.01.2014.

## Recommendations and concluding remarks

Due to their relative novelty, processes related to personal data and their relation to management decisions are under-researched and not fully understood by economics and law. The practice of competition law analysis is, therefore, well advised to pay special attention to data science and to business models and strategies of (digital) companies (van Gorp and Batura 2015). More specifically, the competition law analysis shall take into account what business competitors are in and what their data needs are and weigh the characteristics of data accordingly. The alleged high value of personal data is based on their perceived scarcity due to limited access (also due to data protection requirements), limited scope of the data that can be purchased and high cost of collection of the economically relevant data (Bundeskartellamt and Autorité de la concurrence 2016). However, depending on the business model and industry sector, companies would see data differently; they require different types of data (e.g. real-time or historical), different amounts and quality of data.

When contemplating the role of personal data in competition, one should adopt a more nuanced view of the data-related economy. Data is not always an input in a product, although the industry branches where it plays this role – online search and online advertising – are most frequently scrutinised. Data can also be a product, for instance, for companies active in data collection and creation of databases (Feinstein 2015). Depending on what business a company is in, it may value data differently and be more or less inclined to restricting access to it. For instance, companies engaged in data analysis are unlikely to be interested in restricting access to data as they are more interested in protecting their know-how regarding algorithms, data processing and mining.

Where personal data are an input in the product, they are not the only one. Given the high level of innovativeness and disruption in the digital environment, a creative idea regarding logistics, marketing or invention of a product are a key to success. Data collection and processing may or may not inspire the creativity, but does not replace it.

Industries relying on data as input assign different value to different personal data. Where data-based decisions are taken in real time (online advertising), valuable personal data is rather short-lived (Tucker and Wellford 2014). In other industries historical data may be of greater value (e.g. information about electricity consumption for optimization of power supply<sup>5</sup>).

For specific companies the data generated by the users of their own products are more relevant than data acquired elsewhere if they provide only a limited insight in consumers' wishes with regard to the offered services and goods.

In particular, new entrants do not necessarily need and use the same type and quantity of data as the incumbents (Tucker and Wellford 2014). The practice shows that usually new entrants do not rely on the purchased data, but start collecting and analyzing personal data from their own users the moment they enter the market. This is because data needs of incumbents and new entrants vary according to their business models (Sokol and Comerford 2016). Newcomers, especially startups, rarely enter the market with the offer identical to the one of the incumbent. Instead they focus on a specific functionality, customer segments or user interests (Tucker and Wellford 2014). Data requirements of newcomers are therefore qualitatively different and will develop gradually relying on the data generated during its activities and following the development of these activities.

Furthermore, the assumption about the value of personal data and data in general should be viewed through the prism of data analytics. While one mainly talks of data collection, raw data collected directly and immediately when the consumer used a product, rarely make sense even for the provider itself (Sokol and Comerford 2016). Data per se are necessary, but transient and inherently dumb (Kaufmann 2013). To get value out of data, one needs to apply data science to it (i.e. algorithm) and then treat the results with data crunching and analytical technologies. Depending on the algorithm, the goals set and questions asked, data would reveal different information: this analysed, secondary data are the actual valuable asset. Thus, in fact what is done to data and how it is done is more important than the data itself.

## References

1. Bundeskartellamt and Autorité de la concurrence (2016). 'Competition law and data', [www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.pdf?\\_\\_blob=publicationFile&v=2](http://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.pdf?__blob=publicationFile&v=2), accessed 2 September 2016.
2. Feinstein, D. (2015), 'The not-so-big news about big data', [www.ftc.gov/news-events/blogs/competition-matters/2015/06/not-so-big-news-about-big-data](http://www.ftc.gov/news-events/blogs/competition-matters/2015/06/not-so-big-news-about-big-data), accessed 2 September 2016.
3. Filistrucchi, L., Geradin, D., van Damme, E., and Affeldt, P. (2013), 'Market definition in two-sided markets: Theory and practice', DISEI Working paper N.05/2013, accessed 2 September 2016.
4. Van Gorp, N., and Batura, O. (2015), 'Challenges for competition policy in a digitalized economy', Study for the ECON Committee of the European Parliament, [www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL\\_STU\(2015\)542235](http://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2015)542235), accessed 2 September 2016.
5. Jones Harbour, Pamela (2007), Dissenting Statement in Google/DoubleClick (F.T.C. File No. 071-0170), [www.ftc.gov/news-events/press-releases/2007/12/federal-trade-commission-closes-googledoubleclick-investigation](http://www.ftc.gov/news-events/press-releases/2007/12/federal-trade-commission-closes-googledoubleclick-investigation), accessed 2 September 2016.
6. Kaufmann, J. (2013), 'Is your big data dumb, scary or useful?' The

<sup>5</sup> Case EDF/Dalkia en France, COMP/M.71.32 of 25.06.2014.

Wired Magazine, [www.wired.com/insights/2013/03/is-your-big-data-dumb-scary-or-useful/](http://www.wired.com/insights/2013/03/is-your-big-data-dumb-scary-or-useful/) accessed 2 September 2016.

7. Lianos, I. (2013), 'Some reflections on the question of the goals of EU competition law', CLES Working Papers Series 3/2013, [www.ucl.ac.uk/cles/research-paper-series/research-papers/cles-3-2013](http://www.ucl.ac.uk/cles/research-paper-series/research-papers/cles-3-2013), accessed 2 September 2016.
8. Sokol, D., and Comerford, R. (2016), 'Does antitrust have a role to play in regulating big data?', [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2723693](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2723693), accessed 2 September 2016.
9. Stucke, M., and Ezrachi, A. (2016), 'When competition fails to optimize quality: A look at search engines', *Yale Journal of Law & Technology*, 18: 89-97.
10. Stucke, M., and Grunes, A. (2015), 'No mistake about it: The important role of antitrust in the era of big data', *The Antitrust Source*: 1-14.
11. Tucker, D., and Wellford, H. (2014), 'Big mistakes regarding big data', *The Antitrust Source*: 1-12.

# Sustaining Universal Service Conditions in Smart Electricity Systems

Lea Diestelmeier\*, Dirk Kuiken\*\*

**Abstract** - This article analyses how the transition towards Smart Electricity Systems (SES) influences the household customers' right to access the electricity system under EU law, and gives recommendations on how to sustain this right in the SES scenario.

## Introduction

One of the EU policy goals guiding the evolution of electricity systems is to facilitate smart electricity systems (SES). SES enable increased interaction of various actors in the electricity sector through information and communication technology (ICT) infrastructure. The goal of this increased level of interaction is to improve energy efficiency, competition, and the efficient integration of renewable energy sources (RES).

Also household consumers are envisaged to interact and actively participate in the SES by reacting upon real-time information on electricity generation and supply. However, in order to be able to do so, household consumers need access to the relevant communication system and the subsequent services. This implies only if household consumers can access those communication systems and services, they can enjoy electricity supply at universal service conditions, which is “*the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices*” (article 3(3) Directive 2009/72/EC).

Maintaining this provision in the context of SES inevitably poses the question whether similar conditions need to be included for household consumers accessing the SES' ICT infrastructures. Access to communication systems can be covered by various technologies with different qualities and access conditions. This article briefly points out the differences between the electricity- and the telecommunication access rights for household consumers, and argues that those differences result in ambiguities with regard to conditions for household consumers accessing SES. Thereafter, this article analyses the conditions upon which household consumers should have access to SES,

and whether these conditions can be safeguarded by the current EU legal framework. Finally, this article provides conclusions and recommendations for (national) policy makers on how to safeguard the minimum conditions required for household consumers to access SES.

