Regulatory processes can directly impair or enhance telecommunications innovation, according to Dr. Garcia-Murillo. Using the telecommunications sector in Argentina as a case study, and based on extensive interviews and analysis, her paper demonstrates the relationship between regulation, resources, and innovation. Regulatory independence, transparency, and accountability enhance innovation, but investment in telecommunications innovation also requires timely and predictable policy decisions, and Dr. Garcia-Murillo concludes that these must be fairly enforced.

Introduction

Innovation in the telecommunications sector is a relatively new phenomenon for developing nations. Since liberalization, the main concern in these countries has been connectivity, the promotion of competition, and the prevention of abuses by incumbent operators. The purpose of this article is to determine how governments, and in particular regulatory agencies in less-developed nations, can affect innovation.

This study is an exploration of how regulators and the manner in which they implement and enforce laws can affect innovation within the context of the telecommunications sector in Argentina. It is a country case study, relying on interviews with 21 companies, which led to the development of a framework – Regulation, Resources, and Innovation (2RI) – which, in this author’s opinion, reflects the findings of this investigation. It suggests that delays, unpredictability, and unfairness have negatively affected innovation in the Argentinean telecommunications sector because of the impact they have had on resources.

The focus here is on the Argentinean case because Latin American nations have achieved greater development, and there is a potential for their telecommunications sector to have more resources for innovation than other developing nations. In addition, Argentina was among the first countries in the region to introduce a single license regime, which can facilitate entry and, through subsequent competition, foster innovation. This article also reviews the contributions of previous scholars about

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innovation in general and, more specifically, about the impact that regulation (or the lack of it) has had on innovation from the player’s perspective.

This article makes several contributions: first, previous studies have only considered high-level laws and regulations. Second, studies that focus on uncertainty and investment in the telecommunications sector assume that these markets are normally dominated by a handful of players, and they do not consider small and medium enterprises in their analyses. Also, while large players do indeed dominate the urban metropolis, it is the smaller entities that often provide services in small and isolated towns; thus the need for us to study them. Finally, the main focus here is regulators, but more specifically, the manner in which they implement and enforce laws. Previous studies do not achieve a convincing level of detail, and it is for this reason that a case study was called for.

**LITERATURE REVIEW: INNOVATION AND REGULATION**

Why is it important to focus on innovation? Ever since Schumpeter introduced his concept of creative destruction, there has been a strong belief in academic and policy circles that innovation can have a significant impact on development. Development, for Schumpeter, is understood as a process of economic transformation resulting from innovation. However, as Viotti indicates, innovation is a privilege of industrialized nations because, as he argues, developing nations are usually limited to absorption of existing technologies and incremental improvements. The process of innovation that Schumpeter describes is closer to that of invention, while the notion of innovation that Viotti alludes to is more closely related to the notions of diffusion and imitation.

In this article, the term *innovation* is used broadly, more consistent with the meaning of diffusion as opposed to invention. Although the original intent of this article was to focus on technical innovations, it became clear, from the first interviews, that other non-technical innovations were also important. This prompted consideration of what the 2005 Oslo Manual refers to as organizational innovations. These include the incorporation of new services, improvements to the provision of existing services, and increases in the number of functions of existing services to make them more versatile and more efficient, or to improve their quality and the expansion of infrastructure. It also encompasses the customization of services to serve particular market segments, as well as small adjustments to pricing, for example, to improve access.

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3 Ibid.


5 In the case of Argentina, many innovations were related to investment – one element of innovation according to the Oslo Manual. I considered investment a type of innovation not only because the process of investment in infrastructure entails significant knowledge, but also because of the manner in which it is done. Often these initiatives involved the collaboration of several smaller firms/ cooperatives, and in some cases the decisions were the result of a careful analysis.
Much of the innovation literature focuses on the strategies of corporations alone. Few studies have looked at the relationship between regulatory decisions and innovation. The focus of this article is on the aspects of scholarly research that pertain to innovation and investment in developing countries, paying special attention to the notion of regulatory processes.

Research about innovation and government has had a macroeconomic focus. Authors who have studied the impact of laws and regulations have done so at the national level and have provided general guidelines in the context of development studies, termed “national innovation systems” (NIS). NIS research tries to identify the macroeconomic factors that can foster innovation, but have typically focused on macro factors studied in the aggregate.6

The process of innovation for developing countries is complex. As Malerba and Nelson indicate, catching up requires many different capabilities that go beyond technical expertise.7 One of the challenges of engaging in innovation in developing countries is the economic and political uncertainty there. We cannot address notions of innovation without taking into consideration the literature on uncertainty.

**Uncertainty and Innovation**

Research that has addressed uncertainty has been conducted primarily within the finance field. The relationship between volatility (another term used to refer to uncertainty) and investment has not always been obvious. In neoclassical economics, firms are considered risk-neutral, and price volatility is believed to increase investment. Volatility, however, also has the potential to reduce investment if these fluctuations lead to deeper recessions.8 Uncertainty entails greater risks and potentially less investment because of the possibility that a policy might be reversed.9

Early studies about the relationship between uncertainty and investment found a positive relationship between capital accumulation and uncertainty. The rationale was that under uncertain circumstances, some companies are willing to take risks to get ahead. Subsequent studies refined these initial findings by taking irreversibility into consideration and waiting as an alternative to non-investment.10 It was within these studies that the idea of real options, also originally from finance, was...
introduced. Uncertainty in these studies is considered to emerge from competition, changes in prices, technological advances, and government regulation. Traditional net present value calculations do not take uncertainty into account.

One area of the real options literature that is particularly relevant for the study of uncertainty in telecommunications is the work on irreversible investments. A decision to invest in a riskless alternative over a high-risk irreversible investment will depend on the expected returns discounted to account for the higher risk, or alternatively, on the risk adjusted rates of return. In addition, if the decision maker is risk-averse, the investment decision is less likely to occur or is likely to be delayed, given a riskless option. The first studies to use the real options framework to explain investment in telecommunications were done in the early 2000s. The authors found that with market uncertainties, it is often optimal to delay investment until the network reaches almost full capacity.

In the telecommunications field, a recent issue of the journal Communications & Strategies focused on real options, and the assumption of many studies is that demand, prices, and technology are the main sources of uncertainty. In a similar vein, empirical studies in the real options literature use various metrics to measure uncertainty. Some have used business perceptions; others have used financial data, such as earnings forecasts; and yet others have used prices and interest rates to capture volatilities. However as Angelou and Economides state, the information and communication technology sector experiences several sources of uncertainty, such as competition, technology changes, demand, and other environmental issues.

In many countries, particularly underdeveloped ones, the greatest sources of uncertainty are political. Some of these uncertainties stem from the manner in which the law is written. In his study *General Characteristics of Rules*, Kaplow indicates that policymakers make decisions based on two features of laws. One is the degree of precision, and the other is whether the content of a law should be established at the time of enactment, or afterwards by the judge. Policymakers, therefore, face a trade-off between providing more guidance with specific rules or enlarging the scope and flexibility of decision makers in government with general rules. According to Kaplow, policymakers’ decisions should take into consideration the variability of contingencies and the degree of innovation in the information."

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specific industry that the law applies to. A sector that experiences diverse contingencies will benefit from more flexible and open rules. This, however, entails significant costs because of the uncertainty associated with lack of judges' expertise in certain areas and delays that can occur in the courts when a specific interpretation is necessary. Policymakers also have to decide on *ex ante* versus *ex post* regulation. Under an *ex ante* framework, the regulation provides specific guidelines with which firms should comply, while under an *ex post* regime, a judge can define the optimal standard.\(^\text{18}\)

Deffains and Obidzinski tried to determine the optimal type of law, given the circumstances. They argue that a more specific rule should be preferred if the negative risk is counterbalanced by a higher benefit. Regarding timing, they argue that if the probability of obsolescence is high, lawmakers should enact the law when the value of the content of the law is higher in comparison with the lower probability of obsolescence.\(^\text{19}\) In the specific case of telecommunications, regulators consider uncertainty to estimate the risk premium when allocating subsidies or setting prices for regulated infrastructure. Unlike economic and technological factors, regulatory uncertainties are difficult to estimate through probabilities because of the subjective and often random behavior that regulators exhibit.\(^\text{20}\)

In the case of Argentina, the telecommunications law is general, and it is up to the regulator to issue more specific details.

**Laws, Regulation, and Innovation**

For the purpose of this article, *regulation* is defined in the same manner as Hadfield defines it – as the set of legal instruments that structure and regulate economic relationships.\(^\text{21}\) This includes the law itself, but more important, the formal and informal elements of procedures related to the implementation and the enforcement of rules; the norms, practices, and costs of legal work; the accumulated conventional wisdom about regulation and dispute resolution strategies; and the stock of accumulated legal and regulatory knowledge produced by practitioners, educational institutions, personal experiences, conferences, and trade publications. These features of the legal environment, as Hadfield indicates, influence the cost and efficiency of legal or regulatory solutions.\(^\text{22}\)

As stated by Bauer, the relationships among regulation, investment, and innovation have rarely been examined by researchers, and they are often contradictory.\(^\text{23}\) This is surprising to a certain extent,


\(^{19}\) Ibid.


\(^{22}\) Ibid.

given the level of regulation of the telecommunications industry throughout its history. Thus, we need to rely on literature that addresses the topic on a broader level.

A number of studies have analyzed the relationship between institutions and growth. As explained by Fatás and Mihov; Acemoglu, Johnson, Robinson, and Thaicharoen; and Easterly, macroeconomic factors like inflation, government spending, and exchange rates become insignificant in statistical studies once institutional variables are taken into consideration. These studies suggest that governance plays a major role in a country’s economy. One of the metrics that Fatás and Mihov found to be relevant is policy volatility, which they define as discretion in economic policies; namely, the politically motivated changes in policy instruments. They argue that countries with more checks and balances are less volatile.

Other studies that have tried to determine the impact of regulation on outcomes such as total factor productivity (TFP) and innovation have not been entirely conclusive. For example, Arnold, Nicoletti, and Scarpetta found a negative correlation between regulation and productivity in the ICT sectors, while Amable, Demmou, and Ledezma found no evidence of that relationship – they attribute this inconsistency to the manner in which industries and the proximity frontier are defined; they argue that regulation may be negative when a country or industry is far from the technological frontier, but the reverse holds when they are close. Inklaar, Timmer, and Van Ark found a similar lack of evidence for a negative correlation between market regulation and productivity, while Griffith, Harrison, and Simpson argue that regulation can be negative for economies that are more technologically advanced.

This article looks at the specific impact that the implementation and enforcement of regulations have on innovation because of the effect on resources. It looks into the black box of policy to help us understand how regulation affects innovation processes.

**Resources and Innovation**

This article also makes a connection between regulation and resources. Thus, we need to define what we mean by resources. A resource is a physical entity that constitutes the means by which a company can conduct its business. Often, resources are scarce; the quantity, or even the availability,

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24 Fatás and Mihov.
27 Fatás and Mihov.
of resources has an impact on the operations of a company. Similarly, the manner in which resources are used can affect the profitability of commercial organizations. Resources can include financial capital, human resources, and access to technology – but also access to markets and infrastructures.

