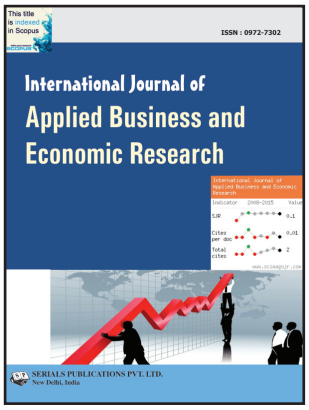

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Emergence of a Policy Analysis Tradition in the Public Sector

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ABSTRACT

This paper looks especially at the epistemological feature of policy analysis in order to overcome the debate on the utility of policy analysis. A method called argumentative reasoning is employed to lead to a new direction of policy analysis. It lays out a logically-built argumentation table which reflects upon the debates on the utility of policy analysis methods from their own epistemological features. Transition to democratic societies and development of science and technology reduce the relevance of knowledge from the positivistic methods, widely adopted in the scientific community as a dominant, frequently used model. The new direction includes the adoption of the presumptive view of science, the emphasis on problem-solving power, the managerial concept of science, and the adoption of argumentative approach. That the belief in human judgement based upon personal experience allows multiple paradigms and explanations on a subject raised the importance of problem-solving power. Argumentation based upon efforts to falsify common sense remains to be a most reliable method and the accompanying philosophical and epistemological debates has led to a practical approach of policy analysis for heightening problem-solving power. This paper suggests a new direction of policy analysis that can produce policy-relevant knowledge for decision-making.

Keywords: Policy Analysis, Epistemology, Argumentation, Post-positivism.

1. INTRODUCTION

Policy Analysis has been widely used to produce relevant knowledge for public policy makings. People have continuously pushed the government agencies to evaluate a certain situation and initiate innovative ways to tackle policy problems of wicked nature. A number of heated debates have followed in policy-making processes. The sources of the conflict come from inaccuracy of the analysis and the ensuing differences in interpreting the same result from the analysis. Risk analysis, a type of policy analysis, for Yucca Mountain, NV produced incorrect outcome that is six times lower than the actual risk (Shrader-Frechette, 1991). The

outcome then became a basis for the Nuclear Waste Policy Act of 1988. In addition, different groups of scientists often produce different analyses, outcomes, and policy recommendations.

Scientists often come out with completely different interpretations in spite that the results of the analyses are almost identical. They attribute the difference to values of diverse groups of the public. Analysts assert that public aversion to societal problems stems not so much from any real, apparent danger but from group attitudes or values that are anti-governmental or anti-scientific. However, despite the lack of scientific expertise, the public often has vivid, on-site information about the problem. Furthermore, the rapid diffusion of knowledge and the involvement of knowledgeable people in civil movements have increasingly enlightened the public1. While experts have emphasized decision-makings based upon scientific facts, the public has criticized the value decisions which reside in experts' analyses and emphasized the appropriateness of their own values and concerns.

Although these situations come from the fact and value dichotomy, differences between the public and experts stem from much deeper roots. Their differences come not from their perceptions or emphasis of interests, but from their conception of science, which is composed of epistemology and methodology. Epistemological and methodological conceptions are the fundamental frameworks that shape scientists' beliefs about truth, knowledge, its relationship with the real world, and strategies for approaching objects in the real world (Dryzek, 1986). Methodology informs scientists of how to study the truth and epistemology, as a theory of knowledge, seeks to answer the three questions: what knowledge is, how knowledge is acquired, and what people know.

This paper looks at policy analysis as a tool to produce relevant knowledge in each stage of policy processes and seeks to develop a methodological foundation for producing sound policy analysis. First, methodological and epistemological debates about policy analysis methods are examined to identify the pros and cons of widely used analysis methods and to understand the focal features of the debate. Then this paper develops the epistemological discussion into the one for more decision-relevance. Based on this discussion, it seeks to integrate the contextual assumptions, methodologies, and epistemological roots and develop policy analysis methods that can translate into a tool to produce policy-relevant analysis.

