Analysis of Internet Diffusion in Italy: A comparison of for-profit and non-profit sector

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Introduction

The Internet is expanding very rapidly (Coffman, Odlyzko, 2001) and has gradually become a parallel reality, with which an individual interacts in order to buy goods, organize leisure time, job-hunt, study and do research, manage one's own finances and the household, communicate with institutions, and find incredible bargains on on-line auctions, without ever leaving home. By now, any company can be seen by whole world on the Internet, enjoying the many advantages and opportunities offered by this means of communication.

These advantages for businesses provided by the Internet are not only linked to the sale of products and services (direct advantages) but can also be indirect (Hansons, 2000, Novak and Hoffman,1996). For example, among the most important of these are reduced costs, image consolidation, greater customer loyalty, and a wider diffusion of products offered by the company. They are referred to as "indirect" since they do not lead directly to sales and do not generate immediate profits; however, they are important since they will probably be the greatest benefits offered to businesses by the Internet.

Such a massive and manifold phenomenon clearly needs to be measured and analyzed. The main difficulty in measuring the Internet, in fact, is its distributed nature: it has no central authority in control and no directory of users exists. It is not possible to give an unambiguous definition of an Internet user. Nevertheless, several indicators are available, including Internet hosts (see studies published by Internet Software Consortium or da Ripe[1]) and domain names (Naldi, 1997; Zook, 1999; Bauer, Carleen and Maitland, 2001), which are the most used.

The widespread utilization of Internet hosts is probably due to the easiness in obtaining data. However, in general, this metric underestimates the Internet diffusion: the presence of firewalls, the use of dynamic IP addresses, the resource sharing, are only a few examples that demonstrate such a assertion.

Among endogenous metrics, second level domain names represent a valid alternative to Internet hosts. Even this metric underestimates Internet diffusion (Zook, 1999, 2000, 2001): not all the users register a domain, nevertheless domains identify a lower bound in diffusion mainly capturing the interactive use of the network.

Methods

The Institute of Informatics and Telematics of the Italian National Research Council (IIT-CNR), which is responsible for the "it" ccTLD Registry, is performing an ongoing study aimed at analyzing Internet diffusion in Italy. Data have been extracted from the database of registrations[2] managed by IIT-CNR, using automatic and semi-automatic procedures[3]. By September 9, 2001 the total number of domain names was about 550,000 of which about 270,000 were registered by companies and about 15,000 by non-profit organizations.

Results and discussion

Our study compares the analysis of Internet diffusion in the non-profit sector with another analyzing companies, and finally evaluates the presence of a digital divide both at the macro-area (North, Central, South) as well as the regional level. From this analysis, it emerged that there are no

[1] http://www.ripe.net/statistics/hostcount.html

[2] Database Whois, Database of the state of the registrations, Database of the Letter of Assumption of Responsibility (LAR). The LAR is a letter requesting the registration of a domain name, with which the applicant assumes full civil and penal responsibility for the use of the domain name requested. The five LARs currently available differ according to the the type of applicant (individual, association/foundation, public administration, professionals, companies).
The WHOIS database contains information regarding the domain names registered under the ".it" ccTLD, applicants who have signed a contract with IIT-CNR and technical and administrative contacts.

[3] This means that we have created a new database useful for analyzing Internet diffusion by initially consulting the WHOIS database using an automatic procedure, for example in order to determine the category of the applicant, the automatic procedure verified whether a ORG field (organization name) or DESCR field (description of the organization registering the domain name) existed and if there was, classified it as a firm or as an organization. If the PIN was erroneous, the LAR database (semi-automatic procedure) was consulted. Finally, where LAR information was not enough accurate, we consulted the Italian Chamber of Commerce database.

significant differences in the determination of penetration rates of the examined organizations, once again showing that the non-profit sector is far from marginal, as many believe. At the national level the penetration rate registered by non-profit organizations is equivalent to 6.80 per 100 organizations and that registered by the companies is 6.33 per 100 organizations. Italy is divided into 20 administrative units called regions. Taking into account that "it" registration procedures permit multiple registrations, the dependent variables of our analysis are penetration rates at the regional level, calculated as the percentage of firms or the percentage of companies that register at least one domain name. The data show that Internet diffusion, both in private companies and non-profit organizations, is correlated to local development as measured by income, infrastructure and openness to innovation. Marked inequalities emerge among the three main Italian macro-areas (North, Center, South).

Internet diffusion is greater in Northern and Central Italy but a digital divide also exists within each macro-area. The three regions that register the highest penetration rates in the registration of domain names for companies are (in order): Lombardy (in the North), Trentino Alto Adige (in the North) and Lazio (a central region). The three regions with the highest penetration rates in the registration of domain names for non-profit organizations are respectively: Lazio, Lombardy and Tuscany (in Central Italy.) As these results show, it is interesting to note that, while in the analysis of internet diffusion of companies the North (7.23 per 100 companies) has an advantage over Central Italy and the South (7.07 and 4.04 respectively), in the analysis of Internet diffusion of non-profit organizations, Central Italy is the macro-area (8.52 per 100 non-profit organizations), overtaking the North and South (6.97 and 4.84 respectively).

Moreover, our research shows that there are no statistical significant differences in the variances of the penetration rate between the three areas. In addition to the classic North-Center-South division, there are also marked intra-regional disparities. Large metropolitan areas exhibit greater penetration rates and in most cases seem to spread out over the territory. At the national level, there do not appear to be significant oscillations in the concentration of domains registered to non-profit organizations with that recorded by private companies even if the latter are slightly higher than the former (the Gini index in the first case is 0.534 and in the second, 0.557). Furthermore, the geographical distribution of domain names of companies and non-profit organizations is skewed and highly concentrated with respect to the income, number of organizations and number of companies throughout Italy (the Gini index with respect to income is 0.466 compared to that calculated according to number of organizations (0.409) and the number of companies (0.468). In order to identify the determining factors for presence of a digital divide at the regional level, both in the non-profit sector and companies, a regression analysis was performed using as a dependent variable the number of domain names registered to the respective organizations and the relative penetration rate; as independent variable, social, demographic and cultural indicators were used.

Conclusion

The data confirm that in both cases, a region with an efficient and service-oriented structure, a lively cultural scene, and a good educational level (i.e., a greater number of college graduates) are more inclined to use the new technology and are the best candidates for an increasingly active and interactive use of the Internet.

In brief, we may conclude that the digital divide in Italy is not a monolithic phenomenon, but displays various territorial aspects that should be explored separately. Further research is needed to test whether geographical concentration resembles the other power- law phenomena that shape the structure of the Internet network (Barabasi et al., 1999, Adamic and Huberman, 1999).

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