INTERNET DIFFUSION VS. THE CRISIS OF THE NEW ECONOMY

by

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Abstract

The diffusion of Internet in the world, both in terms of "users" and "information suppliers" is continuously and constantly increasing. This market growth is based on a development that follows the usual behavior of technological innovation diffusion (S-shaped logistic curve), so it is allowed to obtain reliable forecasts about the future market trend.

Nevertheless, despite the continuous growth of the "target", the E-business seems to be in a crucial situation absolutely unpredictable since few moths ago, when viceversa looked as the main driving force of the "new economy" attacking the boundaries of the "global market".

The objective of this paper is to analyze the potentialities of the growing market, through the actual and forecasted number of users, and the condition of the general offer, in terms of typology and quality of the services supplied, trying to identify a reason for this crisis.

Keywords

Internet
E-business
Global market
New economy

1. Introduction

Internet became one of the most “popular” word during the mid-age of 90s. It’s growth was so unpredictable to surprise anyone, both involved or not in this developing phenomenon. The whole world, including scientific, economic, financial and social communities, was in the need to face something totally unknown in every aspects of it’s essence.

The technical characteristic of Internet, totally different in it’s specific integration of different components (multimediality) with respect to all previous media, so deeply changed usage rules to make void any knowledge or skill previously developed. This particular behavior in some sense reminds the earlier stage of computer diffusion.

A first meaningful approach to this new medium was essentially speculative, as usually happen in the history of innovation. In facts, the earlier approaching attempts was based on the idea to start any imaginable commercial activity, trying to keep an advantage from the general total ignorance, to collect as higher incomes as possible.

The scientific community only later paid attention to the virtual environment and this late was crucial due to the evolution’s speediness of Internet. Until now any attempt to find literature deeply analyzing the phenomenon in terms of proximity constraint cancellation effects, evaluation of virtual enterprises or services’ quality expectation, represents a very hard task.

Even the collection of raw information about Internet, as numerical evaluation of offer and/or demand in the virtual environment, requires meaningful efforts, due to a lack of homogeneity of data sources. This trouble seems incredible thinking to the high interaction level between the National Control Organizations and their technological endowment.

Furthermore, the increasing diffusion of this phenomenon, involving hundreds millions of people until now, as users and/or as suppliers, will amplify the impact effects both in best and in worst way, so increasing the overall probability of success and of failures.

The successes are well known in the virtual environment. There are a lot of winning companies known in Internet through the name of the effective service they supply. Viceversa, the failures are best known in the world financial markets, while one of the main reason of defeat in the network environment is the lack of visibility.

Nevertheless, the successes of the virtual companies seem few both in a ratio with the available market and in terms of those expected performances depicted by the financial environment. As the matter of fact, the Internet-related companies was unable to assume that leading role of the new

economy formerly recognized from stock exchanges in all over the world. Also the idea of a flashing growth of the "global market" seems less reliable, while the prototype of boundless enterprise, the Internet-related company, is in real troubles now.

The objective of this paper is to verify some real condition of this surprising scenario to oppose a concrete result obtained from an empirical study to the volatility of an immaterial context, hoping to contribute for a more concrete development.

In spite of this objective the second paragraph is devoted to present data, model and result of the forecasting exercise about Internet diffusion, while in the third some information about the behavior of the Internet-related financial market are supplied and paragraph 4 includes some concluding remarks.

2. Actual and forecasted diffusion for Internet

2.1 Referring Data

The activity of data collection and diffusion done by the Coordination and Control Organizations operating on Internet significantly improved during last year, even maintaining remarkable difference in their activity. As the matter of facts, some of these national organizations supply more sophisticated information, as in the case of the French Naming Authority (www.nic.fr), managed by INRETS, supplying also data and graphical representation of the territorial distribution (Fig. 1).

Moreover, these data are collected by two different organizations developed information pages about the evaluation of subjects operating in Internet: the *ISC* (Internet Software Consortium), reachable at www.isc.org, presenting data on hosts connected is useful to evaluate the supply side, and *NUA Internet surveys* (at www.nua.com) that supply data and many different statistic collections about users.

These organizations supply also more detailed information, as the number of registered hosts by country or operative specification (.com, .org, .edu, etc.) so enabling some national evaluation, or users number (by country, age class, job, etc.).

