

TELECOMMUNICATIONS

Are telecom services the hidden engine of innovation in the ICT ecosystem?

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Driven in part by the telecom sub-sectors the major changes in the ICT ecosystem illustrate some of the peculiarities of the long term dynamics of R&D expenditures.

Over the last decade drastic changes took place in the telecom services and equipment sub-sector. They have been driven by the entry of some players from other sectors of the ICT (e.g., Apple, Microsoft, Google or Yahoo) and, to a lesser extent, from the media and content industries (de Prato et al., 2010). For instance in France two TV channels (TF1 and M6) launched Mobile Virtual Network Operator (MVNO) services. In Italy MTV is offering an identical service. In the United States, Walt Disney marketed two such services under the brands Disney Mobile and Mobile ESPN between 2006 and 2007.

As noted by Booz&Co (2010: 10) “The extent to which just two companies—Apple and Google—have changed telecom’s competitive landscape is unprecedented”.

The blurring of previously distinct sectors – the so-called convergence, a vague and probably misleading notion – has been described more accurately under “the new ICT ecosystem” (Fransman, 2010; Arlandis et al., 2010). This notion refers to symbiotic relationships (financial, informational and material flows

between the actors) and synergies. But the role of telecommunications operators goes far beyond the mere provision of networks and services (e.g., as enablers of innovation for the other players, backing the creation of new market

opportunities such as applications on iPhones).

To illustrate these changes with some fairly recent examples in the mobile telecom sub-sector, smartphones continued to outperform the overall mobile devices market in 2009 and 2010. They were a key factor in consumers upgrading their devices. The Apple iPhone played a key role to trigger this migration while mitigating the expected negative impact of the financial crisis as data growth in mature markets accelerates. Mobile device sales hit 427.8 million units in the first quarter of 2011, up 19 percent from a year earlier. The increase is mostly due to the ongoing strong sales of smartphones, which surpassed 100 million units in the period and now account for 23.6 percent of the devices total sales (Mobile Business Briefing,

19 May 2011).

The smartphones phenomenon not only contributed to the upgrading of devices. It also changed the way customers are using their mobile phone, among others by shifting the patterns of use toward the Internet world. The phenomenon is only the most visible indication of the changes taking place in the ICT

ecosystem. It paved the way for the creation of an array of new applications whose number has skyrocketed. Notwithstanding this pioneering role of Apple, Google is now taking over with a different approach and a different

| Layers | Description | Examples |
|--|---|--|
| 1. Infrastructure/Technology providers | <ul style="list-style-type: none"> Hardware manufacturing, ranging from semiconductors, chipsets, consumer electronics to telecom network equipment Software development (enterprise and retail), excluding internet software IT and consulting services | Apple, Alcatel-Lucent, Microsoft; Nokia, Cisco, Oracle, Acer, ZTE |
| 2. Telecom services/network operators | <ul style="list-style-type: none"> Wireless operators voice and data revenues (excluding VAS) Cable operators Wireline operators, including fixed, broadband and TV subscription revenues (excluding VAS) | France Telecom, Vodafone, Deutsche Telekom, BSKyB, Cox Communications, Time Warner Cable |
| 3. Intermediation | <ul style="list-style-type: none"> Internet companies, aggregation of content transmitted via electronic ways Advertising | Amazon, Yahoo!, Google, eBay, Facebook |
| 4. Media and content providers | <ul style="list-style-type: none"> Media companies Content production, edition TV and radio programming Games | Lagardère, News Corp, TF1, M6, Walt Disney, Bertelsman |

Table 1 | ICT industry classification

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business model. Google's Android operating system (OS) is set to overtake Apple's iOS in terms of global shipment volumes during 2012. In 2012 Android will have a 19.4 percent share of the global smartphone platform market, with iOS having 15.9 percent.

Exploring the layers within the ICT ecosystem

The transformation of the ICT sector and the new relationships between the players has to be further analysed as it does have a major role on innovation with new forms of co-opetition in a far more open environment. Looking at the entire ICT ecosystem can help to that end by re-integrating the portion of the business activity and related R&D that companies are doing in other segments. This allows to better track down the way players are climbing

com equipment sub-sector (with a 7.4% ratio of R&D/revenues but an overall investments contribution of 84%) and more and more to Internet and other e-commerce companies (with a 9.2% ratio R&D/revenues). The global level of investment of Internet companies (e.g., Google, Yahoo!, Amazon or eBay) is in progression but it remains modest in terms of contribution to overall investments in the ICT sector (2% versus 67% for networks operators). However their level of R&D expenditures is now comparable to the level of expenditures of network operators (respectively USD 7.72 and 9.6 billion). Besides it is to be stressed that these Internet players have the highest growth in revenues (26% CAGR for the 2004-2008 period) and value (entreprise value to Ebitda of 10.2) – the latter reflecting the market capitalisation of these new companies.

Table 2 | Distribution of revenues, investments and R&D expenditures (2004-2008)

| Layers | Revenues | | | Investment | | R&D | | EBITDA margin | Enterprise value to EBITDA |
|--|-------------|------------|----------------|----------------|------------|--------------|------------|---------------|----------------------------|
| | USD Billion | % of total | CAGR 2004-2008 | Capex/revenues | % of total | R&D/revenues | % of total | | |
| 1. Equipment & IT services | 1460 | 49 | 6% | 5.3% | 26 | 7.4% | 84 | 14.5% | 6.8 |
| 2. Telecom services/ Network operators | 1200 | 40 | 10% | 16.3% | 67 | 0.8% | 7 | 35.6% | 4.9 |
| 3. Internet players | 84 | 3 | 26% | 6.5% | 2 | 9,2% | 6 | 23.0% | 10.2 |
| 4. Media and content providers | 236 | 8 | 6% | 5.9% | 5 | 1.7% | 3 | 21.0% | 6.6 |
| Total | 2990 | 100 | 8% | | 100 | | 100 | | |

Source: Reuters and annual reports

Note: EBITDA: earnings before interest, taxes, depreciation, and amortization. EBITDA margin refers to EBITDA divided by total revenue

up (or down) the value chain integrating applications and services they did not provide before.

The ICT ecosystem is composed of four layers (see Table 1). It works as an open innovation system where investments in R&D and innovation occurring within one layer impact the whole sector (Arlandis et al., 2010: 8).

On the one hand if we take a look at the level of R&D expenditures companies like Google (layer 3) are or are becoming major investors in R&D (see Table 2 for R&D to sales, 2002-2007). On the other hand telecom services providers show a rather flat profile of R&D to sales ratio similar to the content layer in line with the finding of the lower R&D intensity of the telecom service sub-sector in the Predict reports (2010, 2011). While R&D expenditures were still growing, the flat profile can be explained by the fact that several telecom services companies combine high R&D growth and zero/negative sales growth (Predict 2011). Table 2 gives the distribution of revenues, investments and R&D expenditures for the four layers (both in absolute and relative terms).

In other words R&D appears to be left to the tele-

However network operators are still pivotal through their investments (Arlandis et al:18).

The long term dynamics in Telecom R&D expenditures

The telecom sub-sectors play a crucial role at the very core of the ICT ecosystem with a likely impact on the innovative capacity of the whole sector (e.g., the development of smartphones and the mobile applications). They also display a couple of peculiarities. First, the telecom services sub-sector is the one with the smallest total R&D investment (Predict 2010, 2011) but is also a sector where the EU is leading (market share, innovation). Second, when it comes to cumulative R&D expenditures, the EU telecom services and EU telecom equipment sub-sectors show R&D investment levels and growth trends above those of other world regions (Nepelski et al., 2011: 39; PREDICT 2010, 2011). The discrepancy between the importance of the sub-sectors and the level of R&D expenditure is an interesting paradox that warrants further investigation. A closer look at the R&D figures is therefore worthwhile in order to better understand their long term

dynamics.

Taken together the figures tend to indicate a long-standing division of labour between the telecom services and the telecom equipment sub-sectors which allows them to mutually benefit from their investments. Worldwide leading telecom operators account for around 45% of global telecom industry revenues and for more than two-thirds of capital investments (mainly in the rolling-out of networks) but only for about a tenth of total R&D investment. These capital investments in turn have generated revenues which are largely spent buying equipment from the equipment manufacturers. Reciprocally telecom equipment companies account for the other 55% of the global telecom revenues and are responsible for close to 90% of the R&D expenses for the whole industry but only a third of capital investments. These R&D efforts have benefited telecom services providers and allowed them to develop their services and markets.

This 'division of labour' builds on the former state of the markets in the EU. In the past each national public services provider (the former incumbent) had a preferential relationship with a corresponding national equipment manufacturer – often dominant as well. For instance France Telecom maintained preferential relations with Alcatel in France; Deutsche Telekom did the same with Siemens in Germany; etc. Of course the nature of that relationship (types of procurement, indirect subsidies, etc.) varied from country to country.

In the EU the liberalisation of the telecommunications markets in 1998 changed the priorities of the incumbent telecom services providers. The former public monopolies seized the opportunity to revamp themselves and become less technology-driven and more customer-oriented. The opening up of markets triggered huge capital investments which reached historical heights (OCDE, 2003). This restructuring could have generated an immediate shift of resources and accordingly the willingness of operators to leave the initiative for R&D to the equipment manufacturers. To avoid a massive disinvestment some Member States imposed on their incumbent telecom operator the obligation to allocate significant amounts to R&D. For instance France Telecom was mandated to invest up to 4% of its revenues in R&D (Decree n° 96-1225, 1996). This was the case at least until 2001 when the so-called 'Boom and Bust' financial crash happened. After that the ratio of R&D expenditures/sales declined while cumulative R&D expenditures maintained a very strong positive growth trend up to 2008 (Nepelski et al. 2011: 40).

We can find a similar evolution in the United States albeit with a different point of departure – marked in particular by the earlier introduction of competition. Initially all activities were integrated within what was then the

largest company in the world, AT&T, acknowledged as the absolute leader in R&D (carried out by Bell Labs). However the level of expenditures of this former telecom R&D leader, during what can be called the 'AT&T monopoly period' (1974-1982), was low and the average R&D intensity (on sales) was around 0.8% illustrating the historically low R&D investments made by the Telecom industry during the monopoly period (Harmantzis et al., 2005). With the break-up of AT&T into several 'baby-bells' (i.e., regional US operators), R&D intensity surged to 4% between 1982 and 1995 as 'AT&T had to pump money into R&D to maintain its market share'. Finally, during the following period (1996-2003), AT&T's R&D intensity declined to 1.7% after the break away of Lucent Technologies (former Bell Labs) from the AT&T parent as R&D expenditures were shifted to Lucent Technologies.

Conclusion

Assuming a positive link between R&D expenditures and innovation the telecom services sub-sector plays a crucial role in the ICT ecosystem albeit in a rather twisted manner: innovation seems to appear more on other layers and this major role does not show in its R&D intensity. ★

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