

UNIVERSAL SERVICE: SOCIO-ECONOMIC CONSIDERATIONS FOR BROADBAND ACCESS

TEPPAYAYON, Orada¹ / BOHLIN, Erik²
Chalmers University of Technology,
Vera Sandbergs Allé 8, SE-41296 Göteborg, Sweden
erik.bohlin@chalmers.se, orada@chalmers.se

Abstract

In the context of the information society, to be able to communicate and interact is a crucial and decisive factor for every citizen and business. New interactive services should be accessible to every citizen in a country, so that the benefits of new technologies and services accrue in all areas. This should in turn benefit the overall economic efficiency of society. The adoption of a liberalization policy does not automatically bring such benefits to all regions of a country, partly because the existing levels of infrastructure and services are significantly lower in some areas, and partly because of educational and institutional barriers to the use of new ICTs.

Since the broadband divide becomes an issue for the information society, many policies have been initiated to bridge this divide. Widening the scope of universal service policy to cover broadband access is one policy option. However, moving broadband into such a direction needs to be carefully examined. Socio-economic issues are among those that need to be analyzed. This paper examines comprehensive theoretical research on the digital divide and its impact in the information society. Results of several studies in relation to broadband are provided. The paper will also analyze the relation between socio-economic issues and implications for broadband, with conclusions on whether or not socio-economic factors can be a reason for broadband universal service.

Keywords

Universal service, broadband, socioeconomic issues, digital divide, knowledge gap hypothesis, information gap, public sphere, accumulation of advantage, adaptive structuration theory

1 INTRODUCTION

The reform of telecommunications on the EU level in the 1980s not only came with liberalization and harmonization of the market, but also accepted the emergence of the universal service concept at the national level, and highlighted the broadband vision as an important factor for economic and social development [Teppayayon and Bohlin, 2008]. Since then, one major telecommunications regulatory principle, so-called 'Universal Service', has gradually emerged to bridge the divide between those who have access to the new possibilities and are comfortable using them and those who are excluded from fully enjoying their benefits. On the EU level, under the current 2002 USO Directive³, the fundamental requirement of universal service has guaranteed to provide users on request with a connection to the public telephone network at a fixed location, at an affordable price. The requirement is limited to a single narrowband network connection. However, there is recognition in the EU that universal service is a dynamic and evolving concept and must respond to changes in the needs and expectations of consumers [European Commission 1996]. This implies that the scope of universal service could be reviewed in Europe as a basis for concrete policy action, where appropriate.

¹ Ph.D. Candidate, Department of Technology Management and Economics.

² Professor, Department of Technology Management and Economics.

³ DIRECTIVE 2002/22/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).

Nowadays, along with technological developments, broadband connectivity is widely accepted as being of strategic importance to all countries because of its ability to accelerate the contribution of ICTs to economic growth in all sectors, enhance social and cultural development, and facilitate innovation. Since broadband is important for economic and social development, the European Commission has considered wide broadband coverage in Europe as crucial for fostering growth and jobs. Many policies have been initiated on the EU level to stimulate broadband coverage by recognition of the primary role of the market as the common approach for broadband deployment.

However, market-driven policy may have an efficient outcome in terms of broadband take-up but not an equitable outcome for people, especially in remote areas [Teppayayon and Bohlin 2008]. Moreover, the difference between the most and the least developed countries regarding broadband penetration in the EU is increasing year by year.⁴ Thus, the increasing broadband penetration growth together with applications development could lead to social exclusion for people who are not connected. As Commissioner Viviane Reding has pointed out, the lack of broadband access widens not only the digital but also the economic and social divides [Reding 2007]. Therefore the discussion is now whether broadband should be included into the scope of universal service as a policy priority to guarantee equal access for people.

Not only in the EU, broadening the scope of universal service to include broadband access is also being debated by governments or regulators in many countries. Although all agree on how importantly broadband contributes to society as a whole, moving broadband into the universal service concept brings in many debatable issues, e.g. those of socio-economic, commercial, and technological development.

In terms of socio-economic aspects, on which this paper focuses, there have been both supporting ideas which favour the inclusion of broadband access in the scope of universal service and counterarguments which oppose it [Teppayayon and Bohlin 2008]. Those arguments are summarized as follows.