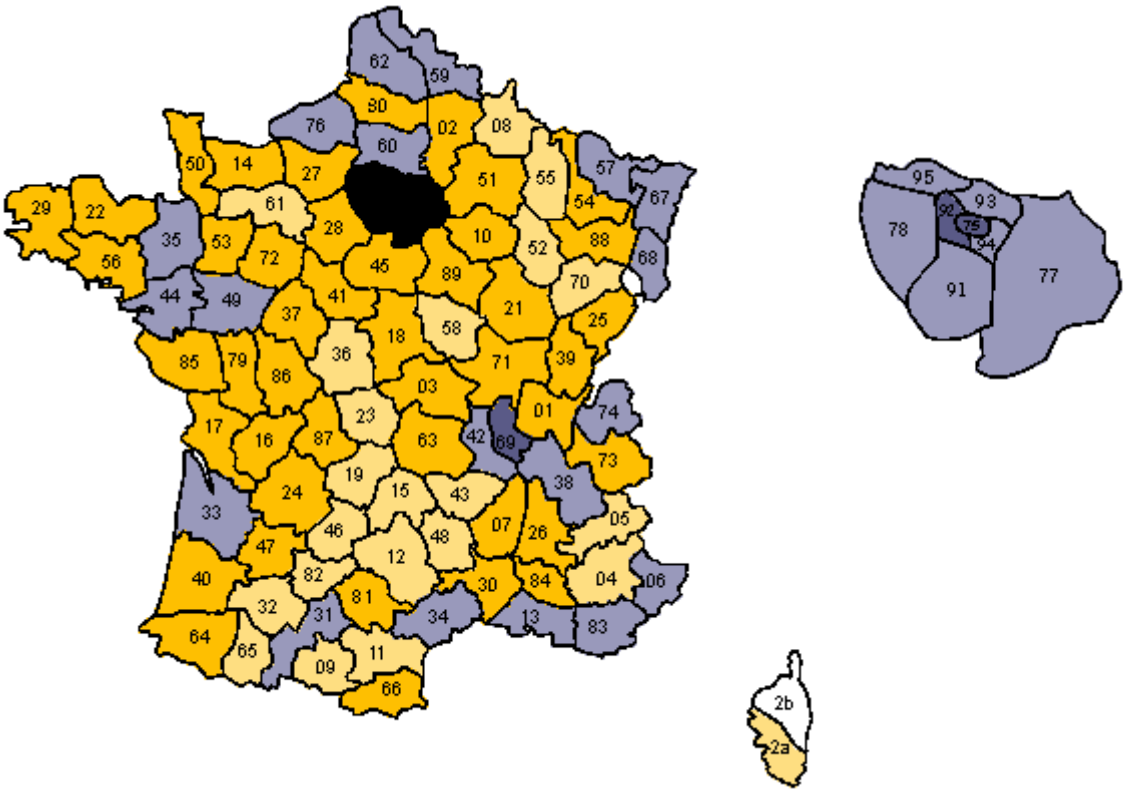

Fig. 1: Internet hosts by district in France
Source: French Naming Authority (http://www.nic.fr)

Figure 2 shows millions of Internet users in the world from 1995 until 2000, while Figure 3 depicts the thousands of registered hosts starting from 1993. Users increased 20 times, from 24 up to 400 millions, during last five years. Viceversa, hosts growing rate was about 54 times, from 1.7 to 93 millions. Nevertheless, both curves show a similar slope, characterized by an increasing growth rate that reached a value close to 100% in the last year.

Figure 4 and 5 show respectively the growth of Internet users and hosts in Italy during last years, while figure 6and 7 depict the growth of Internet registered domains and the actual monthly distribution of these registrations in Italy. The comparison between international and Italian data shows a similar behavior in terms of users (increased 18 times during last 3 years) and different in terms of registered hosts (34 times during last 5 years).

These comparisons depicts an Italian approach to Internet phenomenon different with respect to the international case. The slower growth in terms of hosts is probably due to the strong limitation represented by language constraints that reduce the interaction potentiality with an international environment. The majority of Italian enterprises in Internet uses pages written only in Italian language, so reducing the achieved results and loosing any dragging effect on other enterprises.

