Chapter

3

'Knowledge Society' as Academic Concept and Stage of Development — A Conceptual and Historical Review

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1. Introduction[1]

In the past twenty to thirty years, visionary terms which have been incorporated into public speeches, academic writings, and day-to-day journalism such as 'knowledge society', 'information society' and 'knowledge-based economy'[2] announced a future in which social and economic development is increasingly based on knowledge. While

[1] This book chapter is largely based on Hornidge (2007).

[2] For reasons of terminological clarity, this paper subsumes the wide range of terms including 'knowledge society', 'information society', 'knowledge-based economy' under the term 'knowledge society'. The remaining terms are merely addressed in the sections specifically devoted to them.

the concepts 'knowledge society' and 'information society' were mainly developed by academics from Japan, the USA and Europe, the concept 'knowledge-based economy' was proposed somewhat later by international organizations such as the OECD.[3] From there — although far from complete — all three concepts entered the national politics of many countries which aimed at the active creation of better futures. Governments worldwide adopted the general idea of knowledge society as well as the manifold terminology originating from the scientific community. However, the theoretical concepts and definitions of knowledge society supporting this vision were hardly taken into account. Diagram 1 illustrates the overall focus and line of argument of this chapter: the conceptual and actual construction of knowledge society. While the creation of the concepts was mainly driven by the international scientific community, the construction of knowledge societies as stages of development has been pushed by national governments as well as (although not forming the focus of this chapter) actors from the private sector, the media and civil society groups. In redrawing this process of conceptual and actual construction, I follow Berger and Luckmann's approach of the social construction

[3] The following scholars can be mentioned: Machlup (1962); Umesao (1963); Lane (1966); Drucker (1969, 1993a, 1993b); Touraine (1969); Bell (1973, 1987); Porat (1976); Nora and Minc (1979); Böhme and Stehr (1986); Kreibich (1986); Castells (1989, 1996, 1997, 1998); Gibbons *et al.* (1994); Stehr (1994); and Willke (1998). They were later scrutinised and their concepts of knowledge society developed further by Kumar (1978); Gershuny (1978); Collins (1981); Lyon (1988, 1996); Dordick and Wang (1993); Stehr (1994, 1999, 2001a, 2001b); Webster (1995); Willke (1998, 1999); Maasen (1999); Dunning (2000); Evers (2000, 2002a, 2002b, 2003, 2005); Evers *et al.* (2000); Hofmann (2001); Steinbicker (2001); David and Foray (2002); Lloyd and Payne (2002); Evers and Menkhoff (2003); Mattelart (2003); Evers and Gerke (2005); Knoblauch (2004, 2005); Kübler (2005); Tänzler, Knoblauch and Soeffner (2006) and Hornidge (2007) to name a few.

Few scholars i.e., Lyon (1988, 1996); Webster (1995); Lloyd/Payne (2002); Mattelart (2003); Evers (2003); Knoblauch (2004, 2005); Tänzler, Knoblauch and Soeffner (2006); Kübler (2005); Evers and Hornidge (2007) and Hornidge (2007) point to the aspect of knowledge societies being constructed by social actors. The remaining scholars implicitly subscribe to the notion of knowledge societies emerging due to technological, economic and social developments taking place.

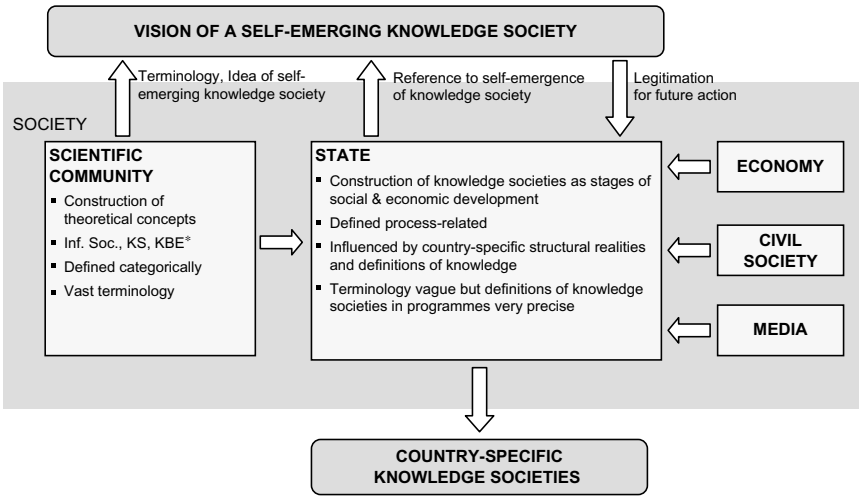

Diagram 1: The construction of knowledge society by the scientific community and state politics

*Inf. Soc. = Information Society; KS = Knowledge Society; KBE = Knowledge-based Economy. *Source*: Hornidge (2007:4).

of reality and understand 'knowledge society' as it is defined by the social actors creating it (1984:16).

In the later half of the 20th century, multiple theoretical concepts of knowledge society were developed primarily by the scientific communities of Japan, USA and Europe as mentioned above. While the academic concepts were quite well defined, this new, manifold terminology lacked a clear distinction and was often used interchangeably. The terminological vagueness — combined with the picture of a self-emerging knowledge society that should be monitored, assessed and analysed — contributed to the construction of a vision of a self-emerging knowledge society (Hornidge, 2007). This vision describes a stage of development as future form of social and economic reality based on the increasing relevance of knowledge and information to social and economic development. Accordingly, knowledge society was often seen as a product of technological developments in the information and communication sector as well as economic developments in the service and knowledge intensive sectors. Governments of many countries embarked on the creation of knowledge societies as stages of national

development and legitimised their actions by referring to the perceived necessity to guide, guard and monitor ongoing technological developments. The vision of a self-emerging knowledge society therefore acted as basis for legitimising government programs and activities towards the realisation of the envisioned future stage of development.

In the following, I will review the creation of knowledge society as theoretical idea and concept, followed by an outline of its adoption by US-American, Japanese, European and eventually Singaporean politics. It is the aim to show that knowledge society as theoretical concept and political vision was constructed and instrumentalised by actors worldwide. As such we are looking at a global hype with local consequences.

Methodologically this paper is based on (a) a review and discussion of primary and secondary conceptual literature on the notion of 'knowledge society' and (b) a review and qualitative assessment of US-American, Japanese, European and Singaporean state programs and initiatives towards 'knowledge society'.

2. 'Knowledge Society' — The Conceptual Development

Overall, the theoretical construction of the concepts of knowledge society can be structured into a primary[4] and a secondary phase,[5]

[4] Here, theorists such as Umesao (1963); Nora/Minc (1979) and Castells (1989, 1996, 1997, 1998) can be named as contributors to the concept of a technology determined society, often called 'information society'. Lane (1966); Bell (1973, 1987); Touraine (1969); Kreibich (1986); Böhme/Stehr (1986); Willke (1998) and Gibbons *et al.* (1994) worked on a concept of a knowledge-driven society, generally labeled 'knowledge society', while Machlup (1962); Porat (1976) and Drucker (1969, 1993a, 1993b) can be listed together with international organisations such as OECD (1996a, b) and APEC (1998, 2000) as theorists constructing the concept of a 'knowledge-based economy'.

