

NETWORKS, STANDARDS, AND COMPETITION

Companies that operate in competitive markets dominated by network externalities face distinct trade-offs regarding the choice of a technical standard. Microsoft continues to develop Windows as an operating system and to expand its reach through technological partnerships with manufacturers of mobile devices, such as Nokia, Samsung, and HTC. On the other hand, the manufacturers practice an open policy of accommodating the dominant operating standards, which are in constant evolution and led by Windows and Android. Apple has adhered to its OS platform for its suite of iPod, iPad, and iPhone products. Google has invested heavily in the development of Android as a competing operating standard, to secure its market power.

Microsoft's dominant position is largely due to collaborating with hardware manufacturers. In its early days, Microsoft cooperated with Intel to make Windows 95 exclusively compatible with Intel x86 microprocessor architectures and vice versa. All PCs produced with the chip came with a complimentary installation of the Windows operating system, which led to an unprecedented global distribution of the operating standard. The media coined the effect the "Wintel Advantage."

Holding on to a primary compatibility standard permits a firm's product to capture the value added by a large network. Conversely, the firm loses direct control over the market supply of the good and faces (direct) intra-platform competition. Alternatively, adhering to a unique standard permits the firm to face less or no intra-platform competition, but it forgoes the added value related to a large network.

This trade-off is a key strategic decision that depends in part on the control that firms have in making their output compatible with competitors' outputs and complementary products. The ability to conform to a common standard opens the opportunity to make this trade-off. Where standards are proprietary, the decision rests with the owner of the standard. The owner's

trade-off is the pay-off associated with developing the existing network and its spillovers versus the introduction of more intra-platform competition. Essentially, the trade-off is the same: to adhere to a common standard or to seek uniqueness. This can be expressed as a sequential game: at the outset, one chooses the appropriate technical standard (and, therefore, the network to join), and later one chooses how to compete. Normal markets do not have this choice of network and there are consequences for market structure and competition in the presence of network externalities. The mathematical model in Economides and Flyer (1997) defines networks as coalition structures and analyzes the stability of coalitions under different standards regimes and varying levels of network externalities. There are a number of implications for market structure and competition in the presence of network externalities.

First, it is intuitively clear that industry output will be higher when there are network externalities and when standards are open. Firms are free to choose which standard to adopt and are deterred only by the costs of adoption. When standards are incompatible and the owners of standards can exercise proprietary control, incumbents are more strongly protected against the consequences of new entrants. Moreover, there will usually be considerable asymmetries between firms in terms of outputs, prices, and profits. (Under incompatibility regimes, firms are equivalent to platforms and constitute one-firm networks.) For pure network goods, the asymmetries are particularly marked.

Second, in general, with total incompatibility of standards market concentration, output inequality and price and profit inequality increase with the extent of the network externality. This is an important result because it explains why one or two firms so often dominate network industries. The mechanism is straightforward. The leading network establishes its critical mass, leaving the second network to establish a critical mass across the remaining untapped market coverage. The third network follows in the same fashion, and so on. It follows that there will be a tendency to provide large incentives to organize customers into few platforms so as to maximize the added value from the available networks. Firms will be keen to

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abandon their own weak standards in favor of the higher value obtainable from a leading network.

There is a third implication. Where there are proprietary standards and strong network effects, there is no natural equilibrium in terms of network offerings. There are always incentives for at least one firm to move to a stronger network, and the consequence of any one move is to shift the incentives for all other firms. However, equilibrium can be reinforced by the refusal of firms to make their proprietary standards available. Again, the mechanism is straightforward. Under strong externalities, the owner of a standard has a considerable incentive to exploit the standard by itself and to exclude other firms with weaker standards. Conversely, where the externality is weak, the owner will find a stronger incentive to admit other firms to its proprietary standard in order to grow the network through collective effort and thus generate more added value. In summary, strong network externalities suggest the following eventualities:

1. Larger industry output
2. Very large asymmetries between firms/platforms
3. Likelihood of market dominance
4. Enhancement and protection of proprietary standards
5. Equilibrium market structures that are the reverse of the world without network externalities.

This leads directly to the fourth implication. Competition, as we know it, can be seriously compromised by the size consequences of “winner takes all.” Microsoft’s continuing presence in front of the competition regulators in the United States and in the European Union is testament to this. The creation of a substantial market share (a de facto monopoly) not only leads to the possibility of monopolistic behavior in that market but also in the potential transfer of that position into adjacent industries. Hence the concern that a company like Microsoft might be able to create similar large market shares in network industries (such as browsers). In addition to the monopoly question, there is continuing controversy about intellectual property rights such as patents and access by smaller

firms to the knowledge bases of the larger. As the information and communications technology (ICT) industry is inherently global, there are also continuing concerns about the ability of the smaller local firms to survive against the global players. Just what is a level playing field is a matter of dispute. Consequently, the competition authorities in the United States and the European Union have paid considerable attention to the ways in which competition in the digital economy should be managed. The following section outlines the more important issues from a European perspective.