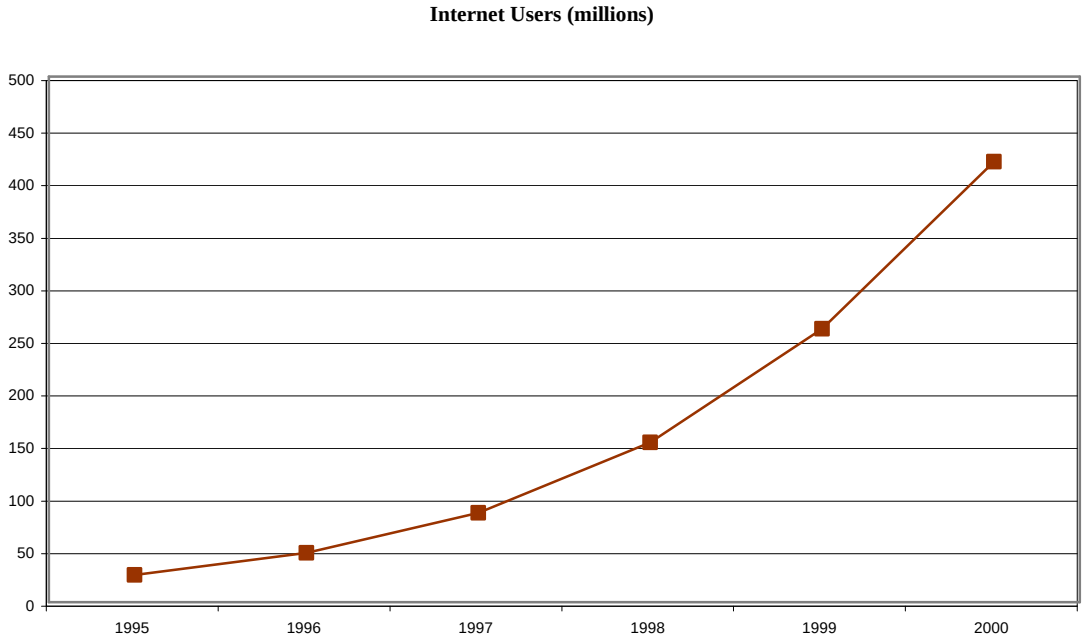

Fig. 2: Millions of Internet users
Source: NUA Internet survey (http://www.nua.com)

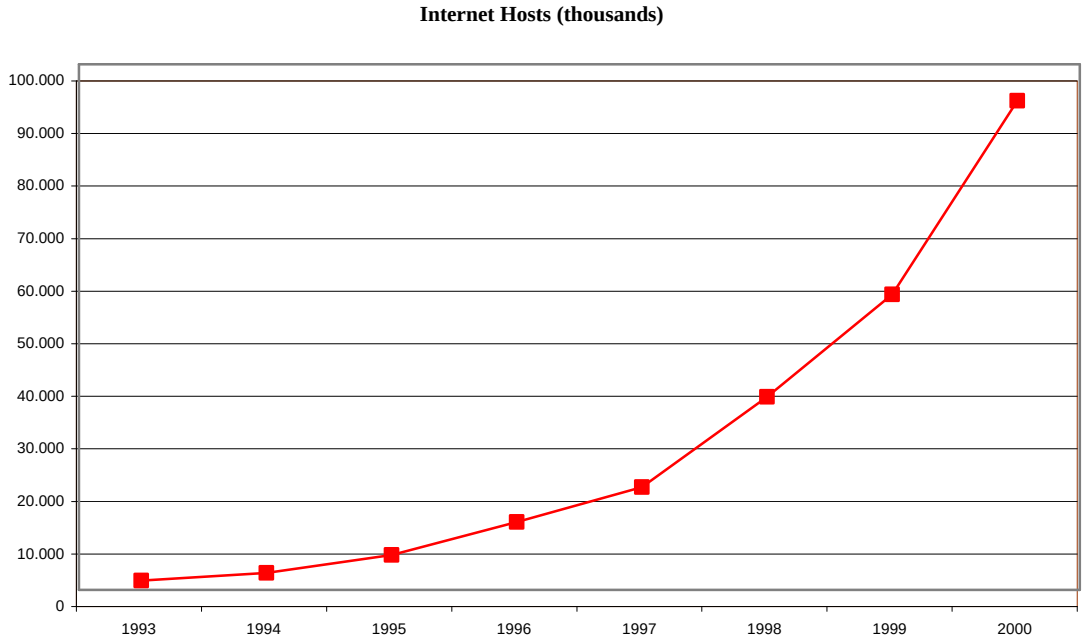

Fig. 3: Thousands of Internet hosts
Source: ISC - Internet Software Consortium (http://www.isc.org)

