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**Identifying who is 'in market'**

**Defining markets by product**

**Defining markets by need**

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# Opinion Piece

## The evolution of the telecommunications industry — What can we learn from it?

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### Abstract

This article focuses on the competitiveness of the consumer telecommunications industry. It explains how the telecommunications industry has changed and how it is merging or intersecting with other industries, such as information technology, media and financial service; how differences between products have emerged; and the effect of these differences on competition. It shows how technological change creates benefits for consumers, but also opportunities for companies to reduce competition. It concludes with a discussion of why and how regulators act. *Journal of Direct, Data and Digital Marketing Practice* (2015) **16**, 157–165. doi:10.1057/dddmp.2014.80

### Defining markets

Most markets do not exist as physical entities — except, of course, actual markets (such as fruit) where the buyers and sellers are in one place. Most markets consist of many buyers and sellers spread over a wide area. It may be unclear which suppliers and customers are 'in the market' either at all or at a particular moment. The more general the classification of the market, the less clear this may be. For example, we refer to the market for mobile communications, but when we make a particular call today, if the handsets of caller and recipient are both on wireless broadband networks, they can make the call mobile-to-mobile without using a mobile operator's network.

Markets can be defined in two main ways: by product/technology type or by customer need. If we define a market as those interested in buying or selling a particular product or using a particular technology, then in analysing their behaviour and strategies, we must consider what other product sellers or suppliers of technology could produce with the same resources, and what else the consumer might want to buy instead. (In the above example of two mobile handsets being used for a call, the devices could just as well have been tablets or laptops.)

Similarly, if we define a market by customer need, we must take into account the different products and services that could be used to satisfy that need. These substitutes can change over time, for example, as technology or consumer habits and lifestyles evolve. At the highest level, the need to communicate with other people was once met in tea houses and is now met by Facebook, used mainly on smartphones.

**Overlapping boundaries**

In the telecommunications industry, the boundary between markets is shifting constantly as technological innovations allow new services to be offered and provide ways for new firms to enter the industry. Customers' needs move on, sometimes prompted by technological change. For example, if consumers spend several hours a day communicating with friends via Facebook and viewing videos on YouTube, including videos of their friends, are these companies providing communications, software, entertainment or all three?

**Acquisition changes markets**

The boundary between the computing and telecommunications industries is so porous that we now refer to the information and communications technology (ICT) industry. Both industries are legends for the emergence and disappearance of great names. For example, Hewlett Packard (HP) is now larger than IBM, absorbing brands such as Digital Equipment, Compaq, Autonomy and EDS. The remaining giants, such as IBM and Oracle, have also absorbed many other brands. The same pattern is visible in telecommunications, with Vodafone absorbing Cable & Wireless. One of Vodafone's main reasons for that purchase was to acquire its 'cloud' outsourcing businesses, managing very high volumes of data for clients in a virtual environment. Vodafone is now competing with companies in the IT industry that provide such services, including IBM and HP.

**Costs fall, features rise**

In this industrial evolution, there is strong interplay between costs and technology. Innovations based on new technology are often initially expensive. As the industry develops, costs tend to fall for a given product or group of products. However, in the ITC industry, products become much more complex over time, giving consumers far more features, and thus this decline in costs may not be visible in falling prices.

**From cassette to CD to MP3**

The media industry now overlaps heavily with the ICT industry. Not only do those providing and distributing programming also provide telephony services (eg, Sky, Virgin Media), but whole areas of the media industry are being replaced. For example, once (analogue) audio cassettes had been replaced by (digital) CDs, consumers shifted from cassettes to get better sound quality. This stimulated demand for personal stereos that could play CDs. These were replaced by MP3 and similar players (in particular the Apple iPod), although the CD remained as the source of the tunes, loaded onto the players via the user's PC. Eventually, the industry moved towards electronic distribution, with most tracks and albums bought and downloaded from sites such as iTunes and Amazon. Meanwhile, Amazon has used its strengths in the management of large amounts of data to enter the cloud computing sector.

**Virtual meetings**

Even industries that may seem remote from ICT have seen some of their activities taken over. For example, the widespread diffusion of smartphones and tablets means that many business meetings can now take place through telephony (sometimes video), thereby reducing demand for physical space in the property and hotel industries.

**The evolution of the industry****Restricted competition**

As a result of its massive benefits to consumers and businesses, the telecommunications industry is of high interest for economists,

**'Natural' monopolies**

governments and for the citizens whom governments aim to protect from the effects of restricted competition, which is endemic in the industry.

When telecommunications networks were first created, they were generally government-owned monopolies. They were considered 'natural monopolies', like power and water utilities, where the most cost-effective way of providing for customers was to have one company running the cable networks and the switches that routed calls. Laying down more than one network of cables was considered wasteful, although in some countries separate regional companies did evolve.

