# THE ECONOMIC AND SOCIAL ROLE OF INTERNET INTERMEDIARIES

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## FOREWORD

This report is Part I of the larger project on Internet intermediaries. It develops a common definition and understanding of what Internet intermediaries are, of their economic function and economic models, of recent market developments, and discusses the economic and social uses that these actors satisfy. The overall goal of the horizontal report of the Committee for Information, Computer and Communications Policy (ICCP) is to obtain a comprehensive view of Internet intermediaries, their economic and social function, development and prospects, benefits and costs, and responsibilities. It corresponds to the item on 'Forging Partnerships for Advancing Policy Objectives for the Internet Economy' in the Committee's work programme.

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# INTRODUCTION

As the Internet has grown to permeate all aspects of the economy and society, so too has the role of Internet intermediaries that *give access to, host, transmit and index content originated by third parties or provide Internet-based services to third parties*. They enable a host of activities through both wired and increasingly, mobile technologies. Internet access intermediaries and hosting and data processing providers provide the platform for new, faster, and cheaper communication technologies, for innovation and productivity gains, and for the provision of new products and services. As to online e-commerce intermediaries, they have brought unprecedented user and consumer empowerment through greater information, facilitating product and price comparisons and creating downward pressure on prices or, in the case of auction platforms, meeting supply and demand and creating new markets. Search engines, portals and participative networked platforms for their part facilitate access to an unparalleled wealth of information, as well as providing opportunities for new innovative activities and social interactions.

Looking forward, Internet intermediaries are rapidly evolving in nature, scale and scope and are poised to connect an increasing number of users, information and services, and to do so at increasing speeds. It should be noted at the outset that, in addition to being very dynamic in nature, different categories of 'Internet intermediaries' are frequently not clear-cut, with actors often playing more than one intermediation role.

The OECD Seoul Ministerial meeting on the Future of the Internet Economy of June 2008 recognised that the Internet economy provides a key engine for economic and social development at both the global and national levels and that the framework for Internet-enabled innovation depends on Internet intermediaries and on the environment in which these players interact (Box 1). This enabling environment requires that the policy framework governing its use and development be adaptable, carefully crafted and co-ordinated across policy domains, borders and multiple stakeholder communities.

**Box 1. The OECD Declaration for the Future of the Internet Economy**

Ministers agreed in their *Declaration for the Future of the Internet Economy* of June 2008 that their challenges and associated goals with regards to the Internet economy are, through an appropriate balance of laws, policies, self-regulation, and consumer empowerment, to:

1. Expand Internet access and use worldwide.
2. Promote Internet-based innovation, competition, and user choice.
3. Secure critical information infrastructures, and respond to new threats.
4. Ensure the protection of personal information in the online environment.
5. Ensure respect for intellectual property rights.
6. Ensure a trusted Internet-based environment which offers protection to individuals, especially minors and other vulnerable groups.
7. Promote the secure and responsible use of the Internet that respects international social and ethical norms and that increases transparency and accountability.
8. Create a market-friendly environment for convergence that encourages infrastructure investment, higher levels of connectivity and innovative services and applications.

Effective co-operation between governments and Internet intermediaries is crucial to achieving the goals contained in the Seoul Declaration, in partnership with users/consumers. For example, Internet access (goal 1) and higher levels of connectivity (goal 8) are predicated on a robust, inexpensive and competitive market for Internet service providers (ISPs) and, increasingly, for mobile operators who offer Internet access. Online service providers such as search engines, participative networked platforms or

auction platforms are key to expanding Internet use (goal 1) and user choice (goal 2). In addition, online service providers are also both innovators themselves and enablers of further innovation (goal 2). They also all have an interest in ensuring the resilience and security of the Internet and responding to new threats (goal 3). Collaboration with, for example, ISPs, hosting providers, and at times domain name registrars and financial service providers can help advance other goals such as offering protection to individuals in the online environment (goal 6). The same applies to ensuring respect for intellectual property rights (goal 5) or improving safety for minors and other vulnerable user groups (goal 6). Internet intermediaries also have a particularly strong role to play in protecting personal information in the online environment (goal 4).

Ministers invited the OECD to further the Declaration's objectives through multi-stakeholder co-operation, including by "examining the role of various actors, including intermediaries, in meeting goals for the Internet Economy in areas such as combating threats to the security and stability of the Internet, enabling cross-border exchange, and broadening access to information."

The goal of the present report is to develop a common definition and understanding of what Internet intermediaries are, of their economic function and economic models, of recent market development, and to discuss the economic and social uses that these actors satisfy.[1] Throughout this exercise, it is important to be mindful that the nature and role of intermediaries are evolving and are likely to change considerably even in the medium term. Therefore, the model of Internet intermediaries presented in this report is necessarily a snapshot in time of a very dynamic system. In such a context, all actors should guard against locking in existing systems to the exclusion of innovation or other potential benefits.

## MAIN POINTS

As the scale and scope of the Internet has grown to permeate all aspects of the economy and society, so too has the role of Internet intermediaries who provide the Internet's basic infrastructure and platforms by enabling communications and transactions between third parties as well as applications and services. *'Internet intermediaries' give access to, host, transmit and index content originated by third parties or provide Internet-based services to third parties*. They offer access to a host of activities through both wired and wireless technologies. Most 'Internet intermediaries' are from the business sector and they span a wide range of online economic activities including: Internet access and service providers (ISPs), data processing and web hosting providers, Internet search engines and portals, e-commerce intermediaries, Internet payment systems, and participative networked platforms.

Intermediation is the process by which a firm, acting as the agent of an individual or another firm, leverages its middleman position to foster communication with other agents in the marketplace that will lead to transactions and exchanges that create economic and/or social value. The main functions of Internet intermediaries are *i)* to provide infrastructure; *ii)* to collect, organise and evaluate dispersed information; *iii)* to facilitate social communication and information exchange; *iv)* to aggregate supply and demand; *v)* to facilitate market processes; *vi)* to provide trust; and *vii)* to take into account the needs of both buyers/users and sellers/advertisers. There is sometimes tension between various functions of Internet intermediaries; for example, tension between preserving identity and privacy while personalising products and services in ways that benefit users or between infrastructure provision and usage.

Internet intermediaries are important actors because their services create network externalities[2] such that the benefits from using the service increase as diffusion spreads. Therefore, building a critical mass of users is key for these actors. In addition, these actors often operate in two-sided markets whereby they are an intermediary between two different groups of agents, for example, users and advertisers or buyers and sellers. Two-sided markets have implications in terms of causing intermediaries to adopt particular pricing and investment strategies that will get both sides of the market on board, and that balance the interests of the two sides.

In particular, online advertisers, which now represent over 10% of global advertising revenue, play an important role as they often enable intermediary platforms to provide increasingly sophisticated content and services at no monetary cost to users. In addition to online advertising, revenue models of Internet intermediaries include subscription and 'on-demand' paid service models, brokerage fees, donations, as well as community development models for content or software.

The pace of change of Internet services and their technical complexity means that reaching stable, established business practices is difficult. It should be re-emphasised that business models are currently in flux and are likely to remain so for most identified intermediaries. In parallel, the blurring of boundaries between what national statisticians classified as separate activities and the creation of new areas of activity that are not necessarily based on transactions make measurement challenging. Nonetheless, available data provides some insight:

- Internet access and service providers (ISPs) in several OECD countries operate in consolidating markets. Broadband subscriptions and mobile Internet access services are the main growth segments although business models for mobile Internet access are still in flux. The evolution to mobile broadband is becoming increasingly pronounced.
- Data processing and web hosting providers also face strong competition and this competition may originate from anywhere in the world. Growth areas include shared web hosting and software as a service, offered on subscription basis, that are also known as 'cloud computing', *i.e.* scalable and often virtualised resources provided over the Internet.
- Internet search engines and portals are now highly concentrated, with advertising as the primary source of revenue. They continue to experience very high growth resulting from demand for more efficient search functions and for the expanding array of services they offer on one side, and from demand for online advertising, on the other. Competition continues apace, particularly in developing markets.
- E-commerce transactions for both consumers and for businesses have become mainstream in OECD countries, experiencing continued growth even during the current economic downturn, albeit at lower levels than before but high compared to their offline counterparts for the same period. Retail e-commerce intermediaries often generate revenue through charging sellers transactions fees, while wholesale intermediaries often use a combination of brokerage fees.
- Internet payment is predominantly conducted through traditional (offline) payment networks that provide a platform linking merchants that accept cards for payments and cardholders who use them to pay for goods and services, although there are some new entrants in the Internet payment sector.
- The emergence of participative networked platforms, including virtual worlds, is a comparatively recent development and online advertising is seen as a main future source of revenue for this sector. In addition, ancillary linked products – in particular mobile – drive traffic, revenue, engagement, and overall value.

To provide an order of magnitude of the size of various Internet intermediaries sectors, in the United States in 2008, official data shows that in total, Internet intermediaries identified represented at least 1.4% of total GDP value added; with 'information sector' Internet intermediaries – ISPs, data processing and web hosting providers, and Internet search engines and portals – accounting for 0.6% of GDP value added, retail e-commerce intermediary platforms accounting for 0.2% and wholesale e-commerce intermediary platforms accounting for 0.57% of total GDP value added. To provide a comparative figure, the broadcasting and telecommunications sector accounted for 2.5% of value added as a percentage of GDP in 2008 while the publishing industries as a whole accounted for 1%.[3]

In value terms ISPs represented revenue of USD 68 billion in 2008 – up 12% from 2007 – data processing and web hosting providers represented USD 78 billion – up 2.9% from 2007 – and Internet search engines and portals USD 14 billion – up 19% from 2007. E-commerce retail intermediaries represented USD 97 billion – up 4.5% from 2007, representing 73% of online retail sales and over 2.2% of total transactions – while wholesale agents, brokers, and electronic markets represented over USD 400 billion – an estimated 7% of wholesale trade.[4] Comparable data for Internet payment platforms and participative networked platforms are not readily available.

Against the backdrop of a broadening base of users worldwide and rapid convergence to IP networks for voice, data, and video, 'Internet intermediaries' provide increasing social and economic benefits; whether it be through information, e-commerce, communication/social networks, participative networks, or web services. 'Internet intermediaries' provide economic growth with new businesses and productivity gains through their contribution to the wider ICT sector as well as through their key role within the Internet ecosystem.[5] They operate and maintain most of the Internet infrastructure, which now underpins economic and social activity at a global level, and are needed to help ensure there is continued sufficient investment in both physical and logical infrastructure to meet the network capacity demands of new applications and of an expanding base of users.

'Internet intermediaries' also stimulate employment and entrepreneurship by lowering the barriers to starting and operating small businesses and by creating opportunities for 'long-tail' economic transactions to occur that were not previously possible, whereby businesses can sell a large number of unique items, each in relatively small quantities. Internet intermediaries enable creativity and collaboration to flourish among individuals and enterprises and generate innovation. User empowerment and choice are considered to be very important and positive social side effects of the access to information that Internet intermediaries provide, as well as improving purchasing power with downward pressure on prices. A critical role of Internet intermediaries is to establish trust, including through protection of user privacy. By enabling individuality and self-expression, they also offer potential improvements to the quality of societies in terms of fundamental values such as freedom and democracy.

# DEFINITIONS

This section proposes a working definition of Internet intermediaries. Part of the goal of this report is to ensure that the definition used by the OECD is comprehensive and accurate. It also attempts to identify categories of Internet intermediaries, based primarily on official industrial classifications and on regulators' definition of Internet intermediary activities. The purpose for using official industrial classifications is to help ensure consistency as well as to be able to use official data to help quantify industry sectors where it is available.

## Definition of 'Internet intermediaries'

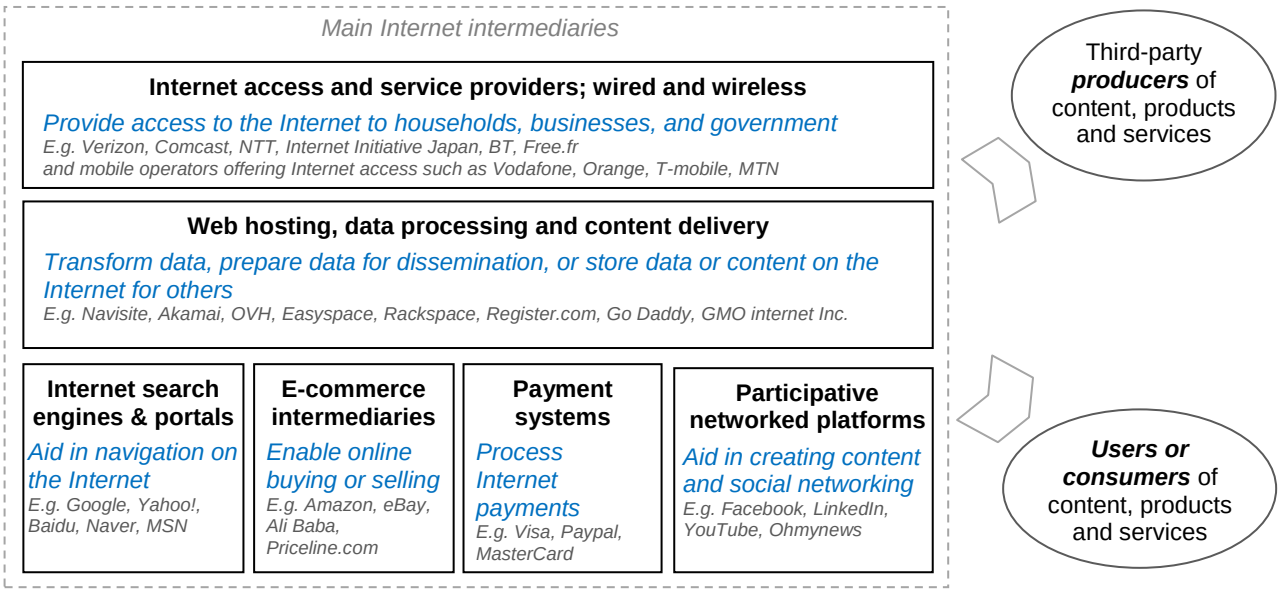
The implicit meaning of the word intermediary is that it is located between or among two or more parties, and although they help in the transmission/dissemination process, intermediaries do not initiate decisions to disseminate the content, products or services that transverse their networks or servers. A proposed definition of 'Internet intermediaries' is the following:

'Internet intermediaries' bring together or facilitate transactions between third parties on the Internet. They give access to, host, transmit and index content, products and services originated by third parties on the Internet or provide Internet-based services to third parties (Source: OECD).

'Internet intermediaries' are mainly from the business sector although there are an increasing number of social platforms. Current Internet intermediaries identified within the scope of this report include (Figure 1):

- Internet access and service providers (ISPs)
- Data processing and web hosting providers, including domain name registrars
- Internet search engines and portals[6]
- E-commerce intermediaries, where these platforms do not take title to the goods being sold
- Internet payment systems, and
- Participative networking platforms, which include Internet publishing and broadcasting platforms that do not themselves create or own the content being published or broadcast.

**Figure 1. Stylised representation of Internet intermediaries' roles**



Several caveats warrant stressing. First of all, it is important to note the differences between the categories of actors being clustered under the concept of 'Internet intermediaries'. Additionally, in practice, categories are often not clear-cut as Internet intermediaries may play more than one role. Moreover, statistical definitions tend to focus on Internet information and service sectors in general and do not necessarily distinguish those with an intermediation role.

In considering the role(s) of Internet intermediaries, it is important to appreciate that Internet intermediaries may have different and potentially competing simultaneous roles as intermediaries, end-users and content/service providers. For example, some Internet service providers deliver their own content. Some e-commerce platforms sell goods that they take title to. To limit its scope, the current report only considers Internet intermediaries in their role as 'pure' intermediaries between third parties. This means, for example, that the report excludes activities where service providers give access to, host, transmit or index content or services that they themselves originate. In addition, it is important to note that Internet intermediaries are increasingly likely to use 'automated agents' such as applications rather than human actors.

The following activities are not considered as within the scope of 'Internet intermediaries' in this report: Internet publishing and broadcasting providers that are not intermediaries, *i.e.* that publish or broadcast their own content via the Internet; for consistency with the European E-commerce Directive, online gambling activities that involve wagering a stake with monetary value in games of chance, and business-to-employee relations are excluded; online brokerage intermediation services and travel reservation services, because these activities that use the Internet rather than traditional methods are often included in classes according to their primary activity;[7] and e-government services, as they are generally not mediated by an 'intermediary.'