[5] Contributors to this secondary phase of construction include Kumar (1978); Gershuny (1978); Collins (1981); Lyon (1988, 1996); Dordick/Wang (1993); Stehr (1994, 1999, 2001a, 2001b); Webster (1995); Willke (1998, 1999); Maasen (1999); Dunning (2000); Evers (2000, 2002a, 2002b, 2003, 2005); Evers *et al.* (2000); Hofmann (2001); Steinbicker (2001); David/Foray (2002); Lloyd/Payne (2002); Evers/Menkhoff (2003); Mattelart (2003); Evers/Gerke (2005); Knoblauch (2004, 2005); Kübler (2005); Tänzler/Knoblauch/Soeffner (2006) and Evers/Hornidge (2007).

as argued in detail by Hornidge (2007). During the primary phase and inspired by developments in the information and communication technology sector, especially the internet,[6] several scientists developed the idea of knowledge, information, as well as information and communication technologies becoming increasingly important for economic and social development and leading to a new stage of development, following the industrial society. The secondary phase of construction is characterised by the further development of the conceptual ideas, increasing their empirical base, depth and the theorising of these empirical data. While the conceptual ideas leading to the concepts 'knowledge society' and 'information society' were mainly developed in the 1960s to 1980s, the conceptual basis of the 'knowledge-based economy' was formed mainly in the 1990s.

2.1 *Phase I: Ideas, Terms, Concepts*

The concept of knowledge and its importance to society is not new. While, for instance, the philosopher Plato (428–347 BC) rated intelligence as the most important quality of a political leader, the philosopher and economist Mill argued, in 1863, that intellectual and moral education even surpasses industry and wealth in its effects on societal development (Mill, 1974). But if one wants to identify a founder of the notion of 'knowledge society', it should be the American sociologist Robert E. Lane. In 1966, Lane developed, based on his works on the US-American society, the concept of a 'knowledgeable society', assuming that knowledge, mainly referring to scientific, philosophical and cultural knowledge, replaces industrial organisation and production as the major source of

[6] On the development of the internet, see J.L. King and K.L. Kraemer (1995). Information Infrastructure, National Policy, and Global Competitiveness, *Information Infrastructure and Policy*, March. Until today, the internet forms the technological backbone of the 'knowledge society' by enabling simultaneous knowledge sharing which facilitates accelerated knowledge production.

productivity. Lane stated as "a first approximation to a definition", that "the knowledgeable society is one in which, more than in other societies, its members: (a) inquire into the basis of their beliefs about man, nature, and society; (b) are guided (perhaps unconsciously) by objective standards of veridical truth, and, at the upper levels of education, follow scientific rules of evidence and inference in inquiry; (c) devote considerable resources to this inquiry and thus have a large store of knowledge; (d) collect, organise, and interpret their knowledge in a constant effort to extract further meaning from it for the purposes at hand; (e) employ this knowledge to illuminate (and perhaps modify) their values and goals as well as to advance them". Lane described further: "Just as the 'democratic society' has a foundation in governmental and interpersonal relations and the 'affluent society' a foundation in economics, so the knowledgeable society has its roots in epistemology and the logic of inquiry" (1966:650). The common criticism towards the concept of the 'knowledgeable society', that knowledge is present and always has been present in all types of human society, Lane answered by mentioning that the elements of knowledge creation, consumption and furthering are present in some degree in every society; but "in the knowledgeable society they are present to the greatest degree" (1966:650).

In 1973, the American sociologist Daniel Bell then popularised the concept with his book "The Coming of Post-Industrial Society". Bell focused on the transformation from industrial to post-industrial society in which theoretical knowledge as axial principle forms the central, economic growth enhancing power. He stated; "the post-industrial society, it is clear, is a knowledge society" (1973:212) and identified two indicators for its 'emergence': (a) "the sources of innovation are increasingly derivative from research and development (...)", and (b) "the weight of the society — measured by a larger proportion of Gross National Product and a larger share of employment — is increasingly in the knowledge field" (1973:212). Parting the society into economic sectors, he argued that the post-industrial sector is vastly developing and changing due to telecommunication and computer

technology.[7] The technological determinism, supported by Bell from the 1980s onwards, can also be found in the literature on the concept 'information society'. Today, four decades later, universities and research institutions are nevertheless far from being the central, axial institutions guiding societal development that Bell envisioned. Instead, several authors state that the university and research sector have long lost their dominant position (Evers, 2000; Knorr-Cetina, 1999; Willke, 1999; Heidenreich, 2003).[8] Despite this and further criticism[9] Bell's work on the emergence and rise of post-industrial society remains to be the first detailed study on the change-enhancing aspect of increasing knowledge production and dissemination in society. As described by Bell, "the post-industrial society (…) is primarily a change in the character of social structure — in a dimension, not the total configuration of society. It is an 'ideal type', a construct, put together by the social analyst, of diverse changes in the society which, when assembled, becomes more or less coherent when contrasted with other conceptual constructs" (1987:73).

In Europe before the 1980s, only few European scientists took part in the discussion. An exception is the French sociologist Alain Touraine (1969). He published his thoughts on an evolving 'societé postindustrielle' in opposition to Bell's thesis and discussed the possibly arising conflict between knowledge 'have' and knowledge 'have-nots' as potential carrier of societal innovation and change.

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[7] In order to define the term 'post-industrial society', Bell identifies five components (1973:14):

1. Economic sector: the change from a goods-producing to a service economy;
2. Occupational distribution: the pre-eminence of the professional and technical class;
3. Axial principle: the centrality of theoretical knowledge as the source of innovation and policy formulation for society;
4. Future orientation: the control of technology and technological assessment;
5. Decision-making: the creation of a new 'intellectual technology'.

[8] Bell's reference to the increasing research budget of the United States in the 1960s and 70s (the time of writing) does not take into account their decrease from the 1980s onwards (Steinbicker, 2001:72).

[9] For details, see Hornidge (2007:33–35).

The term 'information society' goes back to the Japanese economist Tadao Umesao, who in 1963 published his analogy between evolution and the three economic sectors of society. He argued that the agricultural sector can be regarded as an organism simply digesting the production of material goods, while he regarded the production of intellectual goods as analogous to organisms using their nerve systems for planning their actions and controlling their environment. This analogy between evolution and the three economic sectors led Umesao to his argument that society, once it reaches the highest level of societal development, concentrates on the production of intellectual goods (Umesao, 1963). The development of 'joho shakai' ('information society') became the aim of industrial development and since then has shaped the economic and research politics of Japan (Dordick and Wang, 1993:37). Eleven years later in Europe, Simon Nora and Alain Minc published a report on the "informatisation of French society" (Nora and Minc, 1979). The authors took a clearly technological approach and argued that the development of ICTs would act as an economic growth enhancing factor leading to first, a new sector of production specialised on the required hard and software, second, a technology driven productivity push in all industrial sectors and third, a diffusion of ICTs in all sectors of society and materialisation as central factor in the social infrastructure of nations worldwide. Hence, an 'information society', a society based on ICTs would arise. The process leading to this new state of society was labelled 'informatisation'. The combination of telecommunications and automatic data processing that was seen as the main drivers of this development was named "télématique" (Minc, 1987:134). Similar to the thoughts of Umesao in Japan, the report heavily shaped the politics of France in the field of ICT development (Nora and Minc, 1979:7).