Supporting Idea	Counterargument
<ul style="list-style-type: none"> - It is expected that with the growing use, new content and applications requiring broadband capabilities, broadband is likely to take on increasing socio-economic importance. As a result there is concern that those without an enhanced data capability will be unable to access the benefits expected, particularly in relation to education, health and government services [OECD 2003]. - Research from MIT has shown that broadband stimulates growth in employment and in the number of business if available on a large scale [Reding 2007]. Moreover, according to the report of OECD, the gap between rich and poor has grown in more than three-quarters of OECD countries over the past two decades. Income inequality and poverty are rising. A key driver of income inequality has been the number of low-skilled and poorly educated people who are out of work [OECD 2008] 	<ul style="list-style-type: none"> - The perceived delay in broadband deployment and concerns about ‘broadband divide’ are not different from other technology ‘divides’ with different rates of diffusion according to location, income, education, age, gender etc. Setting up universal service obligations should, if undertaken, be done at the mature stage of development of broadband services [OECD 2003]. - The broadband divide is symptomatic of much deeper social, economic and educational gaps that have long existed, so it is difficult to make a case for special broadband subsidies for these groups as a separate regime outside means-tested, targeted, general welfare programmes. Policy-makers would have to choose between general welfare programmes and targeted support to low-income users [OECD 2003].

Against this background, this paper will provide a comprehensive analysis in relation to digital divide and its impact in the information society. Results of several studies in relation to broadband are given. In addition, the paper will analyze and examine the relation between theoretical arguments on broadband universal service, including conclusions on whether or not socio-economic factors can support the inclusion of broadband in the scope of universal service.

⁴ Commission Staff Working Document, *Accompanying document* to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Region, ‘Preparing Europe’s digital future – i2010 Mid-Term Review’, Brussels, 17.04.2008, SEC (2008) 470.

To examine the above challenges, several theories have been drawn upon in order to understand the involvement of technology and society. All theories presented in the paper are rooted in social science and most of them are theories that explain the relationship between societal changes and communications technology development, in particular digital-divide phenomena. Main arguments of those theories are summarized in the next section together with their implications in the broadband environment. Undeniably, economic theories can also explain or defend broadband universal service initiative, but they are not mentioned here.

2 THEORETICAL RESEARCH

Throughout history, the rich have been in a far better position to benefit immediately from new technologies than the poor. Other things being equal, the same will be true of digital technology and computer networks; low-income communities will probably find it more difficult than the rich ones to get wired and connected, they will be less able to pay for the necessary electronic goods, they will not be such attractive markets for software and online content, and they have fewer resources to educate their members to meet the new challenges and opportunities of the digital age [Mitchell 1999].

Unavoidably, the issue of digital divide is inherited by the broadband era since communication among people in society is regarded as important to every sector and technology revolutions make this divide wider. Closing the divide is not only a practical or technological access issue, but also raises academic or theoretical issues. As for practical or technological aspects, the divide appears to be a matter of technological access, where some academics and policy analysts argue that these gaps will close themselves as natural market place dynamics; however, there are also theoretical means to challenge their conclusions [Mason and Hacker 2003]. As for theoretical aspects, this divide involves strong issues of social networking, formations of new forms of affiliation, and new means of networking to organize social, economic and political actions [Mason and Hacker 2003].

The divide can be observed in broadband access, and closing this divide by incorporating it into universal service policy leads to arguments between those who agree and those who disagree as shown in Figure 1. In this section, comprehensive theoretical researches in relation to the divide are analyzed and examined. Six theories are chosen to explain the issue of broadband divide and its implications for society. These theories have been recognized and referred to by many academicians as theories of the digital divide. In particular, they are developed or adapted to the information society environment. These theories can be categorized into two groups. First, there are theories relating to the gap, consisting of a knowledge gap hypothesis, information gap theory and diffusion of innovation. Second, there are theories relating to behaviour, consisting of an ‘accumulation of advantage’ hypothesis, adaptive structuration theory, and theory of the public sphere.

