If, on the one hand, this perspective on business complicates the institutional analysis of capitalism, on the other it enriches our understanding of innovation processes. Reclaiming the analytical independence of 'agency factors' does not mean isolating the economic actors from the institutional context in which they operate. It is to see how they exploit the opportunities or compensate for obstacles through their strategies and interpersonal skills. And this is a theme that brings us to the next section, which deals with socio-economic networks and their influence on innovation.

1.7 Innovative networks

As we mentioned in the Introduction, over the last few decades there has been an increase in collaborative relationships between economic actors. The rapidity of technological change, the uncertainty of its evolutionary trajectories, growing international competition, and the pluralisation of knowledge sources have made companies more dependent on external resources. Inter-organisational partnerships (strategic alliances between companies, research consortia, collaboration with universities, etc.) have therefore multiplied, especially in the field of research and innovation. And this has focused the attention of scholars on the social and economic networks that support them. In the context of new economic sociology, this type of analysis has been developed through the so-called 'structural approach', which has applied the network analysis to the study of socio-economic phenomena. The starting assumption is that economic activity is *embedded* within the social relationships between individual or collective actors (Granovetter 1985). These relationships – and the social structures that they generate – influence economic activity, as they allow access to resources and information of various kinds, create trust and discourage opportunism in transactions.[30]

The networks are not, however, all the same. They are configured differently depending on the type of relationships that exist between the actors. These relationships can be: (1) informal (based on acquaintanceship of a personal kind, membership of the same professional community, etc.) or formal (based on contractual relationships such as alliances between companies, research consortia, etc.); (2) long- or short-term; (3) focused on individual (managers, researchers) or collective actors (companies, research organisations); (4) directed toward specific or more indefinite goals, etc.

Networks can also: (1) be purely *transactional* (such as in trade relations) or *relational* (personal and social relationships); (2) possess different modes of governance (more or less hierarchical, more or less regulated); (3) present a configuration that is more or less closed and dense.

Many studies have been devoted to analysing the impact of networks on innovation.[31] Research has mostly dealt with *innovative partnerships* (inter-organisational collaborations), showing that they foster the circulation of information, the sharing of project risks, access to resources that are different and complementary to those of the company, and also reciprocal learning

regarding solutions and organisational practices. The results show that, especially in areas of high technology, learning networks become the 'locus of innovation' (Powell *et al*. 1996). This, however, should not lead us to think that innovative networks and partnerships play no role in traditional manufacturing sectors (as, on the contrary, is shown by the Italian industrial districts) or in the world of finance.[32] Two important results emerge from all these studies.

1 There is a positive relationship between collaboration and innovation networks, proven by numerous empirical studies in various productive sectors.[33] A kind of virtuous circle is created in which the relationships that companies form with other external actors improve their innovative performance and this tends in turn to foster further collaborations (Powell and Grodal 2005, 67).
2 There does not, however, emerge a univocal link between the type of relationship, the position in the network, and the innovative performance of the actors analysed.

To understand the lack of this nexus, let us examine some theoretical contributions and research on the topic, which to some extent have become classic points of reference in this field, beginning with the studies of Mark Granovetter. Granovetter became famous for his thesis on the 'strength of weak ties', developed from research into the labour market of technicians, professionals and managers in the Boston suburbs (Granovetter 1974). The American scholar distinguishes between two types of relationship: '*strong ties*', referring to subjects with whom there exists a relationship of familiarity and trust (friends, family, relatives), and '*weak ties*', referring to relationships that feature less communicative and affective intensity.[34] The survey results highlight a fact that is apparently counterintuitive: the greater importance of the second type of tie in terms of gathering information that is useful in the search for a new job. The explanation is simple and brilliant at the same time.

Weak ties (e.g. acquaintanceships struck up in the workplace) allow the subject to obtain new information that was not available to him and which he could not obtain through strong ties. Relatives and friends, in fact, belong to the same 'information area' as the subject and are therefore unlikely to be able to provide significant new information. It is a thesis that has been the subject of a great deal of debate. Subsequent research has shown that the type of relationship useful in searching for work varies across countries, productive areas and professional sectors. Granovetter has also dealt with the importance of social networks for innovation, for example in the creation of the electricity industry in the United States in the late nineteenth century. To explain the predominance of the solution backed by Thomas Edison, which envisaged the construction of large hydroelectric power stations, Granovetter draws attention to the inventor's social networks. Edison's solution ended up winning through not so much because of more *efficient technology* with regard to the other solutions possible at the time (maintenance of gas lighting, construction of local generators), since this was a

