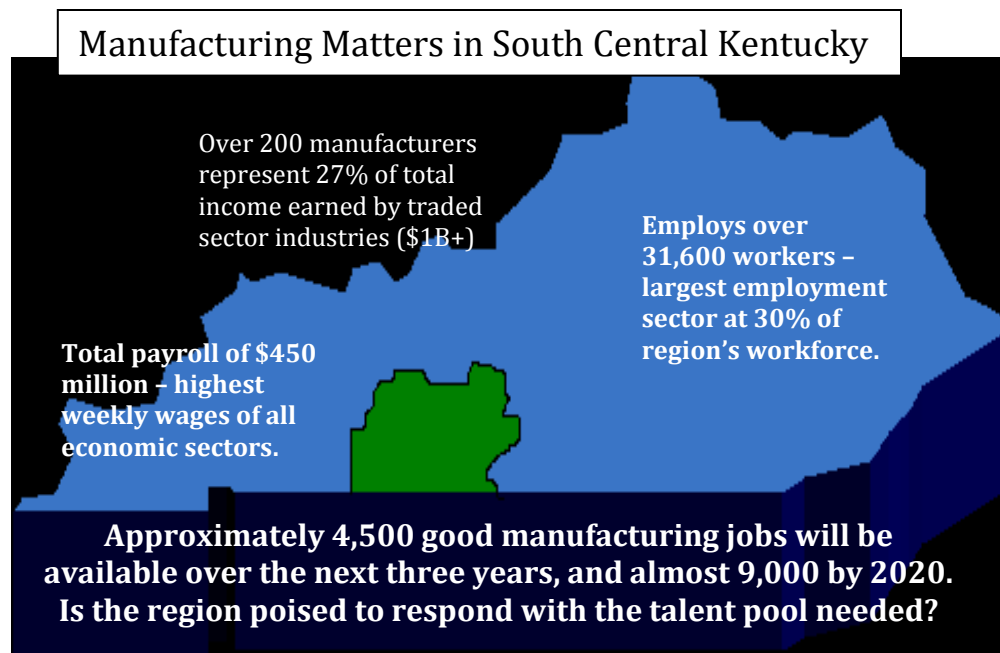


# **An Urgent Call to Action in Support of Manufacturing South Central Kentucky/Barren River Region**



**Submitted to the Advanced Manufacturing Industry Partnership  
South Central Kentucky Regional Development Authority  
Bowling Green Area Chamber of Commerce  
by  
Key Links, Inc.**

**June, 2013**

**An Urgent Call to Action in Support of Manufacturing  
South Central Kentucky/Barren River Region  
Executive Summary**

**Goals**

- Position South Central Kentucky as **THE** premier location for growing existing manufacturing companies and attracting new firms.
- Ensure a robust talent pipeline to fuel the region, from entry-level production workers through engineers.

**Purpose of Project**

Develop a Collaborative Action Plan, driven by regional manufacturers, with strategies that align education and training provider outputs with employer needs.

**The Opportunity**

Eighty-eight percent (88%) of manufacturers in the region report limited access to skilled workers as a barrier to expansion and 67% can't find skilled candidates now for critical positions. At the same time, **the region is projected to need over 4,500 workers by 2016 and over 9,000 by 2020** to fill critical middle-skill production and maintenance jobs, as well as management and engineering positions, due to impeding retirements and new job growth.

**Manufacturing Matters in South Central Kentucky**

Over 200 manufacturing firms in the region employ over 31,600 workers with a total payroll of nearly \$450 million. It is the largest employment sector in the region and represents a broad range of diverse industries. While the vast majority of manufacturers in South Central Kentucky are small, employing fewer than 250, almost all workers earn benefits and higher-than-average wages.

**Disconnects between Employer Needs and Current Delivery Systems**

**Disconnect #1:** A significant mismatch exists between projected employment needs for “middle-skill” jobs and the current output from existing workforce and education/training programs.