Critically inspired by McLuhan's idea of the global village (1962),[10] Manuel Castells in 1989 published his thoughts on

[10] McLuhan assumed that ICTs would decrease the role of distances and hence leading to a restructuring of spatial orders with a decreasing importance of cities.

the transformation of spatial orders due to ICTs as manifestations of interaction between the restructuring of capitalism as a social system and informationalism as a new form of socio-technical organisation, with the informational city in its centre. (Castells, 1989, 2004; Castells and Laserna, 1989). In his trilogy "The Information Age" (Castells, 1996, 1997, 1998), Castells drew the picture of an 'informational capitalism', first (1996) outlining the informational society as revolution of the information technology, the global informational economy, the network cooperation, the transformation from labour and occupational structure and the evolution of a culture of virtuality with its final culmination in the network society; second (1997) discussing new social movements that oppose the instrumental and universal order of the networks; and third (1998) assembling analyses of the collapse of socialism and the second world, the downfall of the fourth world (referring to development countries as well as to peripheries in the metropoles), the rise of the tiger states in the Asia-Pacific-Rim, as well as the unification process of Europe. In the first volume, Castells developed his concept of an 'informational society'. Most central to his approach is the distinction between the capitalist mode of production and the informational mode of development. While the former is a way of organising a social system, the later is presented as a means of generating a given level of production. According to Castells, different societies operate with different modes of development, such as today ICTs announce "the rise of a new technological paradigm, which heralds a new mode of development" (1989:12). Parallel to Bell, Castells views the changes in techniques of production and development — due to ICTs — as well as the increasing importance of information and knowledge as central, but analytically independent axes of societal change. Thus, Castells regards the ICT revolution as main driver to all major structural transformations (Webster, 1995:196). He reasoned that networks form the new social morphology of society and the expansion of the network logic changes the functions and results of production processes, experiences, power and culture (1996:528). As an example, Castells identified the international financial flows as densest, most flexible and efficient global network, which — based on knowledge and

information that continuously flow via ICTs around the globe — basically cannot be controlled by national or democratic institutions (1996:530).

Besides these academic works, popular scientists like Toffler (1970, 1980, 1990), Naisbitt (1982), Vester (1968), Buchholz (1970) and Jungk (1973) contributed to the conceptual development of a mainly technologically-determined 'information society' as well as at the time to the conceptual blurredness and lack of clear-cut definitions. As such, the terms and concepts left the academic field and entered political and popular culture, where they nourished the hopes and dreams towards a better future as discussed in the second half of this chapter.

So while the notion 'knowledge society' underlines the increased role of different types of knowledge for overall societal development, 'information society' regards ICTs as central to a new form of societal and economic development. In addition to this, the term 'knowledge-based economy' emphasises the increased role of knowledge, information and data to economic prosperity, an aspect basically already acknowledged by Adam Smith in 1776 by stating: "man educated at the expense of much labour and time (…) may be compared to one of those expensive machines" (Smith, 1910 quoted in Machlup, 1962:5). Two-hundred years later (1962), the US-American economist Fritz Machlup took up this thought and argued that a fourth economic sector can be added to the traditional three, namely agriculture, industry, services. He labelled this fourth sector the 'knowledge industry'. For the empirical analysis of it, he combined two approaches: (a) the industry approach and (b) the occupational approach (1962:44–50). In both approaches, he ascribed an economic value to industrial sectors and occupational groups and calculated their contribution to the US-American GNP.[11] Due to a proportionate contribution of the fourth sector, Machlup

[11] The industry approach groups information goods and services that are not produced by information workers under the fourth sector. As an example, Machlup mentions the process of paper manufacturing. Within this fourth sector he distinguishes five industry groups (split into fifty sub-branches): (a) education (e.g., schools, libraries, and universities); (b) media of communication (e.g., radio and television, advertising);

argued that a 'knowledge economy' is emerging. Machlup's statistical approach to grasping the 'knowledge economy' was later developed further by Marc Porat (1976), who calculated the contribution of 'information workers' and the 'information economy' to the overall GNP of the USA. His approach was nevertheless criticised for overlaps in his defining categorisation of occupations as 'information workers'. While he for example, counted judges and rent collectors as 'information workers', doctors were not. Today, Porat's calculations are mainly conjoined with Machlup's founding work. Despite existing criticism, Machlup's and Porat's calculations contributed to an easy-to-grasp and purely economy-oriented definition of 'knowledge society'. It later contributed to the fact that the terms 'information society' and 'knowledge-based economy', much less 'knowledge society', heavily entered the political sphere.

Parallel to Machlup and Porat's work, the US-American economist Peter F. Drucker (1969) was convinced that knowledge "has become the foundation of the modern economy" as we have shifted from an 'economy of goods' to a 'knowledge economy' (1969:249, 247). For his analysis, he distinguished the "age of continuity" between 1913 and the late 1960s and the "age of discontinuity" after 1960. He argued that the main technical inventions took place in the years from 1913 to the beginning of World War I in the industrialising countries, while in the subsequent 50 years, economic development took place, but no change in structure. This changed with the age of discontinuity after 1960, which brought about fundamental changes in the areas of

(c) information machines (e.g., computer equipment, musical instruments); (d) information services (e.g., law, insurance, and medicine); as well as (e) other information activities (e.g., research and development, and non-profit activities). In the occupational approach, all occupations concerned with the production and use of knowledge and information are listed. Yet, the disadvantage of the occupational approach is according to Machlup, that *firstly*, a connection between using information and knowledge at the work place and the production of information goods does not necessarily exist. *Secondly*, the occupational approach disrespects qualitative differences in the use of information/knowledge. He therefore concluded: "We conclude that both industry analyses and occupation analyses are needed in order to find out about the past development and present role of knowledge-production" (1962:48).

technology, economy, political structure and society. He holds four factors responsible for the emergence of the age of discontinuity: (a) the development of information and data configuration technologies; (b) the internationalization of the economy; (c) an individualization that leads to a neutralization of the main social and political organisations; as well as (d) the emergence of a 'knowledge society' in which knowledge becomes the central element. Drucker (1969:60) pointed to the development of ICTs which embody a new economic reality. Similarly to Bell, Drucker addressed the knowledge-based character of these technologies as a central aspect of knowledge society. Yet, for Drucker, this new economic sector is directed to a new expansive economic phase in which the state merely creates the legal and infrastructural frame, which then is filled by the industry itself. For Bell, in opposition to Drucker, these new industries point to an increasing dependence of economic growth from state organised basic R&D. Hence, the same focus (on ICTs as new industrial sector) was interpreted by Drucker and Bell very differently (Steinbicker, 2001:23).[12] Similarly to Machlup, Drucker pointed to the growth of the 'knowledge industries'[13] and described the development of knowledge, its

[12] In the economic sphere, Drucker predicted the development of a world economy that is characterised by increasing global integration, disregarding national borders. As an institution, guarding the production and distribution of goods worldwide, Drucker (1969:103–107) suggested a multinational world corporation, not national governments. Looking at the micro-level of economy, he emphasised the increasing importance of the 'knowledge worker' in these 'knowledge industries'. In the political sphere, Drucker developed a theory of organisation which stated that the modern society is increasingly structured by specialised organisations that concentrate on certain social and political aspects in society. The interweaving of organisations with autonomous orientation created a new pluralistic order in society, according to Drucker (1969:219–223), which in turn witnessed the state loosing its central role. Drucker saw the state as increasingly dysfunctional and argued that a reorganisation of the state and its roles is required. In the social sphere, he clearly saw a 'knowledge society' arising. He argued, that "the central wealth-creating activities will be neither the allocation of capital to productive uses, nor 'labour'... Value is now created by 'productivity' and 'innovation', both applications of knowledge to work" (1994:8).

