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Why Are Small High-Technology Firms in Texas Not Competing?

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High-technology firms compete globally by bringing products to market *quickly* and efficiently. In a recent sample of high-technology companies in Texas, 84 percent reported the introduction of a new process or product during 1994—96. However, only 33 percent introduced new products and processes faster than their competitors. A key question for policymakers then is: why are most small high-technology firms in Texas not competing in this dimension?

During 1996—97, the Bureau of Business Research (BBR) and IC2 Institute at the University of Texas at Austin addressed this question in a study of 1,772 Texas high-technology firms. The overall survey response of the study was 22 percent (374 firms), and most of these were small firms: 83 percent have fewer than 100 employees and 95 percent have fewer than 500 employees. More striking is the fact that 49 percent employ fewer than 20 people.

The BBR-IC^2 sample was divided into two groups of firms, low tech and high tech. Scientists and engineers represent less than 6 percent of the number of employees at *low-tech* firms. These firms mainly assemble products that are researched and developed at headquarters located elsewhere. The second group, *high-tech* firms, employs a larger percentage of scientists and engineers and focuses on new product development. Long-term, positive economic development in a region depends on developing or attracting firms from the second group. To design policies that help develop or attract these innovative high-tech firms, policymakers must understand the factors that affect innovations and increase competitiveness.

Industrial Organizations and Innovations

Firms organize their dealings with suppliers and customers based on either *arm's length* or *network* relationships. Arm's length relationships, usually associated with "traditional" American firms, are textbook economic relationships: short-term, with little exchange of information between firms. Companies come to the market to buy from the lowest bidder. In contrast, network relationships are based on long-term linkages between firms, a great deal of information exchange, joint problem solving, and governance by trust.

Arm's length relationships offer competitive advantages in the innovative capacity of firms with large stable markets characterized by long product cycles. Networking relationships, on the other hand, produce competitive advantages in the innovative capacity of firms in constantly changing markets characterized by short product cycles. Most high-technology firms fit the latter description: they must implement new processes and introduce new products quickly, continuously adjusting task coordination in the process. Clearly, networks can help accelerate innovations in high-technology firms that compete by rapidly introducing differentiating, high-value-added products.

For high-tech firms, partnerships with *both* suppliers and customers are key elements in introducing products faster to the market. For instance, by involving suppliers early in product innovation, firms avoid the waste characterized by mismatches in the fitting of parts within a new product. Moreover, when supplier engineers and customer engineers have substantial experience working together they develop relation-specific know-how and are less likely to misread blueprints or misinterpret information.

The Texas Sample

To measure the relationship between speed of innovations and networking relationships, we divided our sample of high-technology firms (those with more than 6 percent of engineers and scientists) into two groups: firms innovating faster than their industry group and firms innovating at a slower pace. The importance the first group attaches to long-term, flexible contracts and frequent (daily or weekly) information exchange with their main customers is evidence that networking relationships with *customers* are important in their product and process innovations. As was frequently mentioned in interviews with executives in high-technology firms in Austin, Houston, Dallas, Fort Worth, and San Antonio, these companies do not want to produce more new product than their customers need. So the firms work closely with their main customers to guarantee a market for their products.

A Competitive Strategy

Certainly, firms gain competitive advantages in innovation from maintaining strong networking relationships with customers. The BBR-IC2 study results indicate, however, that most high-tech firms in Texas overlook another important strategy: establishing networking relationships with *suppliers*. This is surprising given the abundance of examples of the positive effects of close relationships with suppliers for innovations. Japanese firms, for one, are known for effectively coordinating design and manufacturing with suppliers–a practice often credited with Japanese success in rapidly developing and introducing new products.

Another example of the benefits of strong supplier networks can be found in Silicon Valley. In the 1980s, many computer firms in Silicon Valley began treating their suppliers as partners in a joint process of designing, developing, and manufacturing innovative systems. These collaborations encouraged joint problem solving between system firms and their suppliers, and, as a result, Silicon Valley firms learned to respond collectively to fast-changing markets and technology.

Programs such as the Texas Manufacturing Assistance Program (TMAC) help small firms establish networking relationships with customers. Such programs, however, are small and do not focus exclusively on high-tech firms. The need exists for a program devoted entirely to helping small high-tech firms in Texas increase their innovation capacity by developing networks with suppliers. Perhaps this program could be a coordinated effort, with TMAC, engineering and business schools at Texas universities, and large companies working together on behalf of smaller companies. The program could be funded by large companies, which would be the main beneficiaries of more competitive components, and the state.

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