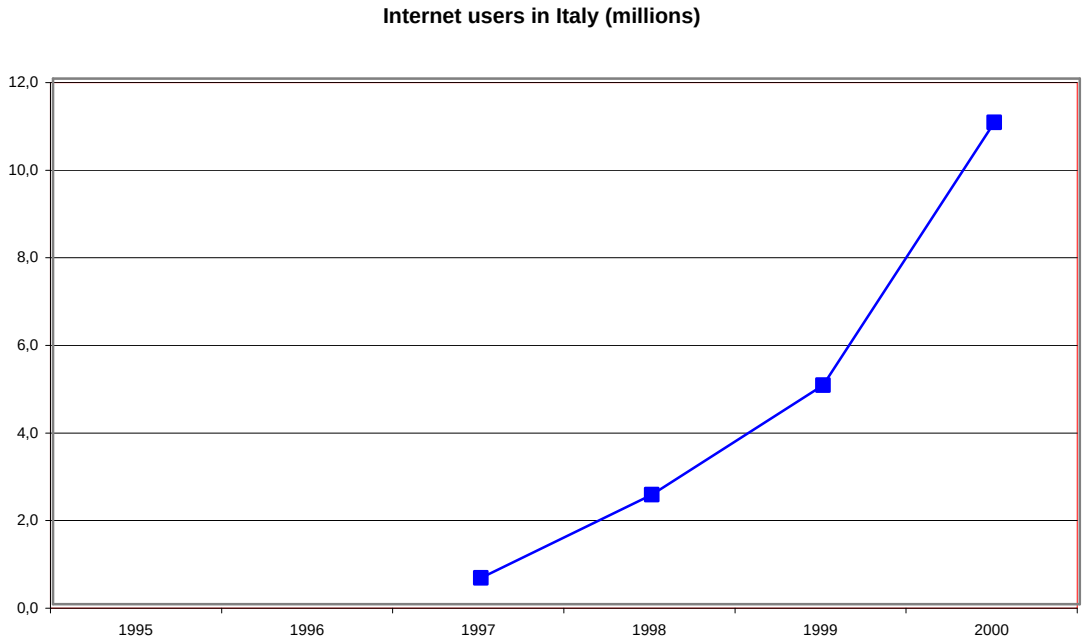

Fig. 4: Internet Hosts in Italy
Source: NUA Internet survey (http://www.nua.com)

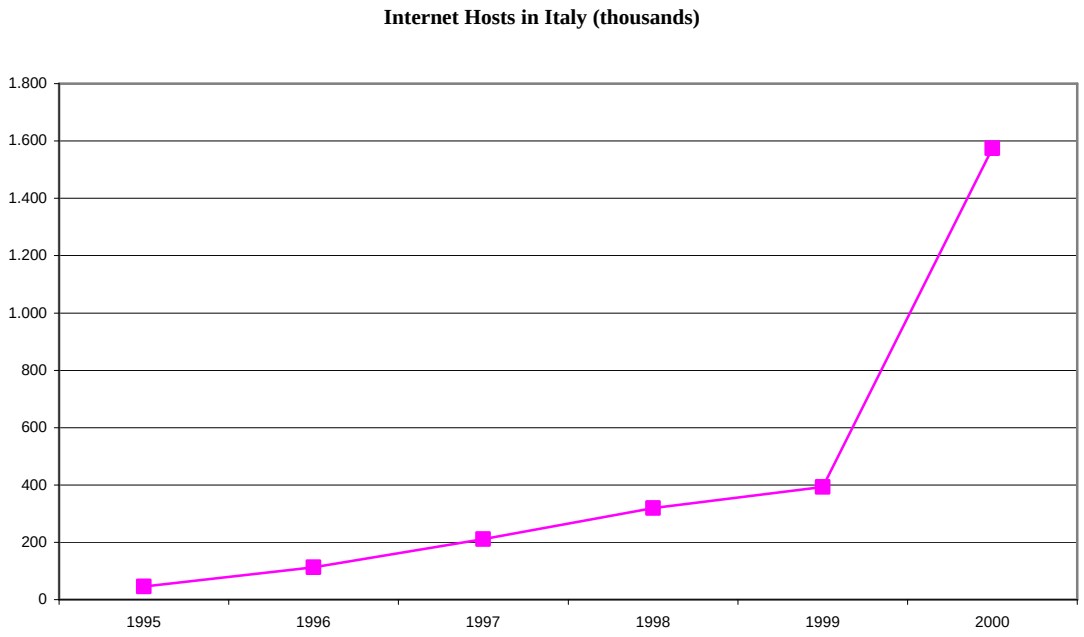

Fig. 5: Internet Hosts in Italy
Source: ISC - Internet Software Consortium (http://www.isc.org)