## Smart Electricity Systems

In the transition towards a more sustainable and efficient energy system, SES are said to be essential (EU Commission 2011: 10). Various objectives and functionalities are ascribed to SES, which can be translated into technical minimum requirements. This section broadly identifies the ascribed objectives and functionalities and resulting technical requirements.

### Policy Objectives

Determining the objectives, article 2(7) of the Regulation on Trans-European energy infrastructures (Regulation (EU) 347/2013) offers a starting point by establishing the following definition of smart grids (electricity systems): “*‘smart grid’ means an electricity network that can integrate in a cost efficient manner the behaviour and actions of all users connected to it, including generators, consumers and those that both generate and consume, in order to ensure an economically efficient and sustainable power system with low losses and high levels of quality, security of supply and safety*”. In addition to this definition, the Regulation provides some indication on SES functionalities by specifying the criteria for smart grids as Projects of Common Interest (article 4(2c) Regulation (EU) 347/2013). On the basis of this, the following four main objectives that a SES should fulfil are identified: maintaining grid resilience, improving energy efficiency, integra-

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ting RES, and involving system users.

The focus in this article is on the objectives to involve system users (including household consumers). The aim of interaction between system users is increasing flexibility of consumption and generation, which becomes crucial with regard to RES and energy efficiency goals. This requires a constant information exchange between all connected system users in order to act and react close to real-time upon supply and demand.

### *Technical Requirements*

Realising the interaction between system users requires the transmission and processing of data and therefore communication infrastructure. Communication systems are defined as: “[...] *transmission systems [...] which permit the conveyance of signals by wire, radio, optical or other electromagnetic means [...] irrespective of the type of information conveyed*” (article 2(a) Directive 2002/21/EC). This definition already implies that many different communication technologies exist. All different technologies have their own characteristics. The current electricity system is enhanced with communication systems for monitoring and controlling (Aiello and Pagani 2016: 14). With regard to the SES ICT infrastructure, not just one type of technology (communication system) is used for SES. Dependent on the exact purposes (e.g. advanced (smart) metering, or demand response) and technical criteria of the SES, a complex web of interconnected communication systems with varying technical specifications will be deployed (Sato et al. 2015: 247 – 250). Hence, the following main types of communication systems can be used for SES: 1) the home area networks (HANs), most likely including a communication service that is used for accessing the internet, 2) communication systems exclusively dedicated to smart meter communications, and 3) other communication systems used by system operators.

The SES involves the electricity system and communication systems. Different types of communication systems can facilitate the access to SES. This also means that household consumers could have different options for accessing SES.

### **SES Access Conditions in EU Law**

As mentioned above, SES are considered as a prominent and cost-efficient solution for ensuring the affordability of the future electricity system (European Commission 2015). Hence, in order to reap the benefits of SES, customers need access to the SES, inter alia the relevant

communication systems (European Commission 2015 and CEN-CENELEC-ETSI 2012: 14). EU law regulates both, the access conditions for the electricity system and for (tele)communication systems. In order to understand the access conditions for SES, both access conditions have to be taken into consideration, and perhaps even more importantly, the differences between both access regimes in SES.

The goal of both access regimes is to provide a level playing field for system users and to protect (household) consumers. Yet, significant differences in technology and circumstances between electricity- and communication systems exist. The most prominent difference is the availability of parallel infrastructures and/or alternative technologies. Whereas only one electricity grid exists, various communication systems are in place. Dependent on the technology used in communication systems, the systems can be used for comparable purposes. This difference in alternative technologies and parallel networks is also reflected in both access regimes.

The access conditions for the electricity system are much more absolute than the access conditions for communication systems. The most important difference is that the Electricity Directive poses a public service obligation for both the supply of electricity (article 3(3) Directive 2009/72/EC) and consequently access to the electricity system (ECJ Case 239-07: par. 40 – 41, 48). Access to the electricity system is the right to use the electricity system (ECJ Case 239-07: par. 42), which should be provided to all system users (including customers) without discriminating between system users (article 32(1) Directive 2009/72/EC and Kruimer 2011: 274.). Given the fact that access is used as a vehicle for providing electricity supply at universal service conditions, “*that is the right to be supplied with electricity of a specified quality within their territory at reasonable, easily and clearly comparable, transparent and non-discriminatory prices*”, to household customers (article 3(3) Directive 2009/72/EC), the access conditions for electricity systems should also ensure such universal service conditions.

In contrast to the access regime of the electricity system, in the EU telecommunications access regime, consumers do not have direct right to access communication systems. Only service providers access the communication system, consumers are seeking access to communication services. In general, three different types of communication services can be identified in EU law, each implying different conditions and rights for consumers to access the service (Nihoul and Rodford 2011: 301):

1. (public) communication services, to which general



consumer protection applies. Examples of such protection are: minimum contract terms, information requirements for service providers, and switching (from one service provider to another) provisions (articles 20 – 30 Directive 2002/22/EC);

2. universal services, to be provided to all consumers at specified quality levels and affordable prices (article 3(1) Directive 2002/22/EC). For SES, the most relevant of these services is the data communication service “*at data rates that are sufficient to permit functional internet access*” (article 4(2) Directive 2002/22/EC);

3. services of general interest, which are set at Member State (MS) level. Although such services distort the level playing field, MSs can request for an exemption to the prohibition to provide special rights and duties to specific undertakings in order to appoint specific companies with a right to provide services of general interest (article 106(2) Treaty on the Functioning of the European Union).

Although the above access conditions could well guarantee access to communication services that are suitable for SES purposes on MS level, from a EU law perspective such a guarantee does not exist. Firstly, EU law does not require (public) communication services, suitable for SES purposes, to be of a specified quality and at an affordable price. Secondly, no universal service exists that de facto guarantees suitability to be used for SES purposes. Although functional internet access should be guaranteed by the MSs, the MSs have the discretion to decide what is considered as ‘functional internet access’ and for what purposes. The European Commission already acknowledged that the current universal service conditions for data connections are not up to standards anymore for the modern data connection requirements (European Commission 2010: 21, and Batura 2016: 239). Nevertheless, in practice it seems plausible that the minimum data rates or latency requirements for such a universal service on MS level might be suitable for SES purposes (e.g. ADSL connections might be suitable, Sato et al. 2015: 267). Thirdly, MSs could opt for a service of general interest, assuming MSs can rely on justifiable reasons for granting special or exclusive rights to certain undertakings. Yet, although this seems like a suitable alternative if no other services able to meet SES communication standards are available, EU law does not guarantee the availability of such services.

## Access Options and Regulatory Conditions

Key for the functioning of SES and for household consumers to participate and benefit therein is access to informa-

tion in a specified time interval through communication services. Household consumers who do not have access to SES communication services at a reasonable price and therefore cannot participate in the SES at a reasonable price, might pay unreasonably higher electricity prices compared to consumers who are able to participate at a reasonable price (most likely the benefits for those that interact in the SES are paid by those who do not interact). Thus, ensuring the effective right for household consumers to be supplied with electricity at universal service conditions depends on the access conditions for communication services. From the current rules on accessing communication services four potential access options can be identified, each revealing different regulatory guarantees for household consumers to access SES communication services.

### *Option 1: Data Connection under Universal Service Conditions*

MSs have to ensure the availability of ‘functional internet access’ to all users, geographically independent, and at an affordable price (article 3 and 4(2) Directive 2002/22/EC). Possibly, ‘functional internet access’ could also be of sufficient quality for SES communication services. Yet, this is no guarantee as the provision leaves much discretion to the MSs and does not include any quality specifications required for SES purposes.