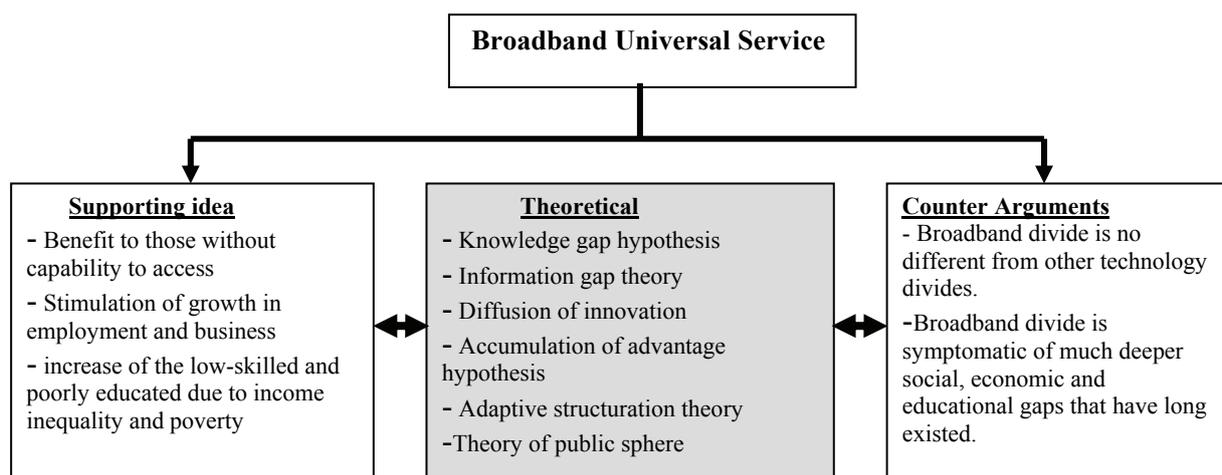


Figure 1: Main arguments under broadband universal service and related theories

2.1 Theories relating to the gap

Knowledge is now regarded as the main driving force of innovation and development [Evers et al., 2004]. In the almost poetic words of the World Bank, ‘Knowledge is like light. Weightless and tangible, it can easily travel the world, enlightening the lives of people everywhere [World Bank 1999].

Some experts have not failed to stress that one of the most immediate consequences of the expansion of a knowledge-based economy would be the rich growing richer and the poor remaining at a standstill. In support of this hypothesis of a deepening of inequalities between the rich and the poor, several communication theories have examined the relation between technology development and the knowledge gap in society. These theories have been termed the knowledge gap hypothesis, information gap theory and 'diffusion of innovation' theory.

Knowledge Gap Hypothesis: The issue of a knowledge gap in society has a long standing in our history since the origins of traditional communications. The knowledge gap hypothesis is that growth of knowledge is relatively greater among segments with higher socioeconomic status as the infusion of mass media information into the social system increases [Tichenor, Donohue and Olien 1970]. Several tests have been explored to prove the hypothesis in that analysis. Most of the data have tended to be consistent with the 'increasing knowledge gap' hypothesis. To the extent that this hypothesis is tenable, it provides some sobering reflections on the mass impact of the media. At least for the subject investigated, the mass media seem to have a function similar to that of other social institutions: that of reinforcing or increasing existing inequalities. Other tests have been carried out to prove the hypothesis in Internet environments [Kim 2008, Norris 2001]. Findings also indicate that Internet use may increase, rather than decrease, the gap knowledge between social classes.

Information Gap Theory: After the knowledge gap hypothesis was proposed in 1970, during the 1980s comparable hypotheses were advanced following the advent of computers and the perspective of the information society, referring to an information gap [van Dijk 2000]. While the thesis of a knowledge gap was initially only about information supplied by the mass media, the information gap theories were much broader. These theories have dealt with conditions of access regarding the possession of computers and the skill to master them. It was proposed that inequality of access to ICT appears in at least four successive stages, presenting themselves as barriers or hurdles to people who want to use information and communication technology in one way or another. Four kinds of hurdles are the lack of digital experience, no possession of computer and network connections, the lack of digital skills, and the lack of significant usage opportunities. All those barriers are factors that lead to an increasing information gap among people.

Diffusion of Innovation Theory: The rapid evolution of technology may serve to increase existing information gaps. In essence, those who have been using the Internet are developing an increasingly sophisticated set of skills for seeking and processing information, and gaps between these advanced users and the late adopters who possess only basic skills are likely to expand [Roger 1986]. This theory opposes the arguments that the nature of the marketplace dynamics will eventually close the gaps without interference from policy-makers, as compared to eventual widespread adoption of technologies such as television, radio and the telephone [Compaine 2001; Crandall 2000]. Since the Internet and IT require a cumulative set of sophisticated digital skills, they are hardly comparable to previous communication media [Allbritton and Rogers 1995]. Thus, instead of a single S-curve of adoption, there are successive S-curves based upon skills, not just access to equipment [Mason and Hacker 2003].

