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# The Impact of Regulation on Innovation

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***Abstract***

This paper presents two examples that indicate the breadth of the impact of regulation on innovation. That some of the impacts in those examples were not intended by the regulators is taken as evidence that a better understanding of the impact of regulation is needed. The examples can be understood within theoretical frameworks that place innovation at the centre of social and economic activity within an integrated system. It is argued that understanding that system is essential to the better appreciation of the innovation process and relevant policy.

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> Much has been written about invention and innovation without any precise clues as to what needs to be supported, promoted or measured, how it is to be done, or what the spatial and temporal dimension of such policy support should be. All too often the modes and means of invention and innovation tend to be confused, lead to policy formulations that are seriously flawed, or at best, ineffective (Suarez-Villa, 1996, p. 258).

## Introduction

The stated purpose of much of the recent spate of market liberalisation has been to achieve the benefits of competition including reduced X-inefficiency, restoration of consumer sovereignty and dynamic efficiency through innovation. From the consumers' perspective this means lower prices, greater choice and better quality. The achievement of these benefits relies on innovation in the broadest sense. Innovation, as used here, means the application of new knowledge to industry, and includes new products, new processes, and social and organisational change. Some of those innovations may be unintended by the regulator, or may lead to unintended responses.

This paper reports on two examples where regulation or liberalisation led to innovation choices in industry that were not entirely intended. The first example, discussed in subsection 1.1, explains that television licensing regulations common to much of Europe had an unintended impact on the direction of telecommunications product innovation. The subsequent liberalisation of those regulations led to innovation-based alliances that constrain innovation by each party while enabling joint innovation. The second example, reported in subsection 1.2, explains that the liberalisation of telecommunications competition led to the intended competitive advantage based on rapid and targeted innovation, and to an unintended restriction on the range of innovation by each company. Implications for our understanding of this important nexus of law and economics are presented, along with a conclusion, in section 2.

## 1. Liberalisation and innovation

This section reports on two examples where the liberalisation of regulation has impacted on innovation. The examples are drawn from an extensive analysis of innovation in the telecommunications equipment company Ericsson. While that study focused on Ericsson's operations in Sweden and Australia, the findings are broadly relevant because the liberalisation discussed here is common to some extent to most developed economies. Moreover, the examples explain the interaction of regulation, technology and society in determining the rate and direction of innovation. While that interaction is specific to each situation, its importance is general to every situation.

### *1.1. Television license regulation*

Telecommunications in Australia and Sweden are almost entirely digital. Ericsson as a major supplier to Telstra (Australia) and Telia (Sweden) has developed advanced digital voice communication technology. At the time that Ericsson in conjunction with Telia and Telstra chose to concentrate exclusively on digital technology, that technology was inferior to analog technology for communication other than voice. In particular, analog technology was superior for television broadcasting. Digital's superiority in voice communication was initially in terms of cost but with subsequent innovation, by companies like Ericsson, it became superior in terms of quality and extent of service. Given that both Telia and Telstra operated as protected monopolies the choice of technology on the basis of cost is interesting. The choice of digital technology can be understood within the restrictions imposed by the regulation, common to all developed countries, that prohibited telecommunications service providers from owning television licenses. In an environment in which their main customers could not own television licenses, Ericsson's choice to develop digital technology was 'natural.'

Recent relaxation of regulation has permitted telecommunication service providers to hold television licenses. This changed the relative value of analog and digital technologies for Ericsson's major customers and so for Ericsson. Telia and Telstra now sought a single technology that could handle both voice and media communication. Analog was still superior for this combination. This restored Ericsson's interest in the analog technology that they had deliberately forgotten. Unable to develop the analog technology quickly enough in house, Ericsson sought to buy analog companies. However, the global trend to liberalise television licensing regulation created a shortage of such companies and invested them with market power. Ericsson resorted to entering strategic alliances with analog companies at the global level. While neither Telia nor Telstra has a television license to date, the ongoing prospect of converging voice and broadcast technology maintains Ericsson's interest in analog and its need for the alliances.

