

Next Generation Manufacturing

Pennsylvania Manufacturers Assess progress on Strategies Required for Future Success

Findings of the Pennsylvania Industrial Resource Centers' Next Generation Manufacturing Strategies Survey

This report summarizes key findings from a survey of Pennsylvania manufacturers conducted recently by the Pennsylvania Industrial Resource Centers (IRCs) in cooperation with the Manufacturing Performance Institute (MPI), a leading national survey research firm focused on manufacturing.

The goal was to learn more about how Pennsylvania manufacturers view the future, especially the strategies necessary for manufacturing success in the next five years. Working with the Manufacturing Extension Partnership (MEP), the National Institute for Standards and Technology (NIST), and MPI, the IRCs identified six core Next Generation Manufacturing Strategies considered essential to future success in the global economy:

- Customer-focused Innovation;
- Talent Acquisition, Development and Retention;
- Superior Process Improvement;
- Extended Enterprise Management;
- Sustainable Products and Processes; and
- Global Engagement.

The survey addressed four core questions:

- 1) How do Pennsylvania manufacturers rate the importance of each strategy to their own future success?
- 2) How do Pennsylvania manufacturers assess their own progress toward world-class performance on each strategy?
- 3) Through what practices do Pennsylvania manufacturers measure their progress on each strategy? and
- 4) To what extent do Pennsylvania manufacturers find regional resources available to support their progress on each of the six manufacturing strategies?

The report that follows offers a summary of what was learned from the manufacturers surveyed and perspective on the Next Generation Manufacturing strategies on which they assessed their progress.

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Next Generation Manufacturing (NGM) Strategies

Next Generation Manufacturing Strategies are those strategic disciplines that will be important for success in the global marketplace within the next decade. Pennsylvania SMMs will have to provide superior execution on those strategies most important to *their* enterprises and understand and be competitive in *all six* of these strategies:

- **Customer-focused Innovation:** *Develop, make, and market new customer solutions at a pace faster than the competition.*
- **Talent Acquisition, Development and Retention:** *Secure a competitive performance advantage by having superior systems in place to recruit, hire, develop, and retain talent.*
- **Superior Process Improvement:** *Record annual productivity, quality and customer satisfaction gains that exceed the competition through a company-wide commitment to continuous improvement.*
- **Extended Enterprise Management:** *Develop and manage a network of suppliers and partners that beats the competition by providing greater flexibility, faster response times, and lower costs.*
- **Sustainable Products and Processes:** *Design and implement waste and energy-use reductions at a level that provides superior cost performance and recognizable customer value.*
- **Global Engagement:** *Secure business advantages by having people, partnerships, and systems in place capable of engaging global markets and talents better than the competition.*

The NGM Strategies Survey

The NGM Survey was conducted on-line from February to April 2009. Respondents were asked to answer 61 questions, typically an investment of 30 minutes. Nearly 400 Pennsylvania manufacturers executed the confidential survey. A high majority (83%) were independent companies. Median annual revenues of the firms were about \$7M. Median employment was just under 50. More than 70% of the responding CEOs were between 40 and 60 years old. In these attributes, those who responded were broadly representative of their peers. Each respondent received a customized report of their results.

Responses to questions about each of the six NGM strategies can provide important perspective for developing IRC services, for the work of many economic development organizations in the state, and for leaders who make informed decisions about investment of public resources to grow the Commonwealth. Key findings on each NGM strategy and how Pennsylvania manufacturers view the resources regionally available to them as they implement the strategies in the future are summarized below.

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Customer Focused Innovation

Develop, make, and market new customer solutions at a pace faster than the competition.

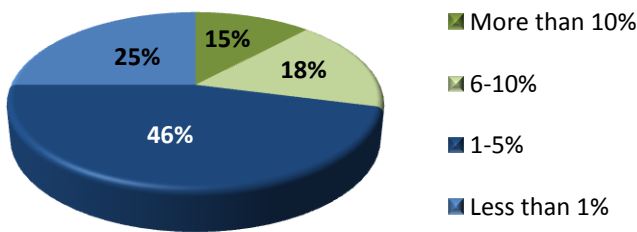
The NGM Survey indicated that a strong majority – 86% -- of Pennsylvania manufacturers rate this strategy as highly important to their success in the next five years. Some 46% rated their performance as world-class (13%) or good (33%). **When asked about investment in this strategy, 46% reported spending 1-5% of their sales in new product development (slightly above the national average) while 18% spent 6-10% of sales and 15% invested more than 10% of sales for this purpose.**