2.2 Theories relating to behaviour

In theoretical research, technology developments not only widen the knowledge gap among people, but also impact the behaviour of people in society, which leads to increased inequality. It changes ways of living, working and networking. Several theories supporting behavioural impact have been initiated. These theories are, among others, the accumulation of advantage (AOA) hypothesis, adaptive structuration theory, and theory of the public sphere.

The accumulation of advantage (AOA) hypothesis: This hypothesis originates from the sociology of science, in the 'Matthew effect' which was introduced to explain differences in performance between scientists. The concept of accumulation of advantage refers to the ways in which initial comparative advantages of trained capacity, structural location, and available resources make for successive increments of advantage, such that the gap between the haves and the have-nots in science widens [Merton 1988]. This hypothesis can also be applied outside the area of science [deHann 2004]. The accumulation of resources can lead to highly stratified outcomes in many different fields of society. Unequal access to digital resources may have behavioural consequences that can lead to increasing inequality. If this assertion holds up with empirical evidence, people who have better access to IT have a competitive advantage in their quest for scarce rewards than people with poor access. Ideally, cumulative advantage exists when an initial advantage (for example, higher education) bestows a secondary advantage (such as high levels of digital skills), which has an independent effect on some outcome measure (like earnings) net of the initial advantage [deHann 2004].

The Adaptive Structuration theory: This theory suggests that advanced information technologies enable multiparty participation in organizational activities through sophisticated information management [DeSanctis and Poole 1994]. Many researchers believe that the effects of advanced technologies are less a function of the technology themselves than how they are used by people. According to DeSanctis and Poole (1994), members of a group adapt rules and resources which they perceive to be necessary to accomplish their goals. Rules are defined as formulae or guides for actions, and resources are all the things people bring into interactions, including dispositions, abilities, knowledge and technologies such as IT. According to the theory, society and its rules and resources are reproduced when members’ actions reinforce the system. Initially, those with power and resources outside the IT context are the primary early adopters of the technology. They use technology to shape the roles and rules of those interacting via IT. The outcome is a technology that primarily meets the needs of those who adopted it first, and the unintended consequence is that those already excluded fall further behind.

The theory of the public sphere: The traditional idea of public spheres serves as a platform for the negotiations that comprise society [Keane 2000]. Keane has proposed three levels of public sphere – micro, meso and macro – ranging from the citizen or locality to the national and the global. With the advent of information technology, people are moved beyond the traditional pattern of being bound by geographical restrictions to new spaces of communications. Within this new paradigm, users who can get into these new spaces have a chance to connect, to network with other users, and to recreate the structure of society by renegotiating rules, roles and meanings. Inequality will be observed among those who cannot connect because rules and resources already existing are adapted via technology.

3 IMPLICATIONS FOR BROADBAND UNIVERSAL SERVICE

The magnitude of technological change has brought a number of hypotheses that a new era of knowledge has come to the threshold. Following knowledge regimes based on oral tradition, written expression and then the printed word, the rise of digital media has fostered an unprecedented expansion of networks [UNESCO 2005]. All agree on how important knowledge is to people, but the opportunity to acquire knowledge is not equal for all people, especially in an online world. Differences in access are assumed to be related to divergent opportunities for people. Along with technological development, broadband connectivity is accepted as being of strategic importance because of its ability to accelerate the contribution of ICTs to economic growth, enhance social development, and facilitate innovation. However, outcomes derived from market mechanisms lead to the gap increasing among people in society in terms of broadband access. Although the inclusion of broadband in the scope of universal service might be a tool to bridge the divide between those who have access to the new possibilities and those who are excluded, arguments and counterarguments regarding broadband universal service inclusion need to be analyzed.

