# Advanced Technology and New Management Practices

***Both nonmetro and metro establishments cited lack of worker skills as the biggest problem when implementing new technologies or management practices.***

Advanced technology and new management practices are often cited as key determinants of manufacturing competitiveness. Nonmetro plants were somewhat less likely to use four of five advanced technologies asked about on the survey (table 3). In particular, use of computer-assisted design technologies and use of local area computer networks were 9 percentage points higher for metro than nonmetro establishments. Several of the technologies are used by a smaller percentage of workers in nonmetro plants.

Nonmetro plants compared much more favorably with metro plants in their use of advanced management practices. Nonmetro plants were more likely to report using two of five management practices, and nonmetro-metro rates of use were equal for the other three. The percentage of production workers involved in the practices was the same in metro and nonmetro plants.

Nonmetro establishments were less likely than their metro counterparts to include a research and development unit, reflecting the tendency for R&D functions to be concentrated in urban areas. A little more than half of both metro and nonmetro establishments reported having used outside expertise for implementing new technologies or management practices in the previous 3 years.

The most important sources of technical assistance were the firms or establishments with which the plants do business. Customers or suppliers and other locations or branches of the same firm were the most important sources of expertise, followed by machinery, equipment, or software vendors (table 4). Public/university technology assistance programs were less frequently cited, but half of respondents rated these as either "very important" or "somewhat important." Nonmetro plants placed more importance on other branches of their firm, competitors, and public/university programs, while metro plants placed greater importance on consultants.

**Table 3—Use of advanced technologies and management practices by manufacturing establishments**

| Type of technology/practice | Plants reporting usage | | Production workers using[1] | |
|---|---|---|---|---|
| | Nonmetro | Metro | Nonmetro | Metro |
| | Percent | | Percent | |
| Type of technology | | | | |
| Numerically or computer-controlled machines | 51 | 53 | 22* | 28* |
| Programmable controllers | 47* | 44* | 19* | 23* |
| Computer-assisted design or engineering (CAD) | 45* | 54* | 12 | 14 |
| A local area computer network | 33* | 42* | 20* | 28* |
| CAD linked to computer-assisted machining (CAD-CAM) | 21* | 25* | 15 | 16 |
| Type of management practice | | | | |
| Job rotation | 59* | 53* | 60 | 57 |
| Self-directed or self-managed work teams | 49 | 47 | 60 | 61 |
| Employee problem-solving groups or quality circles | 49* | 45* | 59 | 58 |
| TQM or total quality management | 45 | 43 | 68 | 69 |
| Statistical process control | 37 | 38 | 41 | 41 |
| Establishment includes a research and development unit | 22* | 30* | NA | NA |
| Establishment used outside technical assistance | 55 | 53 | NA | NA |

* = Nonmetro-metro difference is statistically significant at 0.05 level. NA = not applicable.
[1]Percent is only for establishments that report using the technology.
Source: ERS Rural Manufacturing Survey, 1996. N=2743 nonmetro, 1043 metro.

"Adequacy of worker skills" was clearly the biggest problem reported by manufacturing establishments when implementing new technologies or management practices. Over 30 percent of both metro and nonmetro respondents cited that factor as a major problem (table 5). Employee turnover and the time and cost of implementation were major problems for about 20 percent of nonmetro plants. "Availability of adequate technical assistance" and "obtaining sufficient capital" were rated as major problems by relatively few respondents, but about 40 percent cited these as minor problems. Employee turnover was cited more often by nonmetro plants than by metro plants as a major problem. Nonmetro plants were less likely than metro plants to cite "time and cost of implementation" and "obtaining sufficient capital" as major problems.[2]

[2]Gale (1997) and McGranahan (1998b) provide more detailed analysis of technology and management practice adoption.

**Table 4—Importance of outside expertise concerning new technologies and management practices used by manufacturing establishments**

| Source of expertise | Nonmetro | | Metro | |
|---|---|---|---|---|
| | Very important | Somewhat important | Very important | Somewhat important |
| | *Percent* | | *Percent* | |
| Customers or suppliers | 50 | 38 | 46 | 42 |
| Other locations or branches of the firm | 49* | 31* | 45* | 30* |
| Machinery, equipment, or software vendors | 41 | 43 | 42 | 44 |
| Private or nonprofit consultants | 21* | 39* | 28* | 39* |
| Partners | 17 | 15 | 15 | 15 |
| Competitors | 14* | 36* | 9* | 38* |
| Public, vocational, or university technology assistance programs | 16* | 38* | 11* | 28* |
| State or national industry associations | 13 | 35 | 10 | 37 |

Note: "Not Important" responses are not shown.
* = Nonmetro-metro responses are significantly different at 0.05 level.
Source: ERS Rural Manufacturing Survey, 1996. Applies only to those using technical assistance.
N=1,495 nonmetro, 559 metro.

**Table 5—Problems encountered by manufacturing establishments implementing new technologies and management practices**

| Problem | Nonmetro | | | Metro | | |
|---|---|---|---|---|---|---|
| | Very important | Somewhat important | Not important | Very important | Somewhat important | Not important |
| | | *Percent* | | | *Percent* | |
| Adequacy of worker skills | 31 | 44 | 24 | 33 | 45 | 21 |
| Employee turnover | 20* | 38* | 41* | 12* | 41* | 46* |
| Time and cost of implementation | 19* | 46* | 33* | 24* | 47* | 27* |
| Obtaining sufficient capital | 15* | 32* | 50* | 19* | 33* | 46* |
| Availability of adequate technical assistance | 11 | 40 | 48 | 10 | 39 | 50 |
| Getting resources from headquarters[1] | 7 | 37 | 56 | 6 | 40 | 53 |

* = Nonmetro-metro responses are significantly different at 0.05 level.
[1]Branch plants of multiunit firms only. "Don't know" responses are not shown.
Source: ERS Rural Manufacturing Survey, 1996. N=2,742 nonmetro, 1,054 metro.