difficult parameter to assess, especially in relation to its long-term effect: what proved decisive, rather, was Edison's *relational effectiveness* in promoting, and achieving the acceptance of, a solution that was then highly innovative (and problematic). This effectiveness is explained by the structure of his social relationships, which enabled him to mobilise his personal contacts with international financiers, entrepreneurs in the electricity sector and many other inventors and researchers whose opinion affected the decisions taken regarding the lighting system of the major American cities (Granovetter and McGuire 1998). Granovetter has also applied his weak ties thesis to the matter of innovation. At the time of its first formulation in the early seventies, he had already stressed the importance of these kinds of ties in the diffusion of innovation, advancing the hypothesis (previously proposed by Simmel and Sombart) that social marginality favoured the latter's adoption (Granovetter 1973, 1366–7).[35]

These ideas were later taken up and developed in a more recent essay that shows the (variable) importance of social marginality, but also the (potentially) conflictual character of innovation when it challenges power structures and positions of dominance. The argument put forward is that, especially in scientific fields, 'new information and ideas are more efficiently diffused through weak ties', thus facilitating the flow of non-redundant information (Granovetter 2005, 34).[36] In contrast, strong ties and extremely dense social networks, while on the one hand strengthening trust, on the other circulate ideas that are already familiar. These stabilise to become 'normative ideas' – shared ideas about the 'proper behavior' to follow. This type of pattern thus makes deviance from group norms more difficult and non-compliant behaviour easier to sanction (ibid.). In other words, it hinders highly innovative behaviour. This does not mean that it cannot foster the institutionalisation of innovation.

Granovetter exemplifies this point of view through reference to certain studies on the formation of new high-risk financial products, initially perceived as simple 'gambling'. In some cases, these became institutionalised as respectable financial instruments. In others, they were opposed and then prohibited by the financial élite. A study by MacKenzie and Millo (2003) regarding the introduction and legitimisation of so-called 'financial derivatives'[37] on the Chicago Stock Exchange well illustrates the role played by social networks in the process of the institutionalisation of innovation. Chicago financial circles were highly structured by personal relationships that distinguished between *insiders* and *outsiders*. The institutionalisation of this financial innovation was possible only through the mobilisation of cohesive groups of *insiders*: these were, however, supported by actors from different institutional spheres (economists and politicians).

Granovetter, however, also shows that the most radical innovation is produced by marginal individuals who are more easily able to distance themselves from conformist behaviour. The example given is that of *junk bonds*: risky but highly profitable financial products. During the seventies, these instruments were widely used and publicised by a young American trader (Michael Milken) who worked for a small finance company. Junk bonds soon became a sort of symbol

for medium-sized companies excluded from the circuits of the financial élite, and a tool to promote hostile takeovers towards the latter. *Insider* companies however, members of the financial élite, were able to mobilise the support of their political allies who, in a number of states, introduced rules restricting the use of junk bonds. These subsequently led to Milken's judicial prosecution and his disqualification from financial activity.

This research – according to Granovetter – highlights how innovation involves the breaking of established routine (as indicated by Weber) and the combination of previously unconnected resources to attain a new economic purpose (Schumpeter). The creation of new institutional forms, as the case of venture capital shows,[38] also involves overcoming conventional boundaries. Thus, the actor collocated astride different networks, separate circuits of exchange, and distinct institutional spheres 'is well placed to innovate' (Granovetter 2005, 46).

Here Granovetter refers explicitly to the argument made by Ronald Burt (1992) regarding 'structural holes'. Social relationships tend to agglomerate around clusters of individuals between whom interaction is frequent and intense. These relational clusters constitute 'islands of opinion and behavior' that can 'create barriers to information inconsistent with prevailing beliefs and practice' (Burt 2005, 15). There may also be disconnections in the social structure: in other words, a lack of relation between clusters, which are isolated one from the other. These relational gaps form structural holes, spaces in the social structure, which impede the flow of information but also create entrepreneurial opportunities. Their potential value is due to the fact that 'they separate nonredundant sources of information' (ibid., 16). Individuals who collocate themselves within these spaces thus create a bridge between different circuits of communication and derive benefits therefrom: they obtain a greater variety of (non-redundant) information; gain access to important information before others; and control the flow of information between the various clusters. These figures constitute the entrepreneurs of the networks, true brokers, playing a mediating role between the various relational circuits and in this way achieving competitive advantages, for example in terms of innovation and creativity (Figure 1.1).

