

## TÁRKI Social Report Reprint Series No 18.

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### The Spread of Information Technology: Objective and Subjective Obstacles

#### Abstract

In our study we examine the characteristics of the spread within society of information technology in general, and the internet in particular. We look at factors hindering its diffusion, especially the roles of material or cultural considerations in keeping the large group of people who do not use the internet away from the information society. For our analysis we primarily use data collected in the past three years under the World Internet Project (WIP).

According to the results of the WIP, 25 per cent of Hungarians aged 14 and over used the internet in the autumn of 2003. In the past three years the penetration of internet use has exhibited a linear increasing trend. The spread of internet use in Hungary had not reached the point of inflection. The dynamic period of diffusion was yet to come.

We investigate to what extent internet use is explained by 'cultural capital' or 'financial status'. We shall make use of an overall path model for this task. The model reveals that cultural capital has the lead among direct effects, since the strength of path between cultural capital and internet use is beta of 0.45, while the path from financial status to internet use receives a beta of only 0.09.

In summary, we may contend that cultural reasons behind the (non-)use of the internet have a substantial explanatory power.

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In our study we examine the characteristics of the spread within society of information technology in general, and the internet in particular. We look at factors hindering its diffusion, especially the roles of material or cultural considerations in keeping the large group of people who do not use the internet away from the information society. For our analysis we primarily use data collected in the past three years under the World Internet Project (WIP).<sup>1</sup>

### **The diffusion of internet use**

In connection with the information age and the post-industrial transformation, one of the most important subjects of inquiry is the dynamics of the diffusion in society of information technologies which have played a fundamental role in the transformation (Bell 1973; Castells 2000). Rogers' (1995) diffusion theory provides a convenient theoretical framework for the reconstruction of the diffusion process.

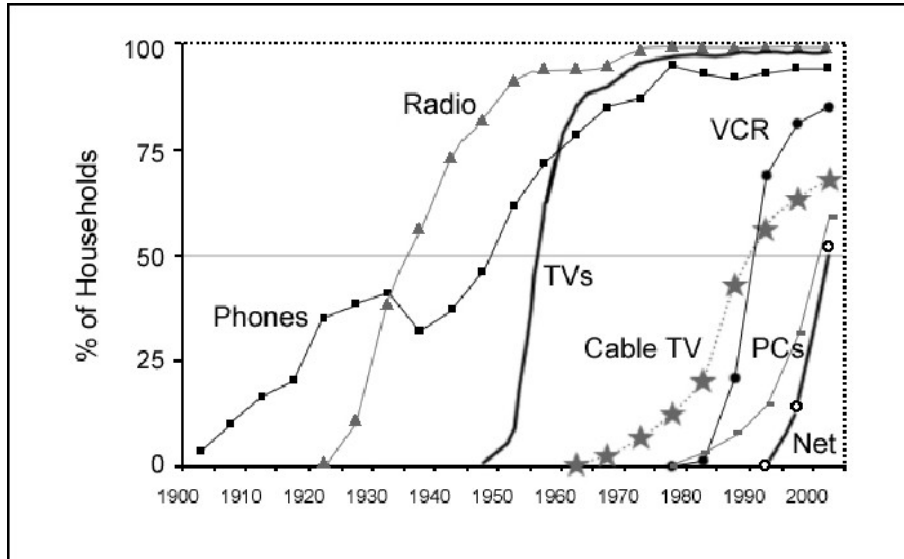
One of the most important tenets of diffusion theory is the observation that the spread is non-linear. It is instead made up of several stages, each with its own characteristics. The first people to start using the new technology at the initial phase of diffusion are the so-called 'innovators'. The members of this group are typically more open than average to innovation and ascribe a special significance to it. They are followed by the 'early adopters', who are then joined by the 'early majority'. At this point the distribution curve of the diffusion process shows an abrupt steep rise. Since the groups are of unequal size, the process of the spread of technology is non-linear.

The diffusion model describes the spread of successful innovations with an S-shaped curve. The S-curve models the frequently observed distribution of innovation spread: initially, the number of users rises at a slow pace; this is followed by a substantial boom; and finally, after saturation point has been reached, the rate of increase slows down again.

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<sup>1</sup> The World Internet Project (WIP) was launched in the summer of 1999 by UCLA of California and the NTU School of Communication Studies of Singapore. More than 15 countries participate in the international research into internet use worldwide. In Hungary research for WIP has been carried out with the cooperation of the Social Science Research Institute (TÁRKI), the Information Society and Trend Research Institute (BME-ITTK) and the Centre for Information Society and Network Research (ELTE-ITHAKA). The research uses a panel sample. The initial representative sample of 2001 included 5,032 people nationwide. For details of the project see Dessewffy and Fábán (2003).

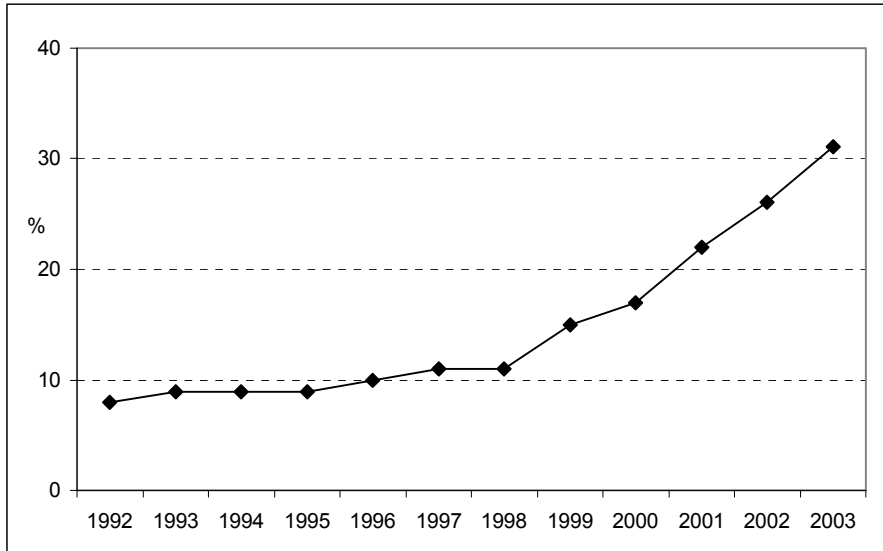
Figure 1: *The diffusion of information technology in the US, 1990–2000*  
 (% of households)



Source: Dessewffy and Galacz (2003).

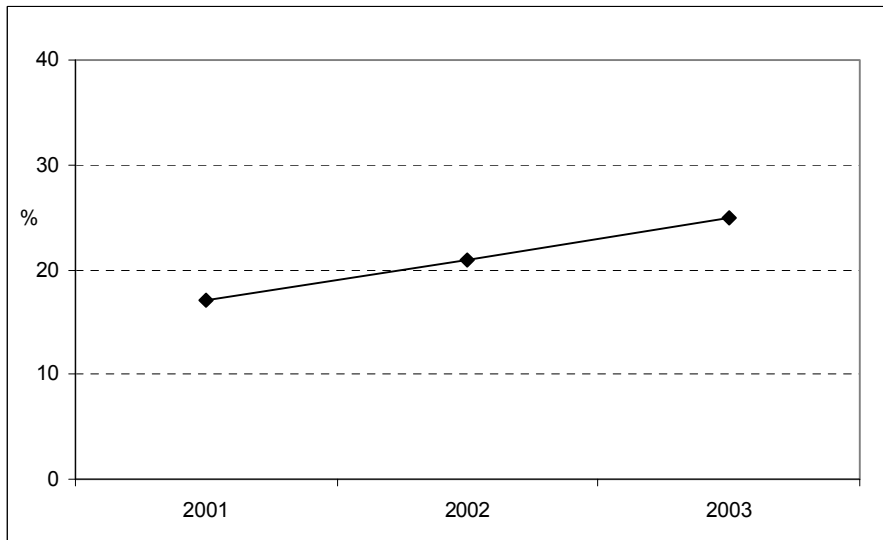
In examining the diffusion of information technologies, especially the diffusion of internet use, it is worth looking at the data on the development of computer ownership in Hungarian households in the past few years. The latest results show that the growth of computer ownership has finally intensified, albeit not spectacularly, after a prolonged period of stagnation and slow increase. The rate of growth has been largely constant since 1998: the proportion of households with at least one computer has increased by four to five percentage points each year (see *Figure 2*).

Figure 2: Computer ownership in Hungarian households, 1992–2003 (%)



Source: 1992–1997: TÁRKI Household Panel Survey; 1998–2000: TÁRKI Household Monitor Survey; 2001–2003: TÁRKI WIP.

Figure 3: Proportion of internet users among Hungarians aged 14 and over\* (%)



Note: \*Due to the panel sample in 2002 it represented the population 15 years old and over. In 2003 the sample was completed, so it was represented the Hungarian population aged 14 and over.  
Source: 2001–2003: TÁRKI WIP

According to the results of the WIP, 25 per cent of Hungarians aged 14 and over used the internet in the autumn of 2003 (see *Figure 3*). In the past three years the penetration of internet use has exhibited a linear increasing trend. In terms of the categories of diffusion theory, the situation in Hungary may then be labelled as the stage where the spread of internet use has reached the ‘innovators’ and the ‘early adopters’ but not yet the ‘early majority’.<sup>2</sup> That is, in 2003 the spread of internet use in Hungary had not reached the point of inflection. The dynamic period of diffusion was yet to come.

### Factors accounting for internet use or non-use

What could be the factors that impede the dynamic diffusion of internet use? What stops the majority of the Hungarian population from using the internet? What reasons do people give as an explanation?

According to the results of the survey, more than a third (36 per cent) of non-users said that one (or the only) reason they do not use the internet is that they do not need it (see *Figure 4*). The unavailability of computers is another important cause (30 per cent), although this factor now appears far less frequently than it did in 2002. One-quarter of non-users (26 per cent) are simply not interested in the World-Wide Web. At the same time, financial considerations continue to be mentioned as a major reason. In both 2002 and 2003 one-fifth of non-users said they did not connect to the internet because they found it too expensive (21 per cent and 18 per cent, respectively). At the same time (presumed) lack of skills appears to be an important deterrent factor in both years: in each year 17 per cent of non-users stated that they did not have the skills necessary to surf the net.<sup>3</sup>

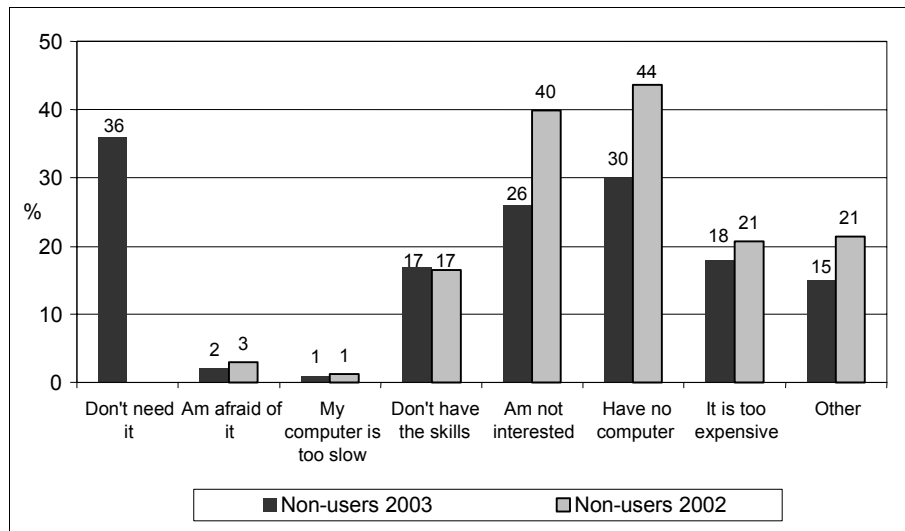
Looking at *Figure 4* it is easy to see that material reasons, such as the lack of a computer or the connection fee, are still important deterrent factors, even though they are on the decline. However, reasons of a non-financial, but rather cultural or cognitive nature cannot be ignored either. The answers ‘don’t need it’, ‘am not interested’, ‘am afraid of it’ and ‘don’t have the skills’ belong to this category.

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<sup>2</sup> We must emphasize that we discuss internet use in general, including those using the internet at school or work or elsewhere. The spread of internet use in the home only is considerably smaller (10 per cent).

<sup>3</sup> The comparison of the two surveys is complicated by the fact that the ‘don’t need it’ answer was only added to the survey in 2003. The addition substantially ‘restructured’ earlier results. The change was necessitated by the finding that in previous years the ‘other reason’ option revealed a significant proportion of comments to this effect.

**Figure 4:** Why do you not use the internet?—the distribution of valid answers by non-users in 2002 and 2003 (%)



Note: Subjects could mark more than one answer.

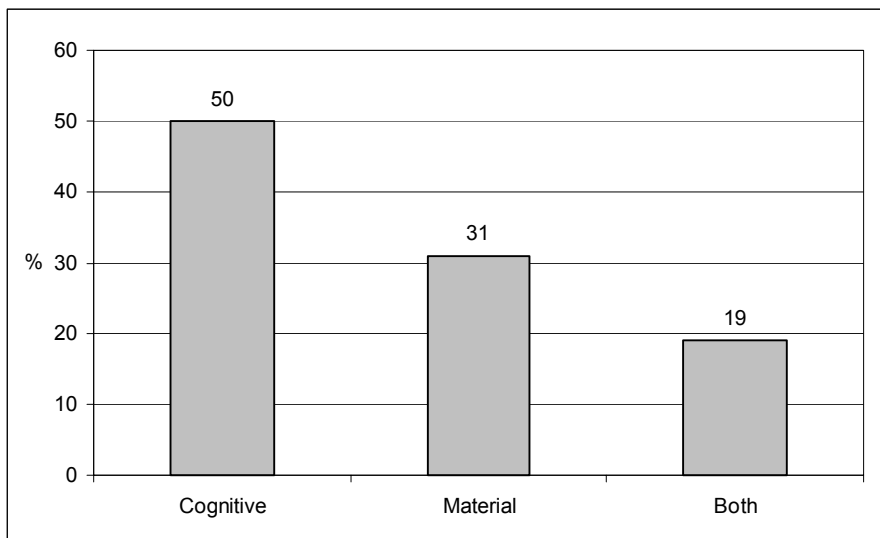
Since the subjects did not necessarily choose only one answer as the reason for not using the internet, we created a variable that classes subjects according to whether they chose only material reasons, only cognitive reasons, or both types of reason as factors keeping them away from the internet. The new variable only takes the above-mentioned concrete reasons into account, ignoring the 'other' category of answers. The three attributes of the variable were assigned the following answers:

- cognitive: 'don't need it', 'am not interested', 'don't have the skills', 'am afraid of it';
- material: 'have no computer', 'it is too expensive', 'my computer is too slow';
- both: if both cognitive and material reasons were marked.

This method revealed that half of those not using the internet attribute this to only cognitive reasons, a further fifth (19 per cent) mention cognitive reasons as deterrents, in addition to other causes (Figure 5). Overall, therefore, more than two-thirds (69 per cent) of subjects who do not make use of the opportunities provided by the World-Wide Web believe that this is due to obstacles of cognitive or cultural origins. This finding, of course, should not obscure the fact that a third of non-users indicated purely material reasons and around 50 per cent of subjects included material reasons as an explanation for their staying away from the internet.



Figure 5: *The nature of non-users' reasons—as a percentage of subjects, 2003*



### The explanatory model of the rejection of internet use

Let us now reach beyond the self-representation of our subjects—since up till now we have been examining the factors mentioned by our subjects as the reasons motivating their rejection of the internet. Let us now look at the interaction of use or non-use on the one hand, and cultural, cognitive and material properties on the other, in an explanatory model where all these factors are characterized by complex indicators independent of the reasons behind non-use of the internet.

In the following paragraphs we shall investigate to what extent internet use is explained by 'cultural capital' or 'financial status'. We shall make use of an overall path model for this task. The path model consists of linear regression models with a high level measured variable as the dependent variable. The dependent variable used by us—the dichotomic variable of internet use—meets this requirement, since, in the case of dummy variables, both averaging and dispersion are applicable.<sup>4</sup>

Each of the two independent variables of the path model has been aggregated in a main component out of several items representing cultural and material capital. The indicator representing cultural capital has been made up

<sup>4</sup> If we wanted to examine internet use as a dependent variable in a pure regression model, we would employ logistic regression. Here, however, we use a complex path model to present our hypothesis process with the help of direct and indirect paths.

of six variables. Level of education,<sup>5</sup> father's level of education, and language skills have been included. The remaining scores indicating cultural capital have been gained from certain cultural consumption habits: they are based on the frequencies of visits to theatres, museums and libraries.

The variable indicating financial status has been created along three dimensions. One score comes from the index of the ownership of consumer durables, which is the number of durable goods owned by the household selected from those listed in the questionnaire. The second score is the household income per capita and the third score is an indicator of the subject's housing standards, the cost of furnishings.

The intermediary variable of the path model is the availability of a home computer and an attitude score. The latter incorporates four variables describing people's misgivings and worries about the internet:

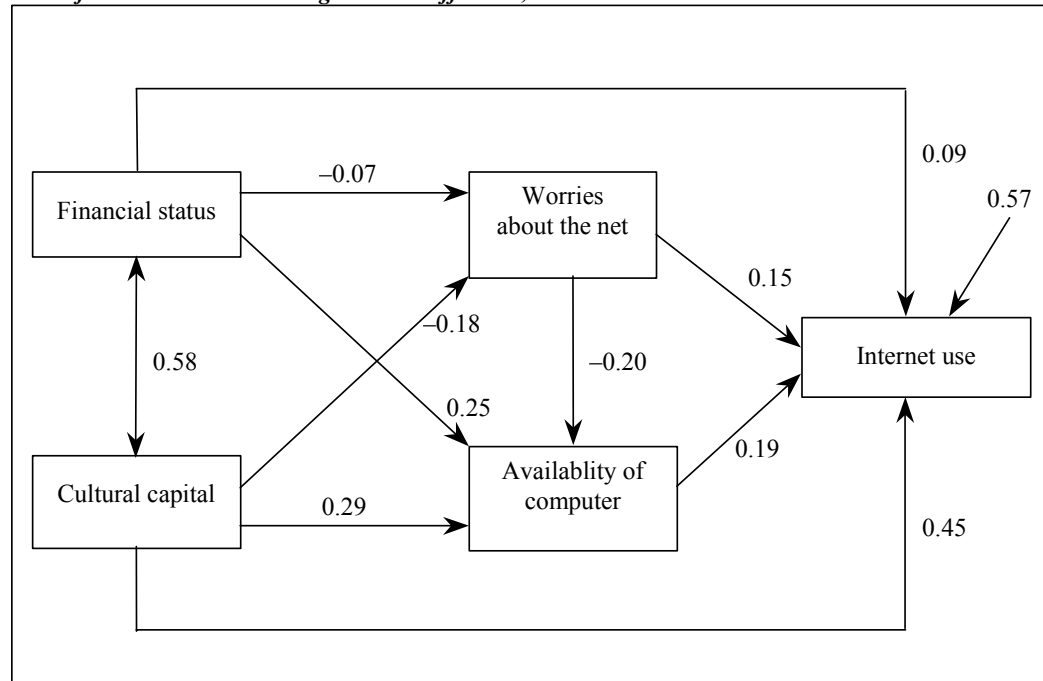
- People spend too much time surfing the net.
- The internet has nothing important to offer you.
- Children can access a lot of information on the net which is unsuitable for them.
- People who use the internet risk the security of their personal details.

In summary, we assign the binary variable of internet use as the dependent variable of our path model. The two independent variables are cultural capital and financial status, and the intermediary variables are derived from the availability of a home computer and the subjects' attitudes towards the internet.

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<sup>5</sup> The level of education used in our model does not correspond to the categories of the original survey. As the subjects of the study were 14 years old or over, secondary school pupils were also included. These were classed in the original analysis as having only primary education. In order to counterbalance this distortion, the measure indicating level of education used in our analysis has been adjusted on the basis of economic activity. Full-time pupils in secondary education have been given the benefit of the doubt and categorized as having secondary education. Similarly, those who are in full-time higher education have been classed as having completed higher education.

Figure 6: The path model of internet use with the regression coefficients, 2003



The explanatory value of the path model is striking: only 57 per cent of our dependent variable could be accounted for by variables outside the model (see *Figure 6*). As expected, cultural capital and financial capital are not independent of each other; the relationship between them is characterized by a correlation of 0.58. For the moment, however, we are primarily interested in the direct and indirect effects of financial status and cultural capital on internet use. The model reveals that cultural capital has the lead among direct effects, since the strength of path between cultural capital and internet use is beta of 0.45, while the path from financial status to internet use receives a beta of only 0.09. The regression beta of the path leading to the availability of computers is 0.25 from financial status and 0.29 from cultural capital. The partial beta values of the linear regression analysis therefore show that, if we compare people with identical attitudes towards the internet, cultural capital gets slightly more weight in explaining computer ownership than does financial capital. The difference between the strengths of the paths from financial status and cultural capital to worries about the internet is somewhat larger. In this respect the role of cultural factors has again proved to be stronger. Put together, these findings mean that if effective, clear and accessible answers were offered—as a market, government or social initiative—to the question ‘*What is the internet good for?*’, this in itself could increase the penetration of the internet.

The strongest direct path of the entire model is the path leading from cultural capital to internet use, with a beta value of 0.45. People’s misgivings about the internet, not surprisingly, have a negative effect on internet use.<sup>6</sup> We find a path of similarly negative strength between the availability of a home computer and worries about the internet as well. This result may be attributed to a more general fear of unknown technology.