2. TRADITIONAL VIEWS IN POLICY ANALYSIS

A positive approach has been a dominant tradition in analyzing public policies for a long time. At the core of the traditional view are the issues such as the value-fact dichotomy, the presumed givens, the conflation of explanation and prediction, and the application of formal logic. The role of analysis under this tradition is to observe empirical phenomena and confirm "the" theory in question by continuous confirmations. Scholars in this tradition look at scientific theory as a tool for explaining and predicting policy phenomena and, in case that their evidences are contradictory, falsify it to build a new theory. This positivistic tradition takes the two forms: logical empiricism and critical rationalism.

Logical empiricists, often called naïve positivists, argue that all policy decisions ought to be factual and value-neutral despite the evaluative and subjective nature of policy decisions. Filled with technical and engineering background, they seek to measure and estimate the objects in interest objectively and build the universal theory of policy analysis that applies to all situations (Renn, 1992; Morgan, 1981). They use formal languages to analyze, evaluate, and communicate policy phenomena and that is the only way to present and explain in a value-neutral manner.

The conception of science taken by logical empiricists coincides with the approaches taken by traditional policy analysts. Science, to logical empiricists, deals only with the empirically observable which is verified only by reference to experience. Scientific knowledge can only be achieved from directly observable, value-neutral objects, eliminating meta-physics and ethics from the realm of science. Valid knowledge is obtained only when people with different disciplinary backgrounds and methods leads to the same conclusions. It is the reason for excluding normative and ethical components from valid knowledge, or so-called the truth. They believe that value-free observation can free scientific research from bias, distortion, and willful manipulation. Formal languages such as mathematical formulas are required to describe the world without distortion. Often logical empiricists place scientific disciplines in the long line of spectrum and rank from the advanced to the immature. Physics and economics are usually placed on the advanced while ethnography and political sciences are located near in the immature. The logic of induction or the accumulation of verification is a standard procedure for logical empiricists and continuous verification of a theory increases the validity and the accuracy of knowledge.

The conception of early policy analysts has been frequently reflected in their practice. Program evaluation guidelines from the US federal government see policy problems as value-neutral, objective phenomena and try to build a universal procedure which is applied to any case (National Research Council, 1983). In conducting the analysis, analysists in this tradition emphasize the formal aspects of estimation, utilization of quantitative methods, leaving the least room for interpretations. This simplistic view has created a lot of criticism, especially on their notion of value-neutrality (Anbar et. al., 2015). Critics launch the attack on policy analyses based on the notion of value-neutrality, stating that value bias, contextual value, and constitutive value are always indispensable in conducting scientific research (Shrader-Frechette, 1991). In addition, Popper and critical rationalists criticize logical empiricism for not being able to falsify null hypotheses and offer alternative account for science.

The other positivistic tradition is critical rationalism, which is largely represented by Karl Popper. He has been placed in the traditional area because he sees the truth as given and unproblematic. Differences between logical empiricists and critical rationalists lie in ways to see the value and to approach the truth, while sharing their views on the truth with the logical empiricist. Critical rationalists attack logical empiricism systematically. First, induction is an ineffective way to reach a reliable explanation. No matter how many confirming evidences exist in the past, analysts cannot avoid the logical possibility from uncertainties in the future. Second, they criticize logical empiricists in that their research is based on a flawed psychology of perception - value-free observation. Humans are not passive in approaching social phenomena, but actively impose order upon the external world through a process of selection, interpretation and imagination. Third, the objective, value-free observation is an erroneous assumption about the historical practice of science and the logic of scientific discovery. Theories logically precede the observation of any regularity in the world, so is constructed of abstract theoretical entities. Fourth, verification adopted in induction fails to show its effectiveness in producing knowledge, because the notion of verification is not empirically verifiable.

The focus on value has led critical rationalists to alternative accounts of logical empiricism: a new criterion for demarcating science and non-science and alternative conceptions of science, scientific theory and scientific methodology. When critical rationalists and Popper refute the validity of verification and induction, falsification becomes as only a reliable option to test scientific conjecture. In their view, scientists are to question common sense and empirically test widely accepted conjectures empirically. In putting theories

into the test of experience, scientists seek to falsify prediction and learn from mistakes. The rationality of falsification relies on the method of trial and error. Critical rationalists' reliance on testing through experience requires a condition to demarcate science and non-science. All conjectures must be empirically testable and falsifiable. Otherwise, they are only myth and cannot be advanced. Their view on the nature of scientists provides a basis for scientific methods. Scientists always want to cast a doubt on known knowledge and to test it. As long as falsification is to be continued, science will progress and create better theory.