Their results have varied. **Asked about their percent of sales derived from products introduced in the past three years, 7% reported more than half of their sales from these new products, 12% placed returns in the 26-50% range, and 46% in the 5-25% range.**

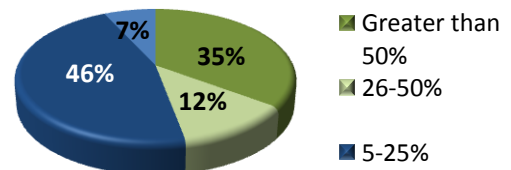
More than a third of respondents reported regularly monitored company-specific metrics to track their returns from customer-focused innovation; nearly a tenth (9%) said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

Finally, when asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on this NGM strategy, 38% reported full or good support – 7% above the national average – but still barely more than a third of all the firms responding.

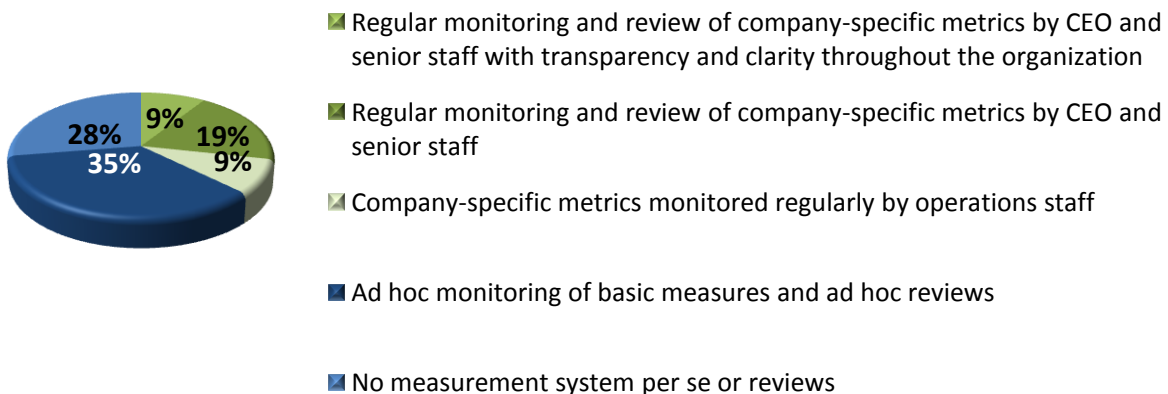
Sales invested in new product development/R&D



Annual sales derived from products introduced in the last three years



Measurement system for reviewing return from customer-focused innovation



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Talent Acquisition, Development and Retention

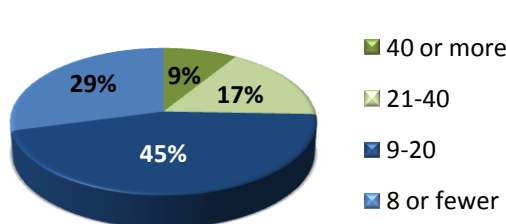
Secure a competitive performance advantage by having superior systems in place to recruit, hire, develop,

The NGM Survey indicated that four-fifths of respondents rated Advanced Talent Management as a highly important (46%) or important (34%) strategy – a finding consistent with most previous research. Once again, these Pennsylvania firms were hard graders of their own progress toward excellence: only 5% consider themselves world-class and only 23% thought that they were making good progress toward that status. **There was wide variation in the intensity of employee training: 9% devoted more than a week annually to the training of each employee, 17% devoted 21-20 hours; nearly half (45%) fell in the 9-20 hours range, and almost a third (29%) devoted a day or less to training each employee.**

