Knowledge and decision-making

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Knowledge and decision-making: Some general observations

An analysis of the role of knowledge rather than say the obedience to authority, the position of actors in networks, or personal influence in decision-making in health requires, in my view, a serious examination of the *nature of knowledge*. In addition, what is also required is an examination of the dominant ways in which knowledge is discussed in different social science fields rather than in epistemology. In the practice of epistemology the *desirable* qualities of knowledge are spelled out; for example, knowledge ought to be objective, true or in conformity with reality. What I would like to explore instead is the *actual* role of knowledge in decision-making.

The dominant approaches to knowledge in the social sciences, especially in philosophy, sociology and economics are all concerned with but one function of knowledge, namely knowledge as *output*. As a result, if one wants to examine the role of knowledge in decision-making one has to radically shift focus and study knowledge as *input* or as a *resource* of social action. More recently, efforts such as knowledge management, which so far is in my estimation but a dubious enterprise, indeed has shifted attention to the question of knowledge as input in administration, organizations and corporations.

The central thesis of my lecture an be summarized as follows: I define knowledge as a *capacity for action* or as a model *for reality*. Knowledge illuminates and is able to transform reality. Knowledge acquires an *active* role in the course of social action only under circumstances where such action does not follow purely stereotypical patterns. Scientific knowledge tends to be depragmatized. It must be made available, interpreted and linked to local, contingent circumstances. The complexity of the linkages and the volume of resources required not only delineate the limits of the power of scientific and technical knowledge but account why the knowledge work performed by the stratum of

experts (or knowledge-based occupations) who attain more and greater influence in advanced society.

I will try to advance these points in a number of steps: First, the notion of knowledge is explicated in greater detail; second, I summarize the now dominant perspectives on knowledge in philosophy, sociology and economics. Third, I discuss those views especially in sociology and economics that deal with knowledge as a product. Forth, I indicate why it is important to analyze knowledge as a resource of social action. Finally, in my concluding observations I draw on these points and offer some reflections on decisions under uncertainty.

The nature of knowledge

Knowledge may be defined as a *capacity for action*. The use of the term ”knowledge” as a capacity for action is derived from Francis Bacon's famous observation that knowledge is power (a somewhat misleading translation of Bacon’s Latin phrase: “*scientia est potentia*”). Bacon suggests that knowledge derives its utility from its capacity to set something in motion. The term potentia, that is: *capacity* is employed to describe the power of knowing.

The definition of knowledge as capacity for action has multi-faceted implications and consequences. *Capacity* for action signals that knowledge may in fact be left unused, or that it may be employed for “irrational” ends. The definition of knowledge as capacity for action strongly indicates that the material realization and implementation of knowledge is open, that it is dependent on or embedded within the context of specific social, economic and intellectual conditions. Knowledge, as a capacity for action, does not signal that *specific* knowledge claims always possess a fixed "value" or even a distinct practical dimension. We cannot, as result, stipulate *a priori* that some knowledge claims, for example those that issue from disciplines in the humanities, are less practical

than knowledge that originates in the natural sciences. Inasmuch as the realization of knowledge is dependent on the active elaboration of knowledge within specific networks and social conditions, a definite link between knowledge and social power becomes evident because the control of conditions and circumstances requires social power. The larger the scale of a project, the greater the need for social power to control the actual realization of knowledge, that is, of knowledge as a model for reality.

Knowledge is a peculiar entity with properties unlike those of commodities or of secrets, for example. Knowledge exists in objectified and embodied forms. If sold, it enters other domains -- and yet it remains within the domain of its producer. Knowledge does not have zero-sum qualities. Knowledge is a public as well as private good. When revealed, knowledge does not lose its influence. While it has been understood for some time that the "creation" of knowledge is fraught with uncertainties, the conviction that its application is without risks and that its acquisition reduces uncertainty has only recently been debunked. Unlike money, property rights and symbolic attributes such as titles, knowledge cannot be transmitted instantaneously. Its acquisition takes time and often is based on intermediary cognitive capacities and skills. But acquisition can be unintended and occur almost unconsciously. Neither the acquisition nor the transmission of knowledge is always easily visualized. The development, mobility and reproduction of knowledge are difficult to regulate. It is “troublesome” to censor and control knowledge. It is reasonable to speak of limits to growth in many spheres and resources of life, but the same does not appear to hold for knowledge. Knowledge has virtually no limits to its growth, but it takes time to accumulate. Despite its reputation, knowledge is virtually never uncontested.

