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Testimony
of
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Presented before the
Senate Majority Policy Committee
Pennsylvania Assembly

Pittsburgh
September 15, 2023

Commonwealth of innovation: A policy agenda for revitalizing Pennsylvania

Good morning Chairman Laughlin and member of the Committee. It's great to be with you all here today.

As Mark mentioned, he and I are co-authors on a recent study looking at Pennsylvania's innovation economy. I'm planning to build on his remarks by talking about some of the communities that are currently being left out of Pennsylvania's innovation economy, and what can be done to better support them.

I'd like to start by acknowledging that on first blush, innovation might seem a remote concern for the many Pennsylvanians.

Especially during the last decade, "innovation" has come to be seen as something that happens in big cities like San Francisco, New York, or Boston, or emerging "hot spots" like Austin or Miami.

Yet that perception isn't quite right.

In truth, innovation turns out to possess specific and local benefits for diverse people in real places—including communities of all sizes across Pennsylvania.

Most notably, innovation—which we define as the creation and adoption of new products, services, and business models—allows workers to become more productive and produce more output for the same amount of work.

As such, innovation is the key to improved standards of living. And indeed, research has shown that the higher a state or region’s innovation capacity—measured by patents per 100,000 jobs—the higher its standard of living, measured by average wages.

So it’s a problem then that a substantial and growing share of communities in Pennsylvania are being left out of the state’s innovation ecosystem. That matters because excluding places or groups of people from the innovation sector depresses the commonwealth’s innovation activity, leaves ideas on the table, and separates many Pennsylvanians from the state’s best employment opportunities.

Trends

To that end, Pennsylvania must contend with two broad issues of exclusion in its innovation ecosystem:

- That innovation is in decline in smaller communities outside of the state’s three largest innovation hubs, and that
- Access to opportunity within the state’s innovation economy remains unequal across demographic groups, particularly across gender and racial lines.

To start, in recent years innovation has been in decline in smaller, often rural, communities across Pennsylvania. To be sure, there is innovation activity in every region of Pennsylvania, whether that be patenting activity or employment in innovation-intensive advanced industries. And while it’s not realistic to expect innovation to be at the same level in smaller places as it is in the largest innovation hubs, it can be problematic when smaller places are *losing ground* to larger places—or even in some cases seeing outright declines in innovation-related activity.

More specifically, we identify two particularly acute innovation challenges that smaller communities in Pennsylvania face:

- First, university-based innovation activity remains sparse outside state’s three largest innovation-driven metro area surrounding Philadelphia, Pittsburgh, and State College, and

- Second, that advanced industry employment is lagging, or even declining outright, in many smaller communities across the state.

To the first point, roughly 99% of Pennsylvania’s higher education R&D takes places in the state’s three most innovation-intensive metropolitan areas. What’s more, the Philadelphia, State College, and Pittsburgh metro areas’ combined share of utility patents (i.e., patents for invention) increased by 5% between 2001 and 2015, while that of the rest of the state declined. This matters because it means that firms in smaller communities across the state, whether they be in advanced manufacturing, energy production, agriculture, or some other industry, have less access to the cutting-edge advancements being discovered in Pennsylvania universities that are essential to keeping them nationally and globally competitive.

Mirroring this divergence in research has been growing spatial inequality in all-critical advanced industry employment. Advanced industries are industries with the highest levels of private sector R&D and STEM (or science, technology, engineering, and math) employment. Advanced industries pay substantially better than other industries, generate longer domestic and international supply chains, and produce the majority of Pennsylvania’s exports.

Between 2010 and 2022, the two counties that saw the largest share change in advanced industries employment in Pennsylvania were Philadelphia County and Allegheny County. Conversely, over a third of Pennsylvania counties saw outright decline in advanced industries employment, possessing fewer advanced industries jobs at the end of 2022 than they did in 2010. These counties range from the suburbs of Philadelphia to cities like Erie, to rural communities across the southern and western parts of the state.

These place-based challenges are contributing to the sluggishness of Pennsylvania’s innovation economy. But innovation in Pennsylvania isn’t just unequal by place. Even in the state’s largest innovation hubs, large portions of the state’s population remain excluded from the innovation system.

