

**Strategies to assess a knowledge exchange program for
University-Industry collaboration.**

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Introduction

The promotion of knowledge exchange is a policy instrument widely used by agencies aiming to improve the performance of national innovation systems. This paper scrutinizes different strategies to assess a knowledge exchange program for University-Industry collaboration. A distinction is made between instrumental and non-instrumental approaches and it is argued that the validity of a policy (program) evaluation increases if instrumental and non-instrumental approaches are integrated. To investigate the broader and higher-order implications of a policy (program) there is a need to consider alternative ways of understanding the problem situation and the policy (program). The policy makers' perspective, in this case how a knowledge exchange program effects the "the national innovation system", is not the only legitimate option.

Not surprisingly, different evaluation approaches have evolved in parallel with shifts in innovation theory and innovation policies. Moreover, when shortcomings are experienced in the performance of a specific policy instrument, policy makers and researchers look for new instruments. Lately, there has been a shift from large scale "pre-competitive and usually collaborative RTD programmes¹" towards "enhancing the environment for innovation and technology transfer" in technology and innovation policies as well as in the evaluation of such policies (Georghiou 1998). The innovation policy discourse is now dominated by an "adaptive learning approach" which gives evaluation an important role in providing feedback to the parties and also a responsibility to recommend which policies should be replicated/terminated. But what feedback should evaluators provide?

The wider range of policy options for the promotion of industrial-academic linkages include legal/regulatory reform, training and mobility, research, co-location, networking, commercialization, information/brokerage and finance (Georghiou 2000). These policies

¹ Research, Technology & Development programmes.

are used in various combinations, and evaluating one of these policy instruments demands considering the effects of other (not) used instruments.

A premise of this paper is that the meaning and implications of knowledge exchange program, indeed any innovation policy (program), needs to be assessed in several ways. It is argued that various evaluation strategies have different advantages and disadvantages, and that there is a need to elaborate some kind of multi-methodological approach. The relevance and validity of an evaluation naturally increases when more dimensions and implications of an initiative are accounted for. Some policy and program evaluation approaches are multi-methodological per se. The recognition of the value of using a combination of methodologies is not novel, but the purpose is more specific in the case described here. The aim is to search for and elaborate methodologies that allow for an appropriate assessment of a knowledge exchange program in the context of University-Industry collaboration.

The purpose of this paper, then, is to explore different strategies to evaluate a knowledge exchange program in the context of University-Industry collaboration. The pros and cons of instrumental and non-instrumental approaches will be discussed, using a specific knowledge exchange program, initiated by the Swedish Knowledge Foundation, as an example. It is presumed that such exercise can be helpful in illuminating the evaluation options open and also for improving the assessment of innovation policies (programmes).

First, the knowledge exchange program itself is briefly outlined. Next the instrumental and non-instrumental approaches are presented, followed by tentative assessments of the program from the various perspectives. Finally, the implications for evaluation theory and practice are discussed.

A Swedish knowledge exchange program²

The Knowledge Foundation itself was created to deal with perceived structural problems and bottlenecks in the Swedish economy in the early 1990s. The overall aim was to promote economic growth and competitiveness in Sweden. More specifically, the Foundation's knowledge exchange programme was developed as a response to prevailing problems in the national innovation system. The knowledge exchange programme is itself structured into seven sub-programmes³ with a total budget of approximately 120 US dollars, excluding co-financing. In short, the Foundation is pursuing the program's aims by supporting bridging and networking activities in the hope that academia and industry will derive mutual benefit from the resulting closer interaction. The Foundation contributes with up to 50 % of the costs.

Half way through the programme the various participants have had a range of experiences. According to the *KK-Foundation's* criteria of success, the programme was launched successfully. The KK initiative has introduced a new source and form of funding into the innovation system. It has contributed to the creation of industrially relevant, interdisciplinary research schools in Sweden and has initiated knowledge transfer between universities, research institutes and industry.