[13] He defined 'knowledge industries' as industries, producing ideas and information rather than goods and services.

character and importance in economy and society from knowledge of salvation (*Erlösungswissen*) in 1700 to the linkage of technology and science as well as the application of knowledge in industrial processes and finally the application of knowledge in knowledge production today. He concluded that the increase in formal education after World War II (an increase in 'knowledge workers') as well as the character change of knowledge are the main driving forces for the emergence of a 'knowledge economy'.[14]

The above outline illustrates that the members of the scientific community who originally developed the multiple concepts of 'knowledge society' defined those categorically, meaning by dividing the assessed changes in society and economy into certain categories. The concepts as well as the terminology labelling the differing concepts are both manifold in character, used interchangeably and with textual overlaps. While the definitions of the varying knowledge society concepts are rather distinct, the interchangeably used and manifold terminology blurs the understanding of the notion of a knowledge society. Common to most academic works outlined above is nevertheless the belief that some kind of knowledge society is emerging due to the technological developments in the information and communication industries, the growth of the service sector and the increasing knowledge-intensity of industrial products. But before discussing how the notions of 'knowledge society', 'information society' or 'knowledge-based economy' entered national politics, I shall outline the secondary phase of developing the theoretical concepts further.

2.2 *Phase II: Concepts, theories & recommendations towards their realisation*

The primary phase of constructing the theoretical concepts 'knowledge society', 'information society' and 'knowledge-based economy' was followed by a secondary phase. Here, scholars built on the

[14] In his later works (Drucker, 1993b, 1994), Drucker developed the above outlined hypothesis further.

above outlined works and attempted to specify the analyses of the social and economic changes, the developed concepts and the introduced terminology in order to offer a comprehensive picture of the assessed changes. During this secondary phase, the primary theories on the concepts continued to act as main reference theories which were scrutinised and theorised further. Common to most of these concepts has been the belief that the stage of societal development which they describe emerges as a result of the rapid technological developments in the information and communication sector, the growth of the service sector and the high profit margin of knowledge intensive goods. Hence, that the stage of development here named knowledge society is self-emerging.[15] This section will briefly discuss scholars contributing to the secondary phase. A more detailed outline of their works is, for reasons of limited space, provided in Hornidge (2007) only.

In 1986, Stehr and Böhme in "The Knowledge Society" aimed to contribute to a new approach towards formulating "a theory of society which captures the dynamics of science, technology and society" (Böhme and Stehr, 1986:7). They agreed with the assertion of theorists such as Bell that knowledge arises as an 'axial principle' in highly developed societies. Yet, they criticised mainly three aspects: (a) a missing sociology of knowledge in the existing theories on knowledge societies defining its core element — knowledge (1986:16); (b) the usage of the term 'post-industrial society' rather than 'knowledge society' (Stehr, 1994:12); and (c) the internalism of the new sociology of science, neglecting the impacts of scientific knowledge on societal development (Böhme and Stehr, 1986:4). They stressed the importance of scientific knowledge and concluded that "contemporary society may be described as 'knowledge society' based on the penetration of all its spheres of life by scientific knowledge"

[15] Only few scholars such as Lyon (1988, 1996); Webster (1995); Lloyd/Payne (2002); Mattelart (2003); Knoblauch (2004, 2005); Tänzler/Knoblauch/Soeffner (2006); Kübler (2005); (Hornidge, 2007) point to the aspect of knowledge societies being constructed by social actors.

(1986:8).[16] In 1994, Stehr (1994:9) defined knowledge as the capacity for social action, which — according to him — emphasises the aspect of value added due to knowledge (1994:95).

In 1998, the sociologist Helmut Willke underlined the independent production of new knowledge in all functional areas of society as defining aspect of 'knowledge society'. He saw this in differentiated and highly technological societies of the West, where the structures and processes of the material and symbolic reproduction of society are penetrated by knowledge-based operations up to a degree that the importance of information processing, symbolic analysis and expert systems decreases compared to other factors of reproduction (1998:162). While Stehr and Böhme heavily emphasised the importance of scientific knowledge for the emergence of a 'knowledge society', Willke, as well as Michael Gibbons *et al.* argued that science and academic centres loose its former monopoly-status. According to Willke and Gibbons *et al.*, every sector of society, including the cultural, judiciary, economic and health systems, reproduces itself by producing its own knowledge independently

[16] It advances as follows (1986:8):

1. penetration of most spheres of social action by scientific knowledge ('scientification');
2. replacement of forms of knowledge by scientific knowledge (e.g., professionalisation). The role of experts and consultants is further discussed by Stehr in 1992 (Stehr/Ericson, 1992);
3. emergence of science as an immediately productive force;
4. differentiation of forms of political action (e.g., science and educational policy);
5. development of a new sector of production (the production of knowledge);
6. change of power structures (technocracy debate);
7. emergence of intellectuals as a new social class.

In 1994, Stehr completed this list by replacing point 7 with point 8 and adding point 9 and 10 (1994:10/11):

8. emergence of knowledge as the basis for social inequality and social solidarity;
9. trend to base authority and expertise;
10. shift in the nature of societal conflict from struggles about the allocation of income and divisions in property relations to claims and conflicts about generalised human needs.

(Willke, 1998; Gibbons *et al.*, 1994). This varying emphasis on the production of scientific knowledge stated the main disagreement between Stehr as well as Willke and Gibbons *et al.* It determined the further development of two divergent concepts of 'knowledge society'.

Analysing the production of this knowledge, Gibbons *et al.* stated that the increasing diversification and specialisation of the localities of knowledge production results in new forms of production. The scholars developed a 2-mode-concept: Mode 1 is the traditional way of producing knowledge, characterised by its homogeneity and disciplinary focus. Research problems are solved within academic institutions that are hierarchically organised. Mode 2 is the new form of producing knowledge, characterised as reflexive, multi- and transdisciplinary and therefore dynamic and heterogeneous. Mode 2 knowledge is produced in a multiplicity of different organisations and institutions and is carried out in a context of application. It is generally a very problem-oriented form of knowledge production. In their work, Gibbons *et al.* prognosticated that Mode 1 is slowly replaced by or integrated into Mode 2. This results in a socially distributed knowledge production system which enables most members of society to take part in knowledge production as well as in the consumption of new knowledge (Gibbons, *et al.*, 1994:1–16). Evers took up this thought and argued that a triple helix of science-industry-university has emerged producing knowledge polycentrically with a multitude of 'epistemic cultures' and 'milieus of knowledge construction' (Evers, 2000, 2005). In the words of Knorr-Cetina: "A knowledge society is not simply a society of more experts, more technological gadgets, and more specialist interpretations. It is a society permeated with knowledge cultures, the whole set of structures and mechanisms that serve knowledge and unfold with its articulation" (Knorr-Cetina, 1999:7–8).