**Box 2. Regulators' categorisation of types of Internet intermediation and liability exemptions**

In their laws many OECD countries have addressed the liability of ISPs and other information intermediaries who act as middlemen (*i.e.* merely deliver content) by creating liability exceptions for these entities, *e.g.* in their e-commerce or copyright laws. This is an exemption from secondary liability for their users' content that in some cases requires the online service providers to remove infringing materials hosted on their systems or networks after receipt of a valid notice.

In the United States for example, Section 230 of the Communications Decency Act (CDA) of 1996 grants legislative immunity from liability for providers and users of an "interactive computer service" who publish information provided by others: "No provider or user of an *interactive computer service* shall be treated as the publisher or speaker of any information provided by another information content provider." It has been interpreted broadly, including in cases of defamation, privacy, fraud or spam. The term "interactive computer service" means any information service, system, or access software provider[8] that provides or enables computer access by multiple users to a computer server, including specifically a service or system that provides access to the Internet and such systems operated or services offered by libraries or educational institutions.

The limited liability component of the Digital Millennium Copyright Act (DMCA) creates a conditional safe harbour from copyright liability for online service providers for functions of transmission and routing ("mere conduit" functions), caching, storing, and "information location tools" including online directories and providing links to third party materials alleged to infringe the copyrights of others. Similar principles on the liability of online intermediaries also exist in Australian copyright law.

Under the Korean laws 'Act on Promotion of Information and Communications Network Utilization and Information Protection(…)' and 'Copyrights Act,' 'online service providers' can also be exempt from liability under certain conditions.

The Japanese Law of 2001 and the European Electronic Commerce Directive (ECD) of 2000 establish a liability regime for some types of online intermediary activities. The ECD characterises intermediary activities by the fact that information is provided, transmitted or stored *by, or at the request of, a recipient of the service* (in other words, the recipients of the service are those who publish information as well as those who access the information). The Directive establishes a horizontal exemption from liability for "intermediary information society service providers" when they play a technical role as a "mere conduit" of third party information and limits service providers' liability for the other intermediary activities of "caching" and hosting information.[9] "Mere conduit" equates broadly to networks and access provision, "caching" refers to creating temporary caches of material to make for more efficient operation of the network, and hosting refers to storing information.

The ECD refers to specific activities of intermediaries rather than defining categories of service providers. As such, it does not necessarily cover some of the newer activities of Internet actors who have an intermediation function and could be regarded as types of online intermediaries, such as search engines or the providers of hyperlinks. In their implementations of the Directive some European countries do.

Existing legal frameworks do not necessarily account for all types of Internet intermediation, including newer actors such as participative web platforms.

### Internet access and service providers

Although the terms Internet service provider and ISP are in universal usage, they are potentially confusing because they do not necessarily distinguish between the underlying roles of access provider, host, and others. In this document Internet service providers are generally meant to signify Internet access providers, which provide subscribers with a data connection allowing access to the Internet through physical transport infrastructure.[10] This access is necessary for Internet users to access content and services on the Internet and for content providers to publish or distribute material online.

ISPs may provide local, regional, and/or national coverage for clients or provide backbone services for other Internet service providers. They include 'pure-play' ISPs as well as wired and wireless telecommunications providers, and cable providers that provide Internet access in addition to network infrastructure.[11] Internet service providers have the equipment and telecommunication network access required for a point-of-presence on the Internet. They may also provide related services beyond Internet access, such as web hosting, web page design, and consulting services related to networking software and hardware.

ISPs are typically commercial organisations that generally charge their users – whether households, businesses or governments – a monthly fee on a contractual basis. Sometimes the fee is bundled with other services, as in the "triple play" offered by cable and telephone companies for television, telephone, and Internet access. Laptop users in Internet cafes or wireless "hot spots" may pay an ISP (directly or indirectly) for daily access or even hourly access. ISPs range from large organisations, with their own geographically dispersed networks, local points of presence and numerous connections to other such networks (Tier 1 providers – usually large telecommunications companies), to small providers with a single connection into another organisation's network.

### Data processing and web hosting providers, including domain name registrars

Today, many providers of data processing and web hosting services are better known as "cloud computing" platforms that enable their clients to use the Internet to access services, such as software as a service or hardware as a service. The 'Data Processing, Hosting, and Related Services' industry group consists of firms that provide infrastructure for hosting or data processing services. They are involved primarily in handling large amounts of data for businesses, organisations, and individuals. Most data hosting companies, including domain name registrars, sell subscription services, while data processing services companies often sell services on a per-unit basis.

'Data processing' firms transform data, prepare data for dissemination, or place data or content on the Internet for others. 'Web hosting' service providers supply web server space and Internet connectivity that enable content providers to 'serve' content to the Internet. They may provide specialised hosting activities, such as web hosting, streaming services or application hosting, provide application service provisioning, or may provide general time-share mainframe facilities to clients.[12] Many hosting providers also provide domain name registration services (acting as registrars) and increasingly, additional tools to enable their customers to create websites, manage their sales or sell on-line.

**Internet search engines and portals**

Internet search engines and portals operate websites that use a search engine to generate and maintain extensive databases of Internet addresses and content in an easily searchable format. Content may consist of web pages, images or other types of digital files. Search engines index information and content in an automated fashion, based on sophisticated algorithms. Web search portals often provide additional Internet services, such as e-mail, connections to other websites, auctions, news, and other limited content.[13] It should be noted that many portals do not rely on automated search engines alone, but also include human editors whose function is similar to that of a magasine editor.

Search engines and portals generally provide free services to their users even though these services involve significant investment in technical development and infrastructure to meet simultaneous demand of a growing number of users. Investments and operating costs are most often funded through advertising. For example, Google, Naver in Korea and Baidu in China, use auction-based advertising programs that let advertisers deliver ads targeted to search queries or web content across the search-engines' sites and through affiliated third party websites. Advertisers are increasingly charged per user that clicks on the ad versus per user that sees the ad. Revenue-sharing mechanisms with affiliated websites are often used.[14]

**Web e-commerce intermediaries**

Web e-commerce intermediaries connect buyers and suppliers and enable Internet transactions between them. They provide a range of often bundled services such as fixing prices, transaction processing and co-ordination, quality guarantees, monitoring, as well as, in some cases, stock management. An Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, governments and other public or private organisations, conducted over the Internet. The goods are ordered over the Internet, while the payment and the ultimate delivery of the good or service may be conducted on or off-line.[15]

For the purposes of this report, e-commerce in service industries is excluded. The reason for excluding e-commerce in service industries is the risk of double counting because services sold on-line, such as ISP services, may also be included in separate Internet intermediary sectors (*e.g.* that of 'Internet access and service providers'). Similarly, Internet search engines often sell advertising on-line that is categorised as e-commerce service revenue. The following categories of actors are included:

1. *Internet retailers and auction platforms*: these actors are online retailers who do not take title to the goods being sold.[16] Shopping comparison sites are included when they enable transactions. This category includes mobile retailers. It also includes retail electronic auction platforms that provide sites for and facilitate consumer-to-consumer or business-to-consumer trade in new and used goods, on an auction basis, using the Internet. Establishments in this industry provide the electronic location for retail auctions and allow participants to bid for products and services over the Internet, but do not take title to the goods being sold.[17] The functionality of buying and selling in an auction format is made possible through auction software which regulates the processes involved.

2. *Business-to-business (B2B) electronic markets using the Internet*: business-to-business marketplaces facilitate business-to-business electronic sales of new and used merchandise using the Internet, often on an auction basis, and generally receive a commission or fee for the service.[18] Business-to-business electronic markets for durable and nondurable goods are included. It should be noted that while several existing definitions of e-commerce include Electronic Data Interchange (EDI)[19], EDI transactions are excluded from the present report that is limited to 'Web e-commerce intermediaries', because EDI uses proprietary non-Internet networks. This exclusion is significant because a majority of B2B e-commerce is via EDI (for example in 2007, EDI represented 73.5% of merchant wholesalers' e-commerce activity in the United States).

**E-commerce payment systems**

E-commerce payment systems generally include: *i)* payment systems that rely on a credit or bank account to enable e-commerce transactions (*e.g.* Visa, Mastercard); and *ii)* payment systems provided by non-bank institutions operating on the Internet and that are only indirectly associated with a bank account (*e.g.* Paypal).

Banks remain the core providers to end-users for most online retail payment instruments and services. Payments for Internet transactions in most OECD countries are overwhelmingly conducted through credit cards.[20] Payment networks Visa and MasterCard are not-for-profit associations owned by banks and nonbanks that centrally set the fees that the merchants' banks (acquirers) pay to the cardholders' banks (issuers) for transactions. These fees are proportional to transaction volume. The payment networks' choice of fees has typically favoured cardholders, to induce them to use their cards, over merchants, who kept accepting the cards despite relatively high levels of merchant fees.

Online banking-based Internet payments are a growing category of Internet payments, particularly in Europe. Buyers initiate transactions at a merchant's website and are redirected to an interface putting them in touch with their own online bank for payment authorisation. The merchant receives an instant payment confirmation, after which the money arrives as a regular credit transfer. There are three main types of online banking-based payment systems: [21]

*a.* Multi-bank schemes, where merchants have a connection with all banks, generally via a payment service provider. Examples of multi-bank payment methods include EPS in Austria, e-Dankort in Denmark, iDEAL in the Netherlands, Bancontact/Mister Cash in Belgium, Giropay in Germany, BankAxess in Norway, Secure Vault Payments in the United States, or Interac in Canada.

*b.* Mono-bank solutions, whereby merchants need only to connect with one of the participating banks. Mono-bank payment methods include Nordea Solo in Norway, Sweden, Denmark, Finland, and the Baltics or ING, Dexia, and KBC in Belgium.

*c.* Bank-independent intermediary payment solutions, whereby the online interfaces of intermediary payment solutions enable to connect consumers' to their online banking portals. These include POLi in Australia, New Zealand, South Africa, and the United Kingdom, Mazooma in the United States, or Sofortueberweisung / DIRECTebanking.com in Germany, Austria, Switzerland, and the Netherlands.

In general, the use of non-card and non-bank payment methods is growing with actors such as eBay with Paypal, Amazon, or Google. Payment applications such as mediating services, mobile payment systems, prepaid cards or electronic currency are available from a wider range of service providers. Nonbanks now serve as Internet payment portals, transferring payments between payers, payees and their account-holding institutions, and also transferring payments between buyers and sellers who transact through Internet retail storefronts and through online auction sites.

**Table 1. New payment mechanisms**

| Extensions of traditional retail electronic payment systems | New non-traditional retail electronic payment systems |
|---|---|
| Prepaid payment cards | Electronic purse |
| Internet payments based on bank accounts | Internet payments not based directly on a bank account |
| Mobile payments based on bank accounts | Mobile payments not based directly on a bank account |

*Source*: Based on OECD/FATF (Financial Action Task Force), Report on New Payment Mechanisms, 2006.

## Participative networked platforms

Participative networked platforms facilitate social communication and information exchange. They are services based on new technologies such as the web, instant messaging, or mobile technologies that enable users to contribute to developing, rating, collaborating and distributing Internet content and developing and customising Internet applications, or to conduct social networking.[22] This category is intended to include social networking sites, video content sites, online gaming websites and virtual worlds. Table 2 provides an overview of well-known participative networked platforms.

Participative networked platforms are often based on community models whereby users have a high investment in time on these platforms. Revenue can be based on the sale of ancillary products and services, voluntary donations, or advertising and subscriptions for premium services. Although business models are still in flux, the rise of social networking and success of product versions tailored to mobile use show that the Internet is well suited to community models.

**Table 2. Participative networked platforms**

| Type of Platform | Examples |
|---|---|
| Blogs | Blogs such as BoingBoing, Engadget, Ohmy News;<br>Blogs on sites such as LiveJournal; Windows Live Spaces; Cyworld; Skyrock |
| Wikis and other text-based collaboration formats | Wikipedia, Wiktionary; Sites providing wikis such as PBWiki, Google Docs |
| Instant messaging | Skype, Trillian, Windows Live Messenger |
| Mobile | Mobile versions of social networking sites and applications such as Facebook |
| Sites allowing feedback on written works | FanFiction.Net, SocialText, Amazon |
| Group-based aggregation | Sites where users contribute links and rate them such as Digg, reddit<br>Sites where users post tagged bookmarks such as del.icio.us |
| Photosharing sites | Kodak Gallery, Flickr |
| Podcasting | iTunes, FeedBurner (Google), WinAmp, @Podder |
| Social network sites | MySpace, Mixi, Facebook, Twitter, Bebo, Orkut, Cyworld, Imeem, ASmallWorld |
| Virtual worlds[23] | Second Life, Active Worlds, Entropia Universe, Dotsoul Cyberpark |
| Online computer games | World of Warcraft, Tomb Raider, Lineage Ultima Online, Sims Online, Club Pogo[24] |
| Video content or filesharing sites | YouTube, DailyMotion, GyaO, Crackle |

*Source*: Building on OECD, *Information Technology Outlook 2008*, *Chapter 5 - Digital Content and Convergence in Transition*.

## ECONOMIC MODELS AND ROLE OF INTERMEDIARIES IN THE VALUE CHAIN

### Role of Internet intermediaries

Intermediation is the process by which a firm, acting as the agent of an individual or another firm (a buyer or seller), leverages its middleman position to foster communication with other agents in the marketplace that will lead to transactions and exchanges that create economic and/or social value. There are a number of roles that an intermediary can play that lead to the creation of value. They include: aggregation of information on buyers, suppliers and products; facilitation of search for appropriate products; reduction of information asymmetries through the provision of product and transactional expertise; matching buyers and sellers for transactions; and trust provision to the marketplace to enhance transactability.[25]

The main functions of intermediaries have been studied quite widely in literature and can be summarised as follows: [26]

- *To provide the infrastructure*
- *To collect, organise and evaluate dispersed information*
- *To facilitate social communication and information exchange*
- *To aggregate supply and demand*
- *To facilitate market processes*
- *To provide trust*; *and*
- *To take into account the needs of buyers and sellers or users and customers*.

To fulfil these functions over the Internet, different types of intermediaries have developed and include: access and storage providers, marketplace exchanges, buy/sell fulfillment, demand collection systems, auction brokers, virtual marketplaces, as well as search-engines, advertising networks, web aggregators, news syndicators or social networking sites.

The value-added chain is the set of relationships of agents with other agents, the network of upstream and downstream businesses, from raw materials to final sale, through which a product travels. At every stage of processing, an intermediary often performs a service which facilitates this flow – adding value but also adding cost. In many cases, this service is information intensive – matching a buyer to a seller, certifying parties in a transaction, providing support for the transaction (*e.g.* financial services) – and often involves some type of risk sharing. For example, auction e-commerce sites provide trading mechanisms to facilitate market processes, and at the same time provide information and aggregation/matching services by making it known that a given good is on sale, by identifying the tastes of users and signaling when something of interest comes up, by providing means for the buyer to assess the quality or the aspect of the good, the reputation of the sellers, and by providing guarantees to trade safely.

There are often challenges for intermediaries in performing their various functions. For example, there may be challenges For example, there may be challenges in balancing the request for personal information in order to offer personalised services with the need to safeguard individual rights, in particular the right to privacy and the protection of personal data. There may also be challenges to ensure there is sufficient

investment in infrastructure to meet network capacity demands, while maintaining the openness that has characterised the Internet's success to date. A related issue is how best to stimulate "creative destruction"[27] and innovation in communications infrastructure, while at the same time creating an environment that supports investment. There may also be challenges between ease of use and transparency / disclosure for consumer protection. Taking advantage of the benefits of cloud computing while mitigating the security and privacy risks of having so much online information under third party control is another important challenge, as is enhancing network security while enabling access to the information that users demand and allowing unexpected innovation at "the edges."

**Network externalities**

By nature new Internet services create network externalities (or network effects) such that the benefits from using the service increase as diffusion spreads. In other words, the value that one user receives from a product increases with the number of other users of that product. Once a critical mass of users is reached, a virtuous process of demand for the service is initiated.

Therefore, building a critical mass of users is crucial to most Internet intermediary business models. In addition to network externalities, many intermediary platforms benefit from increasing economies of scale (unit costs decrease as sales increase). Internet access and service providers for example have significant network externalities and large economies of scale. The economic models of search engines and participative networked platforms or online auction sites also tend to rely on volume impact, distributing electronic content and services at low marginal cost and high unit margins.

Non-rivalry (one person's consumption does not limit or reduce the value of the product to other consumers) is another characteristic of many intermediary markets. Combined, these factors can tend to lead to *'winner-take-most'* markets, creating powerful incumbents and tending away from perfectly competitive markets.