More specifically, *academic supervisors* have gained fresh research funds from their participation in the research school programme (the largest sub-programme). Networks

² Umeå Centre for Evaluation Research (UCER), in cooperation with the Centre for Business and Policy Studies (SNS), has been responsible for a research-based, real-time evaluation of the Knowledge Foundation's knowledge exchange programme. Two reports have been presented, one focusing on one of the sub-programmes (Schild and Hanberger 2000) and one mid-term report (Hanberger, Schild and Hamilton 2001).

³ The knowledge exchange programme comprises the following sub-programmes: Expert competence (tailor-made short training courses largely for SMEs): (50 million); Industrial research schools and masters training (57 million); New forms of knowledge exchange between SMEs and universities/university colleges in networks (4 million); Collaboration between new universities/university colleges and industry (12 million); Developing knowledge on academic-industry relations; Dissemination of research results (public understanding of science); and The forestry industry programme (6 million).

and collaboration with firms have also been strengthened. As yet, however, few academics have developed new links with firms.

Research students' success criteria are gaining a doctorate and launching and/or strengthening a successful industrial or industrial/academic career. The achievement of these objectives cannot, in general, be assessed at this stage. Nevertheless, the majority of students are generally satisfied with their supervision, and with opportunities to gain commercially relevant knowledge and skills.

Firms' representatives' perspectives on the success of the sub-programme are indicated in the fact that nearly half of the research projects would not have started without the Foundation's financial support. There is evidence, too, that some firms might have financed their research in other ways. Most firms report positively on their participation, while a few firms feel that their research projects have already benefited from the programme. Collaboration with the academy and research institutes, in that order, appears to have been strengthened. Not all firms, however, report achievement of their own objectives.

The evaluation shows that the implementation of the program has been relatively slow and the programme structure has evolved continuously.⁴ Accordingly, the evaluation tracks a moving target. For instance, the sub-programmes are not clear-cut entities but, rather, an overlapping cluster of initiatives. The overall conclusion of the mid-term evaluation is two-fold; on the one hand interesting and promising results are on the way, on the other launching and implementing the programme has been slow and uneven (Hanberger, Schild and Hamilton 2001).

⁴ With the support of a think-tank, policy group, two new sub-programmes were initiated after 1997, ("Expert competence" and "forest industry"). In addition, changes have been made within sub-programmes, including changes to the names of the sub-programmes.

As indicated, the knowledge exchange program has many implications. For example, its significance can be understood in terms of: its merit and worth for the national innovation system; its value for different stakeholders; the development of the knowledge society; and the notion of (sustainable) economic growth. Some of these implications are captured by the evaluation strategies/methodologies discussed below.

Instrumental and non-instrumental evaluation approaches

The merit and worth of a policy (programme) could be assessed from the policy makers' perspective or from the various stakeholders' perspectives. In addition, the higher-order implications of a policy (program) could also be assessed. The advantages and disadvantages of two *instrumental approaches*, program theory assessment and outcome analysis, and two *non-instrumental approaches*, policy discourse analysis and qualitative network analysis are scrutinized in this paper. It is recognized that the broader and higher-order implications of a policy (program) frequently are overlooked by instrumental approaches.

Industry-Academy interactions are for the most part described in quantitative terms in the innovation theory literature, carrying the implication that greater interaction (knowledge exchange) will improve the innovation system. This does not necessarily follow however.

It is recognized that different problem discourses and interests are at stake when closer university-industry collaboration are being promoted. Therefore there is a need to analyze the implications of a knowledge exchange program from different perspectives and, more than at present, from non-instrumental approaches.

Instrumental approaches

The premise for discussing *program theory assessment* and *outcome analysis* as instrumental approaches is that these methodologies generally adopt the policy maker's perspective and give precedence to their goals and standards. Assessing the merit and worth of a policy (program) then becomes an instrumental activity. Although this is a fair and reasonable approach, it has obvious limitations, (eg. when a policy [programme] involves many stakeholders).

Policy/program-theory assessment

A policy (program) is generally built on assumptions, or best guesses, regarding how a policy (program) is expected to work in order to achieve intended effects. These assumptions, referred to as the policy or program theory, are explicit or implicit in the policy (program).⁵ The policy (program) theory is generally based on the policy makers' perceptions of the problem situation and how they think the problems (challenges) can be resolved. From an instrumental approach the policy (program) theory is understood as a package of interventions causing direct and indirect effects.

The basic idea of a program theory assessment (PTA) is to compare the program theory with an available social science theory. This *ex ante* methodology is a way of assessing the program's realism and potential and should not be confused with *ex post* methodologies (eg. program theory or theory driven evaluations organized and guided by a program theory).⁶

The standard to which the program theory is assessed, and which follows the policy makers' rationale, is a relevant social science theory that captures the cause-effects (in

⁵ Chen (1990) refers to program theory as a prescriptive theory.

⁶ The PTA discussed here does not correspond to any of the six types of theory-driven evaluations discussed by Chen (1990).

this case, cause-effects [mechanisms] improving the Swedish innovation system).⁷ Any discrepancies between the program theory and the social science (or problem) theory indicate that the assumptions are unrealistic and that the policy (program) can be expected to fail as a result of “theory failure” (cf. Weiss 1972, 1996).⁸

As illustrated below, a PTA can also be carried out in relation to different social science (or problem) theories (cf. Weiss 2000). It implies that the accuracy and soundness of a program theory also depends on the (innovation) theory to which it is being assessed. What are the main characteristics of the national innovation theory, that is, the standard to which the programme theory should be assessed in this case?

National Innovation System (NIS) theory

After Edquist and Lundvall, a national innovation system is understood as:

constituted by the institutions and economic structures affecting the rate and direction of technological change in the [sic] society. (...) It (...) include[s] not only the system of technology diffusion and the R&D system but also institutions and factors determining how new technology affects productivity and economic growth (Edquist and Lundvall 1993:267).

A (national) *innovation system* can be conceptualized in different ways, for example as intentionally or non-intentionally created (Freeman 1987, Lundvall 1992, Johnson 1997, Edquist 1997, chapter 1). The notion of ‘system’ implies that the elements/components of the system are ordered, interdependent and related to the environment. An assumption often made is that a number of processes must remain in balance if the system is to survive (Easton 1965, Hill 1997). Innovation processes can be characterized as dynamic, ongoing processes taking place within an innovation system or in a specific historical-economic-political context (Edquist 1997). Furthermore, innovation and knowledge exchange activities are, like other forms of human interaction,

⁷ Carol Weiss (2000) refers to the program theory as the “implementation theory” and the problem theory as the “real program theory”. Cole (1999) discusses “problem” or “aetiology theory” instead of social science theories.

⁸ Program staff can have different program theories. From an instrumental approach, however, the policy makers’ program theory is the one that should be unpacked.

embedded in institutional frameworks which to some extent make innovation processes path-dependent, that is, previous patterns of interaction restrict the choices now open to actors (Krassner 1988, Pierson 1992, Peters 1999, Bro 2000).

Innovation and knowledge exchange processes have been variously understood as a “Triple Helix of University-Industry-Government” relations (Etzkowitz and Leydesdorff 1997), as “technological communities” of individual researchers, firms, officials etc. (Carlsson 1995) and as “technological regimes” (Dosi 1982). Knowledge exchange is considered to be of great importance for improving national innovation systems. The emphasis in the new literature on understanding innovation as an interactive process (e.g. Lundvall (ed.) 1992, Edquist (ed.) 1997) supports the notion that network developments are important for technological innovation (Freeman and Soete 1997 p. 315). This conjecture is also supported by empirical research (Archibugi and Pianta 1996:458). National innovation systems can be conceived as comprising three analytical components or elements: *actors (organizations); institutions; and resources*. These three components, and the *interaction* that take place between actors within the system, are crucial for understanding how to improve a (national) innovation system.

