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Conference Paper

A typology of cooperation strategies in the telecommunication industry: An exploratory analysis and theoretical foundations

22nd European Regional Conference of the International Telecommunications Society (ITS2011), Budapest, 18 - 21 September, 2011: Innovative ICT Applications - Emerging Regulatory, Economic and Policy Issues

Provided in cooperation with:

International Telecommunications Society (ITS)

22nd European Regional ITS Conference
Budapest, 18-21 September, 2011

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A typology of cooperation strategies in the telecommunication industry – An exploratory analysis and theoretical foundations

Abstract: The value chain of the telecommunication industry is subject to a continuing disintegration which is caused by outsourced network operation, the provisioning of wholesale interfaces to competing service providers and the cooperative provisioning of broadband access. Thus, many companies regard cooperation as an element of cooperate strategy. In this paper we propose a cooperation topology for the telecommunication industry and identify drivers of cooperation based on the assessment of case studies. The results indicate that drivers of cooperation differ with respect to the cooperation direction and that the combination of complementary resources is the dominating driver of cooperation.

B40, A10, D80, O33
Cooperation, telecommunication, typology of cooperation strategies, transaction costs

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1. Introduction

The telecommunication value chain of industrialized countries has been operated by fully integrated monopoly companies for many years. A series of deregulation activities has put end customers in the position to choose services from a number of providers. The resulting structural and technological changes in the telecommunications market require the reevaluation of business models within the entire value chain of the industry. Moreover, a steadily growing data demand requires investments in new infrastructures and technologies, which need to be implemented, maintained and operated considering financial restrictions. These preconditions contribute to a debate about the establishment of cooperations within telecommunication industry. Some experts identify cooperation as the only feasible way for a market-driven establishment of Next-Generation-Networks (NGN) [Ge10]. However, every cooperation bears potential risks. This fact is reflected by a large number of NGN pilot projects and canceled cooperation within the telecommunication industry [Di09][Wi07][BB11].

In the telecommunication market success is a matter of utilizing direct and indirect network effects which are particularly strong if cooperation interfaces are standardized [Ge05]. Thus, cooperation is often required in order to make a new service offer to the end customer.
In order to facilitate the understanding of cooperation within the telecommunication industry we propose a topology of cooperation in telecommunications and discuss the theoretical foundations of cooperation. Moreover, we identify characteristics of cooperation within different layers of the telecommunication value chain.

2. Cooperation theory

2.1 Systematization of cooperation

A cooperation can be defined as a medium or long-term collaboration of economically independent organizations [Pi03]. Moreover, a cooperation is voluntary and can generally be canceled by both companies at any time [Ge05]. This definition excludes collaborations which are based on governmental regulation. However, other authors propose definitions of cooperation without this confinement [DRCW96]. Due to the fact that the telecommunication industry is exposed to regulatory influences in most countries, we will include cooperation which is based on regulatory influences in our analysis.
Collaborations between two or more organizations can be systemized in several ways. As proposed by [Mo05] cooperation can be classified according to the degree of mutual binding, duration, origin of the partners, cooperation subject, leadership structure and transaction form. In this paper we will systemize cooperation according to its direction as proposed by researches who have previously assessed the steps of value creation in the telecommunication industry [FrIR04][Ge05].

2.2 Transaction cost theory

Transaction cost theory focuses on the analysis of transactions which can be defined as transfer of properties rights [Wi75][Wi91]. The organizational failure framework proposed by [Wi75] is based on the assumption that transactions differ with respect to frequency, uncertainty, ease of measurement and their asset specificity. The fourth property, asset specificity refers to the ease of redeploying an asset for an alternative use and represents a central transaction property for the employment of make-or-buy decisions [Wi75][Wi91].
Transaction costs occur during different phases of a transaction. Before a transaction is carried out it includes costs for purchase initiation (search, consulting, travel) and purchase (negotiation, legal settlement). Subsequently transaction costs involve deployment (process steering) and post-purchase (monitoring of quality and deadlines, adjustments) [LW02][Pi03]. Furthermore, transactions can be subject to hold-up opportunism and bound rationality. A hold-up referrers to a situation where two or more partners engage in a contractual relationship on the basis of incomplete information and an opportunistic nonowner can withhold assets ex-post from production [Wi75]. Based on the assessment of transaction costs a company must decide whether to produce products and services within the company, a cooperation or procure them from a market. In general a market procurement is advised when asset specificity is low as specialized suppliers may be able to realize economies of scale [LW02]. A market is characterized by autonomous adaption and few obligations between the parties of a nonspecific transaction [Wi91]. In contrast a company hierarchy is advised if the asset specificity of a transaction is high. That is, steps of the value chain should be vertically integrated as the organizational instruments of an organization offer multiple instruments for dealing with asymmetric information and possibly resulting opportunism [Pi03]. Within the transaction cost theory a cooperation can be characterized as hybrid institutional arrangement in-between market and hierarchy. Thus, cooperation is advised if transactions are characterized by medium assed specify. Though a transaction's asset specificity is an important indicator for the optimal institutional arrangement uncertainty and complexity also need to be considered. If these transaction parameters are high, a hierarchy may be the optimal institutional arrangement. Similarly a market is the optimal arrangement if the uncertainty and complexity are low.
Subsequently medium uncertainty, complexity and asset specificity implies the setup up of a cooperation. Similarly it can be argued that a cooperation develops if partners want to retain the advantage of autonomous decisions, manage to share transaction specific investments and the consideration of uncertainty forecloses a market arrangement [Mé04].