Scientific and technical knowledge, while clearly representing such "capacities for action", do not thereby become uncontestable, no longer subject to challenge and interpretation. Scientific and technical knowledge is uniquely important because it produces *incremental* capacities for social and economic action or an increase in the

ability of "how-to-do-it" that may be "privately appropriated", at least temporarily. The greater the *tempo* with which incremental knowledge ages or decays, the greater the potential influence of those who manufacture or augment knowledge, and correspondingly, of those who transmit such increments. If sold, knowledge enters the domain of others, yet remains within the domain of the producer, and can be spun off once again. This signals that the transfer of knowledge does not necessarily include the transfer of the cognitive ability to generate such knowledge, for example the theoretical apparatus or the technological regime that yields such knowledge-claims in the first place and on the basis of which it is calibrated and validated. Cognitive *skills* of this kind, therefore, are scarce.

Dominant perspectives on knowledge

1. The branch of learning that has concerned itself with the nature of knowledge in general has traditionally been *philosophy*. Questions it investigates in addition are the relation between knowledge and belief (or ideology), the validity and reliability of knowledge claims pertaining to the external world based on sense perception, the presuppositions required for the production of knowledge, and the use of language in the construction of knowledge claims.

2. Subsequently in the history of ideas, it is *sociology* that turns it attention to knowledge in the form of the sociology of knowledge. The traditional form of the sociology of knowledge is until this day, for example in its most prominent contemporary form of science studies, primarily interested in the social foundations or dependence of knowledge. The sociology of knowledge and science studies are concerned, as one of the pioneers of the sociology of knowledge Max Scheler put it, the „intimate linkage“ (Scheler, [1924] 1960:193) between class and ideology, labor and knowledge, society and knowledge-guiding interests.

3. Even more recently, the field of *economics* discovered the importance of information or knowledge for economic affairs. That is to say, economic activities are increasingly dominated by the production, distribution and consumption of information. Knowledge has become -- aside from the traditional means of production such as corporeal labour and property -- a productive force. However, the emphasis in economics is on information and not knowledge and mainly treats information as a product asking for example how innovators can capture the fruits of their labor in the market place.

I simplify matters somewhat if I say that the approaches to knowledge in philosophy, sociology and economics are all concerned with but one function of knowledge, namely knowledge as *output*. As a result, one has to shift focus quite radically if one is to examine knowledge as *input*, as is the case for an analysis of the social role of knowledge in decision-making.

Knowledge as a Product

Both in economics and in sociology, most recently science studies, the focus of attention has been on knowledge as a product and in neo-classical economic discourse on how knowledge as a product can take on the characteristics of commodities and can therefore be sold in the market place for profit. More about the economics of information in a moment. First, a few words about the sociology of knowledge and science studies.

Knowledge Production

Interest in the *social foundations* of knowledge as the research focus in particular of the *sociology* of knowledge emerges out of epistemology. In the tradition of epistemological themes, the question of the genesis, its conditions and consequences continue form the core concern of the sociology of knowledge (for an early account see Mannheim, [1929] 1965:164-167).

The sociology of knowledge has of course – aside from self-exemplifying questions about the foundations of its consciousness – always problematized the societal role of knowledge (for example in the sense of Herrschaft kraft Wissen [authority based on knowledge] Weber, [1922] 1964: 339), the sociology of knowledge also displays an interest in social role the carriers of knowledge (for example intellectuals, bureaucrats, experts, and cultural elites) and the civilizational transformation of forms of knowledge (for example in the work of Norbert Elias, 1983).