Analysts who follow the tradition of the critical rationalist are called cultural relativists and share the epistemological and methodological core of critical rationalists. Because everybody, even experts, relies on value judgment at some point, they look carefully at subjective value judgment, rather than objectivity. Cultural relativists begin their arguments criticizing the objectivity of problem estimation and subjective factors in experts' evaluation (Douglas, 1985; Bruner, 1982). Cultural relativists elaborate their arguments based on two assumptions. First, everybody can be wrong because everybody is wrong at some time. Therefore, experts who use scientific, objective methods sometimes can be wrong, especially in evaluating the problem. Second, problem evaluation that includes judgement sees the problem itself as a social construct because the perception of risks is contingent upon cultures to which a person belongs.

This tradition is adapted as an incrementalism in policy science and political science. Continuous falsification is the key element of democratic society. Many social scientists agree with the argument of critical rationalists and apply it to their research.

3. TACKLING THE TRADITIONAL VIEW

Policy makers have always complained of the lack of relevant knowledge in decision-makings in spite of their trust in positivistic, quantitative analyses. Their heavy reliance on universal laws in both deterministic and procedural models creates the inability of science to produce good results and aggravates the shortage of the production of usable knowledge (Bruner, 1982). The complaint about the lack of relevant knowledge made a big impact on applied social science fields with the breakout of the knowledge-utilization model and epistemological approach. The following explanation is often offered (Nowotny, 1993), citing the work of Wittrock: "Why policy-oriented research is not helpful to policy-making is that both rational model and enlightenment model assumes that social science does not so much solve problems as provide an intellectual setting of concepts, orientations, and empirical generalization." The weakness of dominant positivistic approaches is revealed from a diversity of perspectives, stating that a simplified logical-empirical model does not have enough explanatory power whereas cultural models employing critical rationalists' approach are too meticulous to construct a practical model of problem solving (Funtowicz and Ravetz, 1991; Funtowicz and Ravetz, 1993).

In addition to the internal problem of positivism, the new policy environment makes it difficult to apply and use knowledge produced by traditional methodologies (Douglas and Wildavsky, 1982). Two big factors that create the new environment are increased public participation in decision making process and rapidly advancing science and technology. The public awareness begun by the social movement in the 1960s created different public reaction on policy decisions and related analyses. The public questions the utilitarian view of science and politics. Their major question is "science and policy for whom." The public often protests that their concerns are not properly taken into account. They claim that science for public policy should be subject to participatory scrutiny like other inputs into the political process. Rapid

scientific and technological development has added complexity to policy analysis and the use of scientific knowledge. It increases the size of the unknown and, due to the increased chance of making judgmental choices in methods and data, the chance of assigning personal and social values to policy making process. Current issues such as human cloning or the use of new drugs are examples.

The new policy environment creates following changes in analyzing a diversity of problems and producing policy-relevant knowledge. First, the assumption of complete rationality surrounding decision models and political processes are faded away because the unknown from scientific enterprises creates uncertainty for both scientists and policy makers. Second, the new environment succeeds to the inherent difficulty in reconciling the conception of scientific knowledge, in accordance with its methodological war between objectivity and inter-subjective validation, with the demand of popular participation. Furthermore, cultural, ethical and social concerns are intruded into decision processes. Third, the new environment eliminates the positivist's idea of neutral, objective and free of social interests and validates the influence of social, cultural values on scientific knowledge. These changes have reduced the efficacy of traditional positivistic approaches.

4. CHANGING THE TRAJECTORY OF POLICY ANALYSIS

The alienation between theory and practice creates a crisis in the scientific community and so the identification of new environments brings new approaches into the world, with helps from the areas of policy science, political science and the theory of science. This kind of intellectual crisis has come to the scientific community before. In the industrial revolution, the scientific community overcame the change and protected its core by breaking itself into basic and applied sciences. The next intellectual crisis came around the 1970s. Public participation ignited by the social movement created another new crisis. People want policies that reflect their own concerns. Technological development degrades the authority of experts and policy-makers and makes voices of the public bigger. In order to operate effectively in the complex environment, the scientific community is called for a stronger epistemological conception and a methodological armory (Nowotny, 1993).