IMPLICATIONS FOR STRATEGY

There are major differences between the economic and strategic characteristics of the digital economy compared to the traditional industrial order. These major differences can be summarized as follows:

1. The information economy depends on connectivity. Without connectivity, consumer interdependence is indirect. Positive feedback gives an economic law of plenty – more gives more.
2. Upfront costs are very large and revenues can be substantially delayed and are significantly at risk. As a result, the nature of business models is different, with higher degrees of risk embedded in them.
3. It is also a world of immense uncertainty where even the range of potential outcomes is not known, but also where there is a significant probability that future technological change might undermine an apparently winning position.
4. The competition between rival networks/standards can be hard to call in advance.
5. “Tippy markets” substantially raise the level of risk.¹

In this new world, there is much more uncertainty and companies need to take bigger risks in order just to survive. The prospect of entrepreneurial profits is enticingly large but there are probably greater probabilities of failure. The list of failures and near failures in the last decade by large companies is very long. There are some new strategic “rules” for

competing in the digital economy. While these are quite generic in nature, they illustrate that companies need to come to these markets with a different mindset about how to compete:

1. Expectations management is central to the way in which marketing strategy is conceived (see the Case Box below).
2. Open standards are the key to volume. Protected standards are only viable as small, high-priced niche markets. The old preoccupation with protection of intellectual property is giving way to a sharing and cooperating approach.
3. There is a law of inverse pricing. The best (i.e., the most valuable in the future) products are given away, such as Web browsers, in order to create a consumer standard, and sheer volume causes both marginal costs and prices to fall over time as the product becomes more valuable. The cash flow machine consists of modest (even small) margins multiplied by gigantic volumes to defray massive investments. The machine is volume driven and protected by very large switching costs.
4. The first strategic choice is which network to join (which standard to adopt). The second, and a long way behind, is how to compete within the network of choice.
5. Networked complementarities and cooperative strategies are replacing the old order of hierarchical business organization and competition.
6. In a world of uncertainty, customers are also uncertain about which standards, technologies, and products will prevail. This will increase the power of brands and place upon marketing the need to manage customer expectations so as to speed adoption rates toward tipping points in the market.
7. Post convergence and digitization, the new ICT landscape is based on continuous innovation that challenges accepted consumption behavior and regulatory paradigms. Industry players recommend that, for the European Union to protect and develop its international competitiveness in the ICT industry, it must develop a mixture of light-touch regulation complemented by detailed and specific measures (directives)

to ensure a properly competitive landscape (Sammuto-Bonnici, 2009).

The economic characteristics of network industries are dependent in large part on the interconnectivity that is characteristic of the technologies of information goods. Interconnectivity allows customers to view, use, and link products, giving rise to networks of customers. In these networks, powerful demand-side increasing returns can operate. Where consumer-based externalities are powerful, there are strong pressures toward “winner-takes-all” phenomena (e.g., Wintel globally, and Sky TV in the United Kingdom). In these circumstances, conventional economic laws are challenged. De facto monopoly can emerge: but uncertainty is high and markets may be intrinsically unstable. Successive waves of technology may outmode old monopolies and serve as the basis for new monopolies.

The rate of growth and now the sheer size of the ICT industry has been the progenitor of major changes in the economy. We have seen major effects on other industries through the new value possibilities that information technology offers and through the substantial fixed costs and minimum scales required for effective deployment of these technologies. When linked to networks of interdependent customers, we see the potential emergence of winner-takes-all strategies and the emergence of new monopolies.

We have decomposed the ICT industry into its component parts in order to see who the players are and how they interact with one another. In doing this, we argue that we are beginning to see a new type of industrial order – one marked by networked complementarities and cooperation in place of the traditional model of hierarchy and competition. We have also decomposed the industry into four horizontal levels – technology, supply chain, platform, and network – to show that these have different economic characteristics and therefore that corporate strategies have different dynamics. The examples quoted indicate the range and extent of the possibilities inherent in the new technologies and in terms of rivalry in the form of preemptive strikes and technology races. We note, particularly, the pervasive changes that are taking place in supply chains generally.

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The increasing importance of connectivity and modularity is forcing a shift from the competitive mode toward the cooperative mode. This raises thoughts of self-organizing systems and the notion of coevolution, rather a long way from the search for and exercise of crude bargaining power. The sheer size and cost of physical platforms also create new dynamics. The pervasive use of alliances is an obvious example. Less obvious is how the need for interoperability requires new attitudes toward complexity and requirements for agility.

A new set of strategies is emerging to offset the risks and pressures exerted by these rules. This is visible in the setting up of global standards and their ensuing platforms. For example, Group Speciale Mobile, commonly known as GSM, is an association of 600 network operators and suppliers of the mobile phone industry. Their primary objective is to set a common standard for mobile communications in order to create a homogeneous industry where equipment, software, and networks can seamlessly talk to each other. Strategies of standardization are stabilizing the markets and charting the course for research and development policies.

Finally, we remark on the significance of interdependence between consumers. This effect at its strongest completely shifts our thinking from the prevalence of oligopolistic competition (size matters but so do diminishing returns) to the possibility of the winner-takes-all and the monopoly situations (size matters – full stop). Clearly, such network effects are not always going to be so extreme, but there is a real possibility that the combination of high fixed costs, significant economies of scale, and high degrees of knowledge specialization will, when taken

together with consumer bandwagons, create massive new corporate structures to which the major (and perhaps only) discipline will be further developments in technology. However, the analysis of consumer lock-in suggests the real possibility that switching costs might inhibit the adoption of valuable new technologies.

See also *competitive market theory*; *critical mass*; *networks*; *network externalities*

ENDNOTES

¹ “Tippy” markets are those that display potential network externalities.

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