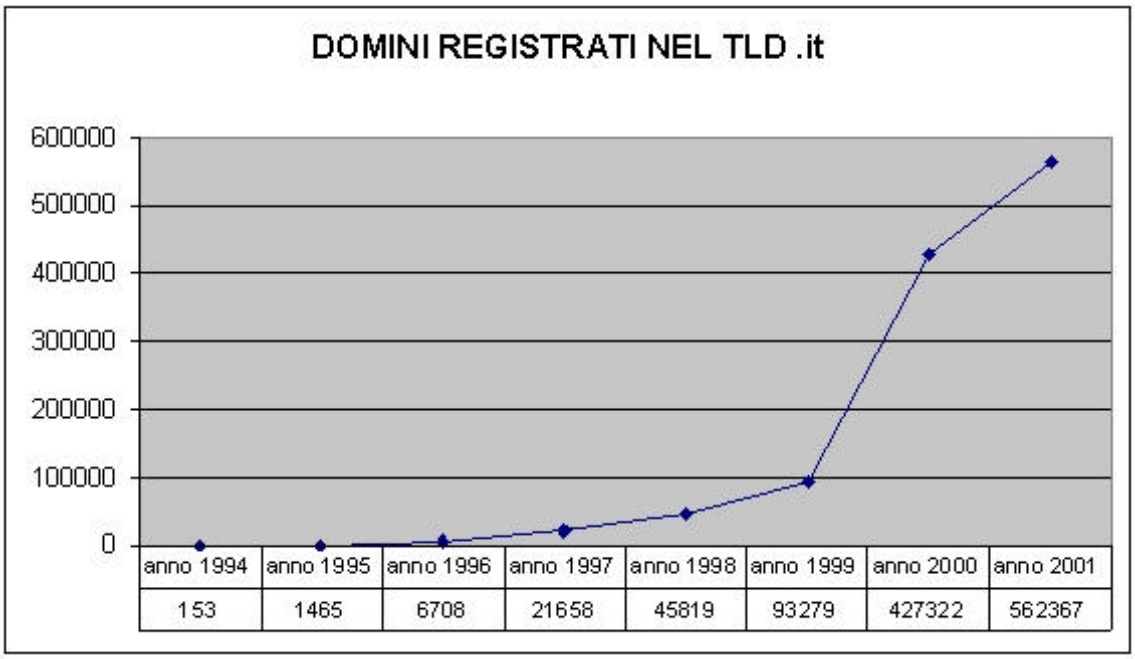

Fig. 6: Registered Domains in Italy
Source: Italian Naming Authority (http://www.nic.it)