Advertising is an important driver for content and services that are available at no or little direct cost on the Internet, as are, to a lesser extent, ancillary service fees and premium product sales with higher margin returns. On the Internet, intermediary platforms are willing to provide services to their users at no monetary cost in order to generate the audience to attract advertisers, to attract sellers, or to be able to offer premium paid services. Consistent with this trend, economic research on network externalities has been complemented by the analysis of intergroup externalities present in two-sided markets.[28]

**Two-sided markets**

Two-sided markets are economic networks having two distinct user groups that provide each other with network benefits. Examples include Internet search engines and portals – composed of advertisers and users; retail e-commerce platforms – composed of buyers and sellers; or payment networks – composed of cardholders and merchants. Benefits to each group exhibit demand economies of scale. Consumers, for example, prefer credit cards honoured by more merchants, while merchants prefer cards carried by more consumers (Table 3 provides additional examples).

**Table 3. Examples of Internet intermediary two-sided market business models**

| Examples of products/services | Group 1 (often loss leader group) | Group 2 (often profit-making group) |
|---|---|---|
| **Internet access and service providers** | Peering partners (possibly) | Subscribers or transit providers (possibly) |
| **Web hosting and data processing providers** | | |
| Example: streaming media software | Consumers | Servers |
| **Internet search-engines and portals** | Users | Advertisers |
| **E-commerce platforms** | | |
| Example: retail e-commerce platforms | Buyers | Sellers |
| **Internet payment networks** | | |
| Example: credit cards | Cardholders | Merchants |
| Example: mobile payment providers | Payers | Payees |
| **Participative networked platforms** | | |
| Example: social networking sites | Users | Advertisers |
| Example: blogs | 'Eyeballs' | Advertisers |
| Example: online games | Gamers | Game developers |
| Example: Wikipedia | Users | Donations / Foundations |

A market is two-sided if at any point in time there are: *i)* two distinct groups of users; *ii)* the value obtained by one type of user increases with the number or with the 'quality' of the other kind of users; and *iii)* an intermediary platform is necessary to internalise the externalities created by one group for the other group. Two-sided markets result in intermediaries that supply both sides of the market, that adopt particular pricing and investment strategies to get both sides of the market to participate, and that adopt particular pricing and product strategies to balance the interests of the two sides.[29] In a two-sided market, an intermediary platform internalises the inter-group network externalities, *e.g.* the fact that the volume of advertising generated by a search engine depends on the number of users on the other side (Box 3).

**Box 3. Characteristics of two-sided markets**

*The need to get both sides of the market to participate*: To succeed, intermediaries in industries such as software, portals and media, payment systems and the Internet, must "get both sides of the market on board."

*Pricing strategies and balancing interests*: even with both sides "on board," intermediaries need to carefully balance their two demands and consider how price changes on one side of the market may impact the other side.

*Multihoming*: most two-sided markets seem to have several competing two-sided firms and at least one side appears to multihome, *i.e.* to use more than one provider. For example, many merchants accept both American Express and Visa; furthermore, some consumers have both Amex and Visa cards. B2B exchange members may buy or sell their products or services on several exchanges, with competitive prices on one market then depending on the extent of multihoming on the other side of the market.

*Source*: Adapted from Caillaud, B. and Jullien, B.[30]

In a two-sided network, members of each group have a preference regarding the number of users in the other group, known as cross-side network effects.[31] Cross-side network effects are usually positive (*e.g.* consumers often prefer retail sites with more products and prefer payment systems supported by more merchants), but can also be negative (*e.g.* consumer reactions to large quantities of advertising). Each group's members may also have preferences regarding the number of users in their own group, known as

same-side network effects. Same-side network effects may be either positive (*e.g.* the benefit from social networking with a larger number of people) or negative (*e.g.* to exclude direct rivals from advertising on the same keywords).

In two-sided networks, users on each side typically require very different functionalities from their common platform, which means the platform incurs different costs in serving the two groups of users. With search engines, for example, users require efficient relevant search functionality and potentially other services such as e-mail, etc. Advertisers, on the other hand, may require software and services to help them determine relevant keywords, to place auction bids on keywords, to create ads, manage spending, process transactions, etc.

Value chains of two-sided networks also differ from traditional value chains on the revenue side. A key strategic issue for most Internet intermediaries operating in two-sided markets is to find an optimal pricing structure, *i.e.* the division of revenues between the two sides of the market that gets both sides to participate. The 'chicken and egg' problem – a platform must have a large installed base of content, products or services to attract users, but advertisers will only pay to finance programmes if they are sure to reach many users – means that the optimal price system can often be to subsidise one side of the market to attract users on the other side, treating one side as a profit center and the other as a loss leader (Table 3).

Intermediary platforms generally subsidise the more price sensitive user group (*e.g.* consumers) or the user group that adds platform value (*e.g.* developers of applications for the iPhone who increase the value or functionality of the network), and charge the side whose demand increases most in response to growth on the other side. Which market represents the profit-making side and which market represents the loss-leader side depends on the tradeoff between increasing network size versus growing network value.

**Revenue models**

As mentioned previously, various Internet intermediaries use different business models including advertising, paid subscriptions or renting hosting space, charging for premium services, commission fees, voluntary donations, or combinations of these business models.

In addition, more complex producer-consumer models are emerging where the intermediary platform providers may have one revenue stream but the producer-consumers have another and there is a symbiotic relationship between the two. Examples might include application developers on Facebook, vendors in Second Life, mod-makers in World of Warcraft, or individuals licensing photographs via Flickr.

***Advertising model***

The Internet advertising model is an extension of the traditional media broadcast model whereby the intermediary provides content and services for free alongside advertising or branding/co-branding messages. This model works best when the volume of viewer traffic is very large or very specialised (*e.g.* a search query). The following business model categorisation builds on previous OECD work on digital content.

- *Search advertising* involves advertisers bidding on keywords that affect the position of their text ads on the user's results page. This model was pioneered by Google.

- *Display ads* are advertisements in text image or multimedia format, on portals such as Yahoo! or specialised websites. In some cases, ad servers analyse the content of web pages and automatically deliver advertisements that they consider relevant to users.

- *Classified ads* are listings of certain products or services on a webpage, *e.g.* Craigslist.

- *E-mail advertising* consists of ads delivered through any type of electronic mail and may take a variety of forms including links, banner ads or advertiser sponsorships placed within an e-mail message.

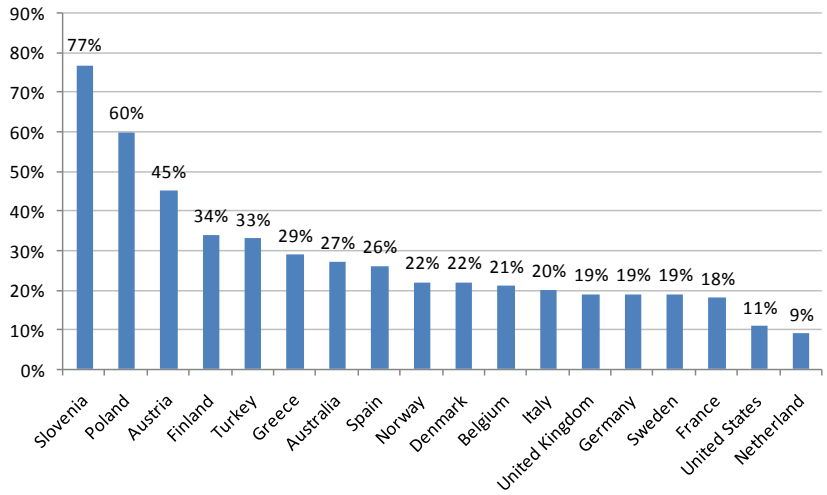
- *Referrals* are a method by which advertisers pay fees to online companies that refer purchase requests (such as shopping comparison sites) or provide customer information. For example credit card companies often invite their customers to receive commercial messages from "affiliated merchants" such as rental-car companies via e-mail or may ask their customers permission to share some information, such as contact information, with selected "commercial partners."

- *Selling user data* involves the sale of anonymous or non-anonymous information about users to market research and other firms.

*Online advertising sector size*

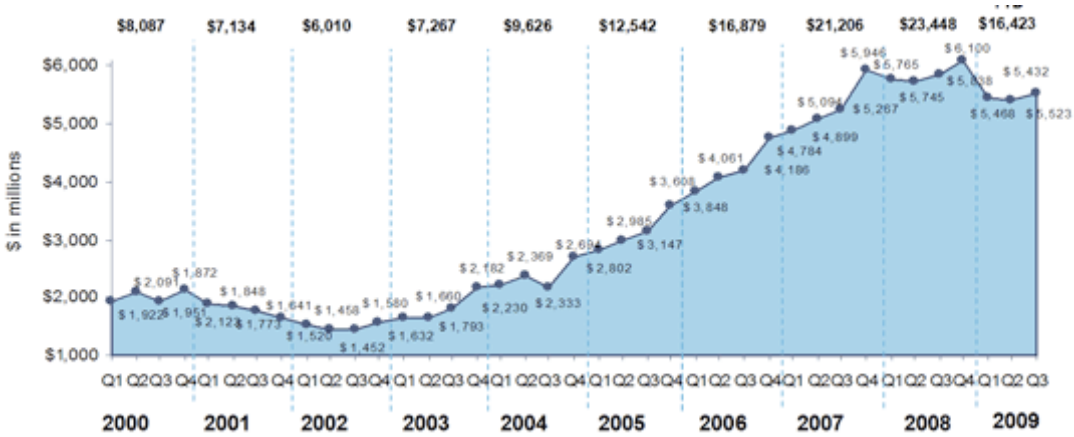
The Interactive Advertising Bureau (IAB) estimated that the worldwide online advertising market was worth over USD 51 billion in 2008, representing over 10% of total advertising.[32] Online advertising growth outperformed overall advertising growth significantly with double digit growth rates from 2003 to 2008. In 2008 the European online advertising market was worth USD 18 billion (EUR 12.9 billion) growing 20% compared to 2007. In the United States, online advertising grew 10.6% in 2008 to USD 23.4 billion. In Australia, online advertising grew 27% from USD 1.3 billion to USD 1.7 billion.[33] While the overall figure is one of growth, the online sector was not immune to the economic crisis and experienced challenging years in 2008 and 2009, particularly in the most mature markets. Online advertising decreased in 2009, but much less so than all other advertising segments (Figures 2 and 3).

**Figure 2. Online advertising, total growth by country from 2007 to 2008 (selected countries), billions**




*Source*: IAB Europe and PWC, IAB U.S. and IAB Australia, 2009.

**Figure 3. Quarterly revenue from online advertising in the United States, 2000-2009**

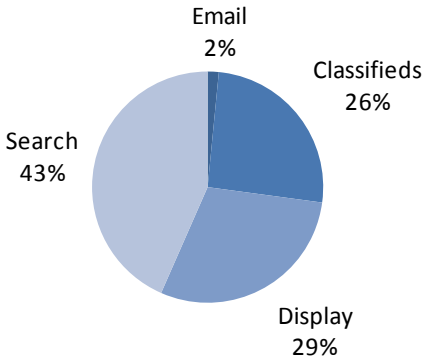



*Source*: Interactive Advertising Bureau (IAB), US, 2010.

The benefits of online advertising are several. Technologies are improving, with for example ads increasingly embedded in the context of free-hosted online video. Rate models are attractive to advertisers who pay for actual prospects or even for actual sales, providing accountability and flexibility. In addition, automation of ad management is increasingly opening up the online ad market to small and medium-sized businesses. There is still a gap between the time that users spend online and the amounts spent on online advertising, which indicates likely sustained growth.

Search ads are the most popular form of online advertising, mostly due to the dominance of search engines as entry portals for Internet users, followed by display ads and classifieds (Figure 4).

**Figure 4. Online advertising formats in Europe, 2008 (billion EUR)**




*Source*: IAB Europe / PWC.

The concentration of online advertising revenue is high but similar to that in traditional media. The top 50 domains account for 91% of ad expenditure in North America, with the top 10 combined enjoying 70% of this revenue. The entry of new high-traffic participative networked platforms into the online advertising market, in particular MySpace and YouTube, is providing competitive pressure because advertisers can turn to new suppliers for advertising inventory. And low entry barriers for creators and dramatically reduced transaction costs for advertisers are slowly creating a long tail of small content producers that are capable of participating in the advertising industry through revenue-sharing schemes.[34]

***Fee models***

Users are charged a periodic — daily, monthly or annual — fee to subscribe to a service. Providers often combine free data or services with "premium" (*i.e.* subscriber- or member-only) data or services. In some cases, services are metered *i.e.* based on actual usage rates. It should be noted that subscription and advertising models are frequently combined.

- *Monthly subscriptions*: ISPs offer network connectivity and related services, often on an 'unlimited' monthly subscription. Web hosting providers also often provide specified amounts of data storage capacity on a subscription basis. In two-tiered subscription services users can opt for a "basic" account free of charge or for a paid "pro" account with advanced features.

- *Usage charges*: Some services are based on metering actual usage rates, or combine monthly subscriptions with metering usage rates, in particular on mobile networks.

- *Item charges*: In the pay-per-item model, users make per-item payments to access content, services or software. Paid services are very common on mobile networks. Some intermediaries on the fixed web manage to generate revenue from paid services, such as Meetic, an online dating website.

Information on the size of fee model markets is provided in the sections on market developments in the Internet access and service provider sector and in the Data processing and web hosting sector.

***Brokerage model***

Brokers are market-makers: they bring buyers and sellers together and facilitate transactions. Brokers play a frequent role in business-to-business (B2B), business-to-consumer (B2C), or consumer-to-consumer (C2C) e-commerce markets. Usually brokers charge a fee or commission for each transaction that they enable. The formula for fees can vary. Brokerage models include:

- *Commission on transaction*: Auction platforms, price comparison websites and other intermediary e-commerce platforms often charge sellers a commission based on the value of the transaction fees and/or listing fees. Online financial intermediaries or transaction brokers which provide third-party payment mechanisms for buyers and sellers to conduct financial transactions also charge a commission on transactions.

- *Membership fees*: Marketplace exchanges often charge membership fees and offer a full range of services covering the transaction process, from market assessment to negotiation and fulfillment.

Information on the size of fee model markets is provided in the sections on market developments in web e-commerce platforms and payment systems.

***Voluntary donations / community models***

Content creators (in particular, for user-created content) often make content freely available while intermediary platforms solicit donations. Community models are based on user loyalty whereby their users have a high investment in time and emotion. Revenue can be based on the sale of ancillary products and services, voluntary donations, or advertising and subscriptions for premium services. Although business models are still in flux, the rise of social networking shows that the Internet is well suited to community models.

- *Open Content*: content or software are developed collaboratively by communities of contributors on a voluntarily basis, such as on the Wikipedia website or social networking sites. In general, open licensing regimes such as the Creative Commons licence have helped open content models.[35]

- *Voluntary donations*: Content creators make the content freely available but intermediary platforms solicit donations from users to fund *e.g.* infrastructure and operational expenses. For example, blogging and citizen journalism sites such as Global Voices Online are supported by bloggers who provide content; operating expenses are funded by grants from foundations or in some cases by news companies.[36]

On the economic side, the notion of complementarities is important in community based models, with many goods being created to "complement" other goods, such as an edit on Wikipedia that builds on previous input. Transaction-based markets are the basis for many economic statistics, but community models imply that creation of value can be for free, for profit, or using a barter arrangement and not necessarily quantifiable.

## DEVELOPMENTS IN INTERNET INTERMEDIARY MARKETS

This section proposes to highlight competitive market conditions and the pace of change for the main Internet intermediary sectors identified. It should be re-emphasised that the speed at which some business models evolve on the Internet and their technical complexity sometimes means that reaching stable, established business practices is difficult. In parallel, the blurring of boundaries between what national statisticians classified as separate activities and the creation of new areas of activity that are not necessarily based on transactions make measurement particularly challenging.