Program theory

First, the program theory has to be unpacked. In this case the program theory is based on the assumption that the way in which actors or organizations (such as firms, universities, and funding bodies) act and interact (e.g. exchange knowledge, collaborate, carry out research, learn) in the innovation system is to some extent shaped by the informal and formal rules and regulations or ‘institutional rules’ which pattern their behaviour. Thus changes within the system can be brought about by manipulating the ‘institutions’ governing the behaviour of organizations (in combination with injecting resources).

By injecting funds with particular conditions attached to them, into the innovation system, the Foundation seeks to bring about organizational changes. These changes are

intended to result in greater exchange and collaboration between the three types of organizations: universities, research institutes, and firms. Ideally, new and lasting constellations and networks are created amongst these organizations. As a result, interactive learning (knowledge transfer) takes place, which enhances innovative capacity. In addition, the new constellations and networks help bring about, and are in turn reinforced by, new institutional rules governing action and interaction and which represent systemic change. Thus it may be said that through its role as a funder and facilitator, the Foundation seeks to initiate a chain-reaction, resulting in self-sustaining changes, which enhance the performance of the innovation system. The hoped chain-reaction is as follows: Conditioned funds → organizational changes → greater exchange and collaboration → new constellations/networks → interactive learning/knowledge transfer → increased innovation capacity → improved performance of the innovation system.

In short, one of the key ways the KK Foundation is trying to effect change is by introducing new types of funding incentives ('institutional rules') into the innovation system. Contract compliance is thus also a key tool used to effect change. But how this change is thought to occur is not presented. It should perhaps be added that the programme theory as outlined here, is first and foremost relevant at the programme-level, and does not provide clear guidelines for how individual project leaders in the sub-programmes can best work to fulfil programme goals.

Program theory contra national innovation theory

A brief assessment of the program theory in relation to the NIS theory indicates that the emphasis in the program theory on knowledge exchange, collaboration and networking is entirely in line with current thinking in the economics of innovation, which emphasises the importance of external sources of knowledge and 'interactive learning' for maintaining a high rate of successful innovation (e.g. Lundvall ed. 1992). Indeed, the recognition that networking, tacit knowledge (know-how), and learning are central to innovation broadly explains why the innovation process is now widely conceived as

systemic (e.g. Edquist ed. 1997, Lundvall ed. 1992, Nelson ed. 1993). Further, in tandem with identifying the economic importance of science-based technologies (e.g. biotechnology, ICTs, new materials), the innovation literature also acknowledges the potential and actual importance of the research base for national and regional wealth creation. Although the PTA indicates that the program theory is in harmony with national innovation theory, and thus has the potential to work, it does not give any clear guidelines for project leaders in the sub-programmes. Furthermore, the programme theory can not be used to guide an ex-post evaluation, simply because the program theory is not sufficiently developed. At present time the Foundation looks for a means of monitoring the program. One could interpret this an attempt to develop the program theory parallel to the program implementation.

For the purpose of illuminating how the programme could be understood in relation to different theories a comparison is made between NIS theory and local/regional innovation policy theory (LIP). As illustrated in Table 1, the unit of analysis differs between the NIS and LIP theory. One could see this as just a matter of scale, but when the further implications are considered the differences are more obvious. The independent (cause) and dependent (effect) variables are not the same. This implies that knowledge exchange activities are considered, or presumed, to cause different effects.

To improve the national innovation system, according to the NIS theory, national resources, institutional rules and the organizations constituting the innovation system should be coordinated and balanced. Imbalances could be accepted within the nation, if it is good for the national economy as a whole. In contrast, to improve local/regional sustainable development, resources, networks, interactive learning and social capital need to be utilized/stimulated, according to the LIP theory. In a prosperous region, the national and regional interests may coincide, whereas in regions with high unemployment, an aging population, and old industrial sector etc., the interests may divert. Whilst NIS theory gives an impression of being value-free, LIP theory focuses on cause-effects (mechanisms) that lead to 'local/regional development'. The NIS theory

and the program give precedence to national interests, whilst LIP theory focuses on local/regional interests. This shows that the theory chosen to assess the program provides different meanings to the same program.

