

associated with participation in the Program has opened doors to increased funding and other opportunities for at least some inventors.

Inventors indicated that the grant was by far the most valuable type of assistance provided by ERIP. The next most highly rated type of assistance was the technical evaluation provided by NIST. Assistance with networking and other benefits provided by DOE Invention Coordinators was the third most valued form of assistance, followed closely by the Commercialization Planning Workshop.

8.2 INTERNAL AND EXTERNAL VALIDITY OF THE EVALUATION

Program evaluations are often judged in terms of their internal and external validity (Campbell and Stanley, 1971). **Internal validity** refers to the validity of the estimated program impacts for the sample selected. Are the impacts attributable to the program, and can alternative explanations be ruled out? **External validity** refers to the ability of the sample-based results to be extrapolated to one or more larger populations. Is the sample representative, and can results be extrapolated to other participants, or to next year's participants? Each of these types of validity is discussed below.

8.2.1 Internal Validity

Program evaluators typically employ comparison groups as a defense against threats to the internal validity of their evaluations. Internal validity is threatened when extraneous variables are able to produce effects that cannot be disentangled from effects of the program. Extraneous variables that are particularly relevant to evaluations of technology innovation programs include: changing economic conditions that might affect access to capital and demand for products; progress that would have occurred in the absence of program participation simply due to the sustained efforts of inventors and product champions; and selection biases resulting in differences between program participants and comparison groups.

The evaluation design employed in this evaluation and all of the subsequent ERIP evaluations does not involve a comparison or control group against which the progress of ERIP inventions can be compared. Rather, the literature at large is relied upon to provide insight into the invention and innovation process as it occurs without government intervention. Thus, as is true of most evaluations of innovation programs (Roessner, 1989), a precise assessment of the net benefits of the Energy-Related Inventions Program is beyond the reach of this evaluation.

In order to address the issue of internal validity, a comparison group assessment of ERIP was recently completed (Brown, et al., 1994). The purpose of the comparison group analysis was to isolate the effects of ERIP from the host of other factors that influence the commercialization of inventions. The analysis was based on the results of the 1991 ERIP evaluation supplemented by a 1992 survey of 79 "program referrals." Program referrals are ERIP applicants that were found by