**Evolution of network traffic**

Once a country-wide network was established, calls could be routed within one exchange, between nearby exchanges, or might need routing over long-distance wires, possibly into the territory or even country of another company. At first, calls took the form of telegrams and Morse Code, but as handsets developed to translate voices into electrical pulses and back again, voice dominated, supplemented later by facsimile and telex traffic, and then eventually data traffic translated into pulses and packets and sent by 'modems' (modulator/demodulators).

**Regulation**

From the earliest days, governments regulated telecommunications, whether a state-owned monopoly or private firms, not just because there was a risk of consumers being exploited by being offered poor prices or service, but also because telecommunication was essential to national economic, social and security interests. Prices were controlled and service standards monitored. Obligations were imposed on telecommunications companies, such as connecting remote areas. These connections were often uneconomic, as were connections to infrequent users. This led to cross-subsidy in telecommunications pricing — urban users subsidised rural users and frequent users subsidised infrequent users.

**Pricing**

As a result of monopoly conditions, pricing could be based entirely on customers' willingness to pay, rather than the cost of provision. Pricing was high at peak times, low at off-peak times, high for long-distance (especially international) calls and low for local calls. Higher prices partly reflected higher costs (more wiring was required for long-distance networks, for example, or capacity might be limited relative to demand at peak), but often the profit margin on higher priced services was very high.

**The issue of efficiency**

An additional problem posed by monopoly supply was that it was hard to determine whether the supplier was efficient. In some Western countries, by the 1960s (by which time networks covered whole countries), telecommunications suppliers were the largest employer, after the armed forces or health services, and questions were asked about whether such a large labour force was necessary.

**From analogue to digital**

**Difficulties with billing**

In most countries, in the later twentieth century (generally in the 1980s), the technical situation changed radically, due to the advent of digital rather than analogue signalling. This greatly increased the technical efficiency of the network and reduced the need for labour, allowing a more efficient service. Digital technology also facilitated the break-up of the value chain.

Earlier, calls were billed using what now seem very archaic metres — usage could not be checked later. Calls transferred between networks owned by different organizations had to be paid for using complex accounting techniques.

### **'Local loop' unbundling**

Once digital technology arrived, every call could be accurately metered and its usage of particular parts of the network tracked. This opened the door to different business arrangements and greater competition. For example, a call could be 'delivered' to a local exchange by one company and then to the final customer using what was called the 'local loop'. Although delivery to the local exchange might require some duplication, in fact even this could be avoided by regulators obliging the company that owned any particular section of wire to lease part of its capacity at attractive prices to other companies. In some countries, the first physical competition to the original monopoly network was a fibre-optic cable. This had higher transmission capacity than the copper cabling used by the original (or incumbent) telecommunications companies. Regulators forced incumbents to allow interconnection with their services at attractive prices to the new entrants.

### **The mobile phone arrives**

The arrival of digital transmission was followed by mobile telephony, which already existed in a more basic wireless form (eg, pagers). From the late 1980s onwards, mobile telephony expanded rapidly, and today, in many countries, most voice traffic is carried by it and a significant proportion of data transfers take place on mobiles. Initially using analogue wireless techniques, it moved quickly to digital techniques, and underwent the same revolution as fixed line telephony, so that capacity could be leased and resold, allowing mobile phone companies to provide services even though they owned no capacity.

### **The regulatory focus in a mobile age**

#### **Supporting competition**

Regulators took a competitive approach to mobile telephony in most countries, realising that the customer benefits of this approach would be great. Initially, the incumbent landline company might provide the mobile service, but soon competition was introduced. (Having more than one mobile network mast serving an area was not as expensive as having more than one wire-in-the-ground network.)

#### **Raising revenue from licences**

Some governments saw a revenue opportunity, and the science of setting up auctions to sell successive generations of mobile telephone licences (each with greater bandwidth and higher-speed transmission) at very high prices became quite refined. Governments saw that very large consumer and producer surpluses (the relative size of each depended partly on pricing policy, which itself would be regulated) could be appropriated via a licence fee.

#### **Cross-network pricing**

Eventually, the regulation of incumbent telephone companies focused mainly on the use of long distance, satellite and other wireless communication, as companies needed to use each others' capacity to route anything from individual calls to thousands, or even millions, of calls. Interchange pricing therefore became a key focus. For the customer, the need for this was most highly visible in the cost of calling across different

mobile networks, from fixed-line to mobile networks, and in ‘roaming’ charges made when using the network of a different company in a different country.

**Emergence of global giants**

The number of companies involved in the telecommunications market in any one country rose sharply, but by the second decade of the twenty-first century, the emergence of companies dominating whole regions posed a new regulatory problem. In the UK, Telefónica from Spain (O2), T-Mobile from Germany (Deutsche Telekom) and Orange from France (France Télécom) share the mobile market with the UK’s Vodafone (one of the world’s largest telecommunications companies) and 3 (Hutchison Whampoa of Hong Kong origin, originally associated with Orange and now with mobile operations in many countries). There are also many resellers, such as Virgin Mobile and The Carphone Warehouse. Orange and T-Mobile merged their operations in the United Kingdom into EE, and landline and broadband operator BT is now in talks about acquiring EE.

**Focus on average revenue per user**

Thus, regulators focus mainly on ensuring that each giant player uses its capabilities to guarantee that customers get the most out of mobile telephony and that they are not locked in by illegal or difficult pricing and contract terms. Although these large operators compete fiercely for market share, they focus strongly on ‘average revenue per user’ (ARPU) and the rate at which customers leave them (churn), as marketing costs rise if they must attract more customers to replace those they lose. If regulators focus strongly on price of calls, operators may focus on increasing the price of other services and on tying customers into longer contracts.

**Internet and broadband**

A further development affecting the need for regulation was broadband access to Internet. This added a large source of revenue for telecommunications companies, as not only could emails and messaging be transmitted, but also complex content, particularly video. This meant that telecommunications companies now competed with broadcasting companies. In the United Kingdom, telecommunications and broadcasting regulators responded by merging into Ofcom. The net effect was to increase competition for broadcasting and for telecommunications as well, as regulators generally ensured that broadband provision would be subject to the same inter-company access to the local loop under regulated pricing, with specialist resellers of broadband capacity appearing.

**Broadcasting to mobile**

Additional pricing opportunities appeared as discrimination became possible, not only according to the amount of data uploaded or downloaded, but also according to speeds. The final stage of this evolution in the broadband industry (at the time of writing at least — the evolution continues, of course) is very high-speed broadband and, in the mobile industry, ‘fourth-generation’ mobile using high-speed mobile data links, allowing smartphones to be used as mobile access to broadcast content with the same speed and resolution as would be possible for fixed-line broadband at home. This means that mobile telephone companies are competing with broadcasting companies. Already, with third-generation mobiles (the standard in most developed countries at the time of writing),

one of the principal uses of smartphones is watching the news — while at home.

### **Mobile handsets and operating systems**

At the time of writing, this market was dominated by a few companies. Apple, Samsung and Nokia are the leaders, though Nokia (whose mobile phone business is now owned by Microsoft) was once dominant, while many other companies (such as Motorola, whose handsets business was bought by Google and sold to Le Novo) have lost their former strong positions. Here, technological progress has been very fast, keeping pace with network developments and facilitating competition. The extreme competition is now between the Google Android and iPhone iOS operating systems.

### **Managing monopolies**

Behind this rapid evolution in mobile handsets lies another competitive battle in which regulators have been involved — the establishment of communication and software standards. The aim of regulators has been to prevent the dominance of one player in order to prevent the exploitation of a monopoly or near-monopoly market share.

### **Regulatory focus**

Regulatory focus has changed substantially over the years. From pricing and access to the fixed-line networks of the incumbent companies, the focus has shifted to the fair release of additional wireless bandwidth and, in the United Kingdom, where Ofcom regulates both telecommunications and broadcasting, to protecting consumers in a world of rapidly evolving content. While the focus on price and terms remains, especially where calls passing between different networks are concerned, the intense competition (at least in the United Kingdom) between different network providers means that the regulator has focused more on ensuring transparency of pricing practices so that consumers can easily compare charges and make the most cost-effective decisions. The advent of super-fast fixed-line broadband and of fourth-generation (4G) mobile telephony will lead to even greater dependence of consumers on telecommunications as the fundamental basis for managing their lives, indicating the need for enhanced regulatory vigilance.

### **Mobile money**

One development that has attracted regulatory interest has been when mobile developments have spilled over into another regulated market, such as financial services, in the form of mobile payments. At the time of writing, many different approaches to mobile payments were being promoted, and communications and financial regulators were beginning to work together to ensure that this service was not being used by mobile phone companies to create barriers to entry.

### **Network effects and externalities**

### **Usage and cost**

The benefit that consumers get depends on how much other people use the service — this is a network effect. Network externalities exist when the value one consumer gets depends on factors external to their own consumption. The more users of the network there are in an area and the more they use it, the less it costs the network provider to serve an additional user (in terms of carriage overheads) and hence the lower the price it needs to charge to cover costs. Of course, network effects can work

in the opposite direction, for example, if there is network congestion (as any rush-hour traveller knows).

**Returns to scale advantages**

In a new network industry, firms gain huge rewards from gaining an early lead for their product. Even if competing products have more useful features, the product with the largest network will be difficult to dislodge simply because the number of its subscribers make it the most attractive option for new subscribers. The firm with the largest network can gain increasing returns to scale. The cost advantages are particularly dramatic for a firm that can establish its own network, or a technical component essential to the functioning of a network, as the industry standard.