Table 1 Assumptions made in two innovation theories

	National innovation system theory (NIS)	Local/regional innovation policy theory (LIP)
Unit of analysis	The nation	The municipality or region
Independent variables	<ul style="list-style-type: none"> • (national) resources • institutional rules • organizational performance 	<ul style="list-style-type: none"> • resources • interactive learning • knowledge networks • social capital
Intermediating variable	<ul style="list-style-type: none"> • knowledge exchange 	<ul style="list-style-type: none"> • knowledge exchange
Dependent variables	<ul style="list-style-type: none"> • improving performance of the national innovation system • national economic growth 	<ul style="list-style-type: none"> • local/regional innovation performance • local/regional sustainable development

The advantages of program theory assessment, in assessing knowledge exchange, are:

- It offers a theoretical understanding of the program in relation to theories (i.e. assumptions about cause-effects [mechanisms])
- It offers an explanation to whether a policy/program is successful or fails due to the program theory
- It offers guide-lines to theory based practice

The disadvantages of program theory assessment, in assessing knowledge exchange, are:

- the program theory is too general or underdeveloped
- social science theories do not always match the programme or available theories could be too abstract
- searching for ‘mechanisms’ imply, mistakenly, that certain mechanisms work beyond time and context

Outcome analysis

Outcome analyses focus on goal achievement, intended effects, cost effectiveness and accountability (Stufflebeam 2001). Generally, the official goals and linked evaluation criteria are central in outcome analysis. However, and in contrast to narrow output analysis, attention may also be paid to unintended effects and consequences. But here the instrumental feature of outcome analysis is emphasized, i.e. the precedence given to the policy makers' intentions.

The knowledge exchange program conceives knowledge exchange as an inter mediating variable. Not surprisingly, policy makers have primarily been interested in the program's effects on organizational performance (collaboration) across the Industry-Academy border. Expectation has concentrated on the added value of extended networking. The Swedish Knowledge Foundation also strives, as a Foundation, to change the institutional rules shaping the activities of actors in the innovation system, such that they become more market or business oriented. In the program a project's business relevance is treated as equally or possibly more important than research quality. However, the institutional and structural impact of the program cannot be assessed at this stage of the program, and there is a further need to compare the implications of knowledge exchange with other policy instruments/options.

The program has not (yet) singled out 'sustainable growth' as an important issue. But, in a comprehensive outcome analysis, the program's effects on 'sustainability' need to be accounted for. Sustainability can be seen as a qualitative dimension of the long-term effects. Knowledge exchange, or any other policy instrument used to promote Industry-Academy linkages, may have different implications for 'sustainable growth/development'. However, 'sustainability' is an ambiguous term. There are at least three understandings of the term: eg. an economic understanding referring to economic growth and jobs, an ecological one referring to biological diversity, and a social/cultural

understanding referring to quality of life issues and democratic participation. This program implicitly adopts the economic notion of sustainability. Moreover, it gives priority to ‘national sustainability’, which implies that consequences for municipalities/regions may be overlooked by the program.

The advantages of outcome analysis, in assessing knowledge exchange, are:

- It focuses on central evaluation issues/metaphors (goal achievement, effects, accountability, value for money)
- It provides answers to questions asked primarily by policy makers
- It focuses on added value

The disadvantages of outcome analysis, in assessing knowledge exchange, are:

- It may overestimate the implications of a policy/program, because intervention effects cannot be isolated
- It is biased to the commissioners’ goals and criteria
- It ignores the normative implications of a program

Non-instrumental approaches

As indicated the two instrumental approaches discussed in this paper have advantages and disadvantages. It has been pointed out that they follow the policy makers’ rationale. To deal with the disadvantages of these approaches and to move beyond the policy makers’ point of view there is a need to turn to non-instrumental approaches. In this section two non-instrumental approaches that direct the attention to the broader and higher order implications of a policy (program) will be discussed.