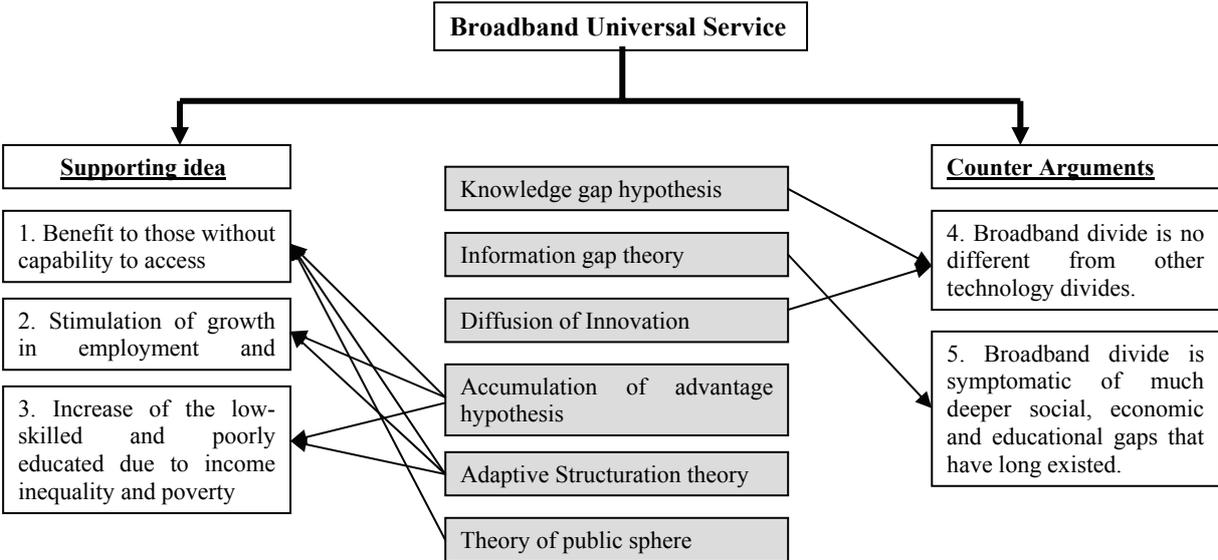


Figure 2: Relationships between main arguments under broadband universal service and related theories

With reference to theories as discussed in the previous section, it can be observed that the issue of digital divide is not only about getting connected in terms of technology; rather it has implications for society and people's development as a whole. The same would be true in a broadband environment in which making broadband accessible and available to people is important. Socioeconomic theories can explain and support the issues as shown in Figure 2.

3.1 Benefit to those without capability to access

With the growing use, new content and applications requiring broadband capabilities, it is expected that broadband is likely to take on increasing socio-economic importance. As a result, there is concern that those without an enhanced data capability will be unable to access the benefits expected, particularly in relation to education, health and government services. Benefits of broadband access to social structure are also supported by theoretical explanations.

Researches on the accumulation of advantage hypothesis, adaptive structuration theory and theory of the public sphere are consistent in implying that those who can acquire technology first will have a chance to shape rules or obtain resources which benefit them. According to the accumulation of advantage hypothesis, unequal access to digital resources may have behavioural consequences that may lead to increasing inequality. People who have access to networks will have a competitive advantage in their quest for scarce rewards. In this way broadband access becomes a new type of resource that influences the distribution of life chances. Consistent with adaptive structuration theory, the effects of advanced technologies are less a function of the technology themselves than of how they are used by people. The rapid evolution of information technology has ensured that those already possessing sophisticated resources and skills continue to shape the technology.

3.2 Stimulation of growth in employment and business

With reference to OECD (2008), rising income inequality and poverty can be observed, in particular, in OECD countries, most of which are developed countries. Poverty cannot be reduced by giving money to poor people; rather, as stated by Sir William Arthur Lewis, a winner of the 1979 Nobel Prize for Economics, "The fundamental cure for poverty is not money but knowledge". Consistently with the other Nobel Prize winner in Economics in 1979, he stated that land *per se* is not a critical factor in being poor, but the human agent is: investment in improving population quality can significantly enhance the economic prospects and the welfare of poor people. Child care, home and work experience, the acquisition of information and skills through schooling, and other means consisting primarily of investment in health and schooling, can improve population quality [Schultz 1979].

The idea of increasing population quality is consistent with the accumulation of advantage hypothesis and with adaptive structuration theory. As technology will benefit those who adopt it first, there should be an equal distribution of chances to every individual to facilitate an equal opportunity in gaining benefits. The creation, acquisition and use of knowledge are highly dependent on the availability of relevant information, which could/should be sought, received and imparted by any means of communications from anywhere. This implies that means of communication through which information is conveyed are indispensable not only for the acquisition of knowledge, but also for the eradication of poverty [Jakhu 2004]. From a socio-economic point of view, those implications have a strong impact in the information society where most activities tend to move away from the traditional to the online world.