**Disconnect #2:** Clearly articulated manufacturing career pathways (high-school through university) are not in place; programs are not aggressively promoted to area residents.

**Disconnect #3:** Educational institutions offer fairly traditional approaches to service delivery; more accelerated and innovative program designs are needed.

**Disconnect #4:** Virtually no programs exist in transportation, distribution and logistics, despite the importance of that sub-sector to the regional economy.

**Disconnect #5:** Employers report the short-term training landscape is cluttered.

**Major Findings and Recommendations**

	<b>Finding</b>	<b>Recommendation</b>
#1	Education and training providers function in relative isolation.	Build an articulated career pathway system designed to address manufacturers' needs and strengthen <b>education-education partnerships</b> .
#2	Business-education partnerships happen as disconnected pockets of activity.	Greatly expand and coordinate <b>business-education partnerships</b> to link real-world experiences with classroom learning.
#3	No aggregated “business voice” exists to drive and monitor change.	Implement a “network of networks” business model to promote <b>business-business partnerships</b> .
#4	No coordinated marketing/outreach campaign is in place to promote career opportunities.	Launch a <b>regional marketing/outreach plan</b> to promote the high-wage career opportunities available in manufacturing.

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## About this Paper

This Call to Action was funded through a grant from the Kentucky Workforce Board (KWIB) to the South Central Kentucky Regional Development Authority (RDA) and administered by the Bowling Green Area Chamber of Commerce. The intent of the grant program was to implement the Advanced Manufacturing Industry Partnership of Warren County, creating an infrastructure that will provide employer-led education and training to enhance talent development in the region, helping local advanced manufacturers attract, recruit, train, retain and advance qualified workers.

The data and information for this paper were collected from a broad cross-section of partners and key stakeholders in the Barren River region, as listed below. Moving forward, these stakeholders will continue to be engaged in the Advanced Manufacturing Industry Partnership to implement the recommendations in this report, as well as others developed by the collaborative partnership as the process unfolds.

### **Partners/Key Stakeholders in this Regional Effort to Support Manufacturing include:**

- Bowling Green Area Chamber of Commerce/Advanced Manufacturing Industry Partnership
- Training Consortium of South Central Kentucky
- South Central Kentucky Regional Development Authority (SCKRDA)
- Local Elected Officials
- Warren County Area Public Schools/Technology Center
- Bowling Green Public School System
- Southcentral Kentucky Community and Technical College (SKYCTC)
- Western Kentucky University (WKU)
- BRADD/ Workforce Investment Board
- Office of Employment and Training
- Regional Economic Development Partners
- Employment Agencies

The Bowling Green Area Chamber subcontracted with Key Links Inc, a nationally-recognized education, workforce and economic development consulting firm, to facilitate the development of this Call to Action. Primary authors included: Dr. Audrey S. Theis, Ph.D., President, Key Links; Dr. Eileen Casey-White, Principle Researcher; and Melissa McVeigh, Research Assistant.

***“Our Industry Partnership will significantly impact our local advanced manufacturing sector. Our work will help increase the local labor pool, which will in turn help manufacturers expand and help us attract new business to the region.”***

***Michael Buchanon, Chair  
Regional Development Authority  
Judge Executive of Warren County***

## An Urgent Call to Action in Support of Manufacturing South Central Kentucky/Barren River Region Opportunity Knocks!

Manufacturers in south central Kentucky are sounding an urgent call to action!

