Given the fact that very few inventors can fully develop, much less commercialize, their inventions solely on the funding provided by ERIP, it is important to study the amounts and sources of non-ERIP inventor funding.

6.2 THE COST OF TECHNOLOGICAL INNOVATION

A review of the literature indicates that ERIP inventions are typical of technological innovations at large, in terms of their development and commercialization costs. At the lowest end of the cost spectrum, Myers and Marquis (1969, p. 60) found that two-thirds of 567 surveyed innovations cost less than $100,000 (or $250,000 in 1984 dollars) for development to the point of use. They examined a broad range of innovations, mostly minor, that were named as commercially significant by firms in five manufacturing industries. Kamin, et al. (1982) found that 82% (N=18) of the 22 small-business technological innovations they studied required total technological expenditures of $1 million or less. Their innovations were sampled from two major industrial sectors—electronics and chemicals. At the more expensive extreme, a 1973 survey of innovation cost patterns for Canada found that the average cost per project was $3.3 million for a diverse sample of 83 process and product innovations. Sixty percent of the innovations cost less than $1 million to develop (Stead, 1976).

Current information on total costs of technological innovation is available for 83 of the 129 ERIP inventions with sales (i.e., those that were interviewed in 1993). Seventy-eight percent of these inventions cost less than $1 million to develop to the point of market entry or beyond (Fig. 6.1). The average total costs incurred by ERIP inventions with sales is $927,000. This high mean value reflects the skewed distribution of the cost data: 4 inventions with sales have incurred costs of more than $3 million, while 29 inventions with sales have incurred less than $100,000 in development costs. This wide variation in the cost of commercializing a new technology is due in part to industry, firm, location, and technology differences.

Some of the most successful ERIP inventions are products—simple in both their manufacture and content—with minimal capital requirements. There are several "do-it-yourself" solar technologies for homeowners, for instance. Other successful ERIP technologies require only nominal capital input for commercialization because they are simply a unique way of combining and utilizing components that are already available. These technologies frequently are assembled and distributed through subcontractors, thereby allowing the inventor to achieve considerable sales on a relatively small capital outlay

At the other extreme, several ERIP inventions with large capital requirements are process technologies in the steel and related industries. Technical problems related to testing and refining industrial processes are costly, and these technologies often require the operation of full-scale pilot plants or expensive retrofits and demonstrations in fully-operating plants.