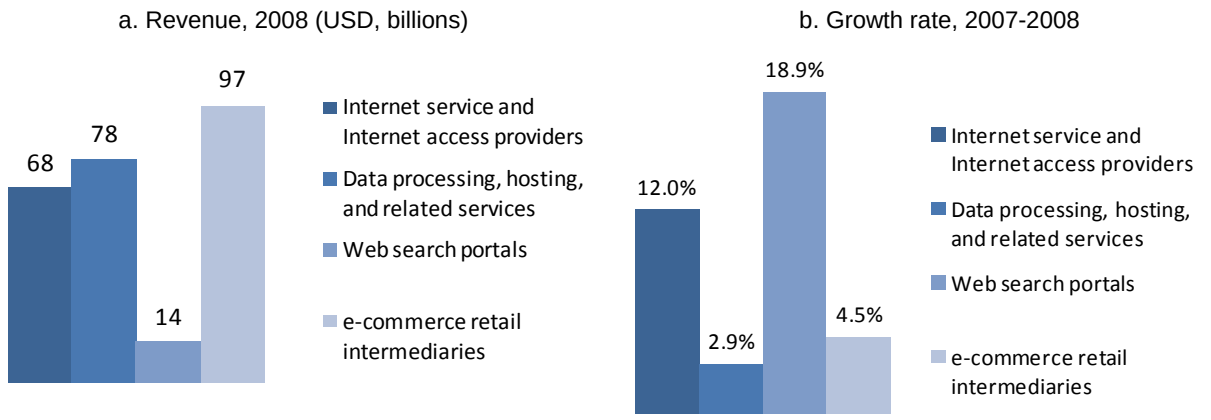
**Box 4. Revenue in Internet intermediary sectors in the United States in 2008 as a case study**

U.S. Census data on revenue in intermediary sectors in the United States show that ISPs represented about USD 68 billion in 2008 (up 12% from the previous year) and data processing, hosting, and related services represented USD 78 billion (up 2.9% from the previous year). While Web portals represented only USD 14 billion in 2008, their growth rate from the previous year was an impressive 19%. These data add up to ball park revenue of about USD 260 billion in 2008 (excluding wholesale). As to e-commerce retail intermediaries, they generated revenue of nearly USD 100 billion in 2008, up 4.5% (Figure 5). Additionally, it can be estimated that e-commerce wholesale intermediaries generated over USD 400 billion in 2008.

These intermediary sectors represent roughly 1.4% of GDP value added in 2008. To put this number in perspective, the value added of the information sector as a whole represented some 4.4% of total GDP value added in 2008. Financial intermediation in the United States represented some 3.6%, while real estate intermediation represented less than 1% of GDP value added in 2008.[37, 38]

It should be further noted that while e-commerce revenue in selected service industries totaled over USD 120 billion, they are not included in the total 1.4% for 'Internet intermediary sectors' in the present report because the data does not differentiate services sold by intermediary platforms from services sold by firms who take title to the services they sell. In addition, double counting is a concern.[39] Similarly, data on manufacturing e-shipments do not differentiate revenue from intermediary platforms and is not included.

**Figure 5. Revenue in Internet intermediary sectors in the United States, 2008**




*Source*: U.S. Census Bureau, 2010.

Note: Internet services and Internet access providers include Internet access services by wired and wireless telecommunications carriers, and cable providers.

The OECD tracks the top 250 information and communications technology (ICT) firms for its biennial publication entitled the *Information Technology Outlook*, by monitoring the annual reports of these firms. Firms in the list are categorised by sector and dominated by large electronics and

telecommunications firms. Telecommunications firms generally have ISP activities alongside voice but these activities are not separated in the context of the *Information Technology Outlook*. However, firms tracked also include an 'Internet' sector which consists of firms earning their revenue from Internet-based activities without being members of any of the other ICT firm categories (pure-play Internet companies). Many of these firms are considered 'Internet intermediaries' in the present report (Figure 6).[40]

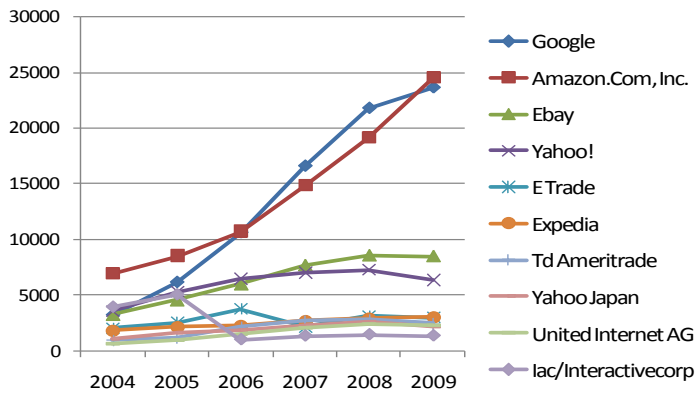
### The impact of the economic crisis on Internet intermediary markets

Recent analysis of the impact of the economic crisis on ICT has shown that the fate of Internet intermediary markets depends on factors that are slightly different from other sectors.[41] In particular, evidence is emerging that business models based on online advertisement (Google, AOL, Yahoo!, IAC) in the Internet sector suffered much less from the crisis than business models based on traditional forms of media advertisement, as it acts as a catalyst for the transfer of advertising to the online market. Online transactions continue to grow as a share of total retail purchases (*e.g.* Amazon, eBay, Expedia). And growth in broadband and mobile data subscriber numbers continues. Slower overall growth in some sectors can benefit Internet companies as consumers look for better deals on-line and advertisers focus on online advertising. This has encouraged further consolidation of companies and offerings and benefited the most successful firms, *e.g.* Amazon for cloud computing and online retailing, Google for online advertising, or Apple for digital content. It should be pointed out that these trends do not necessarily represent OECD member countries as a whole.

**Figure 6. Revenue of top pure-play (non-ISP) Internet firms**

USD millions in current prices

a. Revenue of top 10 Internet firms, 2004-2009




b. Revenue of top 30 Internet firms, 2009

| | | | |
|---|---|---|---|
| **Amazon (US)** | **24,509** | **GMO internet (JP)** | **402** |
| **Google (US)** | 23,644 | Stream Co. (JP) | 306 |
| **Ebay (US)** | 8475 | Asos (UK) | 303 |
| **Yahoo! (US)** | 6304 | Blue Nile (US) | 265 |
| **Expedia (US)** | 3011 | Liquidity Services (US) | 235 |
| **E Trade (US)** | 2978 | The9 Limited (CN) | 209 |
| **Td Ameritrade (US)** | 2423 | Adlink Internet Media (DE) | 193 |
| **United Internet AG** | 2320 | U.S. Auto Parts network | 174 |
| **Yahoo Japan (JP)** | 2154 | Dmail Group Spa (IT) | 161 |
| **Netflix (US)** | 1634 | Shutterfly (US) | 154 |
| **Iac/Interactivecorp** | 1345 | Start Today (JP) | 103 |
| **Findel (UK)** | 1131 | Internet Brands (US) | 96 |
| **Manutan (FR)** | 735 | Dreamnex (FR) | 92 |
| **Valueclick (US)** | 527 | Buch.De Internetstores | 91 |
| **Rue Du Commerce** | 468 | Internet Group (PL) | 69 |

*Source*: OECD Information Technology Outlook database.

Nevertheless, the economic crisis had some impact on Internet intermediary firms. The picture in 2009 was mixed, with Amazon and Google continuing to post positive growth while for others revenues stagnated or declined. In the retail segment, while Amazon posted double-digit year-on-year growth of 28% in 2009, eBay's revenues stagnated. In the online advertising segment, Google reported 8.5% growth in 2009 (down from 31% a year earlier), compared to negative growth of -12% for Yahoo (down from 3.4% the previous year).

### Internet access and service provider sector

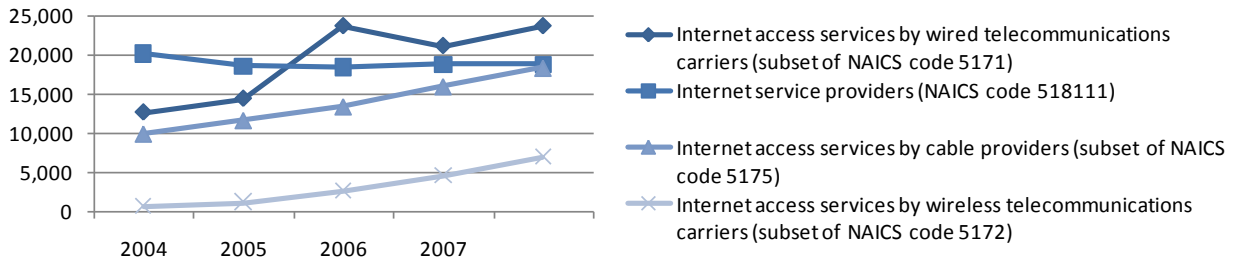
Internet users worldwide reached 1.7 billion at the end of September 2009, meaning that over a quarter of the world's population was using the Internet. China represented the largest Internet audience in

the world with 360 million Internet users, followed by the United States (230 million), Japan (100 million), Germany (54 million) and the United Kingdom (47 million).[42] Drivers for the Internet access and service provider sector include digital content and applications, faster broadband connections and increasingly, mobile broadband. The market for Internet access and service provision was extremely competitive, with low margins. Despite growth in the number of Internet users, employment in the Internet access and services sector is projected to decline.[43] As the industry continues to consolidate, and smaller numbers of providers service larger portions of Internet users, fewer workers are needed to meet the needs of the industry.

### *Wired Internet access and broadband*

Internet access represented a growing segment of telecommunications and cable providers' revenue. In the United States in 2008, revenues from Internet access providers were roughly equal amounts for 'pure-play' ISPs, wired telecommunications operators and cable providers (Figure 7). Data show high growth rates for telecommunications operators and cable companies from their Internet access services. For example, revenues from Internet access contributed about a quarter of revenues of companies such as NTT in Japan or Bell Canada in 2008, *i.e.* about as much as mobile voice or as fixed voice. More telling is the upward trend in data revenues – both fixed and mobile – compared with slower gains in mobile voice and declines in the fixed voice segments.

**Figure 7. Revenue of Internet services and access providers in the United States, 2004-2008 (USD, millions)**




*Source*: U.S. Census Bureau, Service Annual Survey and administrative data, 2010.

Broadband Internet use continues to grow, partly at the expense of dial-up connections. In OECD countries, broadband penetration (*i.e.* broadband subscribers per 100 inhabitants) reached 276 million subscribers in June 2009, or the equivalent of 22.8 subscribers per 100 inhabitants.[44] Although growth lost momentum during the economic crisis, investments in broadband networks – partly stimulated by economic recovery packages in OECD countries – were expected to benefit Internet broadband.[45]

### *Mobile Internet access*

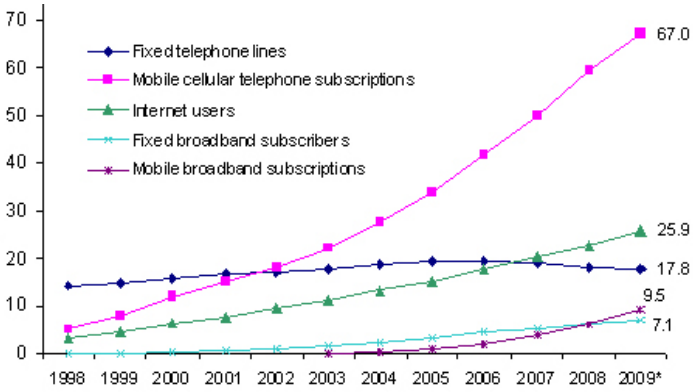
Mobile phones numbered more than 4.6 billion worldwide by the end of 2009 with recent growth taking place in the developing world.[46] Indeed, many developing economies were leapfrogging their OECD counterparts in terms of SIM card ownership (Figure 8 a).

**Figure 8. Mobile phone subscriptions and Internet users, billions**

*a.* Mobile phone subscriptions, billions, 2000-2008

*Source*: World Bank; ITU (Note: * OECD members).

*b.* Global ICT developments, per 100 inhabitants, 1998-2009




*Source*: ITU World Telecommunication/ICT Indicators Database. *2009 data are estimates.

Growth in mobile broadband subscribers was significant in markets where data are available.[47] Data from the ITU showed that mobile broadband subscriptions overtook fixed broadband subscribers in 2008, highlighting the huge potential for the mobile Internet. Figure 8 b shows estimates of numbers of mobile broadband compared to fixed broadband subscriptions worldwide from 1998 through 2009. Mobile broadband, rather than voice minutes, was a main growth area in the mobile market as subscribers upgraded to 3G. Data collected by the European Commission estimated that in January 2009 there were over 90 million 3G mobile users in the EU, representing 15.5% of total mobile operators' subscribers. In Europe, 3G mobile users exceeded 20% of total subscribers in Italy, Australia, Sweden and the United Kingdom.[48] It is noteworthy that Japan, Sweden and Australia have mobile broadband coverage of 100% or nearly 100%; higher than the coverage of fixed broadband.[49]

The revenue models for mobile broadband data are still in flux with no dominant business plan emerging yet. Many operators still charge users by the megabyte for data traffic and these prices are often high. In other cases, operators have chosen flat-rate plans for mobile broadband but control excessive usage with low data caps. Operators face a difficult pricing challenge where setting prices too low will reduce network quality for all and setting prices too high will leave the frequencies unused. Nevertheless, mobile broadband access is expected to continue to be a major source of revenue growth.[50]

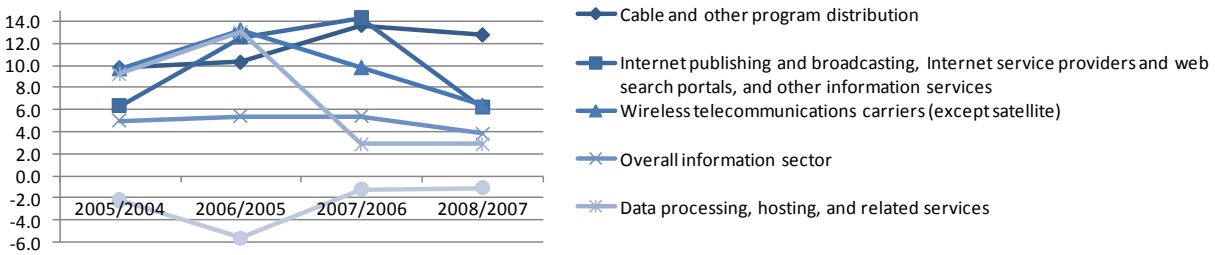
### Data processing and web hosting sector

Drivers for the data processing and web hosting provider industry include faster processing at lower prices, broadband diffusion, which enables remote services hosting for applications, and the trend towards outsourcing IT. Managed hosting firms, such as NaviSite, Easyspace in the United Kingdom, OVH in France, China Unicom, ThePlanet.com, Peak10, Equinix, Savvis, Bluehost Web hosting, Rackspace, and others, usually depend on web hosting revenue and provide software as a service (SaaS) in addition. Frequently 80% of their facilities (by volume) are collocation, *i.e.* sharing a host web server, for which there has been increasing demand.

Managed hosting firms have also benefited from the trend toward outsourcing selected IT functions to outside entities. Increasingly, the trend is towards 'cloud computing' whereby providers such as Amazon, Salesforce.com, or Microsoft help corporate clients use the Internet to access everything from extra server space to software that helps manage customer relationships. 'Cloud computing' encompasses several areas, including software as a service, a software distribution method pioneered by Salesforce.com early 2000. It also includes hardware as a service; a way to order storage and server capacity on demand. All cloud

computing services are delivered over the Internet, on demand, from massive data centers. Analysts predict continued very high growth for cloud computing. For example, in a May 2008 report, Merrill Lynch estimated that 12% of the worldwide software market would go to the cloud by 2013.

**Figure 9. Yearly growth rates in the information sector in the United States, 2004-2008**

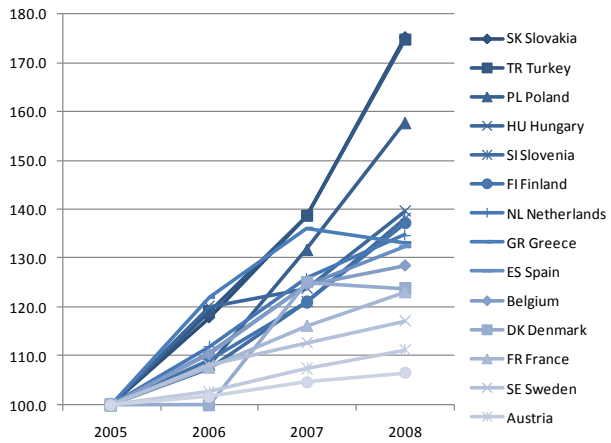



*Source*: US Census Bureau, 2010.