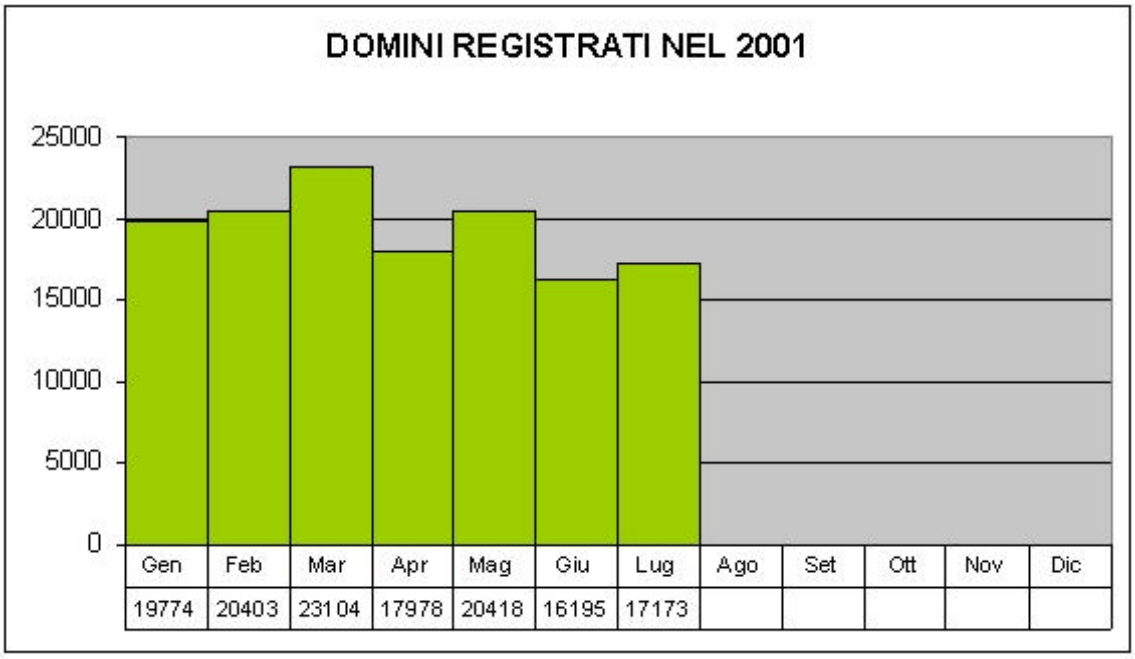

Fig. 7: Monthly distribution (year 2001) of Registered Domains in Italy
Source: Italian Naming Authority (http://www.nic.it)

Figures 6 and 7 represents the only statistical information supplied by Italian Organization. These are useful to confirm the different behavior of the Italian market with respect to the international evolution.

To enable the forecasting exercise in (Tesauro-Campisi, 2001) an estimation of 1.2 billions of users as the overall world target for Internet was presented, assuming a value of 70% of population for developed areas and 5% for developing countries. The data of NUA survey show that those values could be acceptable for a general approach, but can be best tuned for more precise studies. Moreover, the economic growth of some developing countries can substantially modify the estimation, increasing the value to be considered. Similar evaluations drove to a value of 400 millions as potential total number of hosts.

2.2 The model

The more common representation of the dynamics of technological innovation is the well-known Pearl-Verhulst equation or logistic "S shaped" curve (Marchetti, 1980). This curve starts with a light growth, then fast grows in the central part to reach an asymptotic behavior at its final part. The logistic curve can be derived as a development of the simple Coleman and Exponential models (Skiadas, 1985):

Exponential: $df/dt = C_1 f$ (1)

Coleman: $df/dt = C_1 (F - f)$ (2)

where f=f(t) is the number of adopters or the market share of a product at time t, df/dt the step of adoption and F the (predetermined) total number of potential adopters or the asymptotic value of f when t reach infinity. C_1 is a constant that identifies the diffusion parameter namely the number of adopters or the market share gaining in each time unit (this parameter is reversely proportional to the take-over time). From (1) and (2) the Fisher and Pry model (Fisher-Pry, 1971), (Fisher, 1988), with an inflection point for f=1/2, may be derived:

Fisher-Pry: $df/dt = C_1 f (1 - f)$ (3)

If we are concerned with the total number of adopters, we obtain the similar Blackman model (Blackman, 1974), with an inflection point at f=F/2:

Blackman: $df/dt = C_1 (f (F - f)/F)$ (4)

For f->F, the model (4) approximates the Coleman's one, for f->0 approximates the Exponential one, while in the central part it's behavior represents the interaction process between adopters and potential adopters. For reading convenience, we report the integral form of (4): its plotting in a logarithmic scale enables a straightforward interpretation of the phenomena under investigation

Blackman: $\ln[f/(F-f)]=C_1+C_2\,t$ (5)

Models (4) or (5) are widely used in technological forecasting, using the market share gained from the new product or technology as dependent variable an estimate of the overall market.

2.3 The obtained results

The forecasting exercise was totally different with respect to similar formerly done (Campisi-Tesauro, 1992). The different time scale of the phenomenon, with respect to telephone diffusion, or target dimension, with respect to Facsimile, modified substantially the parameters values, the sensitivity and the accuracy of the model, leading to results less reliable with respect to the past.

Figure 8 and 9 show the result obtained from the forecast exercise for users and hosts respectively. Both curves was obtained with an error value, evaluated with LSQ method, near 10^{-5}. This value is not negligible in absolute terms, because leads to an error about 10.000 units for users and 2.500 for hosts, but are surely acceptable with respect to the overall dimension of samples.

In particular, the total amount of Internet users in 2003 should be close to one billion, with respect to last value (year 2000) of 419 millions. It means that the total number of users will double in next three years, approaching the final part of the curve, characterized by a slowing growth rate. Nevertheless, this behavior could be different in case of modified conditions for target estimation, while increasing (as expected) the overall target in future years the reached value could be less close to the asymptote (showing a different shape).

Viceversa, the hosts number will increase faster than users in next three years (from 93 millions of year 2000 up to 243 millions), but their curve seems to reach the maximum growth rate at the end of 2003. Also for hosts values a different estimation of the overall market could modify the final result, but in this case the curve shape will not appear so different.