### *Option 2: Smart Meter Communication Infrastructure*

In case the implementation of smart meters is assessed to be economically viable in a MS, at least 80% of the final customers should be provided with smart meters (Annex I(2) Directive 2009/72/EC). However, this does not guarantee access to SES communication services nor is the reading frequency of such a smart meter guaranteed to be in line with the quality requirements of the SES. Although the Electricity and Energy Efficiency Directives mention certain frequency requirements, such as measuring the actual time of use, and the requirement to produce data “*frequently enough to enable [consumers] to regulate their own electricity consumption*”, the MSs have large discretionary powers in defining such quality standards (article 9 and 10(2) Directive 2012/27/EU and Annex I(2) Directive 2009/72/EC and Hierzinger et al. 2012), technical reports of the European Standardisation Organisations plead that effective demand-response requires 15 minutes, up to real-time information. So, not only is the access to SES communication services not guaranteed, but also the quality standards are contested.

### *Option 3: Service of General Interest*

MSs may choose to ensure access of a certain quality to SES, by classifying it as service of general interest to be provided by one or several designated entities. However,

MSs are restricted by EU law in providing 'special and exclusive' rights, and in principle, services of general interest should only be required if market parties are unable to provide for the services and the service is considered to be of 'general economic interest' (article 106 Treaty on the Functioning of the European Union). Nevertheless, if services of general interest should be provided, possibly the distribution- or transmission system operator (DSO, TSO) could be designated as the responsible party.

#### *Option 4: Market Alternatives*

Alternatively, market parties can offer communication services meeting the SES quality requirements to household consumers. Yet, such communication services are not subject to the requirement of providing all consumers with a service under equal conditions. Therefore, a reasonable price applicable to all household consumers for these services cannot be guaranteed in the market realm. This might be troublesome for ensuring the universal service rights related to accessing SES (article 3(3) Directive 2009/72/EC).

### **Conclusions and Recommendations**

The changing electricity system towards SES implies that access for household consumers to SES includes access to systems and services for the purpose of the transmission of electricity with a view to efficiency gains on the basis of real-time information on generation and consumption. Therefore, MSs have to ensure access to SES communication services for guaranteeing the universal service conditions of electricity supply for household customers. The current EU rules on accessing communication services do not provide a guarantee for access to SES communication infrastructure at a specified quality.

We recommend that national policy makers carefully analyse the national markets for communication services and conclude whether communication services will be available to all household consumers that are, or will become part of the SES. If no minimum guarantee (e.g. based on the data communication services (functional internet access) requirement of Directive 2002/21/EG) for the provision of communication services suitable for SES communications exists, we suggest that the minimum quality standards for internet services could be aligned with the minimum standards for SES communications. Alternatively, the smart meter communication infrastructure could be used to integrate SES communication services. Either way, gua-

rantees that the universal service conditions for household consumers can be maintained in SES should be provided.

Additionally, EU policy makers should address household consumers' access conditions for SES. EU law requires electricity supply at universal service conditions for household consumers and the rollout of smart meters. Moreover, large-scale implementation of SES is envisaged. This should also imply the provision of suitable communication services. However, EU law does not guarantee (or explicitly requires) that SES communication services will be available. Policy makers could consider adopting a safety net, setting minimum requirements for either the smart meter infrastructure, or perhaps data communication services. This would also service a broader policy objective enshrined in the Digital Agenda for Europe: ensuring (high quality) internet access throughout the EU.

### **References**

1. Aiello, M. and Pagani, G.A. (2016), 'How Energy Distribution Will Change: An ICT Perspective' in A. Beaulieu et al., *Smart Grids from a Global Perspective: Bridging Old and New Energy Systems* (Springer International Publishing Switzerland), 11-26.
2. Batura, O. (2016), *Universal Service in WTO and EU law* (The Hague: T.M.C. Asser Press), 215 – 267.
3. CEN-CENELEC-ETSI (2012), *Smart Grid Reference Architecture (SG-CG/M490/C\_Smart Grid Reference Architecture)*.
4. European Commission (2010), *A Digital Agenda for Europe* (Brussels: European Commission).
5. European Commission (2011), *Energy Roadmap 2050* (Brussels: European Commission).
6. European Commission (2015), *Delivering a New Deal for Energy Consumers* (Brussels: European Commission).
7. Hierzinger R., Albu, M., van Elburg, H., Scott, A. J., Lazicki, A., Penttinen L., Puente F., and Saele, H. (2012), *European Smart Metering Landscape Report 2012* (Vienna: Smart Regions)
8. Kruimer, H. (2011), 'Non-Discriminatory Energy System Operation: What Does it Mean?', *Competition and Regulation in Network Industries*, 12(3): 260 – 286.
9. Nihoul, P. and Rodford, P. (2011), *EU Electronic Communications Law*, 2nd ed. (Oxford: Oxford University Press), 299 – 390.
10. Sato, T., Kammen, D. M., Duan, B., Macuha, M., Zhenyu, Z., Wu, J., Tariq, M., Abebe Asfaw, S. (2015), *Smart Grid Standards: Specifications, Requirements, and Technologies* (Singapore: Wiley), 247 – 298.

# Digital Innovation in the Port Sector: Barriers and Facilitators

Valentin Carlan\*, Christa Sys\*\*, Thierry Vanelslander\*\*\*, Athena Roumboutsos\*\*\*\*

**Abstract:** This article identifies the barriers of digital innovation from initiation through to implementation, as well as assessing the impact of facilitators of ICT innovation. To do this, the present research applies four quantitative instruments. The research conducted within the BNP Paribas Fortis chair Transport, Logistics and Ports firstly indicates that alignment exists between company strategies and degree of success in the port sector, as compared to non-ICT initiatives. The ICT innovation initiatives also are profit-driven. Secondly, the port sector should be more open to disclose cost and benefit info, and should conduct more such analyses. Next, there are conditions that improve the degree of success. Overall, terminal alignment with the right ICT infrastructure proves key. But too many diverging interests among the stakeholders entail that digital innovation challenges the ability to cooperate. An important finding: regulation was identified neither as a barrier nor as a facilitator.

## Digital Innovation Change Gradually the Port Sector

Starting from Schumpeter (1939), innovation is “‘doing things differently’ in the realm of economic life”, where “‘new combinations’ of resources bring about five different types of innovation: new products or a new quality of a product, new methods of production, new markets, new sources of supply of raw materials and intermediate goods, and new methods of organizing the economic process. All take place within the realm of economic life. Within the context of the present research, “change” was considered vis-a-vis economic, environmental and social added value.

Under digital innovation, combinations of information, computing, communication, and connectivity technologies are considered (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). The port sector can also expect cost savings, increased quality and further growth by implementing digital innovation. However, the speed at which digital innovation is reshaping the port sector is lower than in other industries.

Three categories may be considered the key innovation domains in the port sector with respect to digital technology. The first category ‘electronic data interchange’

(21 cases analysed) focuses on barriers and success/failure oriented to paperless administration process. New technologies are being used, standardisation has materialized and information flows faster. Regarding IT innovation supporting cargo flow, five innovation cases are analysed. Differently from the previous category, the second cluster focuses on innovation initiatives that are enhancing the cargo flow. Intelligent traffic optimisation solutions, for both freight and vessels, are being compared (5 cases analysed). Moreover, mobility and delivery times are targeted as key factors that should be improved by computer-assisted planning solutions. The main goals of these initiatives are to optimize the traffic, to develop a planning algorithm and to avoid conflicts on navigational ways. The third category (6 cases analysed) brings together innovation initiatives which are focused on better monitoring vehicles and cargo.

Given the trend towards collaborative innovation in the maritime supply chain, the question becomes what are the barriers, who has a facilitating role, and whether there is a role for regulation? That is the main research question that this paper answers for digital port-related innovation.