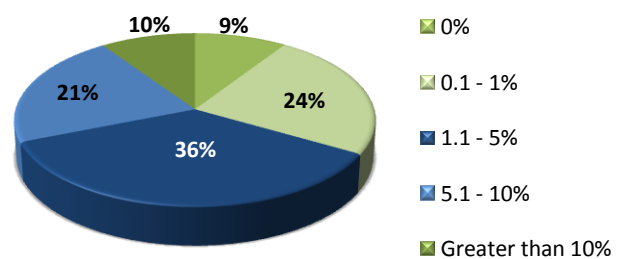
Consistent with many national studies, Pennsylvania respondents reported significant variation in annual value added per employee. Some 30% achieved \$75,000 or less, 42% were in the \$75,000-125,000 range, 17% reported \$125,000-175,000 and a highly productive 11% were above \$175,000 in annual value added per employee. (This wide variance was also observable both between and within industrial sectors.) **Mindful of the high costs associated with labor turnover, the survey asked firms to report their annual rates. A tenth had rates above 10%, more than a fifth (21%) were in the 5.1-10% range, 36% experienced 1.1-2% turnover, 24% were 1% or less and 9% had no turnover at all.** More than a third (35%) of respondents reported regularly monitored company-specific metrics to track their returns from advanced talent management; 7% said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

Finally, when asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on this NGM strategy, 40% reported full or good support – 8% above the national average – but still only two-fifths of all the firms responding.

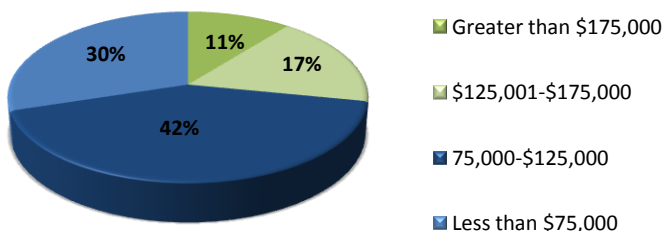
Formal training hours devoted annually to each employee



Annual labor turnover rate



Value-added per employee



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Superior Process Improvement

Record annual productivity, quality and customer satisfaction gains that exceed the competition through a company-wide commitment to continuous improvement.

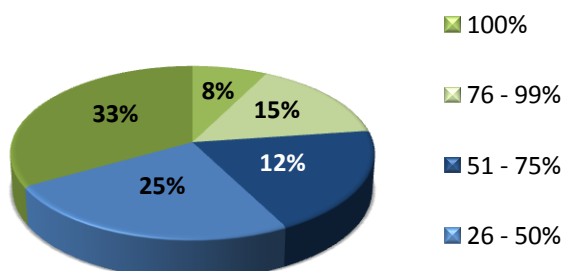
The NGM Survey indicated that more than four-fifths (83%) of respondent firms viewed Superior Process Improvement as a highly important (52%) or important (31%) strategy for future success. Pennsylvania firms were again hard self-graders: 43% thought their progress was above average, but only 8% currently considered themselves world-class.

Broad involvement of employees is considered a signature of superior process improvement, so the survey asked for the percentage of the workforce fully engaged. Nearly a quarter of firms (23%) said that at least 75%; another 19% of them engaged at least half their workers. However, more than half of responding firms (58%) involved fewer than half their workers and a third (33%) engaged fewer than 26%. Perfect deliveries, a broadly use metric for superior processes, was addressed: 28% of firms reported better than 98% of all orders delivered in perfect condition, another 31% were in the 96-98% range, and an additional 20% achieved at least 90%.

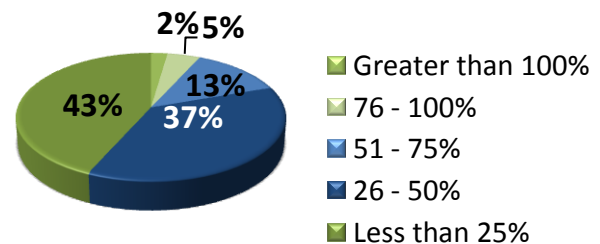
Customer satisfaction was also probed. Nearly half of the firms (49%) reported “strong loyalty to our products due to ongoing trust in our organization’s people and capabilities” while, at the other end of the spectrum, less than a tenth said their customers were indifferent to buying from them or a competitor (6%) or that they were in trouble with customers (2%). **Among the more dramatic findings was the percentage improvement in productivity (value added per employee) over the past three years: 2% more than doubled, 5% increased by more than 75%, and 13% achieved at least 50% growth. More than an additional third (37%) increased productivity between 26-50%.** Better than two-fifths (44%) of respondents reported regularly monitored company-specific metrics to track their returns from Superior Process Improvement; 11% said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

When asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on this NGM strategy, 48% reported full or good support – 7% above the national average – but still less than half of all the firms responding.