Revision in the epistemology and methodology of science has continued to cope with the complexity. Philosophers of science offer a new epistemological conception, the pre-supposition theory of science or post-positivistic view in which the criticism on positivism and the environmental change are embraced (Hawkeworth, 1992). A new conception of scientific progress looks to be more conducive to the current environment of policy analysis[2]. Methodologically, people in the area of public policy have worked on developing methods that are adequate to address the problems (Forester, 1993).

Presupposition Theory of Science

Post-positivists offer an alternative epistemological account that emphasizes the role of theory. While positivism relies solely on empirical observation, the new conception underscores the human intellect and sees theories as a product of human reasoning. Scientific activities, from building theories to observation, are designed and guided by the theory. Furthermore, they free theories from immediate repudiation by incompliant empirical observation. Because theories, the product of human reasoning process are deliberately constructed, a small number of observations in a complex world are not enough ground for immediate rejection. The emancipation from the total reliance on empirical evidence differentiates post-

positivists from critical rationalists. While critical rationalists treat a theory as a simple, convenient tool of research, post-positivists see it as a faith dwelling in human reasoning. Thus, reasoning processes take both subjective factors such as value and culture and empirical factors into consideration. The integration of both subjective and empirical factors offers a breakthrough to the brawl between logical empiricists and critical rationalists.

In conducting empirical research studies, theories, composed of conceptual propositions play a role of a frame to see through, understand and interpret the world. Theories become a guideline in conducting, storing, and comparing empirical observations. When a set of theories is widely accepted and employed in the scientific community, it becomes a dominant and popular framework of explanation so-called paradigm, research program, or research tradition.

The influence of a paradigm extends to the whole area of research activities. Because a paradigm is a world view or a conception of the society, it determines the operational details such as empirical concepts and measurement, as well as the structure of research studies. While scientists want to examine the world directly, the influence of a paradigm on perception and the practical limitation prevent the direct observation and make theory-directed research the only available option. Thus, the structure of research will reflect on the conceptual flow of a paradigm. A deep consideration of the interpretation and judgment process leads scientists to search for concepts and measurements that are more adaptable to their paradigm. The operational side is further studied by pragmatists such as Churchman and Dewey. They elaborated the "learning to learn" as a guideline to conduct scientific research.

Theory-guided scientific activities create a different meaning of human knowledge. As a basic frame of observation and understanding, scientific observation and ensuing description are seen, understood and recorded under the influence of a paradigm. Thus, a paradigm provides a room in which contextual factors such as cognition, perception, and observation reside. The central notion to scientific research - meaning, perception, knowledge, method and explanation - are all theoretically created. Therefore, our observation is mediated and negotiated by socially approved theories (in other word, paradigm). The conception of fact is summarized (Hawkeworth, 1992) as "a theoretically constituted proposition, supported by theoretically mediated evidence and put forward as part of a theoretical formulation of reality and a contestable component of a theoretically constituted order of things."

Scientific Progress: Adjudicated by Problem-Solving Power

Based on a premise that a main goal of science is to solve problems, scientific progress is understood as augmenting a theory's problem-solving power. Following the changes in its operating environment, science itself must progress and improve its explanatory and problem solving power. Scientific progress as an adaptation and improvement is a key to determine the validity and the existence of theories or a paradigm. A theory fallen behind the changes will be discarded, leading to the advent of a new theory.

Despite the identical core concept of scientific progress, scientists with different epistemological roots create different definitions and methods of scientific progress[2]. Positivism begins with the assumption that the truth is untouchable and that human beings try only to see it; scientists only try to get closer to the truth. Therefore, scientific progress is internal in that scientists observe the world carefully and describe it without bias. A theory based on value-neutrality leads scientists to seeing the problem clearly and providing

a right solution. This reasoning is bolstered by the ends-means relationship between science and practice (Nowotny, 1993). In achieving the scientific progress, logical empiricists use the verification method. They attempt to find as many confirming evidences as possible. Critical rationalists take an opposing method, falsification. Because no one but God knows the future, scientists try to falsify a theory that is known to be true. To pass a series of falsification tests successfully makes a theory internally progress.