Revenue in the 'data processing and web hosting provider' sector in the United States grew at just 3% annually between 2006 and 2008, after rapid growth (13%) between 2005 and 2006 which followed the troubled dot-com bust period (Figure 9). Index data for European markets seems to show that growth in the Slovak Republic and Turkey (20% annual growth rates between 2005 and 2008) was particularly high, followed by Poland, Hungary, Slovenia and Finland, which experienced growth rates of between 12% and 16% (Figure 10). Countries such as France or Sweden that already had high penetrations of web servers in the base year, 2005, experienced slower growth (Figure 10).

**Figure 10. Index of total turnover: data processing, hosting and related activities; web portals**

Selected European countries, 2005-2008 (base year 2005)

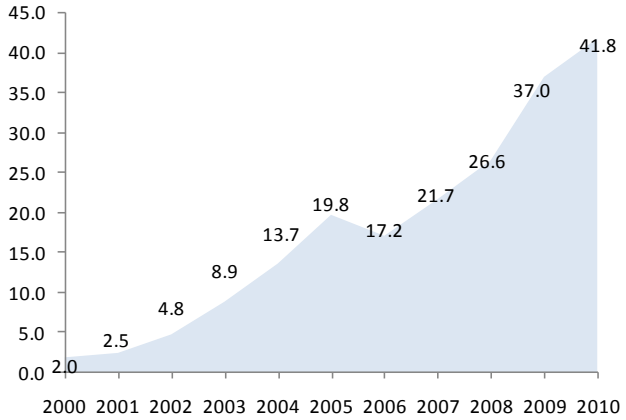



*Source*: Eurostat

As proxies of the global market growth in the web hosting market, web servers worldwide have grown from 2 million in 1998 to 42 million by early 2010 (Figure 11 a). These servers help enable more than 175 million websites to form the world wide web. As to domain names, registrations increased from 25 million in 2000 to 187 million by the end of the third quarter of 2009. Over the past ten years, since the creation of ICANN in 1998, the registrar market for domain name registrations has become highly competitive, with the top 20 gTLD Registrars accounting for over 75% of the market in 2009 and the top four some 50%. Go Daddy is a leading player, accounting for over a quarter of the market and no other registrar accounts for more than 10% (Figure 11 b.).

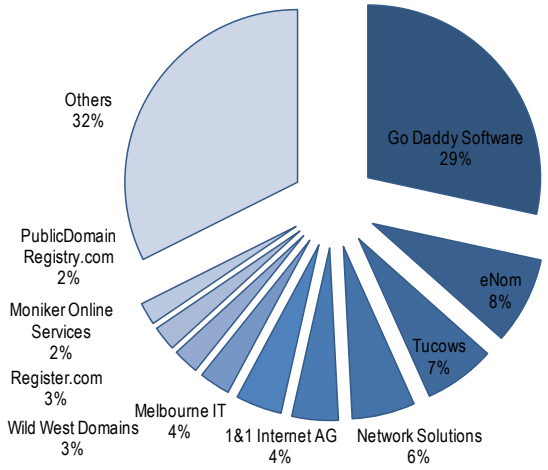
**Figure 11. Internet supporting infrastructure**

*a.* Number of web servers, world, 2000-2010, millions




*Source*: Security Space, 2009.

*b.* Domain name registrars' market share, 2009, at mid-year




*Source*: RegistrarStats.com, 2009.

## Internet search engines and portals sector

Growth in the Internet search engine and portals sector results from business and consumers demand for more efficient search functions for both information and entertainment, and the expanding array of services continued to be offered by web search portals. Major products are search portals and websites devoted to news, sports, entertainment, gaming, networking, and other topics with advertising as the primary source of revenue. The profitability of individual companies depends on their ability to deliver relevant information to consumers and to offer advertisers desirable target markets. Large companies enjoy economies of scale in marketing and in their ability to develop and maintain multiple websites as well as networks of partner sites. Smaller companies can compete by focusing on niche markets.

The global search market grew 46% in 2009, as both highly developed and emerging markets posted strong growth that led to more than 131 billion searches in December 2009. Revenue for web search portals in the United States in 2008 was USD 14.3 billion, growing from USD 12 billion in 2007. About 72% of revenue in 2008 was from online advertising. Limited turnover data is available for this sector in Europe or in other OECD countries.

The search engine segment of the industry is highly concentrated: the top 5 companies account for over 90% of the market. Worldwide, Comscore data from early 2010 showed that in December 2009 Google's search share represented 66.8% of the 131 billion searches per month (*i.e.* 87 billion searches), followed by Yahoo! at 7.2%, Baidu (China) at 6.5%, Microsoft at 3.1%; and NHN Corporation (Naver.com, Korea) at 1.6% (Figure 12 a). In the United States, Google represented 65.7% of the 22 billion searches per month in December 2009 while Google's next closest competitor, Yahoo!, received about 17.5% of the monthly search traffic.

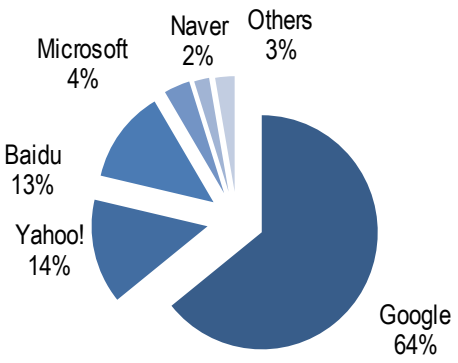
While Google is by far the leading search engine worldwide, competition continues apace, particularly in Asian markets. In the Asia-Pacific region overall, gaps between search engines' share appear to be relatively smaller. Comscore data from September 2009 showed Google's search share at 44.1%, followed by Baidu at 21.3% and Yahoo! at 13.8%. Korea's NHN Corporation captured the fourth

ranking with a 5.1% market share, ahead of Microsoft (2.8%), Lycos Sites (2.6%) or Alibaba.com Corporation (2.5%).[51]

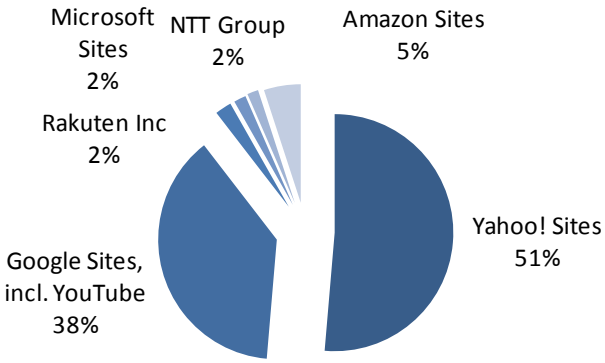
In Japan for example, Yahoo! and Google, each control a significant share of the market. The Japanese market is important as Japan has the third largest Internet population in the world (Figure 12 b). In addition, Yahoo! and Microsoft have recently proposed a partnership whereby Yahoo! would use Microsoft's Bing search engine and advertising server. The combined search market share of Yahoo and Microsoft in the United States would approach 30%, helping the new Bing search engine to gain market share. Yahoo! expected to be able to focus its resources on high traffic portal and e-mail pages.

**Figure 12. Main search actors, Worldwide and Japan**

*a.* Share of total searches worldwide in December 2009




*b.* Share of total searches in Japan in January 2009




*Source*: Comscore, 2010.

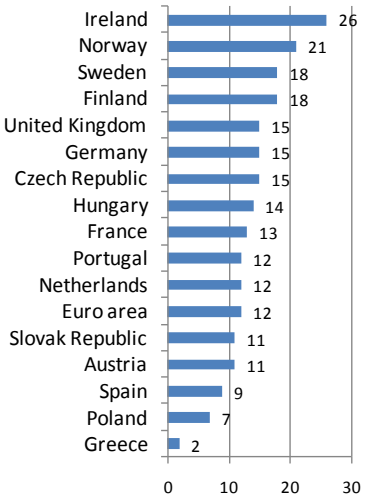
Note: excludes searches from public computers or access from mobile phones or PDAs.

## Web e-commerce sector

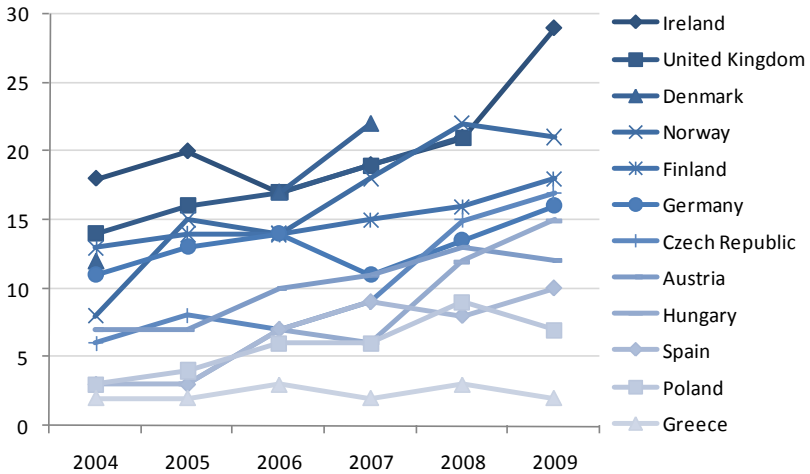
Online transactions have become mainstream in OECD countries. By 2009, they accounted for almost 30% of enterprises' total turnover in Ireland (Figure 13 b). The portion of e-commerce purchases and sale was also very high in the other Nordic countries, at over 18% in Norway, Sweden and Finland (Figure 13 a) and in the United Kingdom, where e-commerce purchases and sales accounted for 15% of the total in 2009. Varying levels of consumer confidence across OECD countries can explain part of the differences in levels of e-commerce activity across OECD countries.

**Figure 13. E-Commerce in Europe, selected countries**

*a.* Value of e-commerce purchases and sales, 2009*




*b.* Percentage of enterprises' total turnover from E-commerce, 2004-2009**



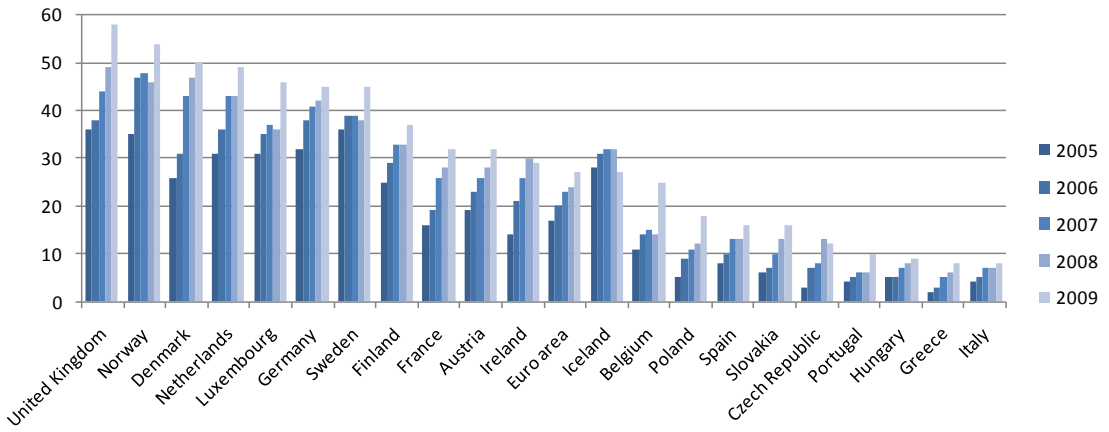

Note: The indicator is calculated as the enterprises' receipts from sales through the Internet as a percentage of the total turnover. Sales through other networks are not included, leaving out EDI-based sales. Only enterprises with 10 or more employees are covered. The year given relates to the survey year. * NACE Rev. 2, e-commerce includes Internet and/or networks other than Internet ** NACE Rev. 1.1.

*Source*: Eurostat, 2010.

### *B2C retail e-commerce*

Reported growth rates for online retail e-commerce in Europe were higher than expected in 2008. Available data from Eurostat shows that growth in retail trade 'via mail order houses or via Internet' was much higher than growth in total retail trade, and highest in Poland and Greece (Figure 15). According to Eurostat, over 37% of individuals in the EU27 area shopped on the Internet in 2009 (Figure 14). About two thirds of individuals in Norway, the United Kingdom, Denmark, the Netherlands and Sweden shopped online. Research firm IDATE explains the trend towards increased e-commerce during the economic crisis by the facts that sales are shifting away from stores, that the number of new online shoppers is rising, and that online shoppers are less sensitive to adverse economic conditions than the average European consumer. Another research firm, Forrester research, projects that Europeans will spend an annual average of EUR 942 per person in 2009.[52]

**Figure 14. Individuals who ordered goods or services, over the Internet, for private use, in the last 3 months, percentage of the population, 2005-2009**




*Source*: Eurostat, 2010.

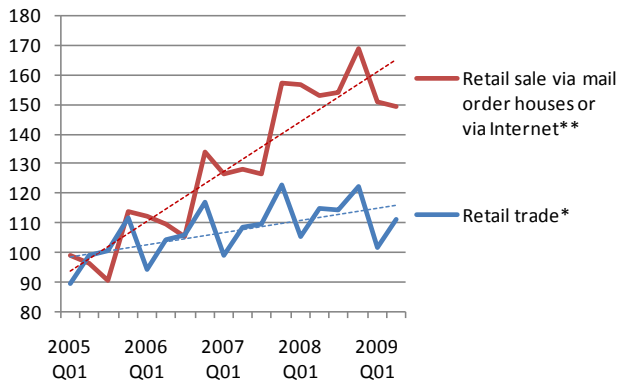
**Table 4. Online turnover and spending in selected European countries (estimates)**

| Country | Turnover in B2C commerce, in EUR (2007) | Average spend per capita in 2007, in EUR |
|---|---|---|
| United Kingdom | 62.6 billion | 1026 |
| Germany | 19.3 billion | 234 |
| France | 16.1 billion | 251 |
| Italy | 6 billion | 108 |
| The Netherlands | 5.0 billion (2008) | 312 |
| Spain | 3.1 billion | 76 |
| Sweden | 1.8 billion | 204 |
| Belgium | 1.2 billion | 118 |
| Poland | 76 million | 1.9 |

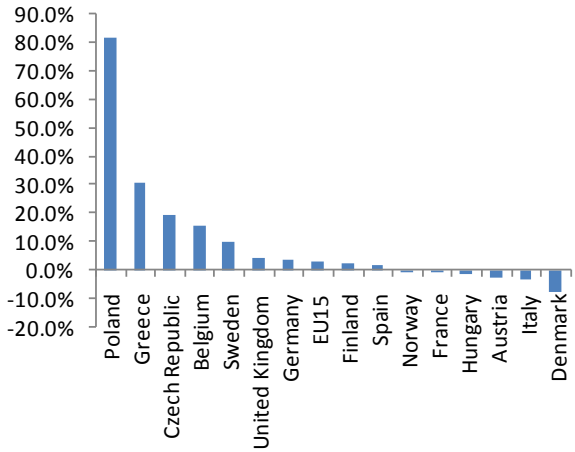
*Source*: Innopay, based on The Paypers: Online Paypers vol. 1, issue 6., IMRG.

**Figure 15. Turnover from retail trade via mail order houses or via Internet in Europe**

*a.* Average growth in retail trade via mail order houses or via Internet compared to total retail sales, quarterly data (2005=100)




*b.* Growth of retail trade via mail order houses or via Internet by country in 2008



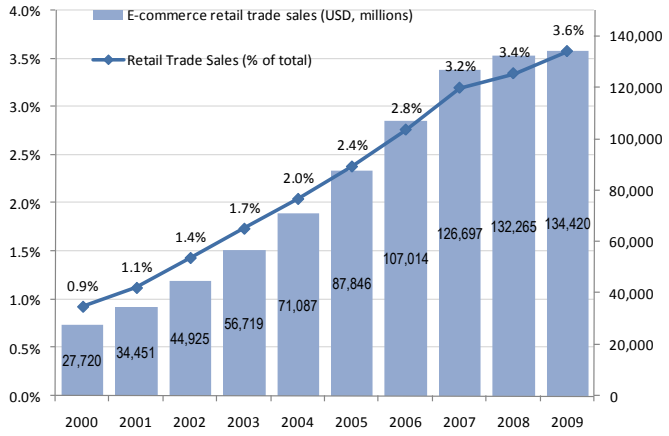

Note: Average for Austria, Belgium, Czech Republic, Denmark, Spain, Finland, France, Greece, Hungary, Italy, Norway, Poland, Sweden, Turkey, and the United Kingdom. *NACE Rev 2 Code G47 Retail trade, except of motor vehicles and motorcycles / ** NACE Rev 2 Code G479.

*Source*: Eurostat.