Nonetheless, and using economic concepts to describe the core foci of the sociology of knowledge as still widely practiced, interest centers on the *supply* and not the demand or the consumption of knowledge.

The emphasis of the production of knowledge forms the almost singular interest of science studies, as we know it. Laboratory studies are a part of this focus (e.g. Latour and Woolgar, 1986), as well as the controversial finalization debate some two decades ago (Böhme et al., 1973) and, more recently, the thesis of new forms of the production of knowledge labeled for example „post-normal science“ (Funtowicz and Ravetz, 1993), „mode 2“ (Gibbons et al., 1994) or „postacademic science“ (Ziman, 1994).

In the context of these observations about science, knowledge of course is not viewed a closed, autonomous canon but it is the *societal orientation of science*, as Gernot Böhme (Böhme, 1993:19) puts it that assures what kind of knowledge we ultimately have in science and what social processes are responsible for the inner structure of knowledge and its conceptual apparatus.

The outcome of the now extensive analysis of the social production of knowledge are insights into the growth of knowledge that paradoxically produces greater uncertainty and contingency rather than providing a resolution of disagreements. [1] Science is

[1] An example from climate research may illustrate the point: Few scientists today doubt that the global temperature has risen during the last century. It is also the case that agreement on future climate developments is less widespread, as is the consensus on the forces that contribute to climatic changes. And the uncertainties that can be observed

incapable to offer cognitive certainty. . This is to say that scientific discourse has been depragmatized, it cannot offer definitive or, even true statements (in the sense of proven causal chains) for practical purposes but only more or less plausible and typically contested assumptions, scenarios, and probabilities (see Stehr, 1991). Instead of being the source of reliable trustworthy knowledge, this way science becomes a source of uncertainty. And contrary to what rational scientific theories suggest, this problem cannot be comprehended, or remedied by differentiating between "good" or "bad" science (or between pseudo-science and correct, i.e. proper science). After all, who would be capable of doing this under conditions of uncertainty?

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among climate scientists actually appear to be rising, despite intensified research efforts in the last few decades. This observation of the growth of uncertainty applies not only to global changes but to regional transformations as well. A study carried out by Chris E. Forest (2002) and colleagues was unable to reach a firm answer on the decisive question of the notion of climate sensitivity (that is, what would be the response of climatic conditions to a doubling of CO_2 emissions into the atmosphere). The researchers of the study by Forest arrive at an estimate of climate sensitivity between 1.4 and 7.7 degrees Celsius, while the International Panel on Climate Change, in a kind of compromise, agreed on values between1.5 and 4.5 degrees Celsius. The probability that actual climate sensitivity might fall outside the limits set by the IPCC is judged by Forest and his colleagues to be in the range of thirty percent. In other words, the uncertainty regarding the decisive measure of climate forecasts is still considerable; it may even have increased in the wake of growing efforts to arrive at such an estimate.

Knowledge as a Commodity

The preeminent hypothesis in the economics of information, and it follows, the main (practical) economic dilemma, is that information or knowledge can be communicated, appropriated and reproduced almost without cost. Information travels freely and is learned at little cost. To that extent, economists reason, information or knowledge generated by research activities is akin to a *public good*, that is, no one can be effectively excluded from using it (cf. Antonelli, 1999:244-247).

Since knowledge production is seen to be expensive, knowledge producing commercial organizations has little incentive to fabricate new knowledge. It does not pay to invest in research and development. The encouragement of innovation therefore it is argued must occur via intellectual property rights. Patents and other restriction attached to the use of new knowledge convert knowledge into a quasi-commodity. The restrictions force knowledge to "mimic commodity characteristics of tangible goods" (Dempsey, 1999:38-39).

In short, the neo classical paradigm supports policies that are designed to broaden the scope of intellectual property laws, higher penalties for infringement, more policing efforts and restriction or even elimination of such measures as compulsory licensing and fair practices.