Policy discourse analysis

There are normative assumptions underpinning the framing of a policy problem, in this case 'how to improve the Swedish innovation system'. The normative implications of defining and dealing with a policy problem are not very well addressed in the evaluation of innovation literature. But as this paper shows 'policy discourse analysis' and 'qualitative network analysis' illuminate these implications explicitly.

The purpose of policy discourse analysis is to unfold the main problems and solutions in the policy discourse: the accepted truths regarding what causes what, and whose interests are promoted. The discourse analysis provides 'answers' to how problems and solutions are linked. If knowledge exchange is the solution what is the problem? The perception of the problem situation is central for what type of solution is considered to be appropriate. Generally, there are different ways of understanding the problem situation. Table 2 identifies three different policy discourses which view 'knowledge exchange' in different ways. The three discourses provide three different arguments for closer University-Industry collaboration, and accordingly presume different problems and solutions. In the 'national research policy discourse' knowledge exchange is thought of as a solution to real world problems. In contrast, the 'national innovation policy discourse' conceives knowledge exchange as a means of improving the national innovation system and economic growth, whereas in the 'regional innovation policy discourse' knowledge exchange is thought of as a means of promoting social capital, local/regional innovation and development.

The three discourses could be used to investigate whether a policy (program) is in line with the dominant or any alternative discourses and by doing this also illuminate the higher order implications of the policy (program). What kind of knowledge society is the policy (programme) giving support to?

The knowledge exchange program, discussed in this paper, is in line with the 'national innovation policy' paradigm. This implies that the policy makers are conceptualizing, arguing and looking for effects and consequences of the program within the accepted

truths of this discourse. The social/cultural dimension to ‘improving the innovation system’ is overlooked in this perspective and program. Policy makers also assume, or hope, that the program participants share, or will come to share, their perceptions and become devoted to renewal and change. However, in multi-actor contexts this will not generally be the case. As indicated, participants in the knowledge exchange program express different motives for being involved in the program. An extended discourse analysis includes an assessment of the higher-order implications of this program, that is, what kind of knowledge society the program promotes.

Table 2 Knowledge exchange in relation to three policy discourses

	National research policy	National innovation policy	Regional development policy
Problems	<ul style="list-style-type: none"> • Limited resources • Social, cultural benefits of research 	<ul style="list-style-type: none"> • Slow economic growth • Old industrial structure 	<ul style="list-style-type: none"> • Regional decline • Poor social capital
Solutions	<ul style="list-style-type: none"> • Resource allocation (eg. co-funding) • Research independence • KE resolves real world problems 	<ul style="list-style-type: none"> • More resources to innovation • Institutional rule-adjustment • U-I- innovation collaboration, • KE promotes national innovation system (economic growth) 	<ul style="list-style-type: none"> • Mobilization of regional resources • Support to regional U-I- collaboration, • KE promotes social capital and regional development
Excluded from discourse	Private capital dependency/ commercialization	Social/cultural benefits	National benefits

Abbreviation: KE= knowledge exchange

The advantages of policy discourse analysis, in assessing knowledge exchange, are:

- It acknowledges the social construction of knowledge
- It illuminates the dominant problem perceptions and solutions
- It illuminates the accepted truths regarding the relevant variables and causality

The disadvantages of policy discourse analysis, in assessing knowledge exchange, are:

- It does not contribute to the understanding of existing mechanisms, i.e. for improving the innovation system and whether knowledge exchange could be a reliable instrument
- It does not offer any guiding principles to improve practice
- It does not pay attention to social actors
- It does not give equal attention to alternative discourses

Qualitative network analysis

Qualitative network analysis focuses on formal and informal patterns of interaction which constitute policy agendas and policy processes. This methodology is ‘a powerful brush for painting a systematic picture of the global social structures and their components’ (Parsons 1995:185). The dynamics and importance of networks, the inter-organizational contribution to solving the policy problem, the content and scope of networking, old and new networks, for example, could be explored through (qualitative) network analysis (Hanf and Scharpf 1978, Smith 1993, Marin and Mayntz 1991, Hjern and Porter 1983). Qualitative network analysis directs attention to the program participants’ motives, arguments and experiences of the program and to the scope, content and worth of collaboration.