The relationship between innovation and resources for less developed nations is rarely explored. A search for articles on the topic yielded only one study, the purpose of which was to determine how innovation happens in resource-constrained, emerging economies. The authors did not consider how limited resources affect innovation but focused on the characteristics of innovation under conditions of limited resources, and thus they provide little insight for this study. One could argue that the availability of resources can both enhance and limit innovation. Resource constraints can motivate companies to come up with innovations that allow their survivability, while limiting the competitiveness of other companies. From the point of view of resources, this article argues that the impact of resources depends on the initial set of endowments that a company has.

Figure 1 below presents the connection between resources and innovation. Companies have different amounts and types of resources. Those with severely limited resources will find it difficult to engage in innovation because of the constraints on their operations that result from having few resources. As we move on the x-axis towards the right, more resources are available, and a company, we believe, will be more able to innovate. From the center to the left of the x-axis, we are likely to see innovations that aim to minimize costs or that make available resources more efficient. From the center to the right of the x-axis, we are likely to see companies that will be able to introduce new products or services.

![Figure 1: The effect of resources on innovation with and without competition.](image-url)
In the telecommunications sector, resources are crucial, because without them a company could simply not operate. For example, access to an incumbent’s infrastructure is the only way a company can provide services. A market is also a crucial resource, which is controlled by regulators through licenses. Please note that this definition of resources is slightly broader than that in the traditional research on innovation. In this case, infrastructure, markets and technologies that can be influenced by regulators are considered to be crucial resources. This may be unique to the telecom sector, and future research may want to explore this relationship for other industries.

It should be noted that the willingness of a company to engage in innovation is also affected by the amount of competition it faces. Without competition, organizations do not need to be concerned about introducing new services or improving existing ones, as they are the sole provider, and the customer has no options.

**Competition and Innovation**

The previous section argued that the presence of competition can affect innovation, and thus, we need to address this notion. The traditional Schumpeterian view holds that a greater number of participants contribute to the process of innovation. Schumpeter argued that differences among firms keep the capitalist system running and that in a mature stage, capitalism tends towards competition, where the “perennial gale” of creative destruction keeps firms investing in new products.

Many scholars have written about the competition-innovation relationship. Aghion et al. proposed an inverted U-shaped model, which explains that with little competition there is little innovation, and that an increase in the number of participants leads firms to engage in innovation due to the incremental profit they can gain over their rivals; this they labeled the “escape-competition effect.” Aghion et al. also argue that competition has a positive effect on innovation when companies have similar levels of technological sophistication, which means that any given company has an incentive to innovate in order to fend off its competitors; that is, to “escape competition.” However, excessive competition may also reduce innovation incentives for laggards, which is called the “Schumpeterian effect” due to the reduction of rents that can be captured. Aghion et al. therefore argue that the effect on innovation changes at different levels of competition. The challenge is then to find the level of competition that optimizes innovation in each industry.

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35 Aghion et al., “Competition and Innovation.”
36 Ibid.
Competition and Innovation in the Telecom Sector

This article focuses on a single sector because, as Malerba and Nelson indicate, different sectors experience different dynamics. The telecommunications sector has been selected because it has traditionally been heavily regulated, and that helps us understand how decisions made by regulators can affect innovation. In addition, the telecommunications sector is among the most dynamic in terms of innovation and investment, which makes it an ideal industry for exploring the regulators/innovations relationship.

The telecommunications industry, because of network externalities, experiences a different competitive dynamic than that encountered in other more traditional sectors. Because of the sector’s tendency towards monopoly, during liberalization regulators put in place mechanisms that facilitate entry. These pro-competitive regulations have been deemed responsible for the growth, increased productivity, and innovation of the sector— including in Latin America.

Investment in telecommunications entails sunk costs and economies of scale, which makes entry difficult. Network externalities can slow down the adoption of new products because average consumers are waiting for early adopters. A potential competitor thus has to cope with consumer inertia, meaning that a person will not change affiliations, either because of loyalty to another company, considerations of reputation, long-term contracts with penalties, or switching costs. In addition, it has been shown that leaders tend to carry out research and development that keeps them in the lead, where they can best influence the market. In this respect, Etro also found that investment done by a leader is higher than investment done by a follower, which perpetuates its dominance. Similarly, leaders facing potential competitors innovate considerably more compared to followers, as measured by the amount of investment in patents. Amable et al. indicate that “incumbents may innovate to keep their market power and fend off new or potential entrants” to capture market share through innovation. Because of this, regulation and its enforcement is essential because it affects resources and, thus, investment/innovation in this particular sector. In most of Latin America, incumbent telecommunications carriers exhibit significant market power, with few threats of entry. This is not surprising, given the heavy investment that is necessary for

43 Amable, Demmou, and Ledezma.
setting up networks. In addition, there is great disparity between cities (profitable markets) and rural communities (unprofitable markets) in regards to connectivity and potential entry. In developed countries, the greatest concern is for the upgrade of their existing and widespread wired infrastructure to a next-generation network. In developing countries, the main concern is still investment in traditional infrastructure.

The telecommunications sector is also unique because, in spite of efforts from governments to rely primarily on the private sector, evidence suggests that investment was slower than anticipated, and current desires for broadband have made investment in this infrastructure a public good, so that it is believed that government intervention will be necessary to establish adequate incentives to motivate investment. Due to the special circumstances of the telecom sector, which has such strong tendencies towards monopoly, this author believes that the presence of competition from smaller competitors can foster investment and innovation.

**REGULATION, RESOURCES, AND INNOVATION (2RI)**

In advocating a *Regulation, Resources, and Innovation (2RI)* framework, this article refers to the way in which regulators affect access to the resources used by corporations. We assume that the degree of access to resources affects how they are used, as well as a company’s willingness or ability to innovate.