A forecast exercise for Italian case was not included because allowed only for hosts case. This constraint is due to data available representing a too short time series.

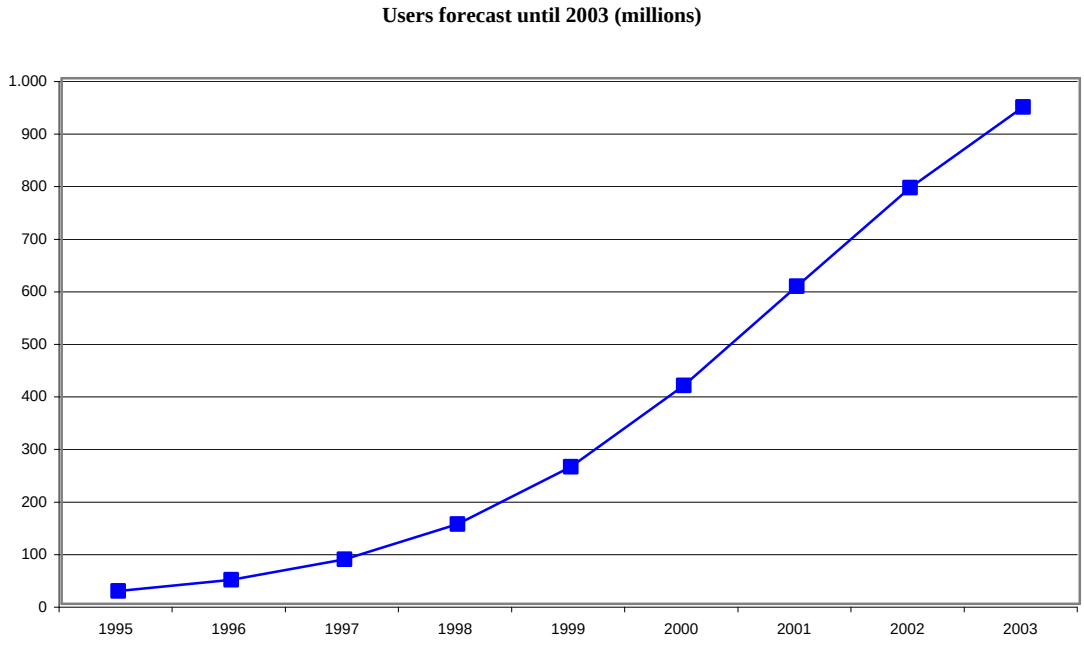

Fig. 8: Forecast of Internet users until 2003 (millions)
Source: Personal evaluation on NUA data (http://www.nua.com)