Burt considers this aspect through an examination of the 'social origin of good ideas'. In his analysis, he shifts the focus from the production of the idea to the value that this produces when it is imported into different environments: its 'valorisation' is the function of a transaction between information deriving from distinct and separate groups. In other words, creativity is presented as information brokerage, as a sort of import-export activity: '*creativity by brokerage*' implies the movement of 'an idea mundane in one group to another group where the idea is new and valued' (ibid., 64). To demonstrate this thesis, Burt examined the suggestions made by 673 managers of the supply network of a large American electronics company to improve the network itself. The ideas that received the best evaluations from top management came from managers who could take advantage of less redundant information sources (ibid., 69ff.).[39]

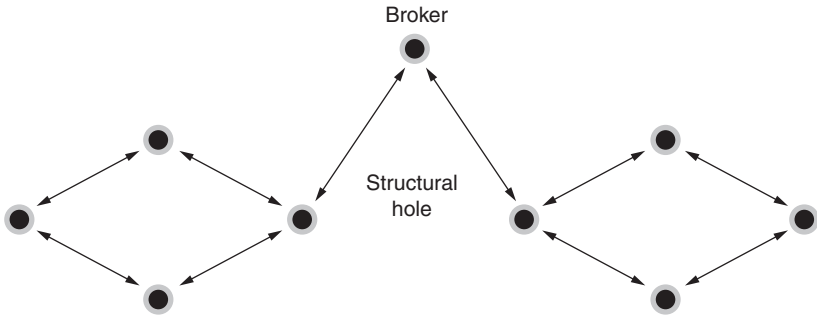

Figure 1.1 Structural holes and relational brokerage.

Another line of research involving the role of networks in innovation is that by Walter Powell and his colleagues in the field of biotechnology. Studies in this field show that *inter-organisational partnerships give companies a significant advantage in terms of innovation*. Two elements emerge as crucial:

1 The effectiveness of the partnership depends very much on trust and the ability to learn new knowledge. Relationship building – that is, the ability to build and make use of external collaborations – therefore assumes strategic importance. A central position in the network and experience in managing these partnerships have a positive influence on innovative performance (Powell *et al*. 1996; Powell and Owen-Smith 1999).
2 The ability to learn from external relations is conditioned by internal company resources, in terms of knowledge and technical skills.

An interesting aspect of these studies is that they use a diachronic and contextual approach. In fact, the configuration of the network changes over time, both at the individual level (in the history of a single company) and at the industrial level: the biotechnology sector, for example, shows increased connectivity between businesses and other organisations as the sector develops. In addition, the networks are studied within a specific production sector and the importance of contextual factors is recognised. To explain the tendency of biotechnology companies towards territorial agglomeration, the complex economic and institutional infrastructure that sustains the transfer and commercialisation of scientific knowledge is brought into play: universities of excellence, technical and legal consultancy firms, venture capital businesses, and so on (Powell *et al*. 2002). Recently, finally, John Padgett and Walter Powell (2012) have dealt with organisational innovation through combining the analysis of social networks with models of autocatalysis drawn from biochemistry. Through various case studies – taken from history, post-socialist economies, and sectors of biotechnology – the two authors explain the emergence of organisational innovation as

the result of spillover deriving from interconnected social networks: in other words, through the interaction of autocatalytic mechanisms within different networks.[40]

Another line of research that refers to social relations is that dealing with the diffusion of innovation. These studies show that the adoption of innovation and its diffusion depends on interpersonal relationships and the conformation of the social structure.[41] Diffusion is defined by Everett Rogers (2003, 11) as 'the process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) *over time* (4) among the members of a *social system*'. One of the best-known results of this particular line of research concerns the speed of innovation adoption. Much research, in fact, identifies a distribution of the rate of adoption that assumes a characteristic S-shaped form, even if there are differences from case to case in the grade of the curve (Figure 1.2). This phenomenon is easily explained: in the beginning, innovation is adopted only by a handful, but after a while – thanks to word of mouth from those who have tried it out – the rate increases more rapidly (so the curve rises) and then decelerates as the number of individuals who have not yet adopted it gradually reduces.