The role of national governments in influencing the definitions of 'knowledge society' according to their perspective of future, not current society, was critically questioned by Knoblauch (2004:360–361). For him the discourse surrounding 'knowledge society' in the political sphere represents the aim to construct different types of social

reality rather than assessing it.[17] Kübler in 2005 underlined that 'knowledge society' is merely a myth constructed by academics, politicians and the media.

Similarly to the notion of 'knowledge society', 'information society' was developed further.[18] In 1995, Webster assessed several theoretical perspectives on 'knowledge' or 'information society' by identifying two groups: (a) those who proclaim the emergence of a new type of society (e.g., Bell, Castells, Baudrillard etc.); and (b) those who emphasise continuities (e.g., Schiller, Harvey, Giddens, Habermas, Garnham etc.) and aimed "to shake at least some of the presumptions of those who subscribe to the notion of the arrival of a novel 'information society'" (1995:4). He criticised the strong emphasis on technological development as prime vehicle of social change and cautioned that the assumption of a new form of society arising caused scholars to merely seek phenomena that might characterise the new order. The analysis follows the idea rather than the observation of social phenomena of change the analysis.

In 2001, Steinbicker critically assessed the works of Drucker, Bell and Castells. He identified a structural common ground: (a) the new means of productivity that are expressed in the organisational structure, work processes and changes in the academic system, as well as in the relationship between scientific community, state and economy; and (b) the transformation of labour and work relations. For Drucker,

[17] In 2006, Tänzler, Knoblauch and Soeffner underlined this further and regarded 'knowledge society' as "one of the last great inventions of the social sciences" which caused some sensation also outside of the academic world (Tänzler/Knoblauch/Soeffner, 2006:7).

[18] In 1988, Lyon critically assessed how the emergence of an 'information society' "is orchestrated, by whom, to what purpose and with what methods and effects" (1988:20). The book concludes that the concept 'information society' is ideological as well as utopian in character, used "to disguise the reality of powerful interests and beliefs at work within it" (1988:19), but should not be abandoned. As reasons he stated: (a) the process of 'informatising' poses questions concerning social, economic and cultural life that have to be discussed; (b) the development of ICTs is of social as well as technical relevance; (c) it should be remembered that technological potential is not social destiny; and (d) ICT-policies should always also involve social analysis.

this is the inner contradiction of 'knowledge work'. For Bell, the central characterisation of the 'post-industrial society' typifies work/labour as the 'play between humans'. For Castells, the work conditions lever through the changes in the social structure that affect society. These aspects were not considered as crucial by the authors themselves, but, according to Steinbicker, pose a possibility for connecting all three towards an empirically based theory of the 'information society'. Concerning Castells' concept, this empirical analysis could focus on the interplay of technological development, economy, state and research as well as the institutional structures evolving. An empirical assessment of the transformation of work conditions should include (a) the thesis of structural change concerning work conditions; (b) the analysis of the gap between 'knowledge workers' and lower qualified workers as pointed out by Drucker and Castells; (c) the relation between 'knowledge work' and organisations as well as the meaning of hierarchy and control in the work process; and (d) the social relevance of structural change concerning work conditions. Yet, Steinbicker merely suggested the development of this theoretical model without developing it further.

In line with Webster's criticism of technological determinism underlying many analyses of the 'information society', Mattelart (2003) assessed the magnitude of which this technological development is the result of geopolitical interests. He argued that the idea of a global 'information society' is a construction that releases symbolic powers while at the same time legitimises political activities, for the satisfaction of geopolitical and economic interests. According to Mattelart, the term 'information society' developed due to the invention of the intelligent machines built during World War II. From the 1960s onwards, it emerged as academic, political and economic aim. The combination of (a) the belief in technology and technological process as well as (b) the idea of a sanctuary of all human knowledge built the ideological foundation of the term 'information society'. Aiming for a genealogical deconstruction of the term, Mattelart takes a geopolitical perspective and goes back in time, outlining the development of informatic machines, the academic debates on post-industrialism and its impacts on the national politics of Japan, France

and the USA as well as the spread of the concept into international politics. In contrast to Webster or Steinbicker, he does not discuss the theoretical works contributing to the primary phase of conceptual construction, but rather focuses on the origin and consequences of the discourse and the creation of 'information society' in reality.[19]

In comparison to the terms 'knowledge society' and 'information society', the notion of the 'knowledge-based economy' was less constructed in the academic sphere, but mainly developed by international political organisations and think tanks, before it triggered down to national politics. Since the early 1990s, multinational organisations such as the Organisation of Economic Cooperation and Development (OECD) as well as the Association of South-East Asian Nations (ASEAN) in publications spoke of a 'knowledge-based economy'. In 1996, OECD defined the 'knowledge-based economy' by emphasising the importance of knowledge as "the driver of productivity and economic growth leading to a new focus on the role of information, technology and learning in economic performance" (1996a). In another article of the same year, the origin of the term 'knowledge-based economy' is seen in the "fuller recognition of the role of knowledge and technology in economic growth" (1996b). The 'knowledge-based economy' is here regarded as naturally emerging. As indicators of this emergence were identified: (a) the strongest expansion of output and employment in high-technology industries such as computers, electronics and aerospace; and (b) the rapid growth of knowledge intensive service sectors such as education, communications and information. Based on this, OECD estimated >50% of GDP in the major OECD economies as knowledge-based (1996b:9). Several of the conceptual ideas of OECD were also

[19] Besides the here mentioned secondary theorists, many more contributed to the construction of the concepts. These include authors such as Bittlingmayer (2005); Cawkell (1987); David/Forray (2002); Dizard (1982); Dordick/Wang (1993); Dunning (2000); Feather (1998); Garnham (2002); Gill (1996); Lievrouw/Livingstone (2002); Lloyd/Payne (2002); Martin (1995); Riddle (1988) and Williams (1982, 1991).

adopted by the Asia-Pacific Economic Cooperation (APEC) for the Asia-Pacific Region. In 2000, APEC defined the 'knowledge-based economy' as "an economy in which the production, distribution, and use of knowledge is the main driver of growth, wealth creation and employment across all industries". A definition that was later also adopted by the Singaporean government (Toh *et al.*, 2002). Overall, these organisations did not question the emergence of a 'knowledge-based economy' but merely assessed them along mainly economic indicators.

Despite the conceptual and terminological overlaps of the notions 'knowledge society', 'information society' and 'knowledge-based economy', the terms 'information society' and 'knowledge-based economy' entered the political sphere more rapidly than the more academic term 'knowledge society'. Reason might be the technological and economic connotations, emphasising the importance of ICTs and their infrastructure for economic prosperity, which emerged as a political focal point in many countries from the 1980s onwards.

3. Entering the Political Sphere — USA, Japan and the European Union

As pointed out by Kubicek *et al.* (1997:9), the notion of 'knowledge society' was a technology-focused idea that — until the 1990s — failed to capture the public's imagination. While in the 1970s, many industrial countries promoted microelectronics as well as the "new media" cable TV and view data, the promoted technology in the 1980s was ISDN (Integrated Services Digital Network). In the 1990s, multimedia and 'the information superhighway' emerged as new catchwords, which are currently replaced by WLAN (Wireless Local Area Network), UMTS (Universal Mobile Telecommunications System) and digital signalling (in opposition to analogue handheld two-way radio). Yet eventually the governments of many countries, with the USA, Japan and the European Union belonging to the foremost, embarked on political programmes aiming at the construction of 'knowledge societies'. In the following paragraph, I will highlight some activities of these early players.