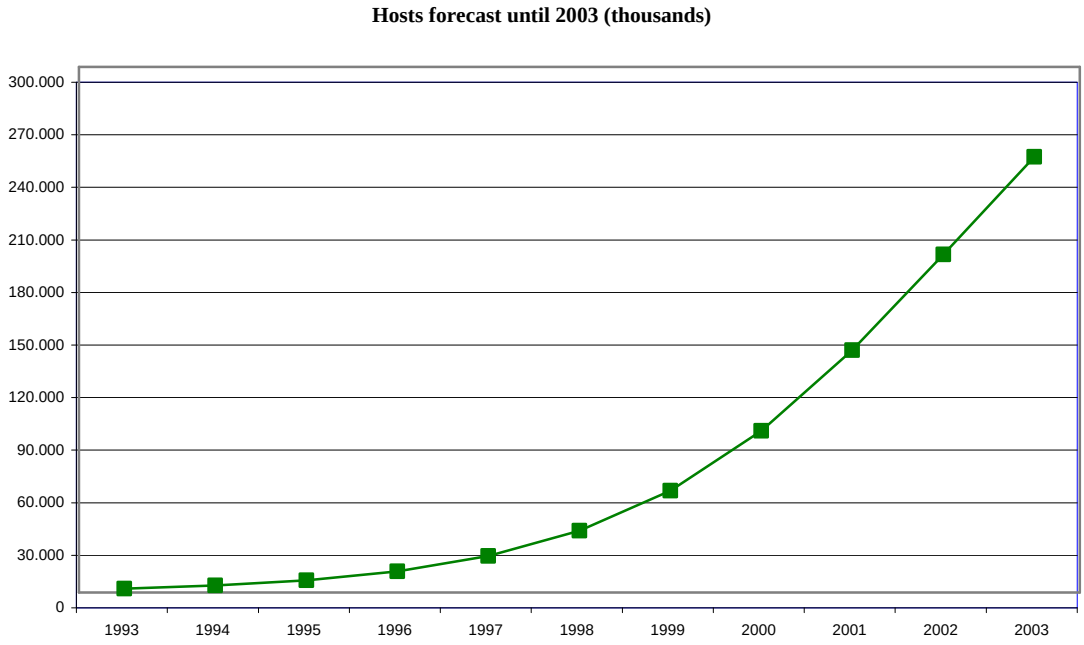

Fig. 9: Forecast of Internet hosts until 2003 (thousands)
Source: Personal evaluation on ISC data (http://www.isc.org)

3. The financial market

The financial market generally consider Internet-related companies as new and innovative enterprises dedicating them specific indexes, separated from the more general one. In fact, the New York stock exchanges have a specific index for this kind of companies (Nasdaq) different from the more general Dow Jones. However, Nasdaq index collects values of all the new and innovative enterprises, including also those involved in totally different sectors, as bio-tech companies and others. Nevertheless, even considering the presence of different types of companies, the Nasdaq index seem to express the idea of the world financial market about Internet-related companies.

A similar difference exists in the Italian market, where a specific index (Numtel) was defined to consider new and innovative enterprises separated from the other, included in the more general Mibtel. The difference between the Italian and the USA market is in the percentage of Internet-related companies considered by the specific index, because the percentage of different companies in Numtel is lower than 10%.

Figures 9 and 10 are related to the USA case, while figures 11 and 12 to the Italian stock exchange. In both cases the period considered is last year, because the Numtel evaluation started at the beginning of 2001.

All the diagrams show considerable loss during last year, nevertheless they seems substantially different. The Dow Jones index shows a more varied behavior, with an initial high value quickly reduced to a mean natural fluctuation until an sudden loss near the end of march. Subsequently, the index rebound to maximum level near the end of may to decrease smoothly until today.

The Nasdaq behavior seems totally different, presenting a continuous reduction of value stopped only two times by small rebound effects, in february and in may, but leaving the general impression of a continuous process.

Viceversa, the Italian case shows a general different behavior. Both indexes, Mibtel and Numtel, had an absolutely decreasing trend. The difference between them is that the Internet related index shows a completely continues behavior, while the index connected to traditional activities alternated decreasing and rebounding phases, even with the same final result.

The final result of this observation is that the new technology market in USA decreased of 57% during last year, while the traditional decreased of 12%. In Italy the technological market lost 58% and the traditional 28%.

Fig. 10: Nasdaq index during last year
Source: Italia On Line Financial Data (http://mercati1.iol.it)

Fig. 11: Dow Jones index during last year
Source: Italia On Line Financial Data (http://mercati1.iol.it)

Fig. 12: Numtel index during last year
Source: Italia On Line Financial Data (http://mercati1.iol.it)

Fig. 13: Mibtel index during last year
Source: Italia On Line Financial Data (http://mercati1.iol.it)

4. Conclusions

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INTERNET SOURCES

Main Denomination Organs in Internet:

Austria (.at)	**http://www.nic.at/**
Belgium (.be)	**http://www.DNS.BE**
Denmark (.dk)	**http://www.nic.dk/**
Finland (.fi)	**http://www.ficix.fi/**
France (.fr)	**http://www.nic.fr/**
Germany (.de)	**http://www.nic.de/**
Greece (.gr)	**http://www.hostmaster.gr/**
Ireland (.ie)	**http://www.ucd.ie/hostmaster/**
Italy (.it)	http://www.nic.it/
Luxembourg (.lu)	**http://www.dns.lu**
Netherlands (.nl)	**http://www.domain-registry.nl/**
Portugal (.pt)	**http://www.dns.pt**
Spain (.es)	**http://www.nic.es/**
Sweden (.se)	**http://www.nic-se.se/**
United Kingdom (.uk)	**http://www.nic.uk/**
USA Defence (.mil)	http://nic.mil/
USA Governmental (.gov)	http://www.nic.gov/

Commercial (.com)	http://www.iana.org/generic.html
Educational (.edu)	http://www.networksolutions.com/help/registration/index.html
Internat. Organiz. (.int)	http://www.iana.org/int.html
Networks (.net)	http://www.iana.org/generic.html
Organisations (.org)	http://www.iana.org/generic.html

Information suppliers about Internet:

I S C	http://www.isc.org/
NUA	http://www.nua.com/