Other studies have focused on the diffusion of information and knowledge useful for innovation, and the role played by the various kinds of social ties: strong ties being considered more reliable and suitable for conveying tacit, complex and interdependent knowledge;[42] weak ties instead for codified knowledge and non-redundant information (Hansen 1999; Van Wijk *et al*. 2003; Powell and Grodal 2005).

These should not be imagined as automatic, however: no necessary correspondence always exists, in fact, between weak ties and non-redundancy of information. In the analyses, therefore, the form and content of the ties must be kept distinct, as must the socio-cognitive (variety of knowledge conveyed) and

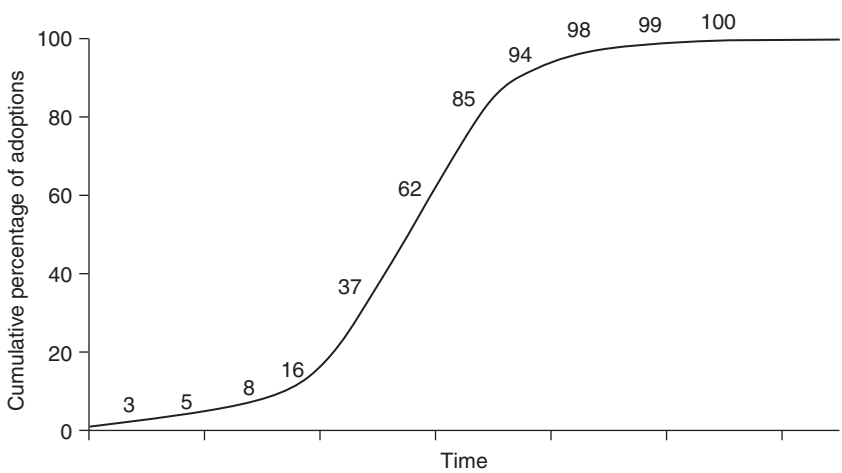

Figure 1.2 The process of innovation diffusion: the S-curve of the adoption rate.

socio-normative (role of trust and frequency of contact) aspects (McEvily and Zaheer 1999, 1153; Ramella and Trigilia 2010b, 107–8).

Variability also exists in relation to production specialisation: in traditional and slow-tech sectors, for example, strong ties play a more important role; while weak ties are more important in high-tech sectors. Some studies, however, have shown that the type of ties activated by employers varies greatly with the functions and activities carried out (Ramella 2005; Ramella and Trigilia 2006). As far as innovation is concerned, for example, emphasis has been given to the fact that companies need to balance strong and weak ties, internal cohesion and variety in external relations: in other words, the necessity of using complementary relationships and resources for innovation (Ramella 2011; Ruef 2002).[43] To conclude, what studies about social networks show is the importance of interpersonal and inter-organisational relationships for innovative performance. However, it should also be added that the relevance of networks takes on a highly contingent and contextual value: their presence, effectiveness and conformation depends on a plurality of social and institutional factors.

1.8 The economic sociology of innovation

This short review of the contributions of economic sociology to the subject of innovation is not intended to be exhaustive, but rather show (selectively) their relevance for Innovation Studies. As will be seen in the rest of the book, many of the topics covered in this chapter demonstrate a clear connection with contemporary research. There is an increasing awareness, in fact, that innovation takes the form of a complex process in which institutional and socio-relational factors occupy a prominent place.

Sociology can make an important contribution on both these fronts, thanks to the tradition of studies which it has developed. First of all, there is the contribution of the classic sociologists, for whom innovation does not correspond to 'simple' technological change but also brings the overall structures of capitalism into play. Their observations are closely related to the theme of social change, and raise questions regarding the relations of power, legitimisation and conflict involved in the innovation process.[44] This macro-sociological focus does not mean, however, that the classics did not also present more specific reflections on the social aspects of technological change,[45] the actors and the micro-mechanisms of innovation.[46] As already mentioned, many of the insights provided by the classics of sociology are echoed in contemporary research. And yet, reviewing the latter, the feeling aroused is that today's thinking about innovation – especially in the economic sphere – has in a certain sense been 'sterilised'. In fact, although the importance of socio-relational and institutional aspects has been recognised, some of the constitutive elements of the innovation process (power, legitimisation and conflict) are neglected, and the same applies to their interdependence with social change.

In recent years, however, innovation has been the subject of fresh attention in economic sociology. For example, the 'macro' tradition regarding the relationship