3.1 *United States of America*

In the late 1960s, the internet, which until today can be regarded as the technological backbone of the 'knowledge society', was under the term ARPANET developed in several US-American defence-sponsored university research projects. It was designed as communication network which could withstand a nuclear attack. From 1971 to 1981, the ARPANET grew from two dozen sites to 200. Besides the ARPANET, several other private companies built their own networks. IBM for example built the VNET. In order to enable communication between these networks, a set of conventions was drafted and published in the network community. The publication of these conventions, combining the varying networks that existed until then, basically marks the beginning of the internet. In 1993, 160 countries were connected and the internet as a communication infrastructure with mailing services, file transfer and news groups was created (King and Kraemer, 1995:5). As technological foundation for increasingly faster, by now simultaneous communication and knowledge exchange around the globe, the internet fundamentally inspired the creation of the theoretical concepts of knowledge society. It highly pushed the idea of an 'arising' information or knowledge society in the public, political and academic spheres worldwide.

In the USA in 1992, Governor Bill Clinton and Senator Al Gore used the development of the enormously fast growing internet for a successful presidential campaign (Kubicek, 1999:70–71; Read and Youtie, 1995:101; Schneider, 1997:345). The 'information infrastructure', as named by Clinton and Gore, was quickly given the name 'information superhighway' by the public. A few months after taking power, the Information Infrastructure Task Force (IITF) composed of high–level representatives from various ministries was formed under the lead of the then Minister of Trade, Ronald H. Brown, as well as accompanied by an advisory council constituted by high level representatives from business, scientific community and non-government organisations. In September 1993, the IITF published the Agenda for Action, a mix between declaration and action plan. Here, the National Information Infrastructure (NII) was

defined as a "seamless web of communication networks, computers, databases, and consumer electronics that will put vast amounts of information at users' fingertips" (IITF 1993). The access to information should lead to an information revolution which was supposed to introduce sustainable changes to human lives, work and interaction.

One year after founding IITF, a progress report was published (IITF, 1994a). Furthermore, the working group on applications published the broad spectrum of applications of that time (IITF, 1994b). The outline involved topics such as e-commerce, industry applications, disaster management, schools, libraries and art. The Advisory Council, founded in 1993, published three reports during its three year activity (US-Advisory Council on the National Information Infrastructure, 1995, 1996a, 1996b), which all focused on establishing universal access to NII. Consequently, the question of universal access was increasingly also recognised by IITF itself. Following from this, the government appointed the National Telecommunications and Information Administration (NTIA) with the task to suggest ways of assuring universal access to the government in preparation for a telecommunication reform. This reform of the telecommunication law was finally executed in 1996, aiming at the deregulation of the telecommunication sector (Kubicek, 1999:70). Further areas of legal reform were copyright, data security and coding, control of illegal discriminating contents as well as the equipment of schools. In the second term of the Clinton-/Gore-administration, the focus shifted to numerous projects aiming at the final user. Hence, NII was continued to be built, but at a more user-oriented level than before.

By successfully making use of the envisioning character of the Agenda for Action and the booming growth of the internet technology the Clinton-/Gore-administration clearly managed to introduce the topic of ICTs to the public (Read and Youtie, 1995:101). Here the use of the term 'information superhighway' which drew an analogy to the construction of the interstates, the US-American motorways that link the different states (Kubicek, 1999:70–71) was a cleverly chosen image for fostering public acceptance. The technological focus underlined the tangibles of 'knowledge society' and found expression in the terminological choice of 'information society'.

3.2 *Japan*

In Japan, the term 'information society' has been frequently used in government reports and publications from the late 1960s onwards. Special focus laid on the impact of technological development, specifically in the field of microelectronics, and on social and economic processes of transformation (Steinbicker, 2001:18). Nevertheless, it is important to note, that at the end of the 1960s in Japan, the stage of development labelled 'knowledge society' was regarded as a revolution inside the system of industrial society. The idea, that 'knowledge society' might replace industrial society only emerged with the beginning of the 1970s.

In 1971, the Japan Computer Usage Development Institute produced a governmental action plan with the title "The Plan for an Information Society: A National Goal towards the Year 2000" (Vogel, 2000:286–288). Similarly to the IITF in the USA, the plan identifies the private sector as main actor in the process of creating k-society. Besides this, it paints the following image of a future society: a central state controlled database; linked up telesystems; programmed school lessons, which foster an ICT-embracing attitude; a central information system for small and medium sized enterprises; and a centre for retraining parts of the work force. Mattelart (2003) describes it as "Computepolis", a city, completely linked via personal computers, with automatic traffic planning, mega-supermarkets, computer guided transport vehicles and fully automated air-conditioning systems (2003:91–92). Interestingly the Federal Ministry of Education and Science of Germany published a German translation of this report (entitled "Japans Technologische Strategie") merely one year after its publication in Japan (BMBW, 1972). This suggests that while the German government was not yet speaking of a German knowledge or information society, the activities of other players, i.e., Japan, were monitored.[20]

[20] The first appearance of the terms ‚information society' and 'information economy' in a German federal government document can be found in the final report of the enquete-commission "Future of the Media in the Economy and Society — Germany's Road into the Information Society" (DBt, 1998).

By the late 1970s, attention turned towards knowledge production for development (Morris-Suzuki, 1996:212; Tuomi, 2001:4). In 1976 and with the aim to stimulate corporate creativity, the Very Large Scale Integration (VLSI) project was set up under the auspices of the National Research and Development Programme of the Ministry for Industry and Trade (MITI), focusing on the development of microchips. With the beginning of the 1980s, MITI defined new materials, biotechnology and new forms of microelectronic technology as main areas of innovation and research supported by the government and several highly government-financed research projects followed (Morris-Suzuki, 1996:214). In 1985, the Key Technology Promotion Centre was set up jointly by MITI and the Ministry of Posts and Telecommunications. By the early 1990s, the Key Technology Promotion Centre had supported several hundred research projects, mainly in the area of microelectronics. According to MITI, its activities in the information sector proved to be successful, when Japanese companies slowly took over a major market share in the hard drive and personal computer producing industry (Mattelart, 2003:93).

The hopes of a better future, fostered by the development of the microchip, video and audio systems industry were, in Japan, popularised by the futurist Yoneji Masuda. In his book, "The Information Society as Post-industrial Society", published in 1980, Masuda describes a future society, in which intellectual creativity wins over the consumer society, self discipline is socially integrated and humans live in harmony with nature (Masuda, 1980). Nevertheless, in the 1990s, the Japanese government turned away from its former strong focus on the computer industry and increasingly emphasised the reformation of the educational system as well as basic research, in order to provide for potential long-term development (Vogel, 2000:323). Interestingly, this change in focus shows a clear parallel to the developments in Singapore, discussed below.

In 1994, MITI published a "Programme for Advanced Information Infrastructure" focusing on the expansion of the information technology network, connecting businesses, research institutions, offices and corporate production sites (MITI 1994). In 1999, the Ministry of

Posts and Telecommunications in Japan published a White Paper, entitled "Communications in Japan 1999" (MPT, 1999). It assessed the impact of the internet on the status of the information and communication industry and policies of Japan and resulted in the formulation of the IT policy package of the Japanese Government, entitled "E-Japan Strategy" in January 2001. It overall focused on the further development of communication facilities[21] and therefore continued Japan's technological focus towards 'knowledge society'.