The criticism of positivism and the introduction of the presupposition theory modify and extend the concept of scientific progress. The conception of theoretically mediated knowledge of the post-positivists makes it possible to have multiple paradigms. Therefore, scientists or the scientific community must choose an appropriate theory, looking for a global progress (Dryzek, 1986). The existence of multiple paradigms requires global progress as well as internal progress. Post-positivists clarify the necessity of scientific progress and offer several conceptual criteria pertaining to both internal and global progresses. They all agree that if a paradigm does not progress and loses its problem-solving power, it is obviously discarded and a new paradigm is to be chosen from the many emerging theories.

In practice, policy analysis does not solve either conceptual or empirical problems in a laboratory. Although the theories of both Lauden and Lakatos provide a sound basis of producing a reliable knowledge, practical barriers such as social forces, political influence, and bounded human rationality make it difficult to apply their conceptions and criteria to the practice. Those difficulties have been experienced in practice under positivism. In addition, a paradigm assumes the partial representation of the world, by stating that the world is much richer than we can grasp. Thus, a plurality of paradigm cannot be rejected. Although much labor would be rendered to make internal progress within a paradigm, choice among paradigms will be dependent on a given set of circumstantial factors.

Although scientific progress in the applied social sciences still recognizes the chance of achieving both internal and global progresses, the practical difficulty in achieving them calls for a re-conceptualization of scientific progress; lateral progress which is defined as "an increasing capacity to cope with contingencies in the character of empirical problem[2]." In that way, scientists can deal with both conceptual and empirical problem simultaneously. It is clear that a role of scientific community is to achieve the lateral progress; to develop theories that maximize empirical success while minimizing conceptual liabilities.

Because theory is a product of human reasoning, a plurality of paradigm is natural. It creates, to the scientific community, the question of how to deal with more than one paradigm in problem solving situations. Do we have to suppress the diversity and tenaciously hold a dominant paradigm? Scholars such as Dryzek clearly objects to the effort of the scientific community towards global progress[2]. They warn that too much tenacity is a source of irrationality of evaluating a paradigm. In practice, complexity of the modern society creates many representations, and people choose and use their own pictures of society. Also policy makers who work for the public will understand a diversity of paradigms and try to apply new methods to the social problems.

Managerial Concept of Science

Multiple paradigms, bounded rationality of human reasoning, political interference in the scientific community, the increased size of unknowns in human knowledge caused by scientific development characterize the current environment of both the scientific community and the community of policy analysts. Funtowicz and

Ravetz (1991, 1993) capture and analyze this situation in two dimensions: system uncertainty and decision stake. System uncertainty refers to the amount of the unknown in scientific knowledge (or the ignorance of the system). Rapid scientific and technological development raises the system uncertainty. Both conceptually and empirically, the acceptance of theory's insufficiency to comprehend the world is another mark of the high system uncertainty. Decision stakes are dependent on the number of people involved in the decision making process. The higher the public participation is, the higher the decision stake. Funtowicz and Ravetz (1991) describe the environment of policy analysis in 2-by-2 with system uncertainty and decision stake. Although all policy problems do not fall under high system uncertainty and high decision stakes, policy problems with attention are usually categorized as high system uncertainty and high decision stake. Nowotny (1993) furthermore calls for the analysis toward decision-relevance. In addition, policy analysts agree with the political interference in policymaking and social science in general (Forester, 1993).

The current environment, especially high system uncertainty and high decision stakes, does not leave room for the traditional approach; the art of the soluble. Scholars such as Funtowicz and Ravetz (1991; 1993) and Nowotny (1993) have pointed out that scientific and systematic attempts to build formal models are not successful. Realizing the difficulty of finding a solution, the term "solution" in the sentence is used as a word specifically opposed to "management." Thus, it is not appropriate to compare with a phrase such as "problem-solving." To a wicked problem, alternative conceptions such as managing, coping, and ameliorating problematic issues are suggested.