There are three important roles that regulators have control over and that can affect a company’s resources. Regulators: (a) issue rules and regulations on an established law; (b) issue licenses which control entry to the market; and (c) enforce rules and regulations to prevent abuses and violations. Each of these functions has an effect on resources. This article argues that timeliness, predictability, and fairness are elements under the control of regulators, which affect a company’s resources for innovation.

*Timeliness* refers to the length of time that it takes for the regulator to make a decision with respect to a license or dispute, or to issue regulations for a law that has been passed by the legislature. *Predictability* refers to the ability of the regulatory authority to be able to accurately inform affected parties about when a decision is going to be made. The predictability factor is independent of timing. While it may take a long time for a regulator to make a decision, the fact that the private sector knows how long it is going to take allows companies to make plans. *Fairness* is defined as equal treatment, consistency in the decision-making process and the repeatability of decisions, based on similar circumstances and criteria. If decisions are perceived as arbitrary, that can negatively affect innovation because investors will not know how they will be treated before the law, and will not be able to plan nor be willing to invest.

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44 Bauer.
Figure 2 below provides a graphical representation of this article’s hypotheses. The diagram shows the impact of delayed decision-making under a predictable and fair decision-making process. The solid line aims to represent a slow but predictable decision-making process. It shows that resources invested in innovation decrease over time, but these can increase again after a decision has been made, because the private sector is able to plan. The broken line shows little change. That is because it does not matter when the decision is made; the lack of predictability and fairness makes it difficult (if not impossible) to formulate any plans. Because of that, investment in innovation is impaired and may not even occur under such uncertain circumstances.

![Diagram](image)

Figure 2: The impact of timeliness, predictability, and fairness of regulatory decisions on innovation.

Methodology and Data Collection

This is primarily an exploratory qualitative study that relied on interviews. For the interviews, the author used an electronic database available to the public via the website of the Argentinean regulator, the National Communications Commission (NCC). The database listed 3,298 companies as of April 2009 but many of these were repeated as some companies applied for more than one license. Unfortunately, the database was not updated, and it appears that officers simply added companies as they obtained their licenses, but they never deleted the names of companies that had ceased to provide services.

From a set of 3,298 companies listed, 510 were eliminated from the sample because they did not provide communications services. These included taxi and trunking services, alarm services, and vehicle location and government communications services offered by the army, specifically maritime...
communication services. After also eliminating repeats, a random sample of 1,222 companies (83.87%) was contacted by phone. Many of the phone numbers (633; or 60.5%) were no longer in service or had been assigned to another user. An effort was then made to try to locate the company through the Internet, using the legal name, commercial name, address, or contact information posted in the NCC database. Through this process, the author was able to contact 126 of these companies (12.0%), which were invited to participate in a small survey and a phone interview. Twenty-one companies agreed to participate.

It should be noted that in the telecommunications sector, it is normal to have two or three mobile players with one incumbent fixed-line operator and sometimes one or two other fixed-line providers that lease capacity from the incumbent. In Argentina, there are four mobile companies (Claro with a 34% market share, Movistar with 43%, Personal with 30%, and Nextel with 2%) and two main fixed-line operators (Telefónica and Telecom with a 32% and a 30% market share respectively). It is quite remarkable that the country has been able to attract many small and medium enterprises to the capital, but more important to the rest of the country in this sector. Although a sample of 21 is relatively small, it is fairly representative of firms that include various services (including local, long-distance, mobile voice, and data communications services); types of companies (one incumbent, several small and medium providers, and cooperatives providing communications services); and of geographic locations (from the capital city of Buenos Aires to Patagonia). Table 1 below offers details of the composition of the sample.

Table 1: List of companies interviewed

<table>
<thead>
<tr>
<th>Name of organization or company45</th>
<th>Type of company</th>
<th>Type of service</th>
<th>Year of initial operations</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSRL</td>
<td>SME</td>
<td>Value-added services</td>
<td>2001</td>
<td>15</td>
</tr>
<tr>
<td>DT</td>
<td>Cooperative</td>
<td>Long-distance phone</td>
<td>2001</td>
<td>170</td>
</tr>
<tr>
<td>ISRL</td>
<td>SME</td>
<td>Corporate internet access</td>
<td>1980</td>
<td>40</td>
</tr>
<tr>
<td>Cnet</td>
<td>SME</td>
<td>Triple play</td>
<td>1990</td>
<td>20</td>
</tr>
<tr>
<td>CSPCCJML</td>
<td>Cooperative</td>
<td>Broadband</td>
<td>1947</td>
<td>160</td>
</tr>
<tr>
<td>Inet</td>
<td>SME</td>
<td>Value-added service</td>
<td>2001</td>
<td>16</td>
</tr>
<tr>
<td>ITSA</td>
<td>Cooperative</td>
<td>Telephone service</td>
<td>2004</td>
<td>1</td>
</tr>
<tr>
<td>ADCD</td>
<td>SME</td>
<td>Value-added service</td>
<td>1998</td>
<td>5</td>
</tr>
<tr>
<td>WT</td>
<td>SME</td>
<td>Internet access</td>
<td>2003</td>
<td>75</td>
</tr>
<tr>
<td>CT</td>
<td>Cooperative</td>
<td>Internet access, including WiFi</td>
<td>1963</td>
<td>70</td>
</tr>
</tbody>
</table>

45 For privacy purposes only the initials of each company are shown in the table.
The interviews were mostly unstructured, but they used a basic instrument consisting of ten questions asking about the company, its innovations, the factors that contributed to or limited innovation in the country, and the impact that specific regulations such as licenses, interconnection, and universal service had on promoting or limiting innovation in the country. The interviews lasted between 45 and 90 minutes and generated more than 100 pages of text, which were coded using a content analysis software called QDA Miner®. While the researcher was aware of the factors that the literature had identified as having an impact on innovation, it was clear that there were other significant factors that affected, perhaps more pervasively, the manner in which companies conducted their business in the sector. It was from all of these data sources that the connections among innovation, regulation, and resources were established.

In this map below (Figure 3), the companies are identified by their type (cooperative, small and medium enterprise, or large company), and location. The map shows the types and locations of the companies that participated in the interviews.
The content analysis of the interviews began with five major categories: (a) innovations, where the subjects talked about their innovations; (b) benefits of innovation, where they talked about the reasons why they engaged in those innovations; (c) obstacles to innovation, where they mentioned the factors that, from their perspective, have limited innovation in Argentina; (d) promoters of innovation, where they identified factors that have helped innovation; and (e) recommendations, where they provided suggestions to the government. Table 2 below shows the subcategories that were created for each of these macro codes.
Table 2: Categories used in the content analysis of the interviews

<table>
<thead>
<tr>
<th>Macro code</th>
<th>Subcategories</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovations N=30 (4%)</td>
<td>Service, tariffs.</td>
<td>The innovations were primarily related to add-ons to services or tariff-related innovations (for customers).</td>
</tr>
<tr>
<td>Benefits of innovations N=10 (1%)</td>
<td>Values added, cultural changes, economic growth.</td>
<td>They comment about how innovation adds value for customers, and how it can lead to positive cultural changes and economic growth.</td>
</tr>
<tr>
<td>Promoters N=267 (39%)</td>
<td>Needs, clients, competition, costs, different business models, diversification, leadership, niche markets, partnership, resilience, liberalization of the market, resources.</td>
<td>This category is not surprising, given that the interviewees talk about their companies’ motivation to engage in innovation.</td>
</tr>
<tr>
<td>Obstacles N=319 (47%)</td>
<td>Bureaucratic procedures, changes in government rules, lack of government vision, lack of enforcement, incumbents, abuses, regulatory paralysis, uneven regulation, culture, transaction costs, lack of resources, being a follower, market concentration, lack of a brand name, lack of competition.</td>
<td>Most of the subcategories related to obstacles were related to regulatory process.</td>
</tr>
<tr>
<td>Recommendations N=60 (9%)</td>
<td>Copy the best regulation, develop a strategic vision, establish clear and fair regulations, promote competition, promote local developers, support resource creation.</td>
<td>The recommendations were broader in nature and included both regulatory processes as well as ideas aimed to support companies.</td>
</tr>
<tr>
<td>Total N=686</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THE IMPACT OF REGULATION ON INNOVATION: EVIDENCE FROM ARGENTINA

Establishment of Rules and Regulations

Laws take a long time to pass because of the many interests that are affected by the issues at stake. Stakeholders try to influence the legislative process in the manner that is most beneficial to them. Once a law has been established, it is then the responsibility of the regulatory agency to issue rules and regulations that clarify and provide details relating to the implementation of the law.
In the Argentinean telecommunications sector, there have been few changes since the deregulation of the sector in 2000 through Decree 764/00, which sought to open the telecommunications market by encouraging new entrants, but also included many other initiatives, such as number portability, universal service, and changes to the tariff and spectrum allocation regulatory regimes. Unfortunately, these mandates have yet to be implemented. The programs that the current laws approve are number portability and the universal service fund. In May 2011, the Argentinean regulator announced auctions of the 850, 1800, and 1900 MHz frequency bands, which Telefónica returned in 2005.

Of the 319 obstacles identified in the study, 146 are related to problems associated with government practices. Of those 146 obstacles, 38 pertain to the inability of the Argentinean government to issue regulations after the law was passed.

**Number Portability:** In June 2009, a national court required the SeCom (Secretary of Communications, Argentina’s communications ministry) to issue regulations for the implementation of portability. This would allow cellular phone users to keep their numbers, if they wanted, when they changed their service provider. The court ruled that the regulations had to be implemented within 90 working days (around four and a half months).

Small companies and new entrants are the most interested in the implementation of number portability. They argue that when portability has not been implemented, it is harmful to them, and they believe that implementation has been difficult due to strong lobbying from incumbents. Large companies, and some regulators, argue that the number of customers who choose to change their company is very low and that it would be better if the companies use the resources that will be wasted on implementing number portability to invest in new products or triple play in areas where there is still no access.

The following are some representative quotes about the government’s inability to issue regulations and implement number portability:

From a small telecom consulting firm: “Number portability is late, but it is better late than never. It has been discussed over three years. It is very slow.”

From a small Internet cable provider in Santa Fe: “They never talk about number portability because the new law only affects audiovisual communications, and there isn’t any desire to do anything about it. It negatively affects telcos [telephone service providers] which have strong lobbying.”

From a large incumbent operator: “Number portability has been passed by law, but it was never implemented because of the state’s and operators’ lack of interest.”

Had number portability been implemented, perhaps more players would have entered the market, which would have forced companies to be innovative – not only in the service and customer communication tariff plans provided, but also in quality and customer service offerings that would help them to retain customers.
Universal Service Fund (USF): Something similar happened with the Universal Service Fund (USF), also mandated by the 764/00 Decree of 2000. The USF requires a 1% contribution from telecommunications companies’ revenues. These resources are to be used to provide access in unprofitable locations. Even though it is mandated by the law, this system has never been structured. Many of the interviewed representatives of small and medium enterprises (SMEs) and cooperatives are unaware of the program, and they raised doubts about the regulators collecting the fees.