3.3 *European Union*

On the level of the European Union, 'knowledge society' as a topic only gained relevance in the early 1980s. In November 1983, the Council of Europe established the Senior Officials Group on Telecommunications (SOGT) as an advisory group to the European Commission. Additionally, a subgroup of SOGT was formed with the name GAP (Group d'Analyse et de Prévision) in order to support the European Commission in the long-term development of the telecommunication networks (Campbell and Konert, 1998:73–74). Aiming for economic growth and employment, ICTs were identified as key technologies and therefore research in this field identified for being especially pushed (Vogel, 2000:324–333). Two examples are ESPRIT (European Strategic Programme on Research in Information Technology — since 1984) as well as RACE (Research and Development in Advanced Communications Technologies in Europe — since 1988). Providers of telematic applications were supported by programmes, such as DELTA (Developing European Learning through Technology Advance) and DRIVE (Dedicated Road Infrastructure for Vehicle Safety in Europe). These research

[21] Its main objectives were (Noguchi, 2003:71):

1. to increase the volume of e-commerce in 2003 to ten times the level of 1998;
2. to make available the world's most advanced communication networks by 2005;
3. to increase the number of MA and PhD holders in IT-related fields to a level comparable to the USA;
4. invitation of thirty thousand highly skilled foreign workers.

programmes were accompanied by the Commissions Action Plan on Telecommunications (EC, 1984).

The from there following telecommunication politics of the European Union were mainly structured by the "White Paper on the Completion of the Community-wide Market for Goods and Services", published in 1985 (EC 1985) and the "Green Paper on the Completion of the Common Market for Telecommunication Services," published in 1987 (EC, 1987). With the beginning of the 1990s, the European Union widened its focus from explicitly ICT-development to ICT-applications. In 1993, the Commission published a White Paper entitled "Growth, Competitiveness, Employment — The Challenges and Ways forward into the 21st Century" (EC, 1993). It emphasizes the importance of trans-European networks as stimulation for the European economy and a decrease in unemployment. The construction of information networks and European networks in the transport and energy sectors were to be of prime importance. The increased focus on the effects of ICTs on work processes resulted in a decrease of the terms 'electronic highways' and 'information economy'. Instead the European Commission adopted the term 'information society' and reasoned that Europe focuses its activities, differently to the USA, on social and educational aspects of the assessed stage of development (Kubicek, 1999:73).

This White Paper formed the basis for the foundation of a high-level expert group in cooperation with representatives from the industry. In 1994, the expert group, headed by Martin Bangemann, presents its report "Europe and the Global Information Society — Recommendations to the European Council" at the EU-summit in Corfu (Bangemann, 1994). The group argued that the best support for information networks and services would be open and competitive markets.[22] The Bangemann-Report can be

[22] The report outlines four steps to shape Europe's way into a knowledge society: (a) the liberalisation of Europe's telecommunication markets; (b) the creation of a common regulatory framework regarding standardisation; (c) the protection of intellectual property rights; and (d) respect of privacy and the security of data transmission.

regarded as EU's master-document and key reference point for policy initiatives related to the electronic communication sector (Preston, 1997:282). On its basis and after being requested to do so by the European Heads of State and Government, the Commission of the European Union published the action plan "Europe's Way to the Information Society" in the same year (EC, 1994).[23] This was followed in July 1996 by the "Green Paper on Living and Working in the Information Society: People first" focusing on social aspects of 'knowledge society' (EC, 1996a). In November 1996, the Commission adopted the action plan "Europe at the Forefront of the global Information Society" building on completed, pending and ongoing activities (EC, 1996b). Early 1998, the liberalisation of the European telecommunication sector was completed.

In March 2000, Europe's political leaders met on an EU-summit in Lisbon. Here, the target of developing Europe into "the most dynamic, competitive and knowledge-based economy in the world by 2010" was explicitly formulated (EC, 2000a). Consequently, the European Council published the eEurope 2002 action plan in June 2000 (EC, 2000b), designed to speed up and extend the use of the internet to all sectors of European society. In June 2002, at the Seville European Council, the eEurope 2005 Action Plan was launched and endorsed by the Council of Ministers in the eEurope Resolution of January 2003 (EC, 2002). It states the aim to develop public online services (eHealth, eLearning and eGovernment) and a dynamic environment for e-business through widespread availability of broadband access at competitive prices and a secure information infrastructure. In June 2005, the European Commission set out a new strategic framework, entitled i2010 — A European Information Society for Growth and Employment and the progress made by eEurope 2005 as well as by i2010 was assessed in a benchmarking

[23] It focused on four areas: (a) the regulatory and legal framework; (b) the networks, services, applications, and content; (c) the social and cultural aspects; and (d) the promotion of k-society.

report in December 2005 (EC, 2005:2).[24] While the technological focus is here further maintained, the inclusion of all members of society into the usage of ICTs and decentralised structures of knowledge production becomes an increasingly discussed topic.

3.4 *Singapore*

Similarly to the USA, Japan and the European Union, Singapore, a small island-state with limited land and labour available, adopted the image of a 'knowledge society' for long-term economic growth and social stability. From the early 1980s onwards (around the same time as the European Union), the Singaporean government has taken enormous action towards its realisation. Table 1 lists the government programs that clearly pursued this vision.

In Singapore of the 1980s to early 90s the focus of government activities towards 'knowledge society' clearly laid on the building of an ICT infrastructure in conjunction with a supportive legal infrastructure. As such can be mentioned the "National Computerisation Plan" (1980–1985; Committee on National Computerization, 1980), the "National IT Plan" (1986–1991; National IT Plan Working Committee, 1985), "A Vision of an Intelligent Island — The IT2000 Report" (1992–1999; NCB, 1992), "Infocomm21" (2000–2003; IDA, 2000), "Connected Singapore" (2003–2006; IDA, 2003) and "Intelligent Nation 2015" (2006–2015; IDA, 2007). It therefore was a very technologically and economically determined version of knowledge society pursued by these activities. This primary focus on ICT and legal infrastructure was complemented by the application of ICTs in the public administration, with the first program, the "Civil Service

[24] Main trends identified are: (a) broadband roll-out is a clear success; (b) disparities between the member states have not yet been reduced; (c) connectivity of enterprises is high throughout EU25; (d) availability of online public services has continued to grow; (e) all member states are confronted with the challenge of extending knowledge society to people with little or no formal education, those not in employment and older people (EC, 2005:2–3).

Table 1: State activities for a Singaporean knowledge society

Year	Name of Initiative	Implementing Authority
1981	National Computerisation Plan	Ministry of Trade and Industry & Committee on National Computerisation
1981	Civil Service Computerisation Program	Ministry of Education & Civil Service Computerisation Group
1985	National IT Plan	National IT Plan Working Committee
1991	Founding NSTB/A*STAR	Minister Cabinet
1992	A Vision of an Intelligent Island — The IT2000 Report	National Computer Board
1994	Library 2000	Ministry for Information and the Arts & Library 2000 Review Committee
1996	Singapore ONE	National Computer Board
1997	Thinking Schools, Learning Nation	Ministry of Education
1997	1st Masterplan for IT in Education	Ministry of Education
2000	Infocomm 21	Infocomm Development Authority
2000	1st eGovernment Action Plan	Infocomm Development Authority
2002	2nd Masterplan for IT in Education	Ministry of Education
2002	Creative Industries Development Strategy	Economic Review Committee, Workgroup on Creative Industries
2003	Connected Singapore	Infocomm Development Authority
2003	Innovation & Enterprise	Ministry of Education
2003	2nd eGovernment Action Plan	Infocomm Development Authority
2004	Teach Less, Learn More	Ministry of Education
2005	Library 2010	National Library Board
2006	Intelligent Nation 2015	Infocomm Development Authority

Source: Hornidge (2010 forthcoming).