A key feature of the methodology applied is the fact that it combines four approaches to provide in combination the

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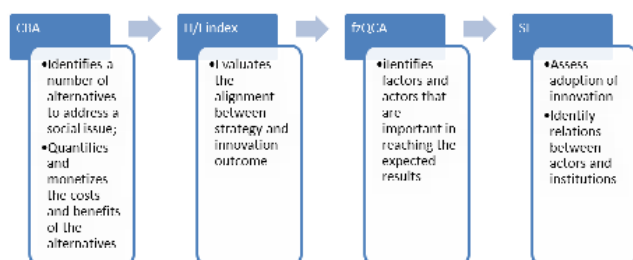
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key factors influencing successful implementation<sup>1</sup>. The combination of the four approaches sheds useful light on the factors that stimulate or hinder port-related digital innovation. (Figure 1) In particular, the need for infrastructure standardization and regulation, and the dominance of certain players through hard-institutional (e.g. regulation) or soft-institutional (e.g. actor culture) issues or strong or weak networking are brought to light.

Figure 1: A holistic approach to research



The analyses followed are complementary and inter-linked. Firstly, cases are viewed with respect to their cost-benefit analysis (CBA). Notably, apart from the level of alignment with company strategies, the adopted innovation should be ex-ante efficient and its feasibility validated. The second method decides whether the innovation cases align with the companies' strategies and the level of alignment. Then, the fuzzy set Qualitative Comparative Analysis (fsQCA) looks for the combination of actors and conditions leading to better results. Finally, the Systems of Innovation (SI) approach determines whether basic concepts are valid, through pattern recognition.

### Identifying the Strategies, Barriers and Facilitators

Digital innovation will change the business model of the actors along the maritime supply chain. In previous decades, forward thinking companies along the maritime supply chain invested in stand-alone IT systems to enhance their operations and maintain competitiveness (i.e. support new business models and deliver new services). A number of software companies specialized in the port sector and developed and adjusted various innovative concepts to the needs of a particular stakeholder. With respect to integration in the maritime supply chain, those stakeholders find themselves in a lock-in situation. Moving to cloud-2-cloud applications will make it possible to move forward faster. Inevitably, integrating such systems carries a price tag. Small and medium sized companies should also embrace the move to digital innovation. How to create positive awareness among those companies? What barriers are on the way, and what role can regulation

play?

First, alignment exists between company strategies and success degrees in the port sector, and efforts should be made to improve the strategic processes that lead to integration in the maritime industry. Economic objectives appear to be ranked higher in terms of importance than the other objectives such as environmental and social, which in many cases are imposed through regulation or through the social responsibility mandate of the initiating entity.

Next, no unique 'recipe' for innovation success does exist. However, some combinations of variables can be identified that lead for certain groups of cases to a higher chance of success. (Figure 2) Overall, important variables turn out to be infrastructure, soft-institutional and hard-institutional issues at the initiation stage, and infrastructure at the development and implementation stages.

Figure 2: fsQCA success conditions

| fsQCA success condition                                   | fsQCA 1                            | fsQCA 2 | fsQCA 3                               | fsQCA 4                  |
|---|------------------------------------|---------|---------------------------------------|--------------------------|
| ICT Innovation cluster                                    |                                    |         |                                       |                          |
| Electronic data interchange innovation (information flow) | APCS                               |         |                                       |                          |
|   | Administration (EDI)               |         | Administration (EDI)                  |                          |
|   | IT data management                 |         |                                       |                          |
|   | SEAGHA - port community system     |         |                                       |                          |
|   |                                    |         | eTransit (prior to the Extended-GATE) | Port Single Window       |
|   |                                    |         |                                       | Extended-GATE 1.0        |
| IT innovation supporting the cargo flow                   | 3PL - Primary Gate of Leixões Port |         |                                       |                          |
| Monitoring innovation - vehicles & cargo                  | Autotrakker                        |         |                                       | Truck Appointment System |

Furthermore, it was identified that capability building and early inclusion of actors that may provide respective capabilities is important for the successful adoption of digital innovation.

Financial support was absent in most cases and in the majority of cases self-financing was the preferred /adopted solution. In depth investigation of exceptions and failed cases highlighted the impact of "lack of market demand" and "port competition" and most importantly "innovation

<sup>1</sup> A detailed description of the four above-mentioned methods is available through Sys et al (2016).



competition". The latter is also responsible of a lock-in effect and deserves further research, as well as the effect innovation systems have on each other.

In addition, market demand is equally important to bring about the change introduced by the innovation. This condition is, also, connected to market readiness and requires further research.

Fostering co-competition within the port is an important prerequisite for the successful adoption of innovation. This consists of managing to achieve cooperation with respect to application of ICT in ports. Such co-competition, in many cases is targeted between ports. The innovation champion in this case is of significant importance.

In the present research and context, initial attempts at working with an upstream and downstream stakeholder often failed. Just a few were subsequently successful, but only in a closed innovation approach. Hence, co-innovation is expected to be the most important challenge for the port industry in the decades ahead. Co-innovation is a new form of innovation whereby the various stakeholders jointly acquire new expertise and create opportunities in the supply chain for new partnerships. In the long term, this will lead to a balance between costs and profits as well as a greater competitive advantage. In this context, the concept (and definition) of innovation widens and includes the cost reduction and improvement of service within a wider system.

It is noted that regulation and standardization (or hard institutions) was not identified as either being a significant barrier or a facilitator to the process. If anything, within the port environment, existing ICT solutions are often considered "standard" bringing about a lock-in effect and creating hindrances for new applications. In combination to the need for co-competition and co-innovation within the port sector, there is an issue for further research as to whether regulation and standardization will be favourable for the uptake of ICT innovation, especially as technology trends are in support of more open access systems.

Research is furthermore required to validate the findings from this paper more in depth. The set of ICT cases analysed within this research effort may be considered adequate in number allowing for comparisons and potential transfer of lessons learnt. However, it is also important to state that the sample may have a potential bias. For example, a great share of the cases within our sample is considered successful. Another point of interest is the market position of the innovation champion and the fact that all the analysed cases were self-financed. Finally, only a minority of cases involve small and medium-sized enter-

prises. It would be useful to verify whether the findings of this paper still hold in sets of cases that are more diverse.

### Joint Lessons for ICT related Port Innovation

During the data collection phase already, interviewees indicated the following barriers to port-related ICT innovation: lack of collaboration with other actors, need for further integration along the maritime supply chain, uncertainty about legislation, and drifting apart of the local needs and the strategic decisions made by headquarters as a result of globalization. These preliminary observations show that regulation does not get immediate attention among chain stakeholders, if only that there should be consistency.

The case analysis with the four methods suggests first of all, through the CBA, that there are benefits and costs for every stakeholder. However, the benefits are not always readily visible, often resulting in a low willingness to pay. At the same time, concern about the cost elements definitely plays in a sector where margins are narrow. Hence, from a game-theoretical perspective, there is no willingness to co-operate (comparable with co-operation between ports). This is easily explained by formalizing the cost and benefits of adopting an IT application in a payoff matrix. The choice is simple: either to continue with the own IT system or to integrate systems. Unlike the innovation champion (e.g. trucking company, carrier...), the follower faces an entry cost that outweighs the benefits, and consequently the game stops. There could be a role for regulation here, to the extent that entry costs may be built excessively high by incumbents. The latter is also supported by the importance attached by port chain decision makers to economic objectives, including optimizing operations and minimizing costs in the first place, as shown by the objectives-success analysis.

Entry costs may also be the driver behind observed potential for imitation (Roumboutsos, 2015). The innovation initiative fails or ends in endless discussions about data (ownership, availability, accessibility and modifiable). Opposed to that, if the cost is lower than the benefit or if everyone is in it from the start (cf. openness and trust), an innovative concept is likely to achieve greater success (Sys et al., 2015).