- 88% report limited access to skilled workers as a barrier to expansion
- 74% are concerned about maintaining a skilled and motivated workforce
- 67% can't find skilled candidates for critical positions
- 63% worry about the employability and work ethic skills of available candidates

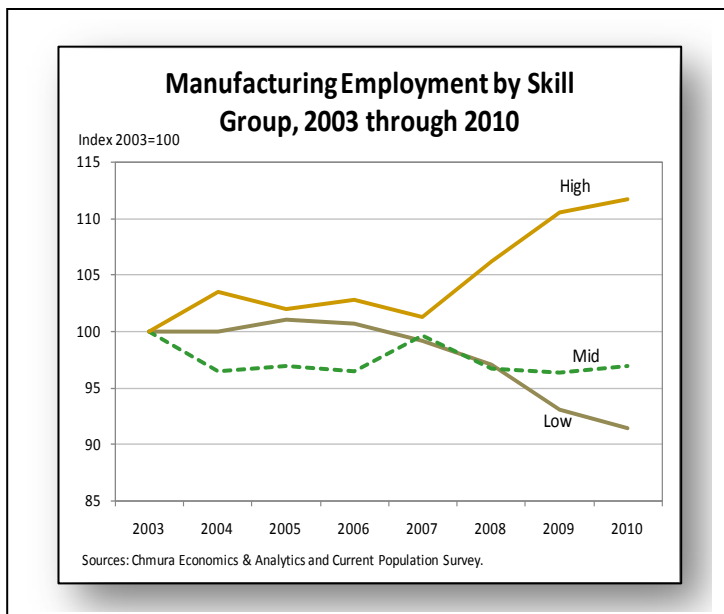
At the same time, **the region is projected to need over 4,500 workers by 2016 and over 9,000 by 2020** to fill critical middle-skill production and maintenance jobs, as well as management and engineering positions, due to impending retirements and new job growth.

Historically, most manufacturers looking to expand or locate in south central Kentucky have been able to find the workers they needed to do the job. Times are changing rapidly – “status quo” is no longer an option. Without prompt and collaborative action from business, government and education partners, the competitive position of manufacturers in the region will be compromised. Opportunity knocks in South Central Kentucky to build the premier workforce and education system in the country. This Call to Action outlines a framework for translating that vision into reality.

### The Urgent Need for Change

At the national level, and reflected in South Central Kentucky, dynamic shifts are fundamentally restructuring the economy and the manufacturing workplace:

- **Expanding Globalization.** In today's global economy, businesses can locate, acquire materials, provide services, sell products, and find talent anywhere. Having a highly skilled and credentialed workforce equal to or exceeding that of any other part of the world is critical.



- **Rapidly Advancing Technology.** Advances in technology are outpacing the capacity of most traditional teaching and learning systems to respond. Workers already on the job are challenged to maintain productivity and learn new skills at the same time.
- **Changing Nature of Work.** The days of performing the same task all day on the production line are gone. Modern manufacturing requires applied math, critical thinking, problem solving, decision making, an understanding of lean processes and teamwork.

- **Growing “Skills Gap.”** While the nature of work in manufacturing is getting more complex, many candidates available for work do not have what it takes to be successful in the modern manufacturing workplace. As a result, good jobs remain unfilled.
- **Demographic Shifts.** Kentucky’s manufacturing workforce is aging. Significant numbers of skilled workers will retire in the next decade with an inadequate supply of skilled, younger workers available to fill the gaps.
- **Image of Manufacturing.** Manufacturing suffers from old stereotypes and an outdated image. The potential pool of workers – high school graduates, unemployed adults, returning veterans, and others – don’t view manufacturing as a career of choice.

### Linking Economic Development, Education and Workforce Development

At the same time, core beliefs about economic development strategies are also shifting, placing a higher value on the quality and characteristics of the workforce than on traditional strategies and tactics such as financial incentives and cheap labor. As a result, regions attempting to position themselves at a competitive advantage in the marketplace are aggressively adopting sector strategies that link their business expansion and recruitment efforts closely to targeted education and workforce development investments and innovations.