2.3 Resource-dependence theory

The resources-dependence theory is based on the idea that all organizations depend on resources which may be controlled or possessed by other organizations. Thus, organizations need to interact in order to acquire and maintain the resource mix necessary to survive [PS78]. The interaction of companies can either be of competitive, symbiotic or a combination of both [DRCW96]. Thus, companies need to become aware of these dependencies and have to decide if it is necessary to reduce the degree of external resource dependence. In order to assess dependencies a company must know to what percentage it depends on the resources of another organization and how critical these resources are for business success [PS78]. If a company identifies dependence on resources of another company it should assess to what extend this company is free to determine rules about the resource usage and if these resources can be procured from a different supplier [PS78][DRCW96]. Once the nature of the dependencies is known it may be necessary to reduce the dependence on external resources. If a cooperation partner is

not substitutable due to its set of resources, depended companies are facing a problems similar to the hold-up situation know from transaction cost theory [BG04]. In general dependencies can be reduced by selecting different market niches, by internalizing dependency effects via mergers or by establishing linkages between organizations that reduce asymmetric information and insecurities [Se95][PS78].
The resource dependence approach assumes that organizations are particularly willing to establish a cooperation if resources are scarce and partners can improve their market position by bundling complementary resources. However, it can also be observed that a cooperation regulates the possession of important resources [Se95].

2.4 Drivers of cooperation

Based on findings from transaction cost and resource dependency theory [DRCW96] have identified drivers of cooperative relations. In this paper we use this findings as a qualitative indicator for the strength of a cooperation within different value added steps of the telecommunication industry. In general drivers of cooperation can be subdivided into external and internal drivers. Subsequently both categories will be explained.

External drivers of cooperation

External drivers of cooperation can be derived from the structural properties of an organization's environment and influence the uncertainty of a company's decision making [PS78]. Dowling et al. (1996) identify the external cooperation drivers: market concentration, scarce resources, regulation and global industries. Subsequently these drivers will be explained in detail.

- Cooperative relationships are more likely in *concentrated industries* as large organizations exhibit more interfaces to potential cooperation partners than smaller companies.

- An environment with *scarce resources* leads to more conflicts and dependencies between organizations than a munificence environment. In general scarce resources can be multifold in their nature. That is, they can refer to physical or financial resources and time constrains [WS05]. Increasing dependencies between organizations increase the likelihood in cooperative relations [DRCW96].

- *Regulation* can force organizations to cooperate. Many regulated telecommunication markets force incumbents to offer predefined products and services to competitors. Moreover, governmental invention can prevent organizations to expand to a different market. Thus, cooperation in network industries may be necessary in order to enable cross-network services for end customers [DRCW96].

- Several authors have identified *global presence* as a driver of cooperative relations [Ho05][DRCEW96]. While two companies may be competitors in one country, it may to necessary to cooperate outside their home market.

Internal drivers of cooperation

Internal drivers of cooperation can be derived from company-specific properties and strategies [DRCW96][PS78]. However, external observers are limited in their ability to assess all internal reasons which lead to cooperative relations. Subsequently we will

therefore focus on the assessment of internal cooperation drivers as proposed by [DRCW96].

- Cooperative relations between organizations are more likely if companies do not exhibit *intersections in their core competencies* [DRCW96]. Moreover, bundling of competencies represents the means to avoid conflicts [Ho05].

- The stability of a cooperation can be increased with congruent or complementary resources [AW09][Mo05]. The *combination of resources* enables bundling of company strengths or the compensation of weaknesses. Congruent resource profiles enable cooperation that can lead to cost degression effects while complementary resources enable the improvement of the market position [Ho05].

- The *acquisition of knowledge* is another driver of cooperation. Research and development cooperation is common if knowledge acquisition is desired by several companies. Moreover, organizations can form a cooperation for the exchange of existing technology specific knowledge as this can improve the identification of new market opportunities [AW09].

- Another internal driver of cooperation are *common goals* of organizations. This driver requires a trustworthy relationship between the partners and related cooperation is characterized by defined rules and processes aimed at minimizing opportunistic behavior [AW09].