The latter weakens the role of the innovation champion on its own in the process: according to the fsQCA analysis, only in a minority of cases, that actor manages to push through the innovation in a key role on his own. The role of partners like terminal operators and shipping lines,

in particular in their alignment with infrastructure, are key. That is also confirmed by the Systems of Innovation approach, where capabilities of all involved partners, market demand and avoiding lock-in effects on behalf of the innovation champion are important. First, innovation carries “newness” both in application and the knowledge which is needed to implement it. Respective capabilities are important to be included in the process from the earlier stages, when this knowledge does not exist in-house. Second, limitations and set-backs may be overcome given the level of market demand that may exist for a specific innovation or the need to improve on efficiency. Third, the “port environment” includes many interlinked and inter-related actors, who may not always share the same interests or their interests may not be achieved in the same way. It is therefore important to both motivate all actors involved and facilitate their involvement in the implementation of the innovation. To this end, a number of issues may arise connected to both existing technology, and thus lock-in effects, for actors as well as competition issues.

A strong role of the innovation champion has been identified through many previous studies (Schon, 1963; Howell, Shea, & Higgins, 2005). However, there is a particular interest in the port sector where market leaders may exist within the group of actors involved in the implementation of a particular innovation. Here, the combined effect of market leaders (hence representing to a large extent market demand or bearing knowledge of market needs) and the power position within the “port environment” may be witnessed. Hence, the combination of the above findings supports the need of stimulating co-opetition in order to support the successful adoption of innovation. That is again supported by the objectives-success analysis, as integrating with other chain actors is shown to be a key objective by chain stakeholders.

Hard institutions (including regulation) moreover only appear as important in a minority of cases, according to the fsQCA analysis. Soft institutions (including informal standardization) are much more important. Of course, in such case, regulation of the market to support the free flow of information among actors and to give the best chances to the best standards becomes important.

The confrontation of objectives and success finally shows that the objectives that typically require public intervention (environmental and social) are not valued high. Clearly, the role for public policymakers in this field is not key.

## References

1. Bharadwaj, A., El Sawy, O., Pavlou, P. A., & Venkatraman, N. (2013),

‘Digital business strategy: toward a next generation of insights’, *Mis Quarterly*, 2(37), 471–82.

2. Howell, J. M., Shea, C. M., & Higgins, C. A. (2005), ‘Champions of product innovations: defining, developing, and validating a measure of champion behavior’, *Journal of Business Venturing*, 20(5), 641–61.
3. Roumboutsos, A. (2015, April 23), ‘Comparative Analysis of Cases: Systems’ Innovation Approach’, BNP Paribas Fortis innovation event, Antwerp.
4. Schon, D. A. (1963), ‘Champions for Radical New Inventions’, *Harvard Business Review*, 41(2), 77–86.
5. Sys, C., Vanelslander, T., Acciaro, M., Ferrari, C., Roumboutsos, A., Giuliano, G., ... Lam, J. (2015), ‘Executive summary’. Retrieved from <http://anet.be/record/opacirua/c:irua:127919>
6. Sys, C., Vanelslander, T., Roumboutsos, A., Giuliano, G., & Acciaro, M. (2016), ‘Port related innovation: the answer to today’s constraints and challenges in seaports related operations’, in review.

# A brief note on transport infrastructure regulation: Harmonizing governance, regulation and policy-making in Portugal

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**Abstract:** This paper provides a historical overview on the transport infrastructure regulation in Portugal. The institutional organization, regulatory models and private sector level of risk assumption are continually changing, requiring a more active and dynamic approach to regulation.

## Introduction

Infrastructure regulation is facing unprecedented challenges. Firstly, over the last 20 years, most countries have evolved towards the development and implementation of an active regulatory framework. Infrastructure networks have undergone a drastic development since the 1980s, and are now reaching a maturity level where maintenance and optimization, rather than construction, is the main challenge. Secondly, after the 1990s' boom in private sector participation in infrastructure, particularly through the form of public-private-partnerships (PPPs), the first contracts developed are close to the end, and there is an entire set of data and experience regarding the benefits and costs over this contractual regulation. Despite being perceived as a clear, transparent and predictable model of regulation, contracts have shown little ability to cope with change, which has led to excessive renegotiations leading to negative consequences for the public sector (Cruz and Marques, 2013a, 2013b).

## Regulating infrastructure in the XXI century: A literature review

The infrastructure sector is changing and there are conflicting trends worldwide. Infrastructure plays a critical role in promoting economic growth and wellbeing. Most developed economies have invested in improving their infrastructure networks and the effort is still ongoing in most developing economies (Burger & Hawkesworth 2013). This "wave" of infrastructure development is still a central development driver in most, if not all, develop-

ping economies.

However, infrastructure requires capital - not just for construction, but also for its operation, which places efficiency at the core of decisions today. Governments are not willing to finance an infrastructure operation at any cost, and societies now require higher levels of efficiency, so they have turned to the private sector (Sarmiento & Renneboog, 2014).

However, there are reasons for ensuring a strong governmental role in the field of networked infrastructure (Miranda and Lerner 1995). There are three main reasons: i) there is a tendency for most networked infrastructure to be natural monopolies; ii) it is difficult to assemble the right-of-way for most projects, and; iii) there are benefits larger than those directly related with the users.

It is estimated that more than 200 regulators were created in the 90s and early 2000s (Brown et al. 2006). Many, if not the majority, have evolved, changing their role, responsibilities, institutional and legal status, etc. These institutional changes have occurred simultaneously with the establishment of new regulatory models, forms and types of contracts.

## The evolution of the regulatory institutional framework in Portugal

Regulators in Portugal have been suffering from a continuous change movement in terms of institutional framework. These changes concern the terms of how to re-

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gulate, and the definition of the objectives of regulation. Until the 1980s, the majority of the regulation of the sector was based on tariff setting - establishing conditions for accessing the market through the issue of permits (most of them being perpetual permits) and technical regulation, and also through norms and technical notes. The markets were relatively stable, and public companies, managed by the Central Government, dominated. Regulation was seen as a secondary activity.

This changed in the 1990s, when the private sector began to be more active, thus forcing a more dedicated regulatory approach in order to preserve the quality of service, and to avoid predatory behaviors, as well as other well-known negative consequences of inadequate regulation.

Figure 1 presents a historical overview of how the regulatory institutional framework has been changing between different institutions in Portugal.

These changes were the result of different policy changes, namely:

- Re-naming and re-organization of institutions: in some cases, the change in the regulatory body was carried out due to the “upgrading” and/or re-organization