**Figure 1: Economic Development Priorities are Shifting**

In the old economy people believed that:	In the new economy people believe that:
Being a cheap place to do business was the key.	Being a place rich in ideas and talent is essential.
Attracting companies was the key.	Attracting educated people is the key.
A high-quality environment was a luxury and stood in the way of attracting cost-conscious businesses.	Physical and cultural amenities are critical to attracting knowledge workers.
Local areas won because they had a fixed competitive advantage in some resource or skill.	Local areas prosper if people have the ability to learn and adapt.
Economic development was government-led.	Only bold relationships among business, government, and education can bring about change.

Adapted from: [www.neweconomyindex.org](http://www.neweconomyindex.org)

### Manufacturing is an Economic Priority

The good news is that leading business and economic development organizations in the region recognize the opportunity and have targeted manufacturing as a priority. The South Central Kentucky Regional Economic Development Partnership and Bowling Green Area Chamber of Commerce have targeted the following sub-sectors: Advanced Manufacturing; Automotive Parts and Suppliers; Fabricated Metals, Industrial Machinery and Plastics; Food Processing; Distribution and Logistics; and Niche/Emerging Industries. Both the Barren River Comprehensive Economic Development Strategy (2012) and the Barren River Workforce Investment Board (2011-2012 Local Plan) also identified manufacturing as a Growing Economic Cluster area.<sup>1</sup>

## Call to Action

While business leaders and elected officials in the region recognize manufacturing as an economic priority, the education and training providers in the region - by their own admission - have not fully organized to respond to the challenge at hand. Equally important, individual citizens are not aware of the career opportunities available to them in manufacturing, so they are not taking advantage of the education and training resources that currently exist.

This Call to Action, and the three-year Implementation Plan that will be developed to support it, builds on the collaborative efforts already in place in the region. However, it challenges key stakeholders to move aggressively in new strategic directions. Manufacturers in the region have identified four key areas in which change is needed.

### The Vision for Change

**Employers:** Manufacturers in South Central Kentucky can find the workers they need to prosper, grow, and remain competitive in the global marketplace.

**Individuals:** Workers in the region have the knowledge and skills required to be productive in the manufacturing jobs of today, but also the critical thinking and innovation skills to advance in the manufacturing careers of tomorrow.

**Systems/Accountability:** Education and workforce systems are aligned with employer requirements and make both efficient and effective use of resources to achieve improved outcomes for both manufacturers and workers.

**Communications:** Enhanced communication efforts raise awareness of the value of manufacturing in the region and promote its high-wage career opportunities to potential workers.

## Structure of Report

This Call to Action is designed to answer five key questions. Each section presents the data and information collected to answer each of these questions.

- What does the data suggest about manufacturers' workforce needs?
- What manufacturing-related programs and activities are workforce, education and training providers currently offering?
- What career pathways in advanced manufacturing will prepare the region to support future innovation and growth?
- How can an Action Plan – and its recommendations for change - be structured to ensure long-term sustainability?
- How can consistent messaging about manufacturing and its opportunities be marketed effectively to targeted audiences?

## Manufacturing Matters in South Central Kentucky

Ten counties comprise the Barren River region in South Central Kentucky. In 2012, **over 200 manufacturing firms** in the region employed **over 31,600 workers** with a **total payroll of nearly \$450 million.**<sup>2</sup> **In this report, “manufacturing” or “manufacturing-related” refers to companies in the 10-county area with 10 or more employees that produce goods and/or transport those goods to other markets.**<sup>3</sup>

**Manufacturing is the largest employment sector in the region.** In four of the region’s counties, the manufacturing sector employs more workers than any other industry and is the second-largest employment sector in three more. Over 22,500 workers are employed in manufacturing plants producing a wide range of products, with an additional 9,200 in warehousing and transportation. Manufacturing-related industries employ nearly thirty-percent (30%) of the Barren River workforce.<sup>4</sup> *(See Figure 2, Manufacturing: Regional Overview)*