3.3 Increase of the low-skilled and poorly educated

Poverty and income inequality are a result of low-skilled and poorly educated people. From this perspective, the information society has the potential of improving the living conditions of disadvantaged groups by helping them increase their income. Telecommunications infrastructure, in particular, promotes development through the combination of three factors: externalities, knowledge creation and regional development. As a channel that contributes to a form of knowledge creation, information technology is regarded as a merit good, a service that society believes everyone should have access to because of its direct impact on poverty reduction [Mariscal 2005]. Indeed, it can be shown that the incomes of the poor grow faster in telecommunications-intensive economies [Navas-Savater et al., 2002]. The accumulation of advantage hypothesis and adaptive structuration theory can also explain that the difference in opportunity can yield different outcomes for individuals.

3.4 Broadband divide is no different from other technology divides

Technological advancement has caused stratification in society. The divide among groups of people in society has arisen due to inequality of development since the traditional means of communication such as newspapers, television or radio. Actually, the issue of a divide could be observed since 1968 when Martin Luther King Jr. delivered one of his last speeches four days before he died [Glaser 2007]:

‘There can be no gainsaying about the fact that a great revolution is taking place in the world today... That is, a technological revolution with the impact of automation and cybernation... Modern man through scientific genius has been able to dwarf distance. Through our genius we have made this world a neighborhood. And yet we – we have not yet had the ethical commitment to make of it a brotherhood. But somehow, and in some way, we have got to do this.’

The above statement seems to support the counterargument which stated that the perceived delay in broadband deployment and concerns about ‘broadband divide’ are no different from other technology ‘divides’ with different rates of diffusion according to location, income, education, age, gender etc. Even though it is true that the divide has long existed in society, since communication becomes important among people where the knowledge gap arises, it is unarguable that the divide has become increasingly important in the information society. If there were no significant benefits to IT usage or any important negative consequences of non-usage, as discussed above, there would be little to debate other than percentage point differences in access and usage over time for various groups. In addition, numerous communication scientists have argued that there are tangible benefits to using IT and there are, in fact, important problems with having large numbers of people with poor or no access and usage [Mason and Hacker 2003]. Therefore, the divide has far more implications than in regard to traditional communication technology such as television.

Diffusion of innovation theory has stressed the difference between the traditional technology divide and the divide in advanced information technology. While the gap of other technologies such as television, radio and the telephone will eventually close through market mechanisms and without interference from policy-makers, broadband is not the same. Since, in theory, broadband technology has advanced rapidly and required computer and network resources, skills, experience and access that are hardly comparable to owning a radio or TV set, all these factors distinguish the broadband divide from other technology divides. Also, in terms of adoption, broadband cannot follow an S-curve adoption since it creates a series of dependent S-curves due to their rapidly evolving nature and the cumulative digital skills required to put them to effective use.

Therefore, the broadband divide is not only an issue of diffusion rate among demographic characteristics. It also includes skills and experiences which take time before people know how to use them. The more delay in getting access, the fewer chances of social and economic development.

3.5 Broadband divide is symptomatic of deeper existing gaps

Another argument against broadband’s inclusion in the scope of universal service has stated that the broadband divide is symptomatic of much deeper social, economic and educational gaps that have long existed. According to the information gap theory, there are four hurdles of access which lead to increasing the gap between people. Among these four hurdles, no possession of a computer and network connection is relevant to a universal service policy which serves the concepts of accessibility, availability and affordability. Under the theory, it is predicted that this hurdle cannot allow a level of diffusion of 80 or 90 percent within the next decades under market mechanisms [van Dijk 2000]. The reasons are that the required expenditures are much too great to ensure availability for all people, and that the general diffusion of old media like television and the telephone emerged in a period of strong economic growth, massification and leveling of incomes in the Western world – whereas broadband is introduced in a period of relative slackening of economic growth, individualization, social and cultural differentiation, increasing income differences and the rise of so-called modern poverty in Western countries. Evidence can be seen from the OECD report which shows poverty rising [OECD 2008] and the dramatic slowdown of PC purchases in the fourth quarter of 2008 [IDC 2009] because of the economic downturn all over the world. Therefore, the broadband divide is partly symptomatic of other gaps in society, but mainly it creates a new situation – where there are no other existing gaps, the broadband gap has still emerged.