Our analysis finds that women, as well as Black, Latino or Hispanic, and Indigenous Pennsylvanians all remain underrepresented in innovation-related education, occupations, and entrepreneurship. In particular, we identify four critical inequalities affecting Pennsylvania’s innovation system:

- First, innovation-relevant STEM education remains unequal by race in Pennsylvania’s K-12 schools,

- Second, women, as well as Black, Latino or Hispanic, and Indigenous Pennsylvanians remain underrepresented in STEM higher education,
- Third, women, as well as Black, Latino or Hispanic, and Indigenous Pennsylvanians remain underrepresented in advanced industries jobs in the state, and
- Fourth, those same groups remain significantly underrepresented when it comes to entrepreneurship and firm ownership.

To illustrate the challenge, women account for half of Pennsylvania’s population, but they receive just 38% of STEM degrees, hold just 33% of advanced industries jobs, and are majority owners of just 19% of firms with employees in the state.

Similar trends can be seen for Black, Latino or Hispanic, and Indigenous Pennsylvanians. For example, Black Pennsylvanians make up nearly 11% of the state’s population, but receive just 2% of STEM degrees, hold just 6% of advanced industries occupations, and are majority owners of only 1% of firms with employees in the state.

As with inequality by place, when entire demographic groups remain significantly underrepresented in the innovation economy, it not only limits the growth of the state’s innovation capacity, but also hinders overall economic growth and locks a significant share of the state’s population out of its most productive and well-paying occupations.

Policy

Given the scope of these challenges, how might policymakers address them?

I refer you back to our report “Commonwealth of innovation: A policy agenda for revitalizing Pennsylvania’s economic dynamism” for a comprehensive policy agenda aimed at fostering an inclusive innovation economy for Pennsylvania communities of all sizes and backgrounds.

Today I’ll just note a small selection of the most critical policy items that we recommend.

In terms of supporting innovation in smaller communities our centerpiece recommendation is that the state **design and fund a 20-region challenge grant, with the aim of catalyzing regional innovation ecosystem development in those places**. This would be a state-level grant analogous to larger Pennsylvania Innovation Hubs program my colleague Mark outlined. This program would provide smaller, \$2 to \$4 million awards to help smaller-market Pennsylvania regions strengthen their local ecosystem supports in order to nurture innovation, entrepreneurship, and cluster growth.

We have several other policy items aimed at smaller communities across the state. One would be to **establish an advanced industries innovation voucher program**, which companies could use to pay universities to help them answer a pressing innovation or product development question. This program would allow potentially innovative companies in smaller communities to better access the innovative research taking place in Pennsylvania's world class universities.

Another is to **continue building on the funding that the Invent Penn State LaunchBox network received in the most recent budget**. We find this initiative encouraging because it's an existing, distributed network of innovation resources in nearly 30 locations across the state, in communities of all sizes. We think this program has significant potential if it is adequately resourced by the state.

When it comes to improving demographic inclusion in Pennsylvania, we see three themes the commonwealth can focus on:

The first is centered on **growing a more inclusive entrepreneurial ecosystem**. The state is already taking some steps to this effect, such as the creation of its Diverse Leaders Venture Program as part of the state's State Small Business Credit Initiative effort. Enhancing funding for existing programs like that would go a long way. Other policy steps could include creating a state CDFI fund, growing the state's Minority Business Development Authority Loan program, and increasing funding for incubators and accelerators focused on underrepresented groups.

Second, we believe the state can do more to **get underrepresented workers into advanced industries careers**. We note in our report that there are a lot of great regional and local efforts attempting to do this already, so rather than reinvent the wheel, we think the state can play a bigger role in funding and convening the variety of regional orgs already focused on connecting workers to advanced industries jobs. The state should also explore ways to fund broader access to childcare and other wraparound supports that can help workers access those jobs.

And third, the commonwealth should work to **make STEM education more equitable**, from pre-K through higher education. To do so, we propose creating new programs to attract diverse STEM professors and doctoral students to Pennsylvania universities, and create more STEM research opportunities for diverse undergraduate students. But waiting until students get to higher education to support STEM learning is too late. As a result, it's also critical to bolster STEM education for underrepresented students at the pre-K-to-12 levels. To do so, we recommend steps such as strengthening the Pennsylvania Department of Education's PAsmart grants, which support STEM education in schools across the state, as well as providing funding to existing regional and statewide efforts like the PA STEM

Coalition that are aiming to expand access to inclusive STEM education in the commonwealth.

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So with that I'd like to say thank you again to Chairman Laughlin and members of the Committee for convening today's hearing on this important topic. As I mentioned, this testimony provides just a peak at our more comprehensive agenda, which you can find in our full report.

We look forward to answering any questions you may have. Thank you.