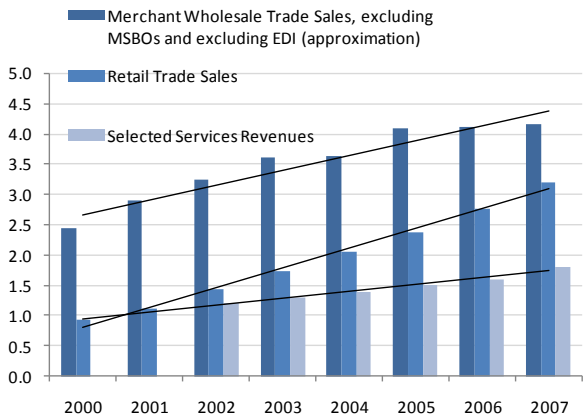
In the United States, official data shows rapid annual growth in e-retail has slowed after 2007 (Figure 15 a). In 2008, online retail sales totaled USD 133 billion, up 5% from the previous year. Online retail sales in 2009, at USD 134 billion, were up a mild 1.6% compared to 2008, and e-commerce still grew as a share of overall retail sales.[53] As a share of total retail sales, retail e-commerce sales in the United States remained modest, at 3.6% of total retail by the third quarter of 2009, up from 3.4% in 2008.

**Figure 16. E-commerce in the United States**

*a.* E-commerce retail trade sales, value and % of total retail trade sales, 2000-2009




*b.* E-commerce as a % of wholesale trade,* retail trade and selected services




* Note: Evidence from Merchant Wholesalers indicates that B-to-B e-commerce relies on proprietary Electronic Data Interchange (EDI) systems, with data showing this reliance at about 75% in 2006 and 2007. To approximate non-EDI e-commerce transactions for 2000-2005, for illustration purposes, it is considered that non-EDI amounts to 25% of actual revenue per year.

*Source*: U.S. Census Bureau, Estats, 2010 and 2007 Service Annual Survey.

Out of total e-commerce retail sales in the United States in 2008, e-commerce retail *intermediaries* (the 'Electronic Shopping and Mail-Order Houses' industry group) represented some USD 97 billion.[54] The leading merchandise category for e-sales within the 'Electronic Shopping and Mail-Order Houses' industry in 2007 was Clothing and Clothing Accessories (including footwear) with USD 14 billion, followed by Other Merchandise with e-sales of USD 13 billion, and Computer Hardware with e-sales of USD 11 billion. The top two merchandise categories for percentage of online sales were Electronics and Appliances, and Music and Videos, both with 74%. It can also be noted that although data may not be additive with other Internet intermediary sectors, e-commerce has also been a growing vector for sales of services, accounting for 1.8% (USD 124 billion) of selected service industries' total revenues in 2007.[55]

### *Electronic business-to-business marketplaces*

Business-to-business commerce is an increasingly integral part of companies' commercial practices. B2B e-commerce transactions in Europe totaled close to EUR 1 000 billion in 2007. In the United States in 2007, the web e-commerce (excluding EDI) portion of merchant wholesale trade represented USD 689.3 billion, or 4.2% of total merchant wholesale trade (Figure 15 b). Wholesale agents, brokers, and electronic markets, who do not take title to the goods they sell, made up 10% of the total sales of the wholesale trade sector in 2002. If the same ratio were to be applied in 2007, this would mean that wholesale agents, brokers, and electronic markets represented some USD 415 billion in 2007. It is assumed that wholesale agents, brokers, and electronic markets generated at least the same revenue in 2008 although official data are not available yet.

Electronic business-to-business (B2B) exchanges usually follow either a transaction-fee-only model or a model that includes any combination of registration fees, transaction fees, and listing (or hosting) fees.

Registration fees may be charged to buyers, sellers, or both, and typically involve either a one-time payment or annual fees in exchange for access to the products or services of the B2B – including reduced costs of searching for an audience of buyers/sellers. Transaction fees are traditionally based on either the monetary value of the transaction (and can be assessed to either buyers or sellers) or on savings realised by the buyer as a result of conducting the transaction through the particular online B2B. Listing or hosting fees are generally paid by the seller in exchange for permission to market products or services over the online B2B's website; the B2B operates as a "catalogue" for the seller to market its products to the B2B's audience.[56]

**E-commerce payment**

Cards, mostly credit cards, are the dominant payment method in overall e-commerce. They also dominate retail transactions. In Europe for example, Deutsche Card Services estimated that credit cards accounted for over 80% of e-commerce retail transactions in 2009 (down from 2008), with Visa representing almost 55% of transactions, MasterCard 22% and other credit card brands (mostly American Express, Diners Club and retailer credit cards) about 4%.[57] The group had highlighted in 2008 that 12% of retail transactions were paid for by direct debiting and 5% by offline methods.[58] In the debit card arena, Maestro (MasterCard's debit card) was the leader with an over 4% share of the payment market in Europe.

Online banking e-payment methods, such as Giropay in Germany, are developing as an alternative to cards. Giropay, introduced in 2006, already has a market share of over 3% in Europe as a whole. In general, online banking methods are still mostly domestic in reach. However, initiatives to increase standardisation are taking place, such as the establishment in 2008 of the International Council of Payment Network Operators (ICPNO) to determine standards and rules for the interoperability of domestic payment networks.

Alternative payment methods are primarily developed in the United States and are slowly gaining ground in European e-commerce (except for online banking based payment methods). There is increasing competition in the online payments business. However, with the exception of PayPal (Box 5), the majority of alternative – non-card and non-bank – online payment means have not yet gained very wide user bases of both merchants and consumers in OECD countries. In addition to Paypal (Box 5), Facebook has been gradually expanding the scope of its nascent online currency system. New types of payment include e-money as well as virtual currencies to exchange virtual goods in Internet games/virtual worlds.[59]

Google and Amazon were not building their own payment service as PayPal has done, but rather, using the credit card infrastructure to enable payments and online transactions. Amazon has been rolling out technology that lets other retailers use its proprietary system ('Checkout by Amazon'). Google has been trying to expand uses of its 'Google Checkout' payment service, offering it as the payment option for developers who want to sell mobile applications for its Android operating system.

**Box 5. Paypal**

PayPal appears to be the most widely used non-bank, Internet-based new payment mechanism. PayPal primarily functions as a payments intermediary, allowing an individual to set up a pre-paid account in his name with PayPal that can be funded from a credit or debit card or a bank account via a credit transfer. Using those pre-paid funds, individuals can buy items or transfer funds to other PayPal account holders. The payment or transfer of funds occurs as a book-entry transaction between the PayPal accounts. When an individual wishes to access the funds in his PayPal account, he directs PayPal to credit his credit or debit card or bank account via a credit transfer or even a paper cheque.

Paypal has been continuously extending its services. For example, PayPal has launched a service called 'Paypal X', to makes it easier for third-party software developers to use the online payments system within their own applications, so that users can make purchases while they are still inside an application, such as an online game. In October 2009, PayPal partnered with payment processor First Data to allow debit cardholders in First Data's Star Network to link their debit cards to PayPal accounts on line through their financial institutions' websites. Paypal has also partnered with Billing Revolution, a mobile payments company, to enable PayPal merchants to conduct mobile credit card transactions.

eBay's e-payment subsidiary, PayPal, held over 150 million accounts worldwide at the end of 2009.[60] eBay has said it expects PayPal to increase revenue to a range of $4 billion to $5 billion in 2011, up from $2.4 billion in 2008, driven by continued penetration on eBay, strong growth of eBay through its merchant services business and expansion into mobile and non-retail payments.

*Source*: OECD, 2010.

## Participative networked platforms

Participative networking platforms include:

- Social networking platforms (*e.g.* Facebook, Twitter): online advertising is seen as the main future source of revenue of social networking platforms. However, it is still unclear whether revenues will be sufficient to finance the increasing number of participative networked platforms and whether users will be receptive to advertising on these platforms. Although user numbers were sharply up last year, the social-networking industry's revenues in America, its biggest advertising market, represented only USD 1.2 billion in 2009, according to market-research firm eMarketer.[61]

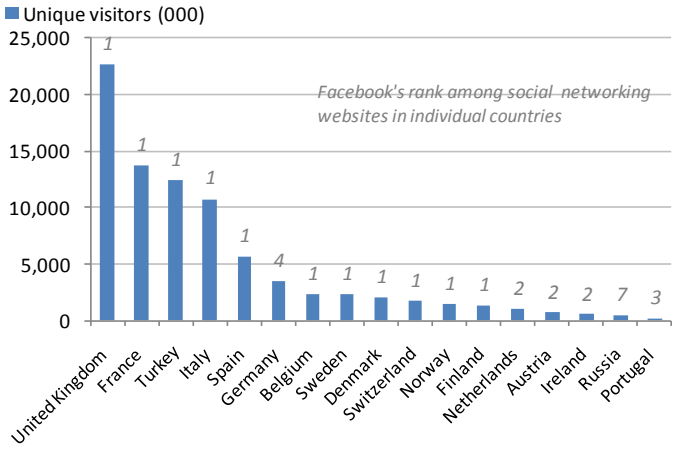
- Online games, which are computer-based games played over the Internet including PC, console and wireless games.[62] The online games market was estimated at USD 11 billion in 2008, representing some 25% of the worldwide game market.[63]

- Participative 'community' platforms such as Wikipedia, of which few generate significant revenues and most content is voluntary.

- Internet publishing and broadcasting platforms that do not themselves create or own the content being published or broadcast, such as YouTube.

With many interactions on participative networks taking place for free or in the form of complex barter arrangements and most participative networks being private companies, it is difficult to quantify the sector, unless proxies can be found (such as evaluating the value of the time spent on some of these platforms). As such, the data presented below by online audience measurement firms is telling of how participative networking continues to grow as a ubiquitous activity across the Internet.

**Figure 17. Unique visitors to Facebook.com in Europe, February 2009 (thousands)**




*Source*: Comscore, 2009.

Online audience measurement firm Comscore found that more than 770 million people worldwide visited a social networking site in July 2009, increasing 18% from the previous year. The global average time spent on social networks was 22.4 hours per user in August 2009. Over half of the Asia-Pacific online population was active on social networking sites, with competition between global and local brands intensifying. Although Facebook was the global leader worldwide and the leader in many countries, top social networks varied by country. For example, CyWorld lead in Korea, Mixi in Japan, studiVZ in Germany, Baidu in China, Kohtakte in Russia, or Orkut in India and Brazil. In Europe, Facebook had a leading position in the social networking category across most European countries in February 2009 (Figure 16).[64] The site's audience was largest in the United Kingdom with 22.7 million visitors (up 75% from the previous year), followed by France with 13.7 million visitors (up 518%) and Turkey with 12.4 million visitors (previous year's data not available). For example, this would mean that 1 out of 4 French people use Facebook every month. While this number seems extremely high, as a cross-country comparison and over time, the data are telling. According to another online audience measurement firm, Nielsen Netview, in the United States in June 2009, users spent an average of over 4.5 hours on Facebook per month compared to 3 hours on the Yahoo! sites and over 2 hours on Microsoft websites (Table 4).

**Table 5. Internet usage in the United States, combined home and work, Month of June 2009**

Top 10 Web Brands for June 2009 (U.S., Home and Work)

| | Brand | Unique audience (000) | Time per person (hh:mm:ss) |
|---|---|---|---|
| 1 | Google | 147,778 | 1:48:58 |
| 2 | Yahoo! | 133,139 | 3:15:59 |
| 3 | MSN/WindowsLive/Bing | 111,352 | 2:02:11 |
| 4 | Microsoft | 96,071 | 0:49:50 |
| 5 | AOL Media Network | 92,705 | 2:43:10 |
| **6** | **YouTube*** | **87,686** | **1:12:57** |
| **7** | **Facebook*** | **87,254** | **4:39:33** |
| 8 | Fox Interactive Media | 72,724 | 2:14:21 |
| **9** | **Apple*** | **59,663** | **1:19:33** |
| **10** | **Wikipedia*** | **54,867** | **0:17:05** |

U.S. Internet Usage

| | |
|---|---|
| Sessions/visits per person | 88 |
| Web pages per person | 2,569 |
| Duration of a web page viewed | 65:10:25 |
| PC time per person | 0:00:57 |
| Active digital media universe | 195,974,309 |
| Current digital media universe estimate | 234,275,000 |

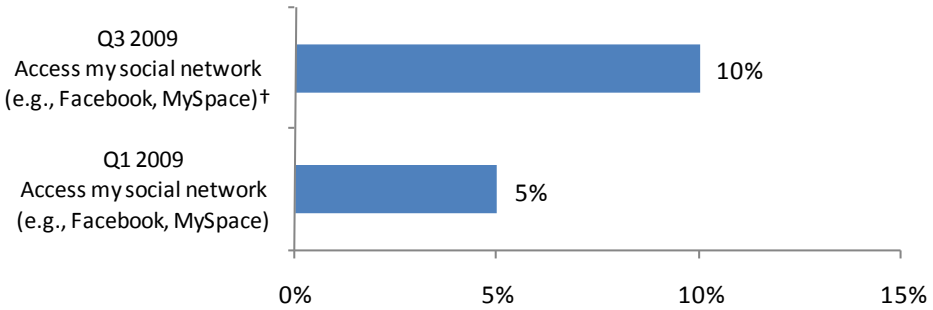
*: these brands are considered to be 'participative networked platforms' in the context of this report.

*Source*: Nielsen NetView.

Mobile social networking is growing very fast in popularity. According to Forrester Research, 10% of adults in the United States accessed social networks from their cell phones in the third quarter of 2009, double the number at the beginning of the year (Figure 18).

**Figure 18. Social activity on mobile devices, Q1 2009 and Q3 2009**

**« Which of the following activities do you do on a cell phone/smartphone or handheld device AT LEAST MONTHLY?"**




Base: 4 290 adults with a mobile phone
†Base: 4 290 adults with a mobile phone

Source : North American Technographics® Benchmark Survey, Q1 2009 (US, Canada)

*Source : North American Technographics® Media, Marketing, Consumer Technology, and Healthcare Benchmark Survey, Q3 2009 (US, Canada)

## SOCIAL AND ECONOMIC PURPOSES OF INTERNET INTERMEDIARIES

A fundamental feature of the Internet is that it is open and decentralised. It is open and decentralised at the level of the architecture of the Internet, which means any ISP can interconnect. Many of the underlying standards were developed in a bottom-up manner, mainly by technical developers, providers and users since the early days of the Internet. This model contrasts with that of the telecommunication and broadcasting industries, where in many cases, top-down national government regulation historically guided and structured the design of the media. The Internet is decentralised at the level of resource management, but close co-ordination between actors is required so that the system works. Most of the protocols at the core of the Internet are based on open standards. That means that the protocol specifications are open for anyone to implement (with little or no licensing restrictions), which considerably reduces barriers to entry and has enabled many new entrants in Internet intermediary sectors such as Internet service provision, web hosting, or search-engines and portals.

### Wider ICT-related growth and productivity

Advancement of information and communication technologies (ICTs), including the Internet enabled by intermediaries, is benefiting economies, with increased productivity as a long-term outcome of ICT investment as their most significant impact on economic growth.

- First, ICT-producing industries contribute directly to productivity and growth through their own rapid technological progress. For example, a rough estimate indicates that in the United States in 2008, Internet intermediaries contributed at least 1.4% of GDP value added.

- Second, ICT use improves the productivity of other factors of production.

- Third, there are 'spillover effects' on the rest of the economy as ICT diffusion leads to innovation and efficiency gains in other sectors. The largest productivity gains are coming increasingly from the use, rather than the production, of networked ICTs including the Internet.

- Fourth, the Internet has qualitatively changed the amount and type of information available to users, including consumers, and has cut the cost of accessing information. In economies which increasingly rely on knowledge, this is having an important positive impact.

Intermediaries create significant market efficiencies by bringing suppliers and demanders closer together, thus decreasing transaction costs such as the cost of searching for a buyer or a seller. They ensure that markets work better and create more competition as well as allow for a greater internationalisation of markets. Indeed, Internet intermediaries facilitated trade by allowing the expansion, aggregation and globalisation of markets as well as the customisation of goods and services.

**Investment in infrastructure**

The Internet is widely viewed as both a critical infrastructure in itself and a key component of other forms of critical infrastructure, underpinning economic and social activity at a global level. Intermediaries such as ISPs and web hosting companies in particular play a vital role in managing network infrastructure, providing access to end users and ensuring there is continued sufficient investment in infrastructure to meet the network capacity demands of new applications and of an expanding base of users.