In addition, increasing differences in skill and usage with the new information technologies might lead to new inequalities of a nature not known before and needing to be contested. The new technologies offer new opportunities for citizens’ participation and for consumer interests. The information society or network society sheds another light on social inequality. Others even claim that the information or knowledge society will discard old inequalities and bring completely new ones based on differential knowledge and education [van Dijk 2000].

4 CONCLUSIONS

Broadening the scope of the universal service concept to include broadband access leads to many debatable issues. From a socio-economic point of view, benefits of broadband access are supported by theoretical explanations. In theoretical research, two main concepts can be observed. The first is that new possibilities of this technology increase the gap and inequality among people in society. This concept is supported by the knowledge gap hypothesis, the information gap theory and the diffusion of innovation theory. The second concept is that new technology affects the behaviour of people and benefits will be gained by people who adopt it first. Support here comes from the accumulation of advantage hypothesis, adaptive structuration theory and the theory of the public sphere.

All those theories point the same way: the divide leads to inequality of knowledge, and inequality of knowledge leads to under-representation of the lower classes in many policy decisions, which in turn reproduces the same socio-economic structure.

In the current situation of broadband deployment, many researchers believe that markets will solve most problems by themselves, lowering prices and offering more choices to everybody, and that people in their communities and organizations will solve the rest of the problems. However, the gap between those who have and have not access to broadband in some areas and some groups of people can still be observed, and will be getting beyond market mechanisms even under efficient market conditions because a proportion of the population cannot afford to pay market prices. Observations can be made that almost every government in the twentieth century has adopted policies to promote important mass media for communication in society, including tax policies and hardware and support subsidies for all kinds of public services, and that every government has implemented corresponding educational and cultural policies.

As a result, there is a strong argument to support the view that broadband must be made available to all persons at an affordable price and to all areas within a country. Since the broadband divide has profound impacts on the continuation of social inequality, individuals, social groups and nations on the wrong side of the digital divide can be excluded from the knowledge economy. If pre-existing inequalities deter people from using computers and the Internet, these inequalities may increase as the Internet becomes more essential for getting jobs, seeking information, and engaging in civic or entrepreneurial activities. Government intervention should then be instituted even where there is no prospect of service delivery at a profit. Therefore, from a socioeconomic point of view, broadband access should be included in the scope of universal service to guarantee that all people can get access to broadband equally, regardless where they live and what social level they are at.

It might be added that delay in making broadband universal may create a new danger by stimulating resentment and antagonism to such technology. Reactionary sentiments of this kind are probably already present in many parts of the developing world, which regard modern technology not as a means of improvement but as a weakness of Western life and as a weapon to acquire only for turning against it. If these sentiments are allowed to grow by frustrating the initial interests of large populations, the 'window of opportunity' for techniques like broadband could begin to close, much as that for e.g. the proliferation of nuclear energy has done.

5 REFERENCES

- [1] ALBRITTON, M. and ROGERS, E. 1995. 'Interactive communication technologies in business organizations'. *Journal of Business Communication*, Vol. 32, pp. 177-195.
- [2] COMPAIGNE, B. 2001. *The Digital Divide: Facing a Crisis or Creating a Myth?* Cambridge, MA: MIT Press.
- [3] CRANDALL, R. 2001. 'Universal Service, Equal Access, and the Digital Divide'. California Public Affairs Forum: Bridging the Digital Divide. Available: <http://www.ccst.ucr.edu>
- [4] DEHANN, JOS. 2004. 'A multifaceted dynamic model of the digital divide'. *IT & Society*, Volume 1, Issue 7, pp. 66-88.
- [5] DESANCTIS, GERARDINE and POOLE, MARSHALL SCOTT. 1994. 'Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory'. *Organization Science*, Vol. 5, pp. 121-147.
- [6] EUROPEAN COMMISSION. 1996. 'Universal service for telecommunications in the perspective of a fully liberalized environment'. Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, Brussels, 13.03.1996, COM(96) 73 Final.