Funtowicz and Ravetz (1991, 1993) provide a more logical account that asserts the appropriateness of the managerial concept. They argue that, drawing upon their conception of the system uncertainty and the decision stake, risky situations can be broken down into three types of problems: scientific, technical, and practical. They offer a good example of clarifying the difference of each problem, illustrating the difference between three types of problem using the example of dam construction. The scientific problem is to find several possible locations and to decide the construction method. It is the questions with low system uncertainty and low decision stake. It can be handled in Kuhnian's puzzle-solving manner; tools in a disciplinary matrix will be used to solve the scientific problem. The technical problem is to decide the final location for the construction by expert judgement. Experts compare the benefit-cost of the locations with differing criteria: high- performance, high-risk location and low-performance, low-risk location. The practical problem, for example, is how to reconcile the opposition of people who lose their home and how to minimize environmental hazard from inundation. The practical problem has societal, ethical components. Risks that call for the public attention in the contemporary society are mostly in the area of the practical problem.

As the system uncertainty and the decision stake are heightened, the problem is transcended from the scientific and the technical to the practical problem. Although a lot of policy analyses fall under the category of the scientific and the technical problems, many important questions are the practical problem. While the pre-designed toolbox or the professional consultancy can solve scientific and technical problems (low or medium uncertainty and decision stake), we do not have a ready-made tool that can be applied immediately.

The notion of the art of the soluble is no longer appropriate to the practical problem. Instead, the managerial conception such as coping and ameliorating is more practical (Funtowicz and Ravetz, 1991). In other words, uncertainty and ignorance embedded in policy analysis will not be conquered, therefore should be managed.

Argumentation: A Method for a New Theory of Science

With the effort to create an alternative epistemological conception of science, the next question gears toward developing methodologies to promote the post-positivism and improve the problem-solving power. Methods based upon positivism rely on the fact and value dichotomy, following their epistemological traditions. Methodological debates began with evaluating methods of positivism. In regard of the efficacy of positivistic models, logical-empirical models do not have sufficient explanatory power and critical rationalist models are too meticulous to construct a practical model for problem solving.

As an alternative methodology for dealing with ill-structured and wicked problems, post-positivists rely on the practical reasoning in building, interpreting, and judging theories (Funtowicz and Ravetz, 1993; Hawkeworth, 1992). Practical reasoning is a deliberation process used in everyday problem solving practice. It does not confine itself to formal logic, but approaches the problem with common-sense methods. Based on a diversity of experiences, people build a tool box of methods, and continuously modify and correct it to cope with wicked problems. Theories and methods from pragmatic reasoning are the accumulated result of previous problem solving and available for trying on new problem.

In pursuit of a solution, inquiry starts with practical, clear, and well-defined problems. Unlike positivism that sees the problem given, people who rely on practical reasoning pay a lot of attention to structuring problems. Because the problem itself answers key questions in analysis such as measurement, definition of basic terms, and research design, the most important role of scientists is to structure the problems.

In achieving scientific progress, practical reasoning relies on the power of human intellect. Practical reasoning is encompassed in exercising the human intellectuality in a diverse way (Hawkeworth, 1992). Practical reasoning understands the diverse dimensions of human reasoning and then the validity of the various cognitive processes involved in science - argumentation, contemplation, conjecture, conceptualization, deduction, deliberation, intuition, inference, imagination, justification, representation, remembrance, reflection, speculation, and validation. Thus, the creative use of human reasoning helps scientists identify the sources of potential errors in theoretical interpretations and generate the criteria of assessment, evidence, and argument that are essential to choose between alternative theoretical explanations. Acceptance of diversity allows various methods of assessing the power of the argument and evidence to be applied. These methods are; weighing the evidence, replicating experiments, examining computations, investigating the applicability of innovative methods, assessing the potential of new concepts and considering the validity of particular conclusion.