Percentage of workforce fully engaged in organization’s specific improvement method/approach



Percentage productivity (i.e. value add) has improved over the past three years



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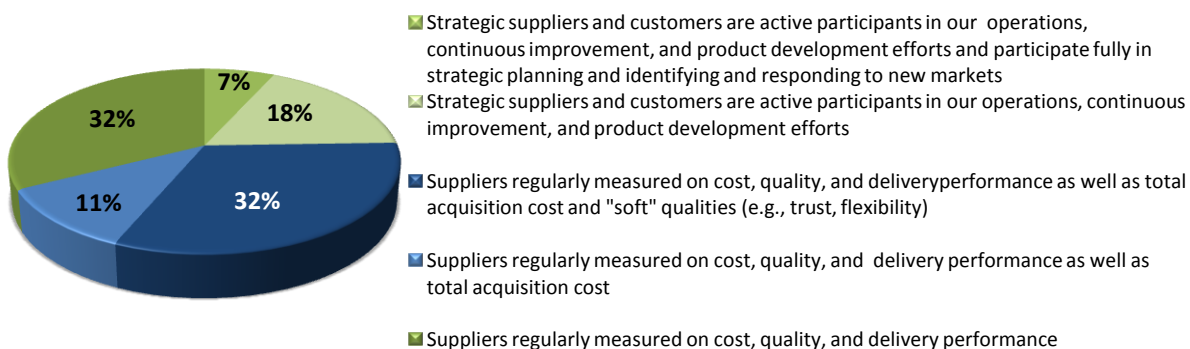
Extended Enterprise Management

Develop and manage a network of suppliers and partners that beats the competition by providing greater flexibility, faster response times, and lower costs.

Almost two-thirds of firms (65%) rated Extended Enterprise Management as highly important (33%) or important (32%) to their success in the next five years. Less than one third (28%) felt they were making good progress with the strategy and only a modest 6% believed they were world-class. **When respondent firms were asked to look both upstream to their suppliers and downstream to their direct and indirect customers and queried about the chains each way as a competitive advantage, only 7% could affirm that both suppliers and customers were active participants in most elements of their enterprise and strategic planning, while 18% said that both chains were active participants in operations, continuous improvement and product development.** Nearly another third (32%) measured their suppliers on cost, quality, delivery and some softer dimensions such as trust and flexibility. More than two-fifths (41%) of respondents reported regularly monitored company-specific metrics to track their returns from Extended Enterprise Management; only 6% said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

When asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on this NGM strategy, 34% reported full or good support – 5% above the national average – but still only a third of all the firms responding.

How is your supply chain a competitive advantage in terms of flexibility and speed to marketplace?



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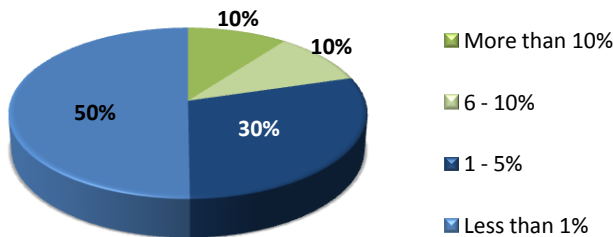
Sustainable Products and Processes

Design and implement waste and energy-use reductions at a level that provides superior cost performance and recognizable customer value.

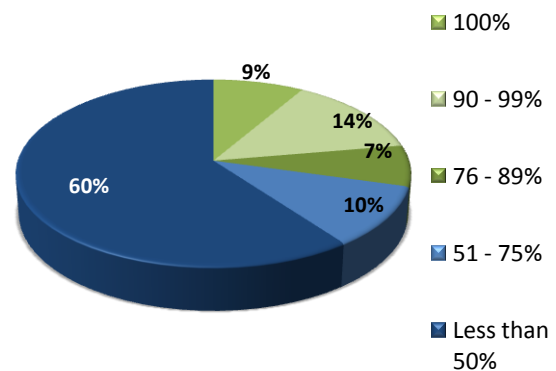
A third (32%) of respondents already rate Sustainable Products and Processes as highly important (13%) or important (19%) to their future success. Only 5% believe their current practices are world-class, but another 40% believe they are making good (13%) or average progress toward this goal. **However, the effort seems currently confined to management. Only a tenth of respondent firms involved more than a tenth of their workforce in sustainability efforts. Another tenth involved more than 5% and fully half involved less than 1%.** Questions on hard measures of green performance showed modest progress. Only 1% of firms had achieved annual reductions of energy used per unit of product output by more than 25%. **Across all respondents, 9% of products were completely recyclable, 14% were in the 90-99% range, while 60% had product mixes that were less than 50% recyclable.** Measurement also lagged that applied to the other NGM strategies. Less than one-fifth (17%) of respondents reported regularly monitored company-specific metrics to track their returns from Sustainable Products and Processes; only 3% said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

When asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on this NGM strategy, 21% reported full or good support – at the national average – but still only a fifth of all the firms responding.

Percentage of workforce dedicated to reducing energy, material or emissions in operations



Percentage of products (by sales volume) completely recyclable/reusable



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Global Engagement

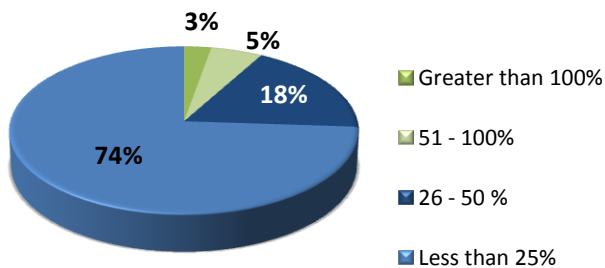
Secure business advantages by having people, partnerships, and systems in place capable of engaging global markets and talents better than the competition.

Pennsylvania SMMs get the message on Global Engagement. Nearly half of them (47%) rate this NGM strategy highly important (26%) or important (21%) to their future success; a quarter (25%) believe they are making at least good progress toward distinctive performance and 7% consider themselves world-class already. **More than a few respondent firms see results. A quarter (26%) have grown the dollar volume of their sales beyond the United States by at least 26% and for 8% the volume has grown by over 50%. A third of respondent firms (34%) have sales or distribution facilities in 1-5 other countries and 13% are active in this way in at least six other nations.**

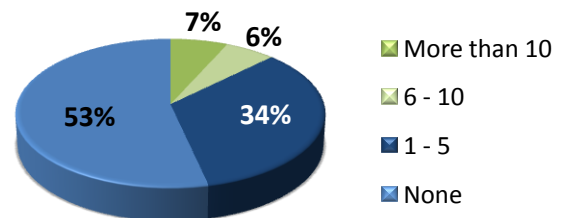
Measurement of the effort on Global Engagement is similar to that for most other NGM strategies. Less than one-quarter (24%) of respondents reported regularly monitored company-specific metrics to track their returns from this strategy; only 3% said these metrics were regularly reviewed at the CEO-level and reported throughout the organization.

When asked to what extent their region of the Commonwealth was able to provide the services and resources needed to support their work on Global Engagement, 27% reported full or good support – 7% above the national average – but still less than a third of all the firms responding.

Percentage dollar volume of sales outside the United States changed in the past three years



How many countries outside the United States does your organization have sales and/or distribution facilities?



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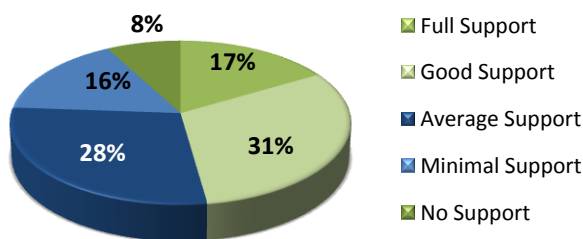
Conclusions

The Next Generation Manufacturing Strategies survey provides valuable perspective for Pennsylvania manufacturers, the IRCs, economic development organizations, and state leaders who invest public resources to grow the Commonwealth. The most fundamental conclusion is that Pennsylvania manufacturers think the six New Generation Manufacturing Strategies matter. High percentages of the respondent firms rated the strategies highly important or important to their success in the next five years:

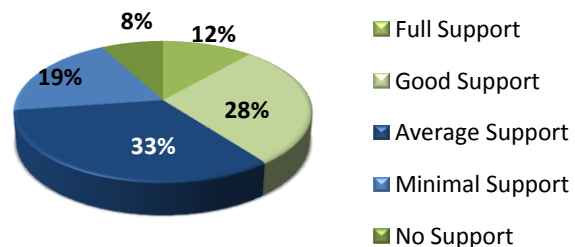
Superior Process Improvement	83%
Talent Acquisition, Development and Retention	80%
Extended Enterprise Management	65%
Customer-focused Innovation	59%
Global Engagement	47%
Sustainable Products and Processes	32%

The relatively modest one-third of firms who made this judgment about the Sustainable Products and Processes strategy in the late winter of 2009 may well quickly become a majority as nationwide views on climate change evolve and the manufacturing marketplace adjusts to the prospect of a “cap and trade” regime that will move energy consumption from carbon to renewable sources. Since marshalling the resources required to pursue Global Engagement is often a challenge for smaller firms, the ranks of SMMs that make this a frontline strategy may not grow as quickly, but market pull and intelligent support services can certainly make this an important strategy for a majority of Pennsylvania firms in the next five years.

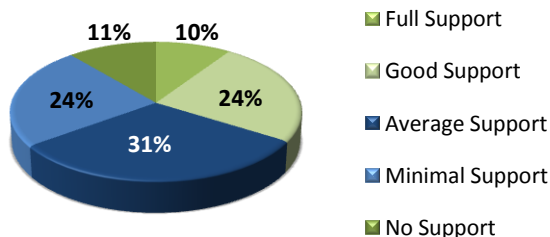
Superior Process Improvement



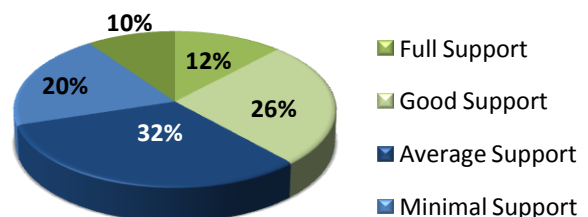
Talent Acquisition, Development and Retention



Extended Enterprise Management



Customer-focused Innovation



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Conclusions continued

An admirable element of Pennsylvania business culture is heard in the collective voice of the firms who responded to the survey: business leaders in the Commonwealth, and especially the CEOs of small- and medium-sized manufacturers, are tough self-assessors. They know that the NGM strategies are important to future success, invest in them, measure progress and show results but, on average, less than a tenth rate themselves as world-class performers on any of the six strategies. Through two decades of service to a marketplace of these decision-makers, the IRCs have learned that hard graders and especially hard self-graders make great customers, once won. In the future, as more of them say they have become world-class, we know they will be. In the present, the gap between the importance they place of each of the six NGM strategies and their assessment of their performance is a welcome challenge for the IRCs.

All Pennsylvanians can be encouraged by the progress reported by many firms as they work to implement the NGM strategies:

- Nearly one-fifth (19%) of firms working on customer focused innovation report that at least one-quarter of sales come from products less than three years old;
- Because they value their employees and invest in talent development, 28% of firms report annual value-added per employee above \$125,000;
- For nearly half the firms (49%), steady pursuit of superior process improvement has won strong customer loyalty to their products due to ongoing trust in the organization's people and capabilities;
- In the era of global sourcing and daunting expectations within supply chains, 25% of firms already involve both their customers and their suppliers in discussions of their operations, continuous improvement efforts, and product development;
- As the marketplace greens, nearly one-quarter (23%) of firms report that at least 90% of their products are completely reusable or recyclable; and
- In the global economy, one-quarter (26%) of firms have grown the dollar volume of their sales beyond the United States by at least 26%.

Clearly Pennsylvania manufacturers are working hard to position themselves for future success. Their success will be crucial to the economic future of our Commonwealth. A modest number of leading firms have achieved world-class performance. They can serve as worthy models for many more that must make this journey during the next five years. The steady progress of these fast-follower SMMs will create and sustain good family-wage jobs across every region of Pennsylvania, stabilize regional economies and help the Commonwealth return to fiscal health. Pennsylvania manufacturers, large and small, know much of what they must do and are investing in the essential strategies and have been able to use the services and resources available to them regionally to support their progress. Going forward, many more must be able to make this connection.