To date, private sector initiatives in competitive markets, enabled by telecommunications regulatory reform, have by-and-large driven the widespread development of Internet infrastructure. The private sector has largely built the Internet infrastructure; it operates and maintains most of the infrastructure. It has also been heavily involved in the process of developing predictable, transparent rules, including rules relative to interconnection between Internet service providers.[65] Developed in a competitive environment, the Internet has spurred research and development and innovations in applications and technologies, and in the range of services.

These innovations in turn helped to provide network operators, equipment suppliers and service providers with low-cost, sophisticated, and high quality solutions to expand their networks, products and service offering. For businesses and consumers, innovations and competition among suppliers have served to increase service offering, affordability and accessibility of the Internet. The market is helping to meet traditional public interest goals in infrastructure provision, such as universal access.

Sustainable business models are needed to support infrastructure development, particularly as the transitions to next-generation networks and mobile broadband take place. However, it is sometimes difficult in an environment that is currently in flux to determine both the identity of a service recipient as well as the beneficiary of value and therefore of determining which party to bill and how. On the other hand, new synergies are being discovered between telecommunication network operators, equipment manufacturers and content providers. Although at this stage of development there are limitations in terms of full substitutability between wireless and terrestrial communications facilities, wireless is creating considerable new opportunities.

ISPs are playing an important part in extending infrastructure, in particular through investments in next-generation access networks. With next-generation access networks (NGN), copper is increasingly being replaced by fibre in the local loop while packet-based technology using the Internet Protocol is replacing existing circuit-based switching technologies. Development of NGN infrastructure is dependent on the regulatory frameworks in place and the extent to which these frameworks have moved from service-level competition to infrastructure-level competition.[66]

Developments in fixed and mobile telecommunication infrastructure are essentially financed by network operators (horizontal co-operation). Companies are co-operating to share investment costs, entering into long-term agreements on the use of networks, and to provide mutual assistance for the marketing of products. Infrastructure sharing is viewed as an option for a less expensive way to improve coverage, particularly in the context of the current economic crisis, where operators are facing decreasing revenues and financing difficulties. For example, in March 2009, Telefonica and Vodafone agreed to share their 3G mobile phone infrastructure in Germany, Spain, Ireland and the United Kingdom. This agreement allows mobile providers to expand coverage while minimising expenditure on masts and their sites and the companies expect to save hundreds of millions of dollars over the next decade.[67]

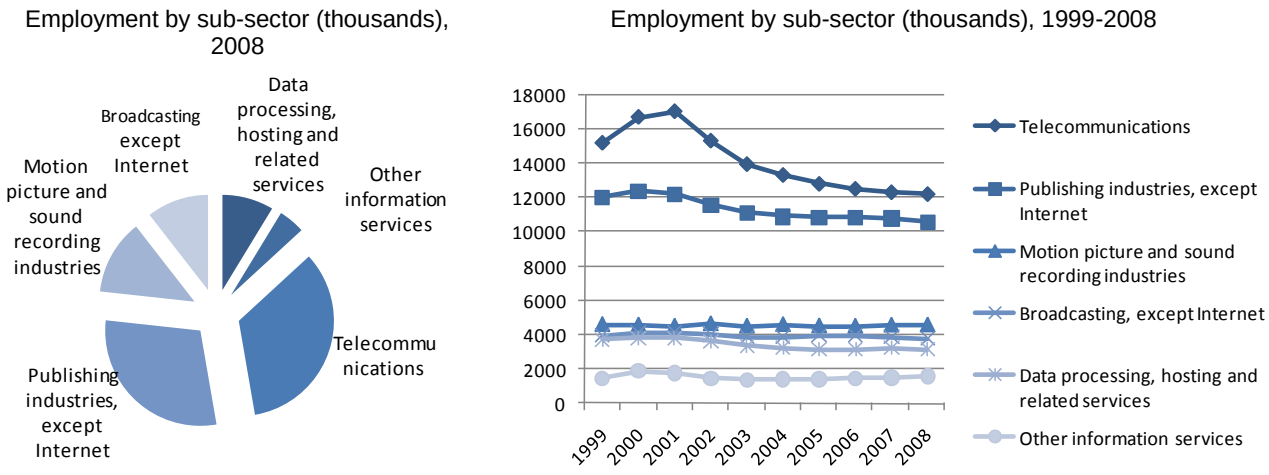
In addition, new forms of vertical co-operation between network operators and equipment producers are emerging. In Germany for example, Swedish equipment producer Ericsson has purchased microwave radio relay links from Deutsche Telekom. Ericsson operates the radio relay links, leasing them to others

including to Deutsche Telekom. Also in Germany, the mobile network "e-plus" is operated by equipment producer Alcatel-Lucent. This trend is associated with the parallel trend of network operators to rely increasingly on research and development by equipment suppliers and hence effectively 'outsourcing' part of this development.

### Entrepreneurship and employment

Internet intermediary sectors are large employers themselves, contributing significantly to employment, particularly in the information sector. In 2008 in the United States, the overall information sector represented 47.6 million jobs (Figure 18). In the beginning of 2009, the top-10 pure-play Internet firms employed more than 94 000 people.

**Figure 19. Employment in the "Information" sector in the United States**




Note: Total employment in the information sector in 2008 was 47.6 million. 'Other information services' includes Internet Publishing and Broadcasting.

*Source*: Bureau of Labour Statistics, 2009.

In addition to being direct employers, Internet intermediaries lower the barriers to starting and operating businesses, particularly small businesses, and help spur innovation in SMEs.

- First of all, they aggregate demand to provide many small and medium-sized enterprises (SMEs) with services at lower complexity and cost, for example, IT and IT-enabled accounting, and managed services provided by 'cloud computing' platforms. The notion of cloud computing, *i.e.* the provision of scalable and often virtualised resources as a service over the Internet, encompasses Internet intermediaries such as application service providers and 'software as a service' providers in the data processing and web hosting sector. 'Cloud computing' intermediary services of various sizes and shapes, host specialised applications, and are creating new opportunities for business efficiency and also new challenges, such as in the areas of security and privacy.[68] For example, Google estimates that savings from using cloud-based applications via Google's cloud computing platform are on average of 50% to 70%, compared to "on-premise" equipment.[69] Some leading technologists have forecast that within five to ten years more than half of the world's computing and data storage will occur "in the Cloud."[70]

- A related consideration is that ad servers and Internet search engines and portals allow SMEs to advertise their goods and services even at low advertising budget levels.

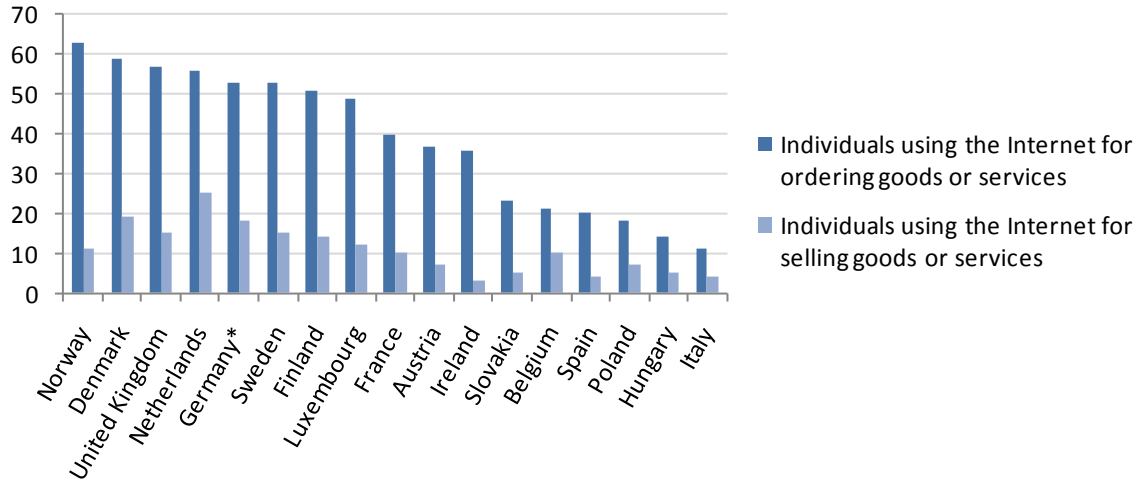
- Internet intermediaries, in particular e-commerce platforms and search platforms are also considered as enablers of the creation of micro-enterprises. A report by the Interactive Advertising Bureau estimated that over one million people ran one-person firms online in the United States in mid 2009. The report estimated that 120 000 people sell full time on eBay, 500 000 do so part time, and 500 000 earn advertising revenues from blogs, mostly through the revenue-sharing schemes of advertising platforms.[71]

Facilitation of market entry and operation of small and medium-sized enterprises (SMEs) is critical to the economy, as these firms provide a significant source of jobs and economic growth. The ability of new and small firms to innovate is considered crucial to ensure long-term and sustainable growth, since SMEs tend to harness technological or commercial opportunities that have been neglected by established companies and bring them to market.[72] In this context, platforms that help new firms to be established and grow are crucial to the innovation performance of an economy. Empirical evidence also shows that entrepreneurship, and specifically the process of business turbulence of market entries and exits, positively contributes to economic growth through greater efficiency in the allocation of resources.[73]

Electronic commerce platforms on the Internet also create many opportunities for transactions to occur that did not exist in the marketplace. In the so called 'long-tail' economic model put forth by Chris Anderson in 1999, entertainment products that are in low demand or have low sales volume can collectively make up a market share that rivals or exceeds the relatively few current bestsellers and blockbusters, if the store or distribution channel is large enough. [74] The reason is that online platforms are more efficient at matching supply and demand than their offline counterparts. First of all, they can track patterns in buying behaviour and help make suggestions to help people find goods that they might be interested in (*e.g.* Amazon). They can also offer a nearly unlimited selection since they do not have the same space constraints as physical stores (*e.g.* DVDs at Netflix). Finally, in contrast to broadcasting, communications on the Internet are often point-to-point, which removes the need to aggregate very large audiences in order to be able to broadcast digital entertainment.

It is noteworthy that not only do individuals buy on line, but they also increasingly sell on line, through platforms like eBay. For example, in the Netherlands in 2008, not only had 55% of individuals bought on line in the past three months, but 25% had sold on line (Figure 20).

**Figure 20. Percentage of Individuals using the Internet to buy or sell goods or services in 2008, selected European countries - Percentage of individuals aged 16 to 74**




Individuals using the Internet for ordering goods or services: for instance via auctions. Within the last three months before the survey. Buy or order over the Internet for private use. Within the last twelve months before the survey.

*Source*: Eurostat, i2010 Benchmarking indicators.

## Innovation

Innovation – the introduction of a new or significantly improved product (good or service), process, or method – has long been viewed as central to economic performance and social welfare. Innovation requires platforms that support the creation and diffusion of knowledge. Part of the work of the OECD's innovation strategy, on the changing nature of innovation, examines the importance of trends like collaboration through Internet platforms, changing business approaches to innovation, the use of knowledge markets for example for intellectual property rights, organisational innovation, users driving innovation, and the rise of new actors such as private foundations funding innovation. This strand of work finds that the ICT sector exceeds all other industries by a large margin in terms of research and development expenditures, patents, venture capital, and innovative new products.

Internet intermediaries, both those at the core and at the edges of the network, are viewed as innovators themselves, as well as enabling further innovation, creativity, and collaboration. In particular, firms co-operating 'at the edge' of the Internet (*e.g.* search engines, news delivery, voice over IP) are successfully innovating through commercial and institutional arrangements that permit experimentation and novel re-use of these service platforms by others. Additionally, the pace of innovation is increasing and it may originate from any part of the world. The importance of interoperability should be stressed as enabling the connection of large amounts of heterogeneous machines and networks, and the furthering of an environment of innovation and cross-fertilisation.[75]

An example of a very creative intermediary is Google, which announces new innovations constantly (for example, recent products include Fast Flip, which lets users scroll through the contents of an online newspaper in a similar way to that of reading through print pages, or Google Wave, a new online collaboration tool. Out of the overall top 250 ICT firms, Google (114%, Internet firm), Yahoo, and e-Bay, for example, have had high rate of growth in R&D spending since 2000 (all CAGR, in current USD terms) (Table 6).

**Table 6. Top ICT R&D spenders: expenditure growth, 2000-07**

percent, CAGR, based on current USD

| | Company | Country | Industry | Growth % 2000-07 |
|---|---|---|---|---|
| 1. | Google | US | Internet | 113.5 |
| 7. | Yahoo | US | Internet | 38.5 |
| 8. | e-bay inc | US | Internet | 35.2 |

*Source*: OECD Information Technology Outlook database.

The use of services around social networking, that provide value at little or no monetary cost, has proliferated on both the supply and demand sides. Facilitated by low barriers to participation, new models of commercial and non-commercial collaborative work have emerged. Illustrations include the development of Wikipedia, the user-created encyclopaedia, which aims to harness the 'collective intelligence' of Internet users. Other examples of "web 2.0" include open application programming interfaces (API), mash-ups merging several services, such as online maps and location data. Users are increasingly part of the creative flow of content and processes, which offers many promises for a more participatory, active and innovative content society.

Firms are also increasingly using participative networks to reach out to customers and partners to improve their product and innovation cycle ('user-centric innovation'). Some have termed this economic and business trend "Enterprise 2.0", and have highlighted its significance in raising standards of living, wealth creation and competitiveness in global markets. Users and consumers who play a growing role in the innovation process often drive demand for new products and services, helping to orient the innovation effort towards the needs of society. The Internet has, for example, played a significant role in obtaining

rapid consumer feedback to improve new products on the market, allowing firms to adjust quality and features on products/services.[76]

**Trust and user privacy**

One of the main roles of Internet intermediaries involves establishing trust. In e-commerce for example, establishing trust is key as, for example, buyer and seller may never meet and accountability can be low. Retail e-commerce platforms provide trust to consumers with an established brand name, associated consumer familiarity and a number of consumer safeguards. Safeguards may include prior histories of consumer ratings ("reputation") and in some cases, pay-back guarantees. These platforms play an essential role because the relative ease of becoming an e-commerce merchant can result in an overwhelming number of offerings. In addition, for sellers, it can be less expensive to use an intermediary than to set-up an e-commerce platform and to advertise it.

Internet payment systems such as MasterCard and Visa use techniques such as digital certificates to protect the use of credit cards in e-commerce transactions because the openness, global reach, and lack of physical clues that are inherent to the Internet also make it vulnerable to fraud.[77] Some deem that an associated important role of Internet intermediaries is that of user authentication, to provide some assurance as to whether the other party is who or what it claims to be, address issues of unauthorised access to personal data, and identity theft and data breaches. For example, in order to promote electronic business based on electronic documents, Korea has introduced e-signatures (an electronic authentication method). Korea has mandated the use of e-signatures issued by Accredited Certificate providers for the use of Internet banking since 2002. As of July 2009, Korea has more than 20 million Accredited Certificates users, amounting to two-fifths of the total population.

Intermediaries can also arguably be in a good position to provide mechanisms and assurance to protect user privacy, as third parties without an indirect connection to marketers. They certainly play a major role in shaping how Internet users perceive, and manage, their personal information. For example, by providing accessible and understandable privacy options, backed-up by privacy-friendly default settings, minimising and anonymising the collection of personal information; Internet intermediaries can help users to control their personal data.

At the same time however, many Internet intermediaries' business models, such as those of social networking sites, rely on users being willing to share their personal information. "Targeted" marketing, based on what information an Internet user has previously accessed or searched for, requires the collection of web browsing and search habits – both of which involve the collection of personal information. Some business models (such as pay per view, which must record what is being viewed by whom) are more privacy invasive than others (such as charging a monthly subscription fee with no need to record what is being viewed by a particular user). A balance is needed between these types of business incentives and the need for Internet intermediaries to protect privacy.