As practical reasoning is introduced as an alternative of positivism, then the following question will be who exercises it and where it is presented. So far, scientists keep their discussion to their own disciplinary (scientific) community. However, many important questions for policy decision are determined outside the scientific community[2].And in the new environment, policy analyses are required to include the inputs from the public. Therefore, needed is a big community that can include all interested parties. Funtowicz and Ravetz (1993) suggest the concept of "an extended peer community" as a place to create a consensus of diverse groups. Both experts and the public are invited in the extended peer community and participated in decision-making processes. Under positivism (and sometimes post-positivism), experts and the public are explicitly divided, and often the public is not permitted in the scientific community or in the policy-making process. Therefore, the public only hopes that the truth will be disclosed through the effort of scientists.

However, in the extended peer community, there is still a distinction between experts and the public, but the way of making policies is different. Respect on human intellect of practical reasoning provides a lot of weight to the public's voice. In the extended peer community, all members listen to experts' knowledge and opinion and then all members discuss problems, scientific findings and the inter-subjective things. Inside the extended peer community, the severity of the system uncertainty and the size of the decision stake are investigated, and then people in the extended peer community reach an agreement of an appropriate inquiry model to be applied to problem. When the decision stakes and the system uncertainty are not high, they will use formal models. When the uncertainty and the decision stake are high or when conceptual and value conflict arise, they will use Hegelian model through the argumentation. After choosing a problem-solving model in an extended peer community, practical reasoning is still exercised to improve both their inquiry methods.

For the problems in the new environment of policy analysis, the Hegelian model is more suitable than formal models. The argumentation employed in the Hegelian model is more preferable in resolving value conflicts, apparent in ill-structured, wicked problems. Continuous argumentation lets scientists be aware their own assumptions and methods and improve their mode of study by modifying or correcting them. The specific methods of argumentation include weighing the relevant evidence, replicating experiments, examining computations, investigating the applicability of innovative methods, assessing the potential of new concepts, and considering the validity of particular conclusions. Through the process of deliberation and debate, a consensus on solution emerges within the extended peer community.

Argumentation method, as a tool for policy making, has developed by many prominent policy scientists. Dunn (1993, 1994) develops the method that helps create sound and robust argument, and furthermore works on designing the logic of sound argumentation. Rein and Schon (1993) regard story-telling or description of problem-setting as the most critical step of problem-solving. Continuous story-telling and question-answer session link causal accounts of problem to particular sets of actions. Forester also uses practice story for designing and determining relevant actions to a problem situation (Hawkeworth, 1992).

No matter how well argumentation processes go, argumentation is concluded with a consensus within the extended peer community (Dryzek, 1993). In other word, a consensus is the major device for the adjudicating arguments. It can be reached in the various conditions. In the medieval time, a consensus between scientists, or politicians, was believed to be a consensus of a country. Therefore, the organizational composition of extended peer communities is an important factor to determine the quality of consensus (Nowotny, 1993). Organizational characteristics must effectively cope with the membership and the power distribution of the extended peer community. Creation of the ideal conditions for debates and the communicative ethics are critical to prevent the unfairness in the argumentation process and to produce effective policies (Dryzek, 1993; Skorobogatov et. al., 2015).

5. CONCLUSION

This study looks at the use of public policy analysis from the epistemological, methodological, and historical perspectives. Since the 1970s, policy analysts in the scientific community have been highly criticized by their inability to produce policy-relevant knowledge. Furthermore, the criticism is linked to the ineffectiveness of public policy itself. Beginning with the observation, this paper studies the ways of creating policy relevant knowledge in various perspectives; a historical order, the epistemological and methodological backgrounds,

and the pros and cons of each knowledge-creation model. Based on the criticism, this paper suggested a new type of knowledge creation model that emphasizes the argumentation method to improve the problem-solving power of public policies.

In conducting policy analysis, positivism has been a dominant paradigm and is still widely used both in academia and in practice. However, both models have not been successful in producing a practical model for public policy and policy-relevant knowledge. This weakness has been apparent since the 1970s when the system uncertainty from rapid scientific development and the decision stake from the public's participation become drastically high.

In the new operating environment, policy analysis needs alternative methodologies to produce policy-relevant knowledge. Therefore, policy analysts need to overcome the weakness of positivistic approaches and take on the followings: the presupposition theory of science, improving problem-solving power, managerial concept of science, and argumentative method for consensus building. These four are the components.

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