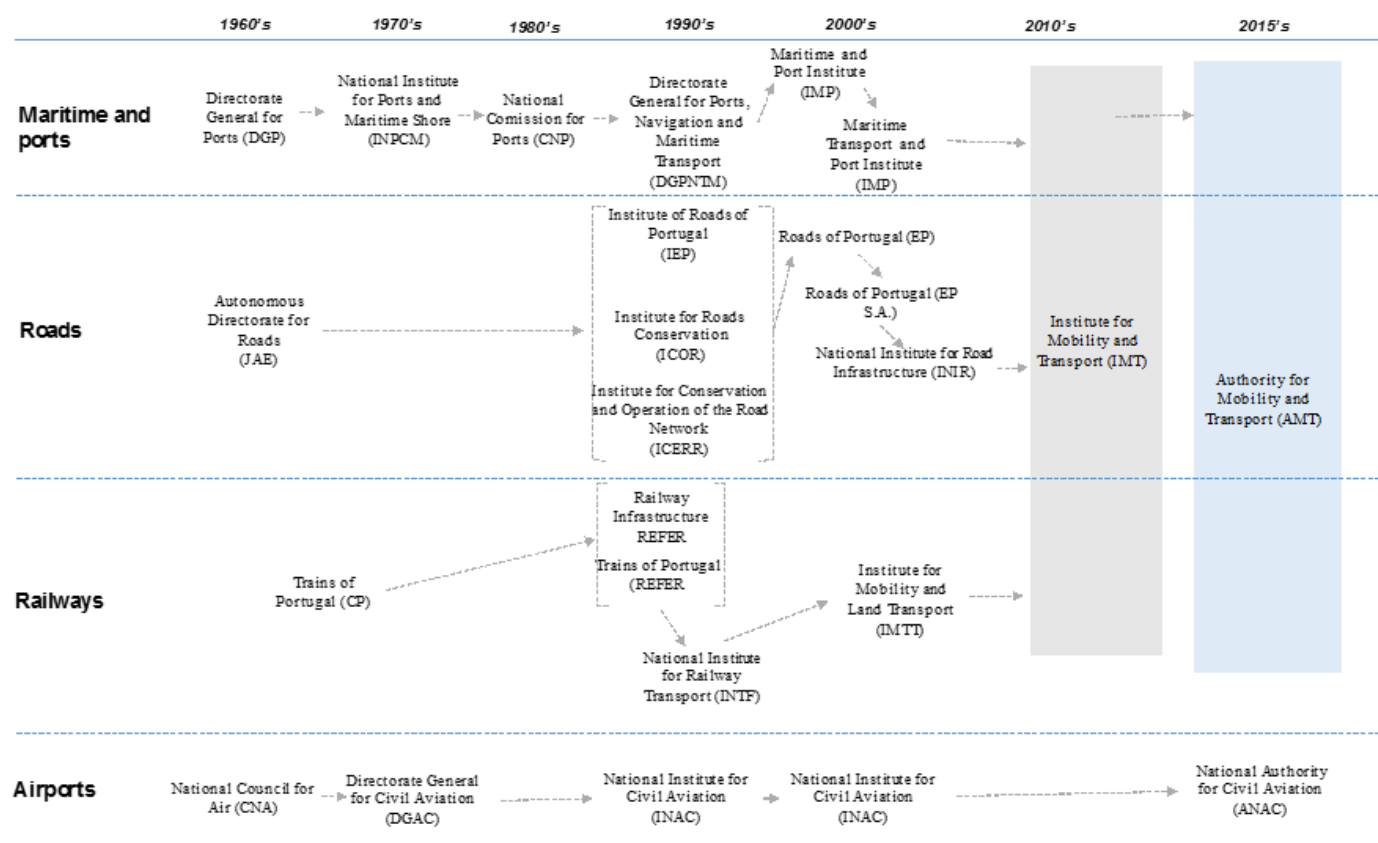
of their activities (e.g. changes in the airport sector);

- Division of responsibilities: the regulatory responsibilities were split between different organizations, as happened in the road and railway sectors in the 1990s;

- Merging of regulatory responsibilities: this was the latest movement, and it resulted in the merger of the regulatory responsibilities in the entire transport sector (except airports) under the same regulatory entity (Authority for Mobility and Transport – AMT) in 2015.

After this restructuring, some entities remained active, with different responsibilities, whilst others were abolished. An example of the former is the change of regulatory responsibility for the transport sector. In the 2000s the Institute for Mobility and Land Transport was created for overseeing public transport. In the 2010s this Institute took over the regulatory responsibility of the rail sector, which had previously been the responsibility of the National Institute for Railway Transport (INTF). The INTF was created in the 1990's, when a political decision was made (not just in Portugal, following the European Commission guidelines) to vertically separate the rail sector, segregating its operational and infrastructure management. The rationale was

Figure 1 – Institutional regulatory changes in the period 1960-2015





to progressively create the conditions to allow competition in the operation of railway services, and to increase the private sector participation in this market. Simultaneously, it was necessary to create sector-specific regulatory bodies capable of addressing the specificities of each sector. This also occurred in the road sector.

There are several examples of institutions that lost their function as a regulator, but kept other functions (e.g. planning). One of these cases is the National Institute for Mobility, which, until 2015 was the single transport regulator for the maritime-ports, roads, and railway sectors. In 2015, with the creation of the AMT, IMT lost its regulatory functions and it became responsible for planning and the issue of permits, etc.

Behind the creation and empowerment of the AMT, was the external “pressure” of the International Monetary Fund (IMF), the European Union (EU) and the European Central Bank (ECB) under the financial aid programme to Portugal. Portugal was subject to a bailout programme in 2011, which imposed several changes. One of them was related to the need to increase the regulatory activity of the transport sector. Unlike previous transport regulatory agencies, the AMT is not subordinate to the Government, which provides a truly independent regulatory action. Former transport regulators were under the control of the Ministry of Transport, and were therefore vulnerable to political interference, and they did not have the ability to provide a transparent regulatory approach.

However, the changes in the regulatory framework were much deeper than just at the institutional level. The regulatory models in different sectors have been evolving from a discretionary-based model towards a contractual-based approach. The increasing involvement of the private sector started in the late 1980s in the ports sector and even more significantly in the 1990s in the roads, railways and ports sectors. This involvement has been developed under either a contractual approach, typically in the form of concessions (ports and, as of in 2012, also airports), or in the form of PPPs, which involves a project-finance scheme (roads and railways) (see Cruz & Marques, 2011 and Sarmiento & Renneboog, 2015, for more details).

Both in the case of concessions and PPPs, there have been opposite movements regarding the contractual structure, or risk sharing in different sectors. Up until 1990, the risks of CAPEX, OPEX and revenue were essentially public (Figure 1), with the exception of the port sector, where, during the 1980s some private concessions were established. By this means, the private sector was made responsible for the operation the subsequent costs, and for small investments on the land side of the terminals.

In the 1990s a deeper involvement of the private sector in infrastructure provision and management began to take place, particularly for roads. These initial contracts transferred the majority of the risks to the private sector (CAPEX, OPEX, and revenue risk). In the railway sector, the first projects developed by the private sector were initiated with a mix of public and private financing and shared risk in terms of revenue risk. OPEX was a responsibility of the private sector. In the ports sector, the port terminals evolved into private management under concessions. The private sector assumes most of the traffic risk and it pays the port authority a rent for the concession.

Since 2010, there has been a shift in terms of risk sharing, mainly in the road sector, with the public sector assuming most risk by changing a significant part of the road system to availability schemes. Under these availability schemes, the concessionaire is paid a fixed fee for operating and maintaining the road, with a very limited variable compensation, which is indexed to traffic volume.

In the port sector, where the previous concessions had resulted in most of the demand risk falling on the terminal concessionaire (private), some concessions moved towards a (partially) variable rent model, which meant that the port authority is also subject to demand (revenue) risk. In the airport sector, the risk matrix moved completely to the private sector, because of a concession agreement of ANA, and its subsequent privatization.

Although the railway sector remained stable in terms of risk sharing, all the other sectors have suffered opposite changes. While in the road and port sector, there is evidence of a greater risk assumption by the public authorities, in the airport sector, the movement was the opposite.

### Network approach

The fast and expressive expansion of the road network, described above, along with some investment in railways, has led to the current situation of a large infrastructure network, particularly in the road sector, with a high quality standard. However, this represents a significant cost for a country facing strong fiscal constraints. Additionally, in many cases, the expansion of both networks was not coordinated, creating an overlap of structures and services. This led to a new reform in 2014, of the merger of “Estradas de Portugal” with “Refer”, resulting in a single company for the management of the road and railway infrastructure. The main motive for the merger was the intention to have a single and unified management structure for both transport systems. The other motive was the fact that both companies share similar challenges, besides the management of

large infrastructures. They are both highly in debt, facing strong financial constraints over the next years. The two companies also have large internal structures, with more than three thousand employees between the two of them.