The focus on knowledge as a product biases the debate in favor on regulatory intervention. Equally deficient is the assumption that the use of knowledge occurs by what can only be described as a set of *passive* actors. Actors who without much effort acquire and easily put knowledge to work. For example, it is assumed that knowledge and information is completely embodied in technological hardware; the actors who use such knowledge contribute nothing. The differentiation between *codified* and *tacit* or *implicit* knowledge -- as the brain researcher would label it -- shows that such an assumption is not realistic (see Cowan, David and Forey, 1999).

In any event, knowledge is not only a product but also a *resource* of social action, be it in the context of health care, innovative activities or policymaking. In such a context, viewing knowledge as a commodity recedes almost completely into the background.

Knowledge as a Resource

Knowledge as a capacity for action has qualities that are contingent on individual and organizational capabilities. This applies with special force to the use of knowledge as a *resource* in decision-making.

First, the range of social conduct in which knowledge plays a role, is restricted to those spheres of social life that have not been fully routinized and regulated. The question of the relation of knowledge to practice then is limited to situations that offer a measure of discretion in social conduct and have not been reduced to a corset of strictly habitual and predictable patterns of social action.

Second, the use of knowledge in situations in which there is a degree of openness requires a measure of control over the conditions of action.

Third, the transmission of knowledge cannot be reduced to the mere acquisition of information let alone though the medium of written communication only. Knowledge does not travel freely. Knowledge is sticky. Its acquisition does not take place in a vacuum; it takes time and is typically based on scarce cognitive capacities and skills. The marginal costs of acquiring knowledge can be considerable. The cost rise with the "distance" from the context in which such knowledge is generated in the first instance.

If one views knowledge not merely as output but as a resource in decision-making and in innovation, then property rights and patents on knowledge have a significant negative effect on social welfare. The transformation of new knowledge into exclusive and proprietary knowledge delays not only its dissemination and postpones competition

but also subsequent innovation that could be based on the new knowledge. There “is also a duplication of effort, and therefore a waste of resources, in re-inventing knowledge which is already available” (Antonelli, 1999:246-27) but restricted from broader adoption. In short, restrictions on the application of new knowledge slow the generation of new knowledge.

Thus, one of the major conflicts with which one has to deal in using new knowledge as a general resource of social action is the need to find solutions to the clash between the demand for restrictions on the use of new knowledge and the societal and individual advantages that flow from any enhanced dissemination of new knowledge.

Conclusions or decisions under uncertainty

. The only certainty is that decisions must be made, leaving us with the dilemma of decision-making under conditions of great uncertainty. The expansion of the potential for decision and the disappearance of any readily agreed-upon metasocial rules, with the resulting pressure to choose options, have resulted in society increasingly viewing its future in terms of risk.

If we try to draw some conclusions from what has been said, the most striking observation is the lack of robust knowledge. Positive or negative consequences of decisions relating to health, the deployment of large scale technologies or ecological changes are associated with great uncertainty, so that ultimately there can be only more or less plausible opinions, scenarios, etc. regarding what to expect in the future. Because we sense uncertainty but would prefer to be certain, we turn to science. We turn to science with the persistent conviction of its superior rationality and with once unimpaired confidence in its ability to manage, plan and design the modern world, and in the feasibility of doing so. However, these convictions are seriously and increasingly

impaired and undermined by the problem of risk, technically, socially and in terms of time.

Knowledge of risk is a precariously balanced, fragile entity based on the hypothetical approach. Trial and error processes, i.e. stepwise adjustments of technical systems to the needs of concrete situations, are being replaced in many cases by scientifically developed long-term planning and statistical risk analysis, which are only able to make theoretical assumptions and approximations regarding reality.

Models, scenarios, and idealizations are increasingly replacing practical experience and empirical research. Empirical knowledge is being pushed out by subjective probability calculation. The potential for damage is no longer determined by experience and by trial and error, but has to be intellectually anticipated; this is because tests cannot be made on an adequate scale, and observations or experiments cannot be repeated as often as desired - or even made at all.

For the onlooker, this leads to an erosion of trust in the public decision-making systems, because from the outside they can see the hypothetical for what it is and attack it as such – a perspective which the decision-maker is denied.