3 A cooperation topology for the telecommunication industry

Cooperative relationships are established between economically independent organizations and can occur at different value added steps of the telecommunication value chain. The value chain of the telecommunication industry can be subdivided into three functional layers: Service, Network and Asset [FrIR04][Fr02].

The *service layer* ensures access to end customers and innovative developers for proprietary platforms. The development and marketing of new products creates value for end customers. Further value added steps at the service layer are billing and brand management.

At the *network layer* companies create value through the provisioning of broadband access and by enabling data transport to backbone networks. Moreover, companies at this layer reduce costs by acquiring knowledge about network management and by optimizing processes.

At the *asset layer* companies provide and maintain the physical infrastructure that lays the foundations for the business models of companies at the network and the service layer. The product lifecycle of infrastructure at the asset layer is much longer than the lifecycle

of products and services at other layers. Furthermore, high infrastructure investments costs are often ensuring a natural monopoly and stable margins.

Figure 1 indicates that the three layers of the telecommunication value chain imply five cooperation interfaces.

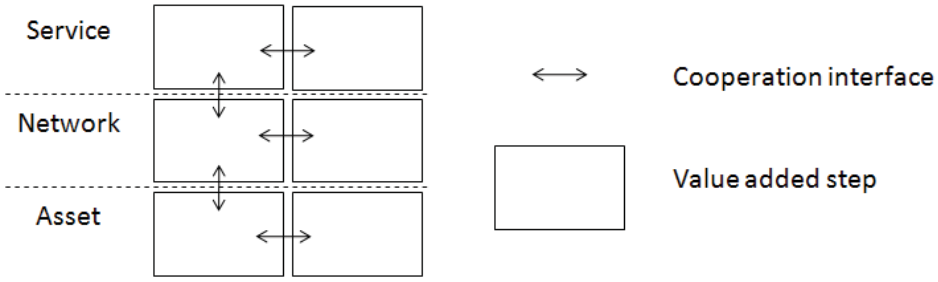

Figure 1: Cooperation topology for the telecommunication industry

In the subsequent section we introduce the methodology for the assessment of the cooperation interfaces.

4 Assessment of cooperation interfaces

3.1 Methodology

In this paper we assess cooperation interfaces based on short case studies. In a first step we conduct a literature review in order to find examples of cooperation at different interfaces in the telecommunication industry. Subsequently only examples are incorporated into the analysis that can be clearly assigned to a single cooperation interface.
In the next step we assess the case studies according to the external and internal drivers of cooperation which were identified in section 2.4. In this process only those drivers of cooperation will be included in the analysis that can be clearly identified in the case study. The analysis will therefore not include undocumented reasons for cooperation and cooperation drivers that cannot be observed. In sections 3.2 to 3.6 we introduce cases studies for each cooperation interface.

3.2 Service-Service Cooperation

The service layer is characterized by short product lifecycles and the utilization of positive network effects. Therefore, many examples can be found for the Service-Service cooperation (S-S) interface [Vo10][Na10][Ve10][Sp10]. One example for cooperation at this interface is the collaboration between Google and Vodafone during the introduction of a business cloud-service. Following [DRCW96] the market for cloud services cannot be classified as concentrated. Both companies are characterized by a world-wide presence and pursuit the common goal to offer attractive services to end customers. Both companies contribute complementary core competency and resources to this cooperation. Google contributes its knowledge about online document management to the cooperation while Vodafone offers direct access to many end customers [Vo10].

3.3 Service-Network Cooperation

In a Service –Network cooperation (S-N) the network of a service provider is operated by a network operator [Fr08]. Usually this network operator is specialized and also operates networks of other service providers. This enables the network operator to realize scale effects which can partially be passed on to the service provider. A service provider like Orange Austria can use such a cooperation in order to focus on its core competencies, the management of customer relations [Ge05][Al10a][Te10]. Furthermore, the service operator can reduce its costs for network operation.
Besides this example for voluntary cooperation, regulation based cooperation can be observed at the Service-Network interface. After the German regulation authority threatened Deutsche Telekom with regulatory measures in its VDSL-Network the German incumbent opened its network for competitors like for example 1 & 1 and Vodafone [He09]. In this type of cooperation Deutsche Telekom is providing a standardized Bitstream-Access to competing service providers.

3.4 Network-Network cooperation

Network operators maintain and operate the infrastructures which constitute the bases for the provisioning of end customer services [Ge05]. Besides the compliance with quality parameters, network operators put great effort into reducing the costs of network operation. Especially for small network operators Network-Network cooperation (N-N) can be useful in order to reach cost saving goals. T-Mobile UK and 3 UK have established a mobile network which they jointly operate in the UK. This cooperation pursues the objective to realize first-mover advantages in broadband mobile networks and to increase the joint market share [No10].