**User/consumer empowerment and choice**

Over the last decade, increased competition and the development of a range of new products have transformed the communication services sector. They have brought significant benefits to consumers and other users, including falling prices, higher-quality services, wider choice of service providers, and access to new services. These trends are likely to continue, and even intensify, as next-generation communication infrastructures and services are put in place. These changes have, however, created challenges. As communication services have become more complex, it is increasingly difficult for consumers to evaluate and compare alternatives. Pricing structures may not be clear and contracts may limit consumers' ability to switch providers or terminate a contract easily. Yet, it is increasingly recognised that communication

services markets can be strengthened by consumers who can, through well-informed choices, help stimulate price competition, innovation and improvements in quality. By making well-informed choices among suppliers, consumers and users not only benefit from competition, they help drive and sustain it.[78]

Such user empowerment and choice are important and positive social side effects of the access to information that Internet intermediaries provide. Internet intermediaries such as search engines and e-commerce platforms provide value to consumers in terms of product or service information and varied choice, and decrease transaction costs associated with economic and social activity, including:

- *Costs of searching* (for example, the time and effort spent in order to determine whether a good is available on a given market, its price level and the most competitive supplier); Internet intermediaries reduce the importance of time as a factor that dictates the structure of economic and social activity, raising the potential for saving time as consumers shop and find information more efficiently. However, some point out risks to consumers in the form of distorted comparisons on price comparison sites, depending on who pays, and placements/sponsored links up front in search engines.
- *Bargaining costs* are the cost of coming to an acceptable agreement with the other party. Consumers are empowered through greater access to information and platforms that facilitate price comparisons, increase competition and create downward pressure on prices.
- *Policy costs* include the costs to supervise whether the other party fulfils the agreed terms of the contract. Consumer ratings and reviews are seen as a healthy and transparent channel to empower consumers and to help them to make informed decisions in e-commerce.[79] Increasingly, before purchasing a product on line or in a store, shoppers will consider online product reviews and consumers report that the reviews very much affect their buying intentions in a majority of cases (they either became more determined to buy the product or changed their minds and bought a different product). [80] There are, however, concerns over misleading consumer ratings linked to non-disclosed compensation for the promotion of products (including free items, gifts, or cash).[81]
- *Costs of enforcement* include the cost of legal action if the other party does not fulfill the contract in the context of electronic commerce platforms. Internet payment providers have a particular role to play with regards to costs of enforcement.

**Individuality, self-expression, democracy and social relationships**

Participative networked platforms bring together features such as citizen journalism, artistic/cultural creation, or user ratings. The significance of participative networked platforms is clear in that never before have so many people introduced so many kinds of content, on such a broad scale, and potentially with such wide-ranging impacts. Changes in the way users produce, distribute, access and re-use information, knowledge and entertainment are likely to continue to have structural impacts on the cultural, social and political spheres.[82]

In Korea, for example, participative networked platforms are deemed to have an impact on democratic processes and the political debate, with real political consequences. Some political analysts claim that the 2002 presidential election was influenced by the participatory networks on the Internet. A particularly noteworthy platform, in terms of facilitating new forms of citizen participation in public life, the free flow of information and freedom of expression, is online newspaper website OhmyNews. OhmyNews enables any individual, rather than only professional reporters, to contribute to, edit, and publish news articles. It was established in 2000 as the first company of this type under the motto that “every citizen is a reporter.” In addition, with the company’s "news alliance of news guerrillas" programme, anyone can post articles on any topic, and content is monitored by other users of the platform.

More generally, evolving social structures can be likened to new patterns of organisation that speak to values of individuality and self-expression. In this context, some stress the need to monitor possible threats to freedom of expression and democratic dialogue and point to examples of what they consider to be instances of overbroad copyright enforcement initiatives that may afford little or no due process.[83]

A majority of Internet users also has a positive perception on the impact of the Internet, enabled by Internet intermediaries, on everyday life and in particular on their resource-enhancing capabilities (learning, culture, health-related information and work). In Europe, more than half of users feel that the Internet has improved their relationship with family and friends while less than half say that the Internet has added opportunities to meet new people (Box 6).[84]

**Box 6. The impact of the Internet - % of users agreeing that the Internet has improved aspects of their lives**

| | |
|---|---|
| Your capability to be informed about current issues | 87% |
| Your opportunity to learn | 74% |
| Your opportunity to share views/access culture | 70% |
| The way you get health-related information | 67% |
| The way you perform your job | 66% |
| Your relationships with family members and friends | 57% |
| The way you manage your finances | 51% |
| The way you pursue your hobbies | 51% |
| The way you shop | 50% |
| The way you deal with public authorities | 48% |
| Your opportunity to meet new people | 44% |

*Source*: EC study on the Social Impact of IT, based on the Flash Eurobarometer – Information society seen by citizens (2008).

# ANNEX 1. THE INFORMATION SECTOR IN THE UNITED STATES (USD, MILLIONS)

**The Information Sector in the United States (NAICS 51) – Estimated Revenue for Employer Firms: 2004 Through 2008**

| NAICS code | Kind of business | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| **51** | **Overall information sector** | **955,083** | 999,741 | 1,052,274 | 1,114,129 | 1156755 |
| 511 | ..Publishing industries (except Internet) | 256,301 | 267,801 | 280,794 | 295,768 | 300365 |
| 51111 | ……Newspaper publishers | 48,366 | 49,594 | 49,239 | 47,914 | 43918 |
| *Of which* | *Online newspapers* | *1,308* | 1,537 | 1,418 | 1,645 | 2,017 |
| 51112 | ……Periodical publishers | 42,290 | 44,241 | 46,827 | 48,692 | 47,505 |
| *Of which* | *Online periodicals* | *1,848* | 2,063 | 3,080 | 2,993 | 3,507 |
| 51113 | ……Book publishers | 27,904 | 27,909 | 28,240 | 29,344 | 30,284 |
| *Of which* | *Online books* | *620* | 654 | 775 | 936 | 1,084 |
| 51114 | ……Directory and mailing list publishers | 18,040 | 19,413 | 18,886 | 19,764 | 20,098 |
| *Of which* | *Online directories, databases, and other collections of information* | *2,540* | 3,243 | 3,000 | 3,700 | 4,186 |
| 51119 | ……Other publishers | 7,440 | 6,788 | 6,920 | 7,258 | 6,852 |
| 5112 | ….Software publishers | 112,261 | 119,856 | 130,682 | 142,796 | 151,708 |
| 512 | ..Motion picture and sound recording industries | 88,269 | 93,719 | 97,199 | 100,534 | 101,792 |
| 515 | ..Broadcasting (except Internet), radio and television, cable and other | 83,466 | 87,709 | 93,075 | 96,453 | 100,298 |
| 516, 5181, 519 | Internet publishing and broadcasting, Internet service providers and web search portals, and other information services | 40,287 | 42,845 | 48,259 | 55,177 | 58603 |
| 516 | Internet publishing and broadcasting | 8,695 | 10,391 | 12,908 | 16,683 | 19,979 |
| *Of which* | *Publishing and broadcasting of content on the Internet* | *5,278* | 6,068 | 7,069 | 8,728 | 10,437 |
| *Of which* | *Online advertising space* | *1,607* | 1,976 | 2,874 | 3,676 | 4,604 |
| *Of which* | *Licensing of rights to use intellectual property* | *401* | 433 | 521 | 569 | 585 |
| 517 | **Telecommunications** | 429,430 | 445,296 | 462,866 | 493,609 | 515,515 |
| 5171 | Wired telecommunications carriers | 211,176 | 205,652 | 195,632 | 196,981 | 194,765 |
| ***Of which*** | ***Internet access services*** | ***12,616*** | 14,374 | 23,692 | 21,143 | 23,692 |
| 5172 | Wireless telecommunications carriers (except satellite) | 127,602 | 140,030 | 157,491 | 172,524 | 183,559 |
| ***Of which*** | ***Internet access services*** | ***659*** | 1,124 | 2,509 | 4,541 | 6,863 |
| 5173 | Telecommunications resellers | 9,849 | 11,135 | 11,802 | 12,256 | 11,619 |
| 5174 | Satellite telecommunications | 6,030 | 5,823 | 6,217 | 6,296 | 6,925 |
| 5175 | Cable and other program distribution | 73,317 | 80,555 | 89,713 | 102,164 | 115,184 |
| ***Of which*** | ***Internet access services*** | ***9,924*** | 11,651 | 13,415 | 15,989 | 18,361 |
| 5179 | Other telecommunications | 1,456 | 2,101 | 2,011 | 2,079 | 2,218 |
| 518 | Internet service providers, web search portals, and data processing services | 82,491 | 87,891 | 98,142 | 103,462 | 110,836 |
| 5181 | Internet service providers and web search portals | 25,161 | 25,520 | 28,061 | 30,874 | 33,173 |
| **518111** | **Internet service providers** | **20,201** | 18,528 | 18,404 | 18,792 | 18,803 |
| **518112** | **Web search portals** | **4,960** | 6,992 | 9,657 | 12,082 | 14,370 |
| *Of which* | *Revenue from online advertising space* | *3,407* | 4,815 | 6,399 | 8,559 | 10,267 |
| **518210** | **Data processing, hosting, and related services** | **57,330** | 62,371 | 70,081 | 72,588 | 77,663 |
| 519 | Other information services | 6,431 | 6,934 | 7,290 | 7,620 | 7,970 |
| 51911 | News syndicates | 1,972 | 2,092 | 2,198 | 2,392 | 2,366 |
| 51912 | Libraries and archives | 1,879 | 1,948 | 2,040 | 2,194 | 2,328 |
| 51919 | All other information services | 2,580 | 2,894 | 3,052 | 3,034 | 3,276 |

*Source*: U.S. Census Bureau 2007, Service Annual Survey and administrative data.

Note: Dollar volume estimates are published in millions of dollars; consequently, results may not be additive.

# NOTES

1 Main resources considered from which to draw market estimates are: OECD, *Information Technology Outlook 2008* – Chapter 1: The IT Industry: Recent Developments and Outlook and Chapter 6: Digital Content in Transition (*e.g.* computer and video games, online film and video distribution, online music revenues, Internet advertising) and OECD, *Communications Outlook 2009* – Chapter 3: Telecommunication Market Size.

2 A network effect (also called network externality) is the effect that one user of a good or service has on the value of that product to other people. A classic example is the telephone – the more people own telephones, the more valuable the telephone is to each owner [from Wikipedia].

3 U.S Census Bureau, 2009.

4 Ibid.

5 See http://www.isoc.org/pubpolpillar/docs/internetmodel.pdf for more information.

6 The industry groups Internet Service Providers and Web Search Portals, Data Processing Hosting, and Related Services are based on differences in the processes used to access information and process information.

7 *E.g.* U.S. NAICS, 2002 and New Zealand Standard Industrial Classification (ANZSIC), 2006.

8 The term "access software provider" means a provider of software (including client or server software), or enabling tools that do any one or more of the following: (A) filter, screen, allow, or disallow content; (B) pick, choose, analyse, or digest content; or (C) transmit, receive, display, forward, cache, search, subset, organise, re-organise, or translate content.

9 To benefit from the exemption as a "mere conduit," the provider must have neither knowledge nor control over the information which is transmitted or stored, *i.e.* "the activity of the information society service provider is limited to the technical process of operating and giving access to a communication network over which information made available by third parties is transmitted or temporarily stored, for the sole purpose of making the transmission more efficient; this activity is of a mere technical, automatic and passive nature, which implies that the information society service provider has neither knowledge nor control over the information which is transmitted or stored." A service provider can benefit from the exemptions for "mere conduit" and for "caching" when he is not involved with the information transmitted; this requires among other things that he does not modify the information that he transmits, although this requirement does not cover manipulations of a technical nature that take place in the course of the transmission as they do not alter the integrity of the information contained in the transmission.

10 OECD (2004), *Access Pricing in Telecommunications*, OECD, Paris, Glossary of Terms; and US NAICS 2002 (518111 Internet Service Providers).

11 While the NAICS classification of "ISP" does not include telecommunication and cable operators, for the purposes of this report it is felt that including these operators is desirable.

12 US NAICS 2002 518210 Data Processing, Hosting, and Related Services CAN and Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 1.0), Class 5921 Data Processing and Web Hosting Services.

13 Based primarily on US NAICS 2002, industry 518112 Web Search Portals US.

14 See for example Google Annual Report 2008, http://investor.google.com/documents/2008_google_annual_report.html.

15 OECD Expert Group on Defining and Measuring E-commerce, April 2000.

16 NAICS 454111 Electronic Shopping.

17 NAICS 454112 Electronic Auctions.

18 NAICS 425110 Business to Business Electronic Markets.

19 Including the OECD definition that is currently being revised by the OECD Working Party on Indicators for the Information Society.

20 2009 eCommerce Report, "Trends in Consumer and Payment Behaviour in E-Commerce on the Basis of Real-Life Transactions" (formerly Pago Report) Published by Deutsche Bank.

21 Innopay, May 2009, Online payments 2009 – European market overview.

22 Based on OECD (2007), *Participative Web: User-Created Content*.

23 Virtual worlds are computer-based simulated environments intended for their users to "inhabit" and interact via avatars. These avatars are usually depicted as textual, two-dimensional, or three-dimensional graphical representations.

24 OECD (2005), "Digital Broadband Content: The online computer and video game industry", DSTI/ICCP/IE(2004)13/FINAL, OECD, Paris, http://www.oecd.org/dataoecd/19/5/34884414.pdf.

25 Chircu, A. and Kauffman, R., "Limits to Value in Electronic Commerce-Related IT Investments", HICSS 2000.

26 *Value creation and new intermediaries on Internet. An exploratory analysis of the online news industry and the web content aggregators* (2007), Ana Rosa del Águila-Obraa, Antonio Padilla-Meléndeza, and Christian Serarols-Tarrésb, based on Anderson & Anderson, 2002; Grover & Teng, 2001; Sarkar, Butler & Steinfield, 1998.

27 "Creative disruption" is a term coined by Joseph Schumpeter in 1942 to denote a "process of industrial mutation that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one."

28 Rochet, Jean-Charles and Tirole, Jean, (2001), "Platform Competition in Two-Sided Markets", http://www.dauphine.fr/cgemp/Publications/Articles/TirolePlatform.pdf.

29 Evans, D, "The antitrust economics of two sided markets", *Yale Journal on regulation*, vol 2. http://aei-brookings.org/admin/authorpdfs/redirect-safely.php?fname=../pdffiles/phpMt.pdf.

30 Caillaud, B. and Jullien, B. (2001), "Chicken & Egg: Competing Matchmakers", CEPR working paper.

31 Wikipedia.

32 ZenithOptiMedia, July 2009, "Global advertising downturn slows despite disappointing Q1. Mild global recovery in 2010; all regions to return to growth in 2011", http://www.zenithoptimedia.com/gff/pdf/Adspend%20forecasts%20July%202009.pdf.

33 In 19 European countries analysed by the Interactive Advertising Bureau Europe and Price Waterhouse Coopers.

34 *OECD Information Technology Outlook 2008*, Chapter 6, OECD, Paris.

35 The model is similar to that of open source software, whereby businesses generate service revenue rather than licensing revenue.

36 *OECD Information Technology Outlook 2008*, Op-cit.

37 It is assumed that the activities pursued under NAICS code 'Federal Reserve banks, credit intermediation, and related activities' relate to financial intermediation. Based on US Bureau of Economic Analysis, Gross Domestic Product (GDP) by Industry Data, http://www.bea.gov/industry/gdpbyind_data.htm.

38 It is assumed that the activities pursued under NAICS code 'Rental and leasing services and lessors of intangible assets' relate to real-estate intermediation. Based on US Bureau of Economic Analysis, Gross Domestic Product (GDP) by Industry Data, http://www.bea.gov/industry/gdpbyind_data.htm.

39 *E.g.* e-commerce sales of services by Internet service providers and web search portals could likely already be counted in the ISP or web portal sectors.

40 With the exception of online brokerage intermediation services and travel reservation services that have been excluded from the present report because these activities that use the Internet rather than traditional methods are often included in classes according to their primary activity by national statistical agencies.

41 OECD (2009), "The Impact of the Crisis on ICTs and their Role in the Recovery", http://www.oecd.org/dataoecd/33/20/43404360.pdf, OECD, Paris.

42 Internet World Stats, January 2010, http://www.internetworldstats.com.

43 Bureau of Labour Statistics, http://www.bls.gov/oco/cg/cgs055.htm.

44 OECD Broadband Portal, www.oecd.org/sti/ict/broadband.

45 OECD (2009), "The Impact of the Crisis on ICTs and their Role in the Recovery", http://www.oecd.org/dataoecd/33/20/43404360.pdf, OECD, Paris.

46 ITU, *The World in 2009: ICT facts and figures*.

47 OECD, 2009, Mobile Broadband: Pricing and Services, http://www.oecd.org/dataoecd/26/19/43280727.pdf. Further work is underway at the OECD to identify the most appropriate methodology for comparing mobile broadband services across OECD member countries.

48 Commission staff working document – Progress report on the Single European Electronic Communications Market (14th report) http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/14threport/annex1.pdf.

49 OECD (2009), "Indicators of Broadband Coverage", OECD, Paris.

50 *OECD Communications Outlook 2009*, OECD, Paris.

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