Coping with the lack of robust knowledge becomes the decisive dimension in decision-making. Because we cannot know the future, it becomes all the more important how this lack of knowledge is dealt with in the decision-making process. That this situation is still relatively new is clear from the fact that there are still no developed theories for it, let alone emerging techniques or routines which are able to handle these new uncertainties.

A modern risk theory must face the problems of how to organize learning processes in situations of fundamental uncertainty and how to make decisions under uncertainty in highly-organized social systems. More knowledge will not assure a shift from risk to security. The opposite seems to be the case: “the more we know, the better we know that we do not know, and the more elaborate our risk awareness becomes. The

more rationally we calculate and the more complex the calculations become, the more aspects come into view involving uncertainty about the future and thus risk" (Luhmann, [1991] 1993:28).

The paradox with which we will have to cope in knowledge societies - that is in societies that are increasingly human-made - is that the growing social, political and economic importance of knowledge goes hand in hand with a decline in our ability to intervene in our affairs in ways so as to remove contingency, fortuitous circumstances, surprises, misfortune and so on.

Nonetheless, one of the outcomes of individual and collective efforts to deal rationally with the uncertainty, contingency and constraint of knowledge in large organizations such as hospitals will be a tendency toward *homogeneity* in structure, culture and output such organizations (see DiMaggio and Powell, 1983), that is to say, organizations will model themselves on those that are perceived to be successful, a process that is reinforced in the case of medicine by the presence of a large pool of professionals.

Appendix: Knowledgeability and health

The site in which a transformation from a society in which things merely happen to a society in which they are made to happen on the basis of the greater knowledgeability of actors perhaps can best be observed is the world of health. In knowledge societies in particular, the general level of knowledgeability of every individual is elevated. In other words, the condition for the possibility of greater and more broadly based agency is knowledgeability or a bundle of more widely accessible social competencies and their impact on the stock of social including health capital individuals commands.

As the definition of knowledge I have advanced already signals, knowledge as a capacity for action is not confined to scientific and technological knowledge. Other forms of knowledge, including what sometimes is called "indigenous knowledge" (Sefa et al, 2000) form such capacities for action, even in modern societies though scientific and technical knowledge clearly play a dominant and authoritative role among the range of circulating stocks of knowledges.

But that benefits or disadvantages associated with one's ability to mobilize the resource knowledge are not strictly confined to the productive deployment of scientific knowledge can be shown most convincingly, I believe, in the area of health. Knowledge commands health. Knowledge as a socially stratified bundle of competencies, for example, as the capacity of avoidance and therefore of a strategy that ensures that certain health risks are minimized is among these generalized capacities. Knowledge must be seen as a facility to master one's life (see Stehr, 1999).

I will refer to two pieces of empirical evidence that underline the linkage I have stipulated. (1) The decline in mortality from infectious diseases is the most significant medical achievement of modern times, and it is commonly assumed that this achievement is a product of applied science. A detailed examination of the historical record shows that

medical science has made but a marginal contribution. For example, mortality from whooping cough, typhus or cholera and related diseases began to decline from the 1870's and therefore long before specific medical measures in the form of medication influenced the decline (cf. Mulkay, 1984:88-90). [2] (2) Extensive reviews of the accumulated empirical evidence of more recent years, conducted by Grossman and Kaestner (1997) suggest that completed years of formal schooling is the most important correlate of good health. [3]

[2] As Galdston ([1932] 1957:294) for example points out, the social movement for health education precedes applied medical science: "In the last quarter of the nineteenth century there also developed the realization, based on the knowledge that most infectious diseases are preventable or controllable, that education in regard to the necessity for health protection is as essential as legislation. This philosophy was adhered to in the face of many difficulties, including the attitude of the medical profession."

[3] This finding "emerges whether health levels are measured by mortality rates, morbidity rates, self-evaluation of health status, or physiological indicators of health, and whether the units of observation are individuals or groups" (Grossman, 1999:64-65).

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