When stakeholders decide to participate in a knowledge exchange program it does not necessarily indicate that they are committed to the aim and direction of the program. Conditions and behavior deviating from the linear/sequential model of policymaking, such as major local adjustments or alternative courses of actions, are generally understood as implementation failures. However, if the actors involved in collaborative innovation and technology policies are only thought of as implementers in relation to the program makers’ line of rationality, the wider implications of knowledge exchange will be overlooked. Even if policy makers seek compliance and commitment, stakeholders

frequently try to influence the aim and direction of a policy or program all the way through the implementation process (Hanberger 2001a). What from one perspective might be considered an 'implementation failure' might still result in closer university-industry interaction, although in different ways than planned. If the outcomes of a knowledge exchange program are to be thoroughly assessed, the motives, strategies and arguments of different stakeholders need to be systematically scrutinized, and the various evaluation criteria embedded in their arguments can then be incorporated into the evaluation.

Collaboration and interaction are considered to be of great importance for innovation, but collaboration is mostly accounted for in quantitative terms. It is suggested in this paper that network analysis could contribute to understanding the broader implications of networking.

If we go back to the knowledge exchange programme, two forms or levels of collaboration could be identified in the sub-programme 'industrial research schools' each of which serves a different purpose and is motivated by different interests on the part of those involved. We refer to the two forms as project based collaboration and beyond project based collaboration. The intensity, the degree of formality, the significance partners attach to collaboration and the nature of the collaboration itself vary between the two types of collaboration. Thus, different motives and rationales drive collaboration (knowledge exchange). The policy implication drawn from this case is that support to foster closer collaboration across the industry-academy border needs to be adjusted to different forms of collaboration. For small firms/academic institutions to engage in 'beyond project based collaboration' more financial support is needed, whereas big companies/institutions can afford and give somebody responsibility for this.

The advantages of network analysis, in assessing knowledge exchange, are:

- It pays attention to the agents that restructure and change (innovation systems)
- It recognizes the collective implications of interaction

- It pays attention to formal and informal networks
- It analyzes various stakeholders' perceptions, actions and non actions on equal terms

The disadvantages of network analysis, in assessing knowledge exchange, are:

- It tends to overestimate actors' contributions and overlook institutional and structural effects
- Equal importance is given to misinformed and informed actors
- Power structures and conflicts are often neglected

Main characteristics of the four methodologies to assess knowledge exchange

This paper has paid attention to the various methodologies that can be used to assess a knowledge exchange program, and their respective strengths and weaknesses. The various methodologies each acknowledge a different aspect or conceptualization of the programme. At this point the main characteristics of the various methodologies will be brought together.

As illustrated in Table 3, knowledge exchange may be referred to as an 'intermediating variable', as 'added value', a 'solution', and as '(content of) interaction', respectively. The paper has illustrated how the framework used to make sense of knowledge exchange and the assessment of impact are interrelated. In other words, the way the phenomenon is perceived guides the assessment. If some of the aspects are left out the validity of the assessment decreases. The two instrumental approaches direct the attention to the policy makers' concerns and assess the program's merit and worth to theory-based programme and intended outcomes. As demonstrated, program theory assessment can be characterized as an instrumental approach because the program theory and the social science theory follow the policy makers' worldview. In contrast,

the broader and ‘higher-order’ implications of a program must be assessed in other ways (eg. qualitative network and policy discourse analysis).

