robustness. Although it may prove possible to measure designs on crude scales of satisfaction for each of these factors, they remain difficult to relate. Thus a very lightweight lawnmower while being easy to manoeuvre and push might also prove to be noisy and easily damaged. For such an item there is no one right answer since different purchasers are likely to place different values on factors such as manoeuvrability or reliability. The sensible manufacturer of such equipment will produce a whole range of alternative designs each offering different advantages and disadvantages. The problem of relative values, however, becomes much more critical when design decisions are being taken for large numbers of people who may not have the choice available to the purchasers of new lawnmowers. Examples of such design problems include public sector housing or a new school, the routeing of new roads or the siting of factories. Inherently, such projects involve varying degrees of benefit to some and losses to others. A new motorway may well save a long-distance motorist's time and relieve congestion in nearby towns but, unfortunately, it may also subject local residents to unwanted noise and pollution.

The attraction of a common metric

An attractive way out of all the difficulties we have seen in this chapter would be if we could reduce all the criteria involved in design to some common scale of measurement. Cost-benefit analysis relies upon expressing all factors in terms of their monetary value, thus establishing a common metric. Attempts have been made to apply cost-benefit analysis techniques to the kinds of design problems where there are both gainers and losers. Unfortunately, some factors are rather more easily costed than others. This is perhaps best illustrated by reference to one of the most well-known applications of cost-benefit analysis, the Roskill Commission on the siting of the third London airport. After a number of preliminary stages during which some seventy-eight sites were considered, the commission narrowed the choice down to four sites at Cublington, Foulness, Nuthampstead and Thurleigh which were then compared using cost-benefit analysis. Even the grossly simplified diagram reproduced here gives some idea of the complex array of effects which the various interested parties could be expected to have on each other as a result of such a project (Fig. 5.6). In fact there are many other much wider effects not shown which include such matters as the distortion of the national transportation network resulting

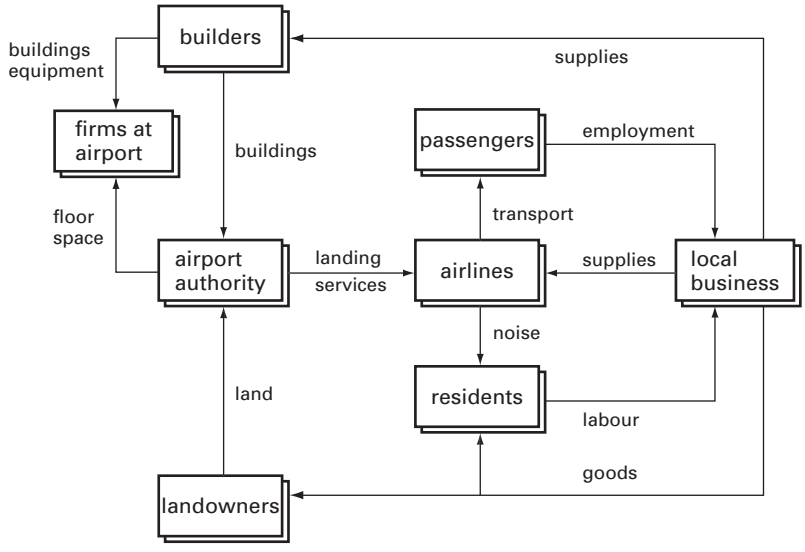

Figure 5.6
A simplified diagram of the interactions between the parties involved in a new airport

from the provision of new forms of access to the chosen site. For example, the opening of an airport at Cublington would have resulted in the closure of the existing Luton airport which would have been too close for air traffic control procedures.

Many of the benefits of the airport in terms of the profits to the various transportation authorities and other companies were reasonably easy to calculate for each site and could be set against the profits lost from the existing use of land. The costs of providing the access transportation to each site and the costs in terms of journey time were also fed into the equation. Losses in terms of reduced amenity, however, proved more difficult to assess in purely monetary terms. These effects range from otherwise unwanted expenditure resulting from people having to leave their homes, through such factors as the depreciation in value of property in the surrounding area to the noise annoyance caused by the operation of the airport.

Such a public use of cost-benefit analysis revealed many of the real dangers involved in basing decisions on the quantification of qualitative factors such as the amenity of an environment. Obviously the success of such a process is contingent upon the assumption that all the costs of amenity loss have been correctly valued. The real difficulty here is that such valuations are unlikely to be arrived at by consensus in a pluralistic society. This was demonstrated when the RIBA publicly expressed its concern at the valuations placed on both gains and losses and pointed out the many minor losses not costed which might have a large effect cumulatively: