



## Open Innovation

The “open” model of innovation (Chesbrough 2003) highlights activities of firms that find it less costly to acquire their inventions from outside sources than to generate them using their own internal research and development laboratories. These firms innovate and compete successfully by sourcing technological and innovative knowledge broadly. Firm survey evidence shows the importance of the invention sources of product innovation in manufacturing that are separate from internal R&D work. For about half of the respondents to American Competitiveness Survey (ACS), which surveyed manufacturing firms with product innovations, the invention underlying their most important innovation was external to the firm. The customer was the most frequent source, followed by suppliers, and then outside technology specialists. These technology specialists include contract R&D performers, independent inventors, and universities. The ACS also finds an important role for startups as the source of invention, with 13% of respondents identifying this source (Arora, Cohen, and Walsh 2016).

One explanation for the growth in external sources of innovation is that information and communications technologies (ICT) improvements allow external innovators to create complementary products, extending the reach of open innovation (Evans and Gawer 2016). These improvements include gains in instrumentation and computing power which increase the potential for innovation to be separated into subprocesses that different teams can accomplish. By diminishing the limitations posed by geographic barriers, digital platforms allow for exchanges between suppliers and customers and for the development of new products and services. Further, ICT can raise the value of external expertise in abstract knowledge, which can be applied broadly across many fields (Arora and Gambardella 1994).