These alliances commit Ericsson to develop technology that will enhance the value of the analog companies' technology and not to develop 'me too' technology that directly competes with those companies during the life of the alliance. While these alliances enable Ericsson to be party to innovation that would not otherwise be possible, they restrict Ericsson's innovation and create a trap in which Ericsson loses discretion over its innovation in the short term. Moreover, the trap extends into the longer term because in order to gain a deeper commitment from the analog companies and therefore gain a stronger bargaining position, Ericsson accepts a delineation of what constitutes 'me too' technology which is generous in favour of the analog company. The outcome is that the direction of innovation is determined by the strategic interests of the allies. As such, it is a compromise rather than radical convergence in the market interest.

This example has shown that television license regulation established an appropriate environment for the advancement of digital technology for voice communication in the telecommunications industry. The example does not explain why Ericsson responded by forgetting analog rather than diversifying to supply media communication using analog technology. The example attributes Ericsson's reliance on the prosperity of Telia and Telstra, but does not explain how or why Ericsson chose options that led to that dependence. That dependence appears to be linked to Ericsson's having adopted a reactive stance in the face of policy change, rather than a proactive stance to maximise use of knowledge. Given the commitment of both Swedish and Australian Governments to infrastructure development in a monopoly regime, Ericsson's dependence on Telia and Telstra's prosperity was not a high risk stance.

### *1.2. Liberalisation of domestic telecommunication markets*

Both Australia and Sweden until recently had single national telecommunications service providers. In Australia, Telstra's monopoly was protected by regulation; in Sweden it was an unregulated monopoly protected by Government support rather

than regulation (Kaijser, 1995; Freese, 1995). The erosion of Telecom and Telia's monopoly regime began in the early 1980s with the introduction of competition in modems and mobile telephony. In 1995 Sweden's telecommunications market was the most liberal in the world (OECD, 1995) with competition permitted across both telecommunications services and equipment. Competition for fixed telephony was introduced in Australia in 1991, and telecommunications licenses were open to broad competition in July 1997 (Joseph, 1996). However, Telia and Telstra maintain their dominant position in their respective markets (Melody, 1997).

The introduction of competition has changed the focus of the relationships between Ericsson and its major customers in Sweden and Australia from advancing technology that was of technical interest to both parties, to providing products and services that are of interest to the end-user customer. Changes to the rate and direction of innovation, in the broadest sense, can be understood within the context of liberalisation. Under the new regime, Ericsson's dependence on Telia and Telstra's prosperity is subject to risk as they no longer can rely on Government support. Rather, they must jointly compete against new entries and their equipment supplier. Competitive advantage in the new regime is recognised as speed to market with products and services tailored to niche markets.

Ericcson has two objectives. The first is to lock Telia and Telstra into relying on Ericsson's technology and services through social and technical dependence. The second is jointly to compete in the market place. Both are achieved by identifying and anticipating end-user needs and interpreting them in a way that requires that the telecommunications service providers must deal with Ericsson in order to capture and satisfy the end-user market. The now powerful end-user market demands products combining voice and data communication. Ericsson is unable to develop the requisite data technology quickly enough in house, and so has entered strategic alliances with data companies. These alliances at once enable and restrict innovation as do the ones with media technology discussed above.

The liberalisation of the market has changed the dynamics of Ericsson's relationships with other companies. It has tied Ericsson to Telia and Telstra through mutual recognition of need for successful competition, and it has introduced a third party (data companies) to that relationship. The latter requires innovative interaction and negotiation strategies by Ericsson in order to remain the central partner of Telia and Telstra. This is especially important given the potential for ongoing convergence to render the data companies Ericsson's direct competitors. Ericsson's new market focus requires extensive company restructuring and the development of new processes supported by new institutionalised incentives for targeted product innovation. Moreover, liberalisation requires that Ericsson develop behaviours that exhibit its innovation intention in such a way that sends a signal to its customers and allies that it is a trustworthy company. 'Trustworthy' to the customers implies commitment to product innovation targeted to niche markets. 'Trustworthy' to the data companies means commitment to not trespassing on their market.