- [7] EVERS, HANS-DIETER and GERKE, SOLVAY. 2004. 'Closing the digital divide: Southeast Asia's path towards a knowledge society'. Paper delivered at the Center for East and South-East Asian Studies public lecture series 'Focus Asia', 25-27 May, 2004.
- [8] GLASER, MARK. 2007. Your guide to the digital divide. Available: <http://www.pbs.org/>
- [9] IDC. 2009. Worldwide Quarterly PC Tracker. Available: <http://www.idc.com>
- [10] JAKHU, RAM. 2004. 'Implementing Global Public Interest in Information Society'. Paper presented at the International Seminar on the Information Society, Human Dignity and Human Rights, Quebec, Canada.
- [11] KEANE, JOHN. 2000. 'Structural Transformations of the Public Sphere'. In K.L. Hacker and J. van Dijk (eds.), *Digital Democracy: Issues of Theory and Practice*, pp. 70-89. Thousand Oaks, CA: Sage.
- [12] KIM, SEI-HILL. 2008. 'Testing the knowledge gap hypothesis in South Korea: traditional, news media, the Internet, and political learning'. *International Journal of Public Opinion Research*, Vol. 20 No. 2, pp. 193-210.
- [13] MARISCAL, JUDITH. 2005. 'Digital divide in a developing country'. *Telecommunications Policy* Vol. 29, pp. 409-428.
- [14] MASON, SHANA M. and HACKER, KENNETH L. 2003, 'Applying communication theory to digital divide research'. *IT & Society*, Vol. 1, No. 5, pp 40-55.
- [15] MERTON, ROBERT K. 1988. 'The Matthew Effect in Science, II Cumulative Advantage and the Symbolism of Intellectual Property'. *ISIS*, Vol. 79, pp. 606-623.
- [16] MITCHELL, WILLIAM J. 1999. 'Equitable access to the online world.' In Schön D., Sanyal B. and Mitchell W. (eds.), *High Technology and Low-Income Communities: Prospects for the Positive Use of Advances in Information Technology*, pp. 153-163. London: MIT Press.
- [17] NAVAS-SAVATER, J., DYMOND, A., and JUNTUNEN, N. 2002. 'Telecommunications and information services for the poor: toward a strategy for universal access'. The World Bank Group, World Bank Discussion Paper No. 432, Washington, DC.
- [18] NORRIS, P. 2001. *A digital divide: Civic engagement, information poverty, and the internet in democratic societies*. New York: Cambridge University Press.
- [19] OECD. 2003. Working Party on Telecommunications and Information Services Policies, 'Universal Service Obligation and Broadband', DSTI/ICCP/TISP(2002)4/FINAL.
- [20] OECD. 2008. 'Growing Unequal? Income Distribution and Poverty in OECD Countries'. OECD Publication.
- [21] REDING, V. 2007. 'How Europe can bridge the broadband gap'. Speech at the Bridging the Broadband Gap Conference, 14 April 2007.
- [22] ROGERS, E. 1986. *Communication Technology: The New Media in Society*. New York: The Free Press.
- [23] SCHULTZ, THEODORE W. 1979. 'The Economics of Being Poor'. Prize Lecture. Lecture to the memory of Alfred Nobel, December 8.
- [24] TEPPAYAYON, ORADA and BOHLIN, ERIK. 2008. 'Broadband Universal Service: A future Path for Europe'. Paper presented at the conference on Public/Private interplay in Next Generation Communications, Seville, Spain.
- [25] TICHENOR, P. J., DONOHUE, G. A., & OLIEN, C. N. 1970. 'Mass media flow and differential growth in knowledge'. *Public Opinion Quarterly*, Vol. 34, No. 2, pp. 159-170.
- [26] UNESCO. 2005. *Towards knowledge societies*. UNESCO Publishing.
- [27] VAN DIJK, JAN. 2000. 'Widening Information Gaps and Policies of Prevention'. In K.L. Hacker and J. van Dijk (eds.), *Digital Democracy: Issues of Theory and Practice*, pp. 166-183. Thousand Oaks, CA: Sage.
- [28] VAN DIJK, JAN., HACKER, KEN. 2000. 'The digital divide as a complex and dynamic phenomenon'. Paper presented at the 50th Annual Conference of the International Communication Association, Acapulco, 1-5 June.
- [29] World Bank. 1999. *World Development Report 1998-99: Knowledge for Development*. New York, Oxford University Press.