There were several objectives for this merger, one of the most important being the financial sustainability of the two operations, through increasing revenues and reducing costs. However, there was also a strong emphasis on promoting a sustainable mobility framework. The merger aims to promote a compensation and remuneration system, with an integrated and rational planning of the entire network, and the development of a multi-modal mobility management.

## Conclusion

This paper evaluates how the different transport sectors (road, railway, urban transports, ports, and airports) have been de-regulated and re-regulated in Portugal. The authors found that, over the last years, changes have made the role of the public and private sector clearer, particularly for the risk sharing structure. The framework has evolved from being dominated by the public sector, to more private participation, particularly for roads, ports and airports. In these sectors, the private sector is now responsible for a large share of the risks and functions. However, as a sign of some weakness in the market and in the regulatory arrangement, this increase of the private sector role was not accompanied by assuming more of the revenue risk. In most of the cases, particularly for roads and railways, the public sector still guarantees most of the revenues to private firms.

The intensive investment in infrastructures posed a new challenge regarding efficiency and the reduction of costs (particularly bearing in mind the budget constraints that the country faced over the last years). A merge between the road and the railway infrastructure operator was decided upon and implemented in 2014-2015. This merger was based on the need for Portugal to optimize the use of its road and railway network, and also to increase the efficiency of the large investments that had been made. The new company no longer positions itself as an investor and constructor of infrastructures, but rather as a provider of multi-modal mobility. This merger created scope for a better service, with increased revenues and reduced costs, all through synergies that allow for a more financially-sustainable operator.

All these changes in the Portuguese transport sector imply a relevant future role for digitalization with regard to regulation, governance, and decision-making, both for the

public and the private sector. Digitalization will allow for the large investments in infrastructures to be optimized and will lead to an increase in mobility and efficiency. This could be achieved by management providing real time information, or by increasing tolls to enable operators to be more flexible and to be able to respond to market and consumer changes, and to be more proactive.

The transformation that has occurred in Portugal in the transport sector over the last decades has been an impressive effort to close the infrastructure gap that the country suffered. However, new challenges ahead focus mainly in reducing costs, improving quality, and increasing mobility. There is a large role for digitalization in this effort.

## References

1. Brown, A. C., Stern, J., Tenenbaum, B. (2006) Handbook for evaluating infrastructure regulatory systems. The World Bank.
2. Burger, P., and Hawkesworth, I. (2013). 'Capital budgeting and procurement practice', *OECD Journal of Budgeting*, 13(1): 57-104.
3. Cruz, C. O., & Marques, R. C. (2011). Revisiting the Portuguese experience with public-private partnerships. *African Journal of Business Management. Academic Journals*.
4. Cruz, C.O.; Marques, R.C. (2013a): «Endogenous determinants for renegotiating concessions: evidence from local infrastructure», *Local Government Studies*, V. 39, n.º 3, 352-374, June 2013.
5. Cruz, C.O.; Marques, R.C. (2013b): «Exogenous determinants for renegotiating public infrastructure concessions: evidence from Portugal», *Journal of Construction Engineering and Management*, V. 139, n.º 9, 1082-1090, September 2013.
6. Miranda, R., and Lerner, A. (1995). 'Bureaucracy, Organizational Redundancy, and the Privatization of Public Services', *Public Administration Review*, 55(2): 193-200.
7. Sarmiento, J. M., & Renneboog, L. (2014). Public-Private Partnerships: Risk Allocation and Value for Money. *CentER Discussion Paper Series No. 2014-022*
8. Sarmiento, J. M., & Renneboog, L. (2015). 16 Portugal's experience with Public Private Partnerships. *Public Private Partnerships: A Global Review*, 266.
9. Sarmiento, J. M., & Renneboog, L. (2016). Anatomy of public-private partnerships: their creation, financing and renegotiations. *International Journal of Managing Projects in Business*, 9(1), 94-122.
10. ply in a context of increasing penetration of intermittent renewables.
11. The industry was established based on utilities as the main

## Management of Urban Infrastructures *A Massive Open Online Course by EPFL - MIR - IGLUS*

In recent years, online courses have emerged as a game changer in the educational landscape. Massive Open Online Courses (MOOCs), covering a wide variety of subject matters, are now available to practitioners, as well as academics, and continue to attract increasingly large audiences via online education platforms such as Coursera and EdX. These online courses enable learners to choose from a diverse array of subjects and to freely explore those that are most interesting to them at their own pace. The combination of the flexibility associated with online education and the high quality of courses offered by world-class universities, have turned MOOCs into an appealing learning reference for many. As a result, these courses have become particularly invaluable to those practitioners who have limited time and tight schedules restricting them from attending conventional training programs, but still feel the need to stay up to date with the cutting edge knowledge in their fields.

As of February 2016, the Chair Management of Network Industries (MIR), is offering a free online course on the [Management of Urban Infrastructures](#) as one of the products of a global action research initiative relating to the Innovative Governance of Large Urban Systems, called [IGLUS](#). This free, and on-demand, course covers the basic principles of the management of urban Infrastructures and illustrates these principles through a deeper investigation of two of the most important urban infrastructures- the urban energy and transportation sectors.

In this online course we, at EPFL, have worked with a series of our partners in the [IGLUS project](#), namely the World Bank, The Veolia Environment group, Swiss Post, City-Canton of Geneva, Boston Consulting Group, and City University of New York. By providing a combination of inputs from both academia and industry experts, we have tried to give a balanced overview of the basic principles of urban infrastructure management and to also illustrate how practitioners make use of these principles in the real-world.

In about six months from the launch of the course, more than 16'500 learners had visited in the course and the feedback from this large audience is quite promising ([Click here to see the feedback](#)). The online learning forum associated with this course provides us with a unique opportunity to host discussions and hear a range of diverse perspectives on the managerial issues raised in the course. People attending the course represent more than 90 different nationalities, and the debates centered around the course materials reflect this diversity and are in themselves an immense learning opportunity, both for us and our learners. You can find more information about free registration in this course by [visiting the IGLUS webpage at: http://iglus.org/mooc](http://iglus.org/mooc)

We are currently planning the second part of the course that is set to go online Spring 2017. The second part of the course will have a more keen focus on the Management of Urban Infrastructures in presence of disruptive innovations introduced by the ICT sector; which can be labeled as [Management of Smart Urban Infrastructures](#).

Online courses that cover managerial, regulatory and governance issues in different network industries are becoming increasingly more prevalent. So, as of this issue of NIQ we will introduce a new section that closely follows the world of online education and reviews the currently available, and the upcoming, MOOCs that might be useful for academics and practitioners active in the field of Network Industries.

If you would like to write a review about a MOOC and publish it in an upcoming issue of NIQ, please send an email to [mohamad.razaghi@epfl.ch](mailto:mohamad.razaghi@epfl.ch).



## The Transport Area of the Florence School of Regulation

The Florence School of Regulation (FSR) has been created in 2004 as a partnership between the European University Institute (EUI) and the Council of the European Energy Regulators (CEER). Since then, the Florence School of Regulation has expanded from Energy regulation to Telecommunications and Media (2009), Transport (2010) and Water (2014). The Transport Area of the Florence School of Regulation (FSR Transport) is concerned with the regulation of all the transport modes and transport markets (including the relationship among them). It currently focuses on regulation and regulatory policies in railways, air transport, urban public transport, intermodal transport, as well as postal and delivery services.

The aim of FSR Transport is:

- to freely discuss topics of concern to regulated firms, regulators and the European Commission by way of stakeholder workshops;
- to involve all the relevant stakeholders in such discussions; and
- to actively contribute to the evolution of European regulatory policy by way of research.