Computerisation Plan", launched in 1981. Further examples are the "eGovernment Action Plans" (NCB, 1982; IDA and Chua, 2006) and the "Masterplans for IT in Education" (MOE, 1997, 2002). The actual shift towards the wide application of ICTs, nevertheless, only

took place in the late 1990s, with the above mentioned ICT focused programs increasingly emphasizing the application of ICTs in private and professional life, educational facilities and the public service. Here "Innovation and Enterprise", launched in 2003, can also be mentioned.

In 1991, these ICT focused definitions of knowledge society were challenged by activities addressing the production of knowledge, meaning basic and applied research and development. Examples are the founding of the Agency for Science, Technology and Research (A*STAR) in 1991[25] as well as the construction of a biomedical research hub, similar to an industrial park, called Biopolis in 2001 (Hornidge, 2008).[26] It derived from an increased awareness of the importance of local knowledge production. In the mid 1990s, this was further complemented by the realisation, that a knowledge society requires the potential of every citizen. With the building of a vast library scene, the Singaporean government aimed to allow everyone to participate in the usage of ICTs as well as in knowledge creation and transmission. As main action plans pursuing this inclusive definition of 'knowledge society' attempting to close the digital divide between social groups, "Library 2000" and "Library 2010" can be identified (Library 2000 Review Committee, 1994; NLB, 2005).

In the 2000s, the fostering of creativity among Singapore's citizens and the development of creative industries (e.g., design and

[25] A*STAR is a statutory board of the government under the Ministry of Trade and Industry which oversees altogether 12 research institutes.

[26] Biopolis is part of Fusionpolis, which is split into Vista X-Change (centre for private-public-partnership and industry development, financial and business services), Central X-Change (centre for ICTs, media and education industries) and Life X-Change (Biopolis). Together these three form Fusionpolis, which is stated in a newspaper article from 2003 to be "Singapore's icon of the knowledge economy where talents gravitate naturally and where diverse ideas thrive. With a focus on knowledge intensive activities in critical growth sectors, one-north would provide an intellectually stimulating and creative physical environment for entrepreneurs, scientists and researchers to congregate, interact and exchange ideas" (JTC Corporation, 20.02.2003).

arts), which in application of ICTs shall contribute to Singapore's economic development, moved into the center of government attention. This belief in creativity subscribes to an image of knowledge society as a creative economy and resulted into an increased push for a national cultural policy. Singapore's first cultural policy, the "Ong Teng Cheong Report" was launched in 1989 (ACCA, 1989). This was then followed by the foundation of the Ministry of Information and the Arts (later renamed into Ministry of Information, Communications and the Arts — MICA) and the development of "The Esplanade" into a major performance arts venue in 1990. In 1991 and 1993 respectively, the National Arts Council (NAC) and the National Heritage Board (NHB) were established as further coordinating and planning bodies. In 1995, the planning document "Singapore: Global City of the Arts" was published (MITA and STPB, 1995), closely followed by the "Renaissance City Report: Culture and the Arts in Renaissance" in 2000 (MITA, 2000). The turn towards the marketability of arts nevertheless came with the publishing of the "Creative Industries Development Strategy" in 2002 (Workgroup on Creative Industries, 2002). Here three approaches to defining the scope of the creative cluster in Singapore were identified and their focused development decided: (a) the cultural industries; (b) the creative industries; and (c) the copyright industries. Together these three pillars are hoped to develop arts and culture as economic sector, as key element for Singapore as 'global city' attracting 'foreign talents' and tourists and as creative basis for innovative R&D-work in all knowledge producing sectors and disciplines.

Taking the examples of the USA, Japan, the European Union and Singapore and their government activities towards the further development of information and communication technologies as well as into 'knowledge societies' indicates three main points. First, the internet, developed by defence-financed research projects, originates from military interests. Second, the technology then, as argued in section 2 of this chapter, inspired academic and visionary thinking that resulted in the creation of the theoretical concepts and visionary terms such as 'knowledge society', 'information society' and 'knowledge-based

economy'. Third, these concepts and visions were then again adopted by governments worldwide to push the actual creation of these envisioned societies further by releasing programmes and initiatives fostering the building of information and communication networks, the application of the technology, as well as knowledge creation and transmission. Yet with regard to the USA, Japan, the EU and Singapore, the above illustrates that each of the three, legitimised their activities towards 'knowledge society' with their current situation. While Japan hoped for a solution to the hollowing out of its manufacturing industry, the European initiative has to be understood as a reaction to the pressures of global competition and as a transnational reaction to increasing unemployment. In the USA, the information superhighway was regarded as a solution to the U.S. infrastructural crisis and advanced as a presidential campaign topic. In Singapore, the drive towards 'knowledge society' has been identified as pathway to economic survival and socio-political stability.

4. Concluding Remarks

The above review of the conceptual and actual construction of 'knowledge society' and therewith the redrawing of a global hype aimed to shed light on the notion 'knowledge society' by assessing how it has been defined by academics in their writings and by governments in their actions around the world. It rests on the belief that social reality is shaped by its actors; basically that, to say it with the words of Franz Kafka, "paths are made by walking". The rapid developments in the information and communication technologies inspired scientific writers around the world, aiming to conceptually grasp the ongoing and future developments. During a primary and secondary phase a wide range of conceptual approaches to 'knowledge society', 'information society' and 'knowledge-based economy' were developed. From there and despite (possibly even fostered by) terminological overlaps, lacking clear-cut definitions, these notions entered the public sphere and were taken up by governments around the globe for either legitimising ongoing programmes or pushing future economy and technology oriented activities. Of the outlined

countries above, Singapore, while nevertheless being purely economically motivated, heavily included the fostering of the arts into its later understanding of 'knowledge society'. The USA, Japan and the EU at large stayed with a technology-driven definition of the concept, focusing on the traditional sectors of economic growth.

Consequently, once the notions had entered into the public discourse, they were discussed, defined and redefined by a multitude of actors in multiple different ways, each outlining a unique path to and from 'knowledge society' as vision and stage of development. This multitude was then taken up again by academics, who developed the concepts further, while in parts the social actors creating 'knowledge society' as stage of development were continuously in the process of readjusting their original definition of it. This was portrayed above by the case of Singapore, which moved within a very short time frame from a purely technological definition to a definition integrating technological, economic aspects with areas such as culture, the arts and creativity being integrated into its economic focus.

This process of continuous further development of the notions and concepts as such and the multitude of definitions attached to them as stages of development continues. Yet, at the same time, the paths taken by governments around the world outline in detail different conceptualisations of 'knowledge society' which all are neither exactly that nor anything else than just that: 'knowledge society' as we, the social actors fostering its notion, define it.

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