**Competing industry standards**

Network industries have in common a number of characteristics, including complementarity, compatibility and standards. A network industry produces complements, such as trains and railway tracks, computers and software, mobile phones and mobile applications (apps), and cars and fuel. These complementary products must be compatible with one another. Without standards, product standardization cannot take place and economies of scale are unobtainable. Establishing an industry standard may involve a struggle between competing would-be standards. At the time of writing, the battle for standards for mobile phones seems to have been won by Google, with its Android operating system, and Apple, with its iPhone iOS. Google's hold over advertising revenue earned from mobiles is at risk because Android is an open system and some versions of Android are inaccessible to Google, while the widespread use of apps by consumers means that less revenue is obtained by Google from browsing. These developments may open opportunities for mobile network operators to earn substantial advertising revenue, demonstrating how successfully challenging attempts by companies to capture markets through standards can create significant changes in company earnings. Where proprietary standards may give great monopoly power, regulators may intervene to ensure open standards.

**New challengers change markets**

No such position is secure forever — Microsoft's Windows operating system has been challenged by Google with its browser and Android mobile operating system, for example. As mobile devices (telephones and tablets) take over from static personal computers or laptops, they mostly run the Google Android operating system, not Microsoft Windows. Sales of tablet computers were at the time of writing larger than laptop sales, as laptops were largely a replacement market while tablets were in their growth phase. Facebook has emerged as a challenger to Google, as the owner of the main pages through which consumers interface with the Internet and each other.

**Regulation**

**Complex networks and consortia**

The accelerating evolution of the telecommunications industry poses a problem for regulators. Regulation designed to prevent abuse of monopoly must change when oligopolies arise in different parts of the value chain and a complex network builds up in which competitors in one part of the value chain become allies in another (eg, the handset

consortia working together to establish standards with respect to mobile money).

### **Socioeconomic objectives**

Regulation can be defined as using legal instruments to implement socioeconomic policy objectives. These instruments are often backed by the threat of sanctions. For example, in telecommunications markets, companies can be required to do a number of things, including:

- charging certain (often maximum) prices;
- supplying particular goods or services (eg, access to networks) to particular markets or types of customer;
- staying out of particular markets;
- providing clear(er) information to customers about prices and contracts;
- allowing customers to switch between suppliers without incurring any or unreasonable penalties and according to established service standards (such as speed of switching of service);
- allowing customers to transfer their telephone number between suppliers (number portability).

### **Sanctions and penalties**

Sanctions include anything from fines through criminal sanctions (eg, imprisonment) or injunctions, through to structural changes such as divesting or closing businesses.

Firms in highly regulated industries such as telecommunications services have responded to regulation by developing large regulatory departments (and associated compliance costs), staffed primarily by lawyers and economists, to ensure that their policies are regulatorily compliant and, of course, to influence regulators.

### **Risk of 'regulatory capture'**

One risk is 'regulatory capture', which is when a regulator advances the commercial or special interests of regulated suppliers.<sup>1</sup> It may happen because the government depends on regulated companies for information about the regulated industry, because staff may move between the industry and regulator and have an interest in maintaining their employability in the industry, or because politicians whose constituents include regulated businesses or their employees apply pressure for favourable regulatory decisions. This is a type of government failure, although there is much controversy about the extent and effects of any regulatory capture and considerable evidence that customer interest groups have succeeded in influencing regulators in their favour and against the interests of the regulated industry.

### **Consumer value and return on capital**

A key focus of regulation in telecommunications has been pricing. A particular problem in this industry is that, if capacity is available, the marginal cost of provision (eg, of a call or data transmission) is near zero. Therefore, regulators focus on setting a fair price that gives better value for money to the consumer while allowing providers a reasonable return on capital. One risk of this approach is that regulated firms are only under pressure to reduce costs to a certain extent. If technology allows them to cut costs more, the benefit is taken in the form of either excess profits or inflated management costs (and salaries).



## Balancing pricing and costs

In telecommunications, regulation has often taken the form of limiting price increases for calling and texting (or insisting on real price reductions). A recent example of strong intervention by regulators has been their insistence on a reduction in roaming prices in the European Union. Of course, telecommunications tariffs have many components, and thus regulators have focused strongly on the costs of network provision (including licence costs, as well as the costs of building and maintaining a transmission and distribution network) and how that should be shared fairly between subscribers.

## Conclusion

This article shows how the telecommunications industry has evolved, driven by technological change, how the evolution has benefited consumers and completely or partially destroyed boundaries between industries, and how these changes require a constantly evolving regulatory approach to ensure that consumers get the full benefits of developments.

## References

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