Table 3: Characteristics of four methodologies assessing knowledge exchange

Methodology	Knowledge exchange	Attention paid to:
Instrumental approaches		
Program theory assessment	Intermediating variable	<ul style="list-style-type: none"> • how the policy/program relates to national innovation system theory
Outcome analysis	Added value	<ul style="list-style-type: none"> • goal achievement and intended effects • cost effectiveness • accountability
Non-instrumental approaches		
Policy discourse analysis	‘solution’ to policy problems	<ul style="list-style-type: none"> • How problems and solutions are communicated • Whose perspective, what values and interests are underpinning the discourse • Conflicting/alternative discourses
Qualitative network analysis	(Content of) interaction	<ul style="list-style-type: none"> • who contributes with what in solving the policy problem • old and new networks • intensity and quality in networking • adaptive learning

In this paper four methodologies have been discussed separately. In the evaluative inquiry, however, the instrumental and non-instrumental approaches must be integrated.⁹

This integrated evaluation approach has been developed and used in other policy (programme) evaluations (Hanberger 1999, 2000a, 2000b). Although the policies

⁹ The specific evaluation model used in this case is based on three components – pre-conditions, processes and consequences (Hanberger, Schild and Hamilton 2001). It has integrated the four methodologies discussed here. Under the heading of “pre-conditions” the program theory assessment and discourse analysis are elaborated and the qualitative network analysis is carried out as part of the ‘process-analysis’. The outcome analysis and the assessment of higher order implications of the program are elaborated under the heading ‘consequences’.

(programmes) differed¹⁰, all policies (programmes) were launched in a multi-actor context – indicating that different perspectives and interests were at stake. Could a combination of instrumental and non-instrumental approaches be reasonable for all types of policy (program) evaluation? Perhaps an integrated approach is somewhat less feasible for policies (programmes) where only one target group and few stakeholders are involved. It is an appeal for conducting critical evaluation and those evaluators that are prepared to move beyond the technocratic or advocacy approach to evaluation would be sympathetic to integrating non-instrumental approaches as a complement to instrumental approaches. Considering stakeholders' arguments and assessing a policy (program) to various criteria serve the needs of the participants and those affected by a policy even more.¹¹

Conclusions

The implications of a knowledge exchange program are multifold. This paper shows that the meaning and value attached to the same program differs according to the methodology used. Different values and preferred notions of the knowledge society are embedded in the policy (programme) and to some extent in the applied evaluation approach. In instrumental approaches the policy makers' values and goals are given whereas in non-instrumental approaches these are critically assessed. It is argued that the broader and higher-order implications of a policy (programme) are as important to highlight as any instrumental impacts of a program (goal achievement, cost effectiveness etc.). Furthermore, a multi-methodological framework, accounting for both instrumental effects and normative implications, reduces the partiality and increases the validity of the evaluation.

¹⁰ A public information program, a health and medical care programme and a rehabilitation programme have been evaluated with more or less the same integrated approach (ibid.).

¹¹ Another example of an integrated instrumental and non-instrumental approach is the critical policy evaluation approach developed by Frank Fischer (1995).

The implications of this paper for evaluation practice are that if the various participants are to agree to the conclusions and learn from the evaluation, it is necessary to consider the participants' different arguments and motives, and to extract evaluation criteria from these. Furthermore, by illuminating the implications of knowledge exchange from different perspectives policy (program) participants can be introduced to, and learn from, the broader implications of a policy/program. In interactive or adoptive learning processes both instrumental and non-instrumental 'results' need to be communicated. This necessitates some kind of meeting-place for deliberation to take place (cf. Hanberger 2001b).

In the face of limited time and resources, it may not be possible to account for all aspects of a policy (program), in which case those implications of the initiative which are left out need to be explicitly mentioned. When results are interpreted, the evaluator might briefly discuss what the possible implications would be if another approach was adopted. A multi-methodological evaluation, integrating instrumental and non-instrumental approaches, illustrates a critical policy (program) evaluation which can be useful to the participants, without being unduly biased in favour of the commissioner's perspective. Such an evaluation has the potential to promote inter-organizational learning and knowledge exchange.

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