3.5 Network-Asset cooperation

Cooperation at the interface of the Network and the Asset layer (N-A) is characterized by a focus on core competencies and the realization of scale effects in network operations [Be05]. The owners of networks with few potential end customers can hardly assure the competitive operation of a network themselves. Therefore the network operation of the Digitalen Netzfunk für Sicherheitskräfte in Deutschland has been delegated to Alcatel-Lucent [Al10b].

3.6 Asset-Asset cooperation

Split investment costs and a high degree of operational freedom are characteristics of Asset-Asset cooperation (A - A) [Fr08]. Especially during the setup of capital intensive fiber optic networks several types of cooperation can be observed. In areas with high population density organizations can split up broadband deployments areas and ensure mutual access to the deployed network [Bu10].

5 Cooperation interface analysis

Table 1 contains the results of the case study analysis. The findings are subdivided into external and internal drivers of cooperation.

Table 1: Case study results for drivers of cooperation

Co	Case study	Sou	External	Internal

			Large companies in concentrated markets	Scarce resources	Regulated	World-wide company presence	No overlapping core competencies	Combination of complementary resources	Know-How transfer for at least one partner	Development of common goals
S-S	Google – Vodafone	[Vo10]				X	X	X		X
	Navigon & T-Mobile	[Na10]				X		X		X
S-N	Orange Austria & Alcatel-Lucent	[Al10a]	X				X	X		
	Vodafone & Ericsson	[Te10]	X			X	X	X		
	1 und 1 & Deutsche Telekom	[He09]			X					
N-N	T-Mobile & 3 UK	[No10]		X				X		X
	Telefónica & Vodafone	[Te09a]	X	X		X	X	X		X
A-N	Alcatel-Lucent & Orange Schweiz	[Ac09]	X				X	X		
	Alcatel-Lucent & Digitaler Funk	[Al10b]					X	X		
A-A	Deutsche Telekom & EWE Tel	[Te09b]		X				X		
	Deutsche Telekom & France Telekom	[He11]	X	X		X		X		X

Table 1 shows that cooperation can be identified at all value added steps of the telecommunication value chain. Moreover, drivers of cooperation vary based on the observed case study and the associated value added step in the value chain.

External drivers of cooperation: The analysis of the external drivers of cooperation shows that cooperation can be observed in either concentrated markets or in environments with many competing companies. The properties of the assessed cooperations do not a allow the conclusion that cooperation is more likely in concentrated markets between large companies. However, in concurrence with the findings of [Ge05] results show that capital intensive investments in infrastructure and its operation are a driver of cooperation in the telecommunication industry. Moreover, scarce resources are an important driver for horizontal cooperation. From this type of cooperation organizations often hope to gain sustainable competitive advantages and realize economies of scope [Ge05]. In the case of regulatory influences regulation maybe the only reason for cooperation. Moreover, the results show that organizations with world-wide presence cooperate at all steps of the value chain. However, cooperation can also be observed between smaller companies with viewer points of presence. Thus, world-wide presence cannot be considered a driver of cooperation.

Internal drivers of cooperation: The combination of complementary resources is an internal driver of cooperation which can be observed in almost all cooperation examples. Furthermore, cooperation can be observed more often if core competencies are not affected. At almost all assessed vertical cooperations core competencies of the partners were not affected. Moreover, cooperation at horizontal interfaces show overlapping core competencies more often. The definition of common goals is important in order to prevent competitive behavior in horizontal cooperation. This cooperation driver can be observed in almost all horizontal case studies. The results of the analysis do not indicate that the transfer of know-how is an important driver of cooperation in the telecommunication industry. Know-how development and transfer is an important driver of cooperation for research and development cooperation which can be observed between providers of end

customer devices and network infrastructure suppliers. However, this interface is not within the scope of the assed case studies.

6 Conclusion and Outlook

In this paper we proved that cooperation in the telecommunication industry can be classified with the proposed typology. Moreover, we showed that several examples can be found for all defined cooperation interfaces. The analysis showed that internal and external drivers of cooperation exist at all value added steps of the telecommunication value chain and that they differ with respect to the cooperation direction and the depth of added value. The combination of complementary resources has been identified as a driver of cooperation which can be observed at all value added steps of the value chain. Common goals and scarce resources are often drivers of horizontal cooperation.
The focus of this paper is the assessment of drivers of cooperation which can be identified by a literature review. For this reason we did not incorporate internal drivers of cooperation like opportunism and bound rationality into the analysis. Thus, future research should consider these influences. Furthermore, the qualitative findings of this paper should be confirmed with empirical assessments. In this paper we proposed a broad definition for cooperative relationships. A cooperation definition which focuses on common investments which are shared ex-ante could possibly lead to different cooperation examples and results.

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