Finally, we have investigated the extent to which internet use is affected by all direct and indirect paths together if we start a) from financial status, and b) from cultural capital. With financial capital as the starting point, the combined effect of direct and indirect paths on internet use has strength of 0.47, while with cultural capital as the starting point, the combined effect of direct and indirect paths has a strength of 0.63.

The final conclusion we can draw from the path model is that, if computer ownership and attitudes towards the internet are taken into account, the

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<sup>6</sup> From the point of view of our model it seems unnecessary to discuss whether the cause and effect relationship of people’s worries about the internet and their use of the internet is reversible. A model could very well be built where internet use is made to explain people’s attitudes towards the internet. In this study, however, our aim was to compare the strengths of the effects of cultural capital and financial status on internet use. From this point of view it seems justifiable to make the assumption that people’s attitudes towards the internet influence their decision to connect or not to connect. It is, therefore, reasonable to take attitudes to be the *explanans* and internet use to be the *explanandum*, rather than the reverse.

effect of cultural capital on the decision to connect or not to connect to the internet can be shown to be significant.

In view of all that, the question may well arise as to whether the effect of age can be left out of the model, since there is a strong correlation between age and internet use (Dessewffy and Fábíán eds. 2003: 21). Will our conclusions still hold if we include the age variable in our path model?

Adding the age variable to the path model does not substantially alter its structure. At the same time, it can be seen from the linear regression showing the explanatory power of the complete model and the regression coefficients of direct effects on internet use that age is indeed a relevant factor in internet use. The inclusion of age increased the model's explanatory power by three per cent. That is, while our first path model accounted for 43 per cent of internet use, this expanded model can account for 46 per cent (*Table 1*). The difference between the direct effects of cultural capital and financial status on internet use is in the same direction as before: with age included, the regression coefficient of cultural capital is still higher than that of financial status. The addition of the age variable leaves the order of other variables unaltered as well.

**Table 1: Direct effects in the linear regression path model including age**

	Beta	Level of significance
Availability of computer	0.17	0.000
Worries about the internet	-0.12	0.000
Financial status	0.10	0.000
Cultural capital	0.40	0.000
Age	-0.17	0.000

*Note:*  $R^2=0.46$ ; internet use is the dependent variable.

## Conclusions

In summary, we may contend that cultural reasons behind the (non-)use of the internet have a substantial explanatory power even beyond self-representation.

The importance of this claim cannot be overestimated. Firstly, the disclosure of the significance of cultural factors draws attention to the fact that while we tend to emphasize financial reasons as the primary obstacle to the spread of the internet, there is, in fact, another kind of explanatory variable, which displays different characteristics. Secondly, if we acknowledge the existence and significance of cultural obstacles, it becomes plain to see that decision-makers—whether they are market or government representatives—need to work out an alternative strategy and *tool system* and employ these in a complex manner to remove both material and cultural obstacles.

REFERENCES

- Bell, D. 1973: *The Coming of Post-Industrial Society: a Venture in Social Forecasting*. New York: Basic.
- Bognár, É. and Zs. Rét 2004: 'A digitális egyenlőtlenségek kulturális vonatkozásai. [The cultural aspects of digital inequality].' In: Z. Karvalics, L., T. Dessewffy and Z. Fábán eds.: *Internet.hu 2*. Budapest: Gondolat Kiadó.
- Castells, M. 2000: 'Materials for an exploratory theory of the network society', *British Journal of Sociology*, Vol. 51, No. 1 (January/March).
- Dessewffy, T. and Z. Fábán eds. 2003: "'A digitális jövő térképe". *A magyar társadalom és az internet*. ["A Map of the DigitalFuture". *Hungarian Society and the Internet*]. Budapest, ITTK-TÁRKI.
- Dessewffy, T., A. Galács and Z. Gayer 2003: 'Az internet és más info-kommunikációs eszközök terjedése Magyarországon. [The diffusion of the internet and other forms of information technology]. In: Z. Karvalics L. and T. Dessewffy eds.: *Internet.hu*. Budapest: Aula Kiadó, pp. 117–137.
- Dessewffy, T. and A. Galács 2003: "'A dolgok új rendje" – technológiai diffúzió és társadalmi változás. ["The new order of things"—technological diffusion and social change]' In: Z. Karvalics L. and T. Dessewffy eds.: *Internet.hu*. Budapest: Aula Kiadó, pp. 31–60.
- Rogers, E. M. 1995: *Diffusion of Innovations*. 4th Edition. New York: Free Press.

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