On the other side, the managers of large firms believe they can use this money better than the government. One manager of a large company thinks it would be better if they kept this 1% of their income, rather than handing it to the state. In this regard, he said: “Basic rules were established some years ago, but they have not been regulated yet. The existence of this contribution prevents our company’s growth in less profitable areas.”

There has also been significant pressure from incumbent operators to be compensated for services that they believe should count towards the universal service fees. In this regard, one regulator explained:

There is a problem. There has been a discussion between SeCom and the operators about a debt, from the time the law was implemented until 2008. During this period, operators were obliged to make contributions to the universal service program but regulations were not defined. According to the incumbents, the state owes them money. There was another program that existed before the regulation. From 2000 operators believe that they did not have any obligation to continue universal service type programs such as support to retirees, to people with little resources or to handicapped individuals. Because incumbents continued these programs, they believe that they should be compensated, but the state says that it did not recognize these programs and, therefore, they don’t owe them anything.

Because of these differences, the fund has never been implemented.

Smaller companies also spoke about the inability of the government to implement the fund. One small, value-added service provider operating in Cordoba and Santa Fe said: “The fund has been created, but has not been applied to any project. It has accumulated resources, and at some point, it will start receiving applications.”

The impact of the lack of regulations for a universal service fund was simply that companies, such as cooperatives, which could have benefited from these resources, did not plan or even intend to apply or compete for projects. They were, for the most part, unaware that this initiative even existed. One example is a small VAS provider in Santa Cruz Tierra del Fuego, which indicated: “Not too long ago there was a publication about a program that was supposed to give economic help to companies that had technology to offer Internet access to cities that did not have any. They tried to look into it, but the information was confusing and the project wasn’t very well organized at all.”
Spectrum: According to a SeCom announcement, a spectrum auction of AWS band (1.7-2.1 MHz, used for mobile broadband services) is to be held in 2011. However, the process has been delayed, and players are not sure whether SeCom will meet the deadlines. This lack of predictability has a great impact on operators’ deployment plans. Big operators need to improve their 3G services, and this spectrum band is crucial for meeting customers’ expectations. SMEs are looking closely at this band; it is a good opportunity for them to deploy niche services, such as those based on WiMax technology.

The analysis of the interviews revealed that a similar type of unpredictability was evident regarding spectrum auctions. A representative quote regarding spectrum issues came from the manager of an SME located in Capital Federal: “The NCC created a record of those companies interested in offering WiMax-based services. More than 1250 SMEs and cooperatives were enrolled. The auction was to take place in March 2009. These enrolled companies have invested more than $25 million. For now, there is no willingness to auction this frequency band. The announcements are not realistic, and small businesses with interest in using this technology are not being favored at all. The fact that some regulatory issues are not being implemented causes frustration for the investors, entrepreneurs, and the market, which expects to reap the benefits of innovation. The written law is one thing; its implementation is something different.”

So how does the delay in the establishment of rules and regulations affect companies' resources? Figure 4 below shows how the time that it takes for regulation to be issued affects resources and, consequently, innovation in the private sector.

![Figure 4: Effect of time and predictability on innovation](image-url)
In figure 4, $t_1$ represents the time when the law was passed, and $t_2$, $t_3$, $t_4$, $t_5$, etc. represent the period between the time when the law was passed and time when the regulations were established. The graph shows the downward slope of the resource/innovation curve. Timing affects resources because companies have to obtain financing to carry out projects they are investing in. The capital necessary for these investments needs to be used; otherwise, the company loses money. Capital is generally obtained through loans that accrue interest. Company officers are not going to invest resources if they are not sure when they will be able to invest them. If capital is available, the longer it takes for the regulator to issue a rule, the more likely it is that financial resources will be allocated to another activity.

Figure 4 is similar to Figure 2 above. Once again, the dotted line represents the impact of unpredictable decision making. Company officers will not consider applying for, or allocating, any capital if they have no idea when a regulation will be issued. If regulations take a long time to be issued, but the public knows how long it will take, it is easier for companies to plan. If the timing is unknown, no plans for investment will be made. It is not only a matter of the span of time it takes for a regulator to issue rules, but also a matter of how predictable the process is.

Licenses

Of the 146 mentions of obstacles, 29 comments were related to licenses. As stated above, the telecommunications sector, given its specific economic characteristics, has experienced highly concentrated markets. Market entry is therefore important for innovation because of the competitive pressure it exerts on incumbent carriers. It forces them to differentiate themselves from their competitors, and that can be done, for example, by the introduction of new products, services, business models, or technologies. Ease of entry into the sector can lead to alternative ways of communicating that are not currently possible.

In some regulated sectors, licenses are mechanisms used by governments to limit entry and exert certain types of control over companies’ activities. A license is granted only to those that prove to have certain qualifications or that fulfill certain requirements. Without a license, a company is prohibited from operating. A license is thus a key resource, given that it provides access to the market; without such access, a company could not exist.

According to information gathered in the surveys, the process of awarding licenses in Argentina can take between two and five years. Currently, many agencies are involved in the awarding of licenses, which has become a highly bureaucratized procedure. The National Communications Commission (the regulator) is involved, and it usually takes about four months to issue a decision on licenses. The Secretary of Communications is also involved, and, due to the lack of its own legal bureau, cases are forwarded to the Ministry of Federal Planning, Public Investment and Services (MinPlan), which is also responsible for energy, transport, and public works. This makes it a long procedure that is frequently exhausting and discouraging for companies. The applicant does not have any idea how long the license approval process will take, because the regulator itself does not know, and that is because it depends on the caseload of the MinPlan at any given time.
Some of the SMEs consulted commented that they had to provide services through other companies because of the delay in obtaining a license. In many cases, this led them to postpone their plans, and whole projects were delayed as a consequence. It is difficult for a small company to fulfill all of the many information requests from regulators; managers make regular trips to Buenos Aires to follow up on their license application status. This can be very costly for a small company located far away from the capital city. This is how the manager of an SME in Santa Fe province explained it:

Prior to our license award, we had to work under the supervision of another company. This meant that all our projects were delayed; we were not able to deploy any type of innovation. [...] When you request a license, there are all these requirements you need to fulfill, such as technical, economic, financial, and providing cash flow to ensure the provision of services. The regulator gave us comments from time to time and requested additional information. The company is 800 kilometers away from Buenos Aires, the capital city, and we had to travel once a month to keep track of the license, folders, papers, etc.

Another case was that of a cable company that was initially not allowed to offer any other communication services. Unable to provide these transport services themselves, they sold them under the auspices of another company. One company allowing other companies to operate under its auspices commented: “Those who were cable TV providers were not allowed to provide any type of transport services. We started allowing other cable companies to sell their bandwidth under our name. This has helped to develop the cable TV business. We do this, although we shouldn’t; if the government finds out, we will have an army of lawyers with half of them arguing that we can, and half of them arguing that we cannot, do this.”

“There is very little predictability, and it depends a lot on the administration in charge of the secretary,” said the manager of an SME that gives legal advice to telecom businessmen.

Here again, evidence from the companies interviewed suggests that timing affects resources, and consequently, innovation. In Figure 4, we can see that no resources or innovation materialize until a license is granted (thus, the horizontal line up to period $t_5$). Once a license is approved, one can then see the upward-sloping innovation/resource curve.

Just as slow and complex as the process for obtaining a new license is the process of getting a permit from the regulator to offer new services. When an operator requests a license, it has to specify the type of service it wants to offer (Internet, mobile, fixed lines, VAS, etc.). To add a new one, a permit (also provided by the regulator) is necessary. In the opinion of the respondents, predictability is once more absent, because an operator might wait the same amount of time again that it takes to obtain a new license. The manager of a legal consulting company noted: “If an operator wants to offer fixed-line services, mobile, or rural, it needs to register each of these services, and this permit is treated by the regulator almost with the same complexity as a new license award. The regulator can take three months or three years.”
If the licensing process is uncertain, it is unlikely that companies will invest in the country. A manager of an SME in Santa Fe said: “Some companies are seeking new ideas and making lots of progress, but they have to wait two or three years to obtain a license. Technology changes fast; we cannot wait that long. The technology presented to the regulator two years ago matches little or nothing to what is offered today. [...] Our company has waited a year for approval for a telecommunications license; we already have Internet.”

Figure 5 endeavors to represent again the effect that unpredictability can have on the resources/innovation curve when a company is completely handicapped. If the private sector knows the amount of time that it is going to take to obtain a license, it can then make alternative plans to be able to operate until the license is approved. These alternative arrangements may require providing services for which a license is not necessary, or establishing some sort of partnership with another company to resell their services, as was the case with the cable company mentioned above. If the time for approval is unknown, the company is unable to make any plans. Any alternative investment or partnership arrangement has to establish time frames to determine, for example, rates of return or the length of contracts.

![Figure 5: Impact of timing and predictability in license acquisition on innovation](image)

The long time that a regulator takes to approve a license can be detrimental to a company’s resources and innovative capability, but even more so when the time frame cannot be predicted. The evidence suggests that the lack of a license impedes entry and limits investment in other, additional services, given that the registration for additional services also takes time. The difficulty of obtaining a license also forces companies to enter illegally or operate under the auspices of others. Access to a
market is a key resource, without which a company cannot operate. The limited competition that results from few entries is likely to negatively affect innovation as well.

**Enforcement**

Enforcement is necessary because there are often violations and abuses by some players in the sector. There are many types of abuses. A company may be operating without a license. This negatively affects the resources available to those with a license, because the violator can be operating outside of the limitations and requirements established by the law. A company may also be taking advantage of a dominant position in the market to charge predatory prices and eventually take some competitors out of business. A company may prevent access to key resources, such as the local loop or central office space and equipment, which are necessary for competitors to enter a market.

Violations and abuses in the market have an effect on the resources of the other players. In the presence of these abuses, some companies are disadvantaged in relation to those that are committing the violations. When deregulation took place in the Argentinean telecommunications market in 2001, new companies were created and entered the market. This brought new challenges to the regulator, particularly on the issue of interconnection negotiations between powerful incumbents and new entrants.

In Argentina, the two major incumbents (also called historical operators) are the owners of the fixed telephone network and have often been accused of charging competitors high interconnection rates. Interconnection prices were set in US dollars before the 2001 financial crisis and the 2002 devaluation of the peso. These fees were never changed and are currently considered very high for companies with local currency earnings. Sometimes, interconnection rates charged to small companies are higher than the final prices offered by incumbents to their own customers.

These negotiations are difficult because the terms and rates for access to infrastructure are a resource that can impair the operations of an entrant if these are unfavorable and high. Adequate, timely, and fair enforcement is necessary. However, the evidence suggests that enforcement does not happen, leaving smaller players to solve problems on their own, which leads to unfavorable terms.

Analysis of the interviews revealed that negotiations with incumbents and a lack of intervention from the telecom regulator were among the most significant obstacles. Of all the obstacles mentioned during the interviews, a quarter of them pertain to poor enforcement. The manager of an SME in the Federal Capital characterized this complicated balance with an example: “In 2001 there were around twenty small firms that required interconnection with the incumbents. These companies had problems because of the reluctance of the latter, who did not want them interconnected to their networks. If the NCC was involved, the incumbents then gave them very limited network capacity. If they wanted twenty frames, they obtained ten or fifteen, which often caused busy lines and customer complaints.”

In the opinion of a manager of a firm located in Rosario: “I often see instances of companies that are not able to interconnect with incumbents. I saw many companies willing to invest, but the
interconnection was denied. The enforcement rules are not clear. They are not applied firmly, and this gravitates against stability and transparency, as we are not sure about the rules. The rules do not apply equally to all. We need to manage ourselves the best we can; it is as if we are alone.”

An Internet operator from Santa Cruz province that uses WiFi technology had serious difficulties with illegal signals that were interfering with its broadcasts. In this case, the company said that after they raised several complaints to local government entities, the regulator intervened and seized the unauthorized equipment, but little was done to find out if there were more companies offering services without a license, which is not only illegal but harmful to others.

Moreover, SMEs that are not clients or suppliers of large companies are also reluctant to initiate legal action against these companies because they consider it a waste of time. The manager of an SME said: “We have raised some issues with the regulator, and they never got back to us; as a matter of fact, I think the complaints are being stored in a closet. […] It is difficult to send large carriers to trial, it takes two or three years. […] We need to be careful in the way we fight our enemy. […] It is really difficult for a small company to afford a lawyer for such time, and big companies know this.”

Proactive enforcement is, for the most part, not done. In this respect, a representative of a regulatory agency said: “We have many unresolved issues in the agency. We need to be more expeditious and resolve these cases faster and more efficiently.”

In light of the previous evidence, there are three elements that can affect resources because of the manner in which enforcement is carried out. First, timing is an important factor. Under normal circumstances, a company may have a certain amount of resources allocated for innovation. Once a violation occurs, these companies are negatively affected because now they do not have access to essential resources, and will be wasting their limited resources to defend themselves.

The effects of enforcement illustrated in Figure 6 (parts A, B, and C) below represent the change in the slope of the resource/innovation curve after a violation occurs. If the regulator makes a prompt decision, the company gets back its resources, and can continue to operate and engage in innovation; as a result, the slope increases again (Figure 6A). If the enforcement takes a long time, resources are diminished, even if a resolution is achieved after a few years; by then, the affected company might have lost resources in the form of market share or through the obsolescence of its technologies. This is represented by the downward slope of the curve after a certain period of time has passed (Figure 6B). The second element of enforcement is predictability. Once again, if a company does not know when a resolution is going to be achieved, it cannot plan to alleviate the problem that a violator is causing (Figure 6C).

The third element of enforcement is fairness in the resolution (equal treatment and consistency in the decision-making process). Fairness is important because it determines where resources go. If, for example, the regulator decides in favor of the violator, this can dramatically reduce the resources of the company affected. This is an unfair decision because it is not consistent with the law, and the violator is not adequately punished after infringing established rules.
CONCLUSION AND RECOMMENDATIONS

The existing literature has not adequately addressed the impact that regulatory processes can have on innovation and investment in the telecommunications sector. Most of the research that has been done on the subject has had a macroeconomic focus, where policy is simply analyzed at a higher
level instead of at the level of its actual implementation. This is surprising, given the impact that the manner in which laws are implemented and enforced can have on an industry. This author does not want, however, to minimize the contributions that others scholars have made on this point. The work on real options gave us, for example, an understanding of how company officers will prefer to delay or not invest at all if they face a significant uncertain environment with no clear benefits. This article simply attempts to expand this work to provide greater detail about the reason why this happens and about the impact it has on innovation/investment decisions. I acknowledge that this may be an issue only for the telecom sector in Argentina, although I believe that the impact is significant enough to be explored further.

In examining the links among regulation, resources, and innovation, this article argues that the manner in which regulations are carried out can significantly affect resources and, thus, innovation. 2RI identifies three elements of great importance that can affect resources: timing, predictability, and fairness. None of these characteristics, or the manner in which they affect the behaviors and resources of companies in regard to innovation, have been adequately recognized. The evidence suggests that it is not only independence, transparency, and accountability that matter. Investment in innovation also requires timely and predictable policy decisions, as well as fair enforcement. Without these, companies find themselves operating in an uncertain environment that is not conducive to investment.

Unlike other innovation studies, here the focus is on a less-developed country and the finding is that it is often not regulators’ actions, but a lack thereof, that negatively affects the innovation process. In an uncertain regulatory context, when it comes to key areas such as licensing/authorization for new services and interconnection fees, companies are facing obstacles that affect innovation. Delay, inaction, and lack of predictability directly impact the ability of a company to implement innovations because uncertainty affects their resources. As we were able to see, although small business units appear to be the most affected by this uneven regulatory framework, large companies are also being harmed, with negative repercussions to their investment plans.

Of the three factors that negatively affect innovation identified here, fairness and lack of predictability have the strongest damaging impact on innovation. Regulators, even when tardy, should provide clear time and decision guidelines that can help companies plan their long-term investments. When regulators are continually unpredictable, fail to enforce regulations, and take a long time to make decisions, there can be severe and long-term negative impacts on innovation.

There is a well-known saying: “once bitten, twice shy.” If regulators continue to exhibit these characteristics, the private sector will be hard-pressed to enter the market or to invest in new products because of negative experiences that they have had in the past. It is not surprising that companies in less developed countries prefer to copy innovations invented in other countries, rather than develop their own. A (perhaps unintended) negative regulatory environment can contribute to this. The long-term effect of this uncertain environment may contribute to the development of a culture in the private sector that avoids risks, further impairing a country’s technological development.
BIBLIOGRAPHY