This example shows that liberalisation of the telecommunications market has led to innovation in the broadest sense including new processes, new products, new social relations and new institutions. It has forced the pace of innovation and changed its direction. While much of this was intended by the decision to introduce competition, the limitations on Ericsson's freedom to develop data technology were not. However, liberalisation was not exogenously imposed on the market and its institutional context. Rather, it resulted from pressures within the end-user market for deregulation, a growing ethos of privatisation which was compatible with the end of the infrastructure-building era in telecommunications, and technological change which made it possible for service providers to operate without extensive capital and infrastructure. Therefore, national and international forces within the system, including technological change, led to the liberalisation that then changed those forces and impacted on the rate and direction of innovation.

## 2. Implications and conclusion

The above examples indicate the breadth of impacts of regulations on innovation, and warn that some of those impacts may be unintended. The work of Winseck (1998a, 1998b) indicates that such examples may be common throughout the telecommunications industry. Ideally, the range of impacts of regulation would not only be explained in hindsight but could be predicted, and regulation targeted to achieve only intended outcomes. While such an ideal is not possible due to uncertainty in both the technology and the market, an appropriate theoretical framework would enhance the understanding of the complexity of the situation and would enable decisions to be taken the light of that complexity. A clearer understanding of the incentives and objects that shape behaviour, and of the short term and long term objectives under which key players operate would lead to a greater capacity to predict and to target policy. The appropriate theoretical framework would need to be suited to complex problems because the impacts are not deterministic in the sense that they lead to outcomes that are uniquely and incontrovertibly identified by that change. Rather, regulatory change disturbs the environment that adjusts in a variety of ways to establish a different set of options from which the innovating firm may choose. Moreover, it changes the values of those options and so influences innovation choices as well as options.

Complex situations that are subject to dynamic uncertainty cannot be explained by conventional neoclassical economics in which parties make optimising decisions with perfect knowledge and without institutional constraints. Rather, they can be understood in terms of the interplay and evolution of elements within the company and the environment in which it operates. Two schools of thought that are compatible with this general argument are the national system of innovation approach, which places learning and innovation at the centre of analysis of economic performance in a particular social context, and the translational theory of learning, which places the social context at the centre of analysis of learning.

According to the translational theory of learning (e.g., Latour, 1986; Callon et al., 1985) facts have no value in isolation from the context in which they are applied. The selection of what to learn (innovate) is based on the value imbued by the context. Learning has an external effect in that while it increases the value of the learner in social relationships, it also increases the value of that knowledge and of those social relations. This process creates paths of innovation as new knowledge is selected to build on and to reinforce existing knowledge and relationships. When knowledge becomes generally accepted it becomes the standard against which subsequent learning is measured. Institutions restrict interaction between parties and so influence how those parties will value knowledge. Regulation influences what will be learned by creating incentives, and by changing the context in which parties interact.

According to the national system of innovation approach (e.g., Porter, 1990; Johnson, 1992) the rate and direction of innovation can be understood within the specific system in which the firm operates. Stylistically, the national system of innovation approach explains the link between learning, innovation and growth through descriptive exemplification. The approach is inclusive and based on the argument that historic and current factors constitute a system of institutionalised social structures that affect both the rate and direction of innovation. The interplay of parties to industry and the institutional framework that determines the rules under which they interact generate the incentives and opportunities to innovate. Therefore, the rate and direction of innovation can be understood within the holistic context of the society, technology and industry.

Combining the arguments of the national system of innovation approach with those of the translational theory of learning allows an understanding of the dynamics of innovation. However, the lack of determinism in the relationships and the evolutionary nature of the innovation process renders generalised prediction of outcomes and blanket policy prescriptions inappropriate. Rather, a detailed understanding of the interests of and relationships between key players in specific institutional context is required. Furthermore, economic management through policy and regulation should be an ongoing process of adjustment tuned to the evolution of society, technology and the economy.

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