**High wages and benefits sustain communities.** Manufacturing provides the highest weekly wage among all traded-sector industries in a majority of the counties, with an average of \$782.96 (approximately \$19.60 per hour), more than 25% higher than the average wages of other sectors in the region. In more than half the counties, employers in the manufacturing and transportation/distribution sectors are the highest source of wages for their residents.<sup>5</sup> Seventy percent (70%) of those employers provide an annual bonus to workers, and 93% of their medical plans cover both employees and dependents.<sup>6</sup>

**Manufacturing careers support upward mobility.** With an average wage of nearly \$20 per hour, manufacturing jobs can provide stability and opportunity for communities. Workers also tend to stay in the industry and build their skills, so they can advance into positions of higher skill and higher pay.

**Manufacturing is diverse.** South Central Kentucky manufacturing, generally associated with transportation equipment, actually includes a wide variety of industry sub-sectors. The chemical, rubber & plastics manufacturing sector employs close to one-fifth of the workforce, followed by warehousing, storage, and distribution companies, which employ nearly 6,000.<sup>7</sup> *(See Figure 3, Company Distribution by Subsector)*

**Small companies dominate the region.** The vast majority of manufacturers in South Central Kentucky are small businesses. Nearly eighty-five percent (85%) of the manufacturing-related firms have fewer than 250 employees; almost forty percent (40%) have less than 50. Only 15 companies in the region have more than 500 workers.<sup>8</sup> *(See Figure 4, Company Size)*

**Employers are making a green impact.** A 2011 study by the Kentucky Education and Workforce Development Cabinet noted that forty percent (40%) of manufacturers in the region are producing new green products, and more than half (66%) are adopting green manufacturing processes. Over eighty percent (80%) of manufacturers report educating their workforce on green sustainability practices.<sup>9</sup>



**Figure 2: Manufacturing: Region Overview**

County	# of Companies	# of Employees	Food /Beverage	Textiles &Apparel	Wood & Paper Products /Printing	Chemical, Rubber & Plastic	Primary Metal & Nonmetallic	Fabricated Metal &	Computer, Elec-tronic ,Electrical	Transportation Equipment	Warehousing, & Distribution
Allen	7	1,891	X		X			X		X	X
Barren	32	5,170	X		X	X	X	X	X	X	X
Butler	12	994		X	X	X	X	X		X	
Edmonson	1	50							X		
Hart	9	2,210	X	X	X	X		X	X		
Logan	26	2,855	X	X	X	X	X	X	X		X
Metcalfe	5	591		X	X	X				X	
Monroe	8	562		X	X			X			X
Simpson	30	4,007	X	X	X	X	X	X	X	X	X
Warren	77	13,274	X	X	X	X	X	X	X	X	X
<b>TOTALS</b>	<b>207</b>	<b>31,604</b>	<b>13</b>	<b>13</b>	<b>44</b>	<b>29</b>	<b>19</b>	<b>32</b>	<b>6</b>	<b>27</b>	<b>24</b>

**Figure 3: Distribution of Companies by Sub-sector**

NAICS	Manufacturing Industries	# of Companies	# of Employees
311-312	Food; Beverage & Tobacco Products	13	2,046
314-316	Textile Product Mills; Apparel	12	2,175
321-323, 337	Wood & Paper Products; Printing & Related Support	44	3,633
324-326	Petroleum & Coal Products; Chemical; Plastics & Rubber	28	5,736
327, 331	Nonmetallic Mineral Products; Primary Metals	19	3,430
332-333	Fabricated Metal Products; Machinery	32	2,437
334-335	Computer & Electronic Products; Electrical Equipment, Appliance, & Components	6	1,225
336	Transportation Equipment	27	5,898
484. 493	Warehousing, Storage, and Distribution	26	5,024
	<b>TOTALS</b>	<b>207</b>	<b>31,604</b>

**Figure 4: Company Size**

# of Employees	# of Companies	% of Total Companies	Primary Industry Sub-sectors For Various Size Companies
10 to 49	76	37%	Wood & Paper Products; Printing; Fabricated Metal, Machinery Manufacturing; Warehousing & Distribution
50 to 99	43	21%	Fabricated Metal, Machinery, Transportation Manufacturing; Chemical, Plastics, Rubber Manufacturing
100 to 249	54	26%	Primary & Fabricated Metals Products; Transportation Equipment; Plastics & Rubber
250 to 499	19	9%	Transportation Equipment Manufacturing; Food
500 to 999	12	6%	Transportation Equipment Manufacturing
1000+	3	1%	Primary Metal, Plastics & Rubber Products Manufacturing, Warehousing & Storage

## Manufacturing Workforce Challenges

Local employers see the development and expansion of manufacturing in the region as top priorities. In an online survey conducted through the Bowling Green Area Chamber of Commerce, leaders from 30 manufacturing companies identified the opportunities and challenges they face. Respondents represented 10 manufacturing subsectors and five counties in companies from 20 to 1,000 workers. While not a large sample, it represented a cross-section of manufacturing in the region. The initial survey results were confirmed by an employer focus group and cross-referenced with other anecdotal information collected by the Chamber and Kentucky labor market information experts.

### Workforce Survey Highlights

- 88% see limited access to skilled workers as a barrier to expansion
- 74% worry about maintaining a skilled and motivated workforce
- 67% can't find skilled workers for some positions

### Local employers are facing workforce challenges and want to find solutions.

More than two-thirds of those surveyed can't find skilled candidates for some positions, and nine out of ten see limited access to skilled workforce as a barrier to expansion. More than half find limited problem-solving skills in candidates, and in current employees.

**Critical jobs are directly impacted by retirements. By 2016, over 4,500 skilled workers will be needed to fill openings in manufacturing in the Barren River Region, with more than 9,000 needed by 2020.** Management and middle-skilled jobs will see tremendous turnover in core occupational areas in the next decade due to an aging workforce. Over half (67%) of manufacturers surveyed are already beginning to feel the pain for some high-demand positions. Almost 100% of the growth in high-demand occupations in production and 90% of those in transportation and distribution each year will come from replacing, through attrition and/or retirement, employees currently on the job.<sup>10</sup> (See Figure 5: Projected Job Openings by High-Demand Occupational Groupings)

**Critical foundation and employability skills need improvement.** Almost 80% of manufacturer responding to the survey indicated that lack of basic employability skills was a moderate or significant problem in new hires, followed by a lack of basic technical training and inadequate critical thinking/problem-solving skills. These findings were reinforced by the manufacturers focus group sponsored by the Chamber. (See Figure 6: "Soft Skill Deficiencies.")

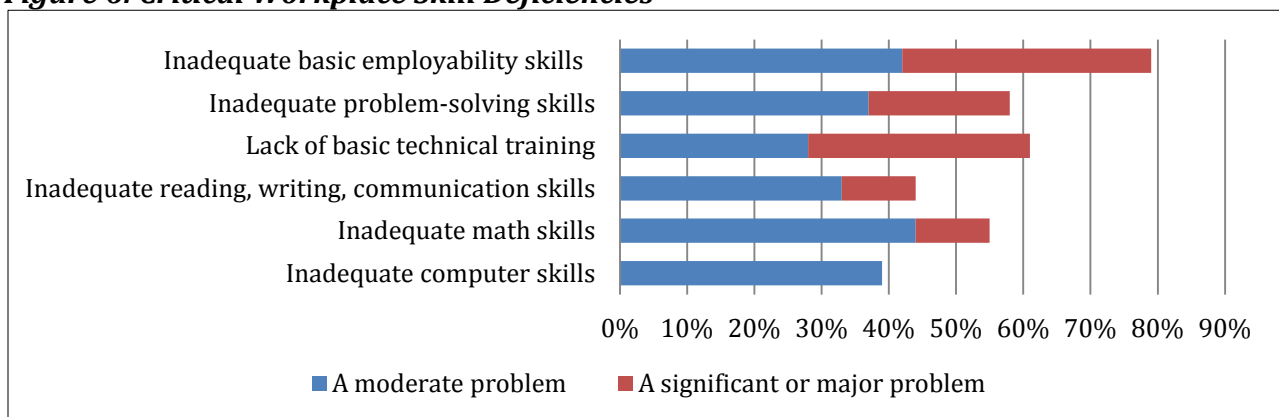
**The emerging workforce in the region will need additional education and training to compete for "middle-skill" jobs.** A recent study by the Kentucky Center for Education and Workforce Statistics<sup>11</sup> found that education levels vary widely across the 10-county Barren River region. As the requirements in the modern manufacturing workplace continue to rise, more workers will be needed for "middle-skill" jobs, those requiring more than a high school diploma but less than a four-year college degree. Higher-educated workers can attract and support more advanced manufacturing firms, which bring better wages and economic stability to the region. (Figure 7: County Education Levels)

**Figure 5: Projected Job Openings by High-Demand Occupational Groupings**

Major Occupational Groupings Related to Projected Job Growth	Job Openings: 2013-2016			Job Openings: 2013 - 2020		
	Growth	Separation	Total	Growth	Separation	Total
Production	105	1,503	1,608	210	3,006	3,216
Maintenance & Repair	216	918	1,134	432	1,836	2,268
Engineering & Design	72	315	387	144	630	774
Transportation, Distribution, & Logistics	99	1,383	1,482	198	2,766	2,964
<b>TOTAL</b>	<b>492</b>	<b>4,119</b>	<b>4,611</b>	<b>984</b>	<b>8,238</b>	<b>9,222</b>

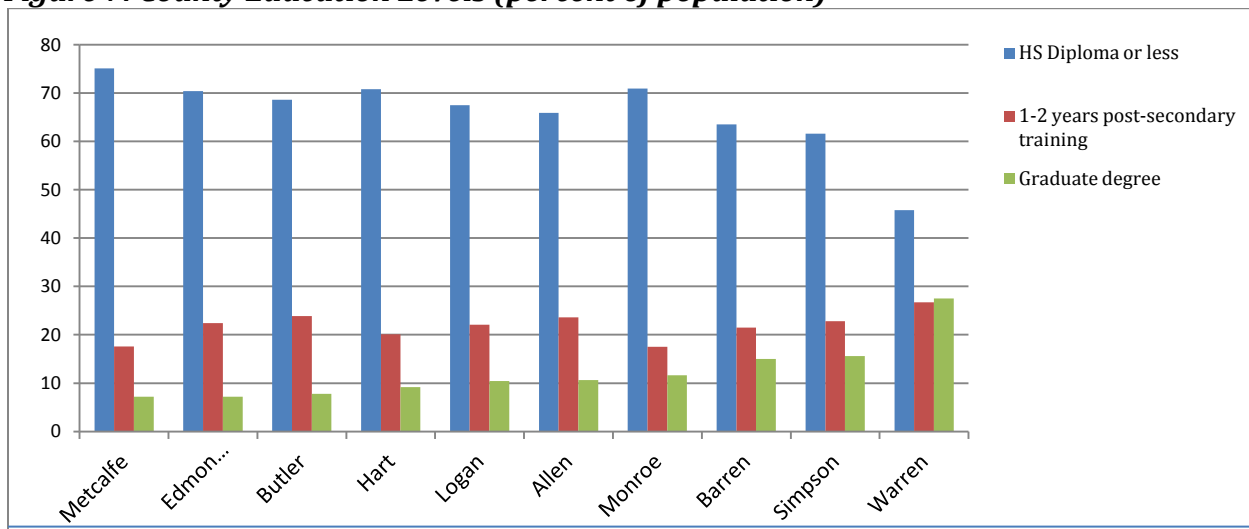