The core activity of FSR Transport is the organization of policy events, where representatives of the European Commission, regulatory authorities, operators, other stakeholders, as well as academics in the field meet to shape regulatory policy in matters of European transport.

The results of FSR Transport's activities are disseminated by way of policy briefs, working papers and academic publications. All FSR Transport materials are open source and available on the FSR Transport webpage, as they aim to involve professors, young academics and practitioners to become part of a unique open platform for applied research.

To learn more visit our website: [www.florence-school.eu](http://www.florence-school.eu) or contact us at [FSR.Transport@eui.eu](mailto:FSR.Transport@eui.eu).

## Highlight



### Executive Seminar on EU Road Transport: Driving change for business and people

Organised jointly by the Cabinet of Commissioner Violeta Bulc, the European Commission Directorate General for Mobility and Transport (DG MOVE) and the Transport Area of the Florence School of Regulation at the European University Institute (FSR Transport), this executive symposium explored the challenges for EU road transport in the current regulatory context with the purpose to prepare for a series of EU Road Transport Initiatives, which are already under discussion.

## FSR-Transport events 2016:

| Date             | Title  |
|------------------|--|
| 29 February 2016 | 4th Florence Intermodal Forum  |
| 9 March 2016     | Executive Seminar at the World ATM Congress in Madrid                          |
| 2 May 2016       | 12th Florence Rail Forum   |
| 3 May 2016       | Executive Seminar: ERA and the Digitalization of Railways                      |
| 23 June 2016     | Book Presentation: Routledge Companion to Network Industries                   |
| 24 June 2016     | 5th Conference on the Regulation of Infrastructures                            |
| 11 July 2016     | Executive Seminar on EU Road Transport: Driving change for business and people |
| 21 October 2016  | 8th Florence Air Forum   |
| 25 November 2016 | 13th Florence Rail Forum   |

For more information about our activities please contact: [FSR.Transport@eui.eu](mailto:FSR.Transport@eui.eu).





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**networkindustries**

## Call for Papers

### Special issue on: Network Industries in Latin America

#### Guest Editors

Joisa Campanher Dutra, Getulio Vargas Foundation, Rio de Janeiro Matthias Finger, Ecole Polytechnique Fédérale Lausanne and European University Institute, Florence

Miguel Angel Montoya Bayardo, Tecnologico de Monterrey, Guadalajara

#### Abstract

The network industries in Latin America (from Mexico to Chile) are undergoing substantial changes, marked in particular by their liberalization but also their privatization. Similarly, the re-regulation of the network industries' sectors is gradually being institutionalized following European, American, but also endogenous approaches. Overall, however, the de- and re-regulation of the network industries in Latin America follows no clear model and results are mixed, at best. This special issue of Utilities Policy aims at shedding light at the de- and the re-regulation practices in the different network industries and in the different Latin American countries, notably Mexico, Brazil, Colombia, Peru, Argentina, Chile and others. This special issue is especially dedicated to critically analyzing these practices, along with the policies that have inspired them.

#### Topics Covered

- Description and critical assessment of the different network industries' de- and re-regulation policies and practices in Latin America, notably Mexico, Brazil, Colombia, Peru, Argentina and Chile
- Sectors covered: telecommunications, postal services, electricity, gas, air transport, rail transport, road transport, urban public transport, water and wastewater
- Comparative studies across sectors and countries are particularly welcome

#### Notes for Prospective Authors

All papers must be submitted through the Utilities Policy website: <http://ees.elsevier.com/juip/>. Make sure to upload your paper to the special Issue "Latin America".

Submitted papers can be in early draft versions, but should not have been previously published nor be currently under consideration for publication elsewhere. All papers will be selected through a peer-review process. For more information, please see the Author Guidelines page. The authors of the selected papers will be invited to either a conference in Guadalajara, Mexico, on November 21st, 2016 or a conference in Rio de Janeiro, Brazil, on November 23rd, 2016, during which their papers will be presented and critically discussed before a final submission to the special issue.

#### Important Dates

- Draft paper due on 30 September, 2016
- Notification of acceptance to the Conference on 15 October, 2016
- Conference in Guadalajara, Mexico, on 21 November, 2016 or in Rio de Janeiro, Brazil, on 23 November 2016
- Submission of revised paper on 31 January, 2017 Notification of acceptance on 15 April, 2017 Publication date: August to September 2017

# networkindustries

## quarterly

### **Network Industries Quarterly, Vol. 18, issue 4, 2016 (December) “Reform of the Railway Sector and its Achievements”**

#### **Presentation of the next issue**

In the last three decades the railway sector has reformed its institutional forms in many countries.

Prior to other countries, the Japanese National Railways (JNR) were divided and corporatized in 1987. In the following year, the Swedish National Railways (SJ) was reformed by introducing vertical separation, and this case had large influence for stipulating the EU railway policies. It is true that the EU railway policies had large impacts on the railways of the Member countries, and their results were discussed accordingly. Nevertheless, there are several other countries, where the railways were reformed in different models and could improve the efficiencies by some measures such as inviting private investments, introducing intra-modal competition, avoiding cross-subsidies, and liberalizing the management.

As the railway sector is required to compete with other modes especially roads to attain environmental circumstances, it is beneficial for the policy makers and experts to learn the lessons from the other countries' experiences. Thus, this issue of the Network Industries Quarterly aims to gain the lessons from the past experiences by covering different models of railway reform in Europe and other five countries: USA, Japan, Russia, Mexico, and Vietnam.

#### **More information**

The guest editor for the next issue of the Network Industries Quarterly is Dr Fumio Kurosaki (Institute of Transportation Economics, Japan). Should you be willing to contact him regarding this publication, please send an email to [FumioKurosaki@itej.or.jp](mailto:FumioKurosaki@itej.or.jp) with cc Ms. Nadia Bert at [FSR.Transport@eui.eu](mailto:FSR.Transport@eui.eu).

## OPEN CALL FOR PAPERS

Implementation of the liberalization process has brought various challenges to incumbent firms operating in sectors such as air transport, telecommunications, energy, postal services, water and railways, as well as to new entrants, to regulators and to the public authorities.

Therefore, the Network Industries Quarterly is aimed at covering research findings regarding these challenges, to monitor the emerging trends, as well as to analyze the strategic implications of these changes in terms of regulation, risks management, governance and innovation in all, but also across, the different regulated sectors.

The Network Industries Quarterly, published by the Chair MIR (Management of Network Industry, EPFL) in collaboration with the Transport Area of the Florence School of Regulation (European University Institute), is an open access journal funded in 1998 and, since then, directed by Prof Matthias Finger.

## ARTICLE PREPARATION

The Network Industries Quarterly is a multidisciplinary international publication. Each issue is coordinated by a guest editor, who chooses four to six different articles all related to the topic chosen. Articles must be high-quality, written in clear, plain language. They should be original papers that will contribute to furthering the knowledge base of network industries policy matters. Articles can refer to theories and, when appropriate, deduce practical applications. Additionally, they can make policy recommendations and deduce management implications.

Detailed guidelines on how to submit the articles and coordinate the issue will be provided to the selected guest editor.

## ADDITIONAL INFORMATION

### MORE INFORMATION

- [network-industries.org](http://network-industries.org)
- [mir.epfl.ch](http://mir.epfl.ch)
- [florence-school.eu](http://florence-school.eu)

### QUESTIONS / COMMENTS?

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Published four times a year, the **Network Industries Quarterly** contains short analytical articles about postal, telecommunications, energy, water, transportation and network industries in general. It provides original analysis, information and opinions on current issues. Articles address a broad readership made of university researchers, policy makers, infrastructure operators and businessmen. Opinions are the sole responsibility of the author(s). Contact [fsr.transport@eui.eu](mailto:fsr.transport@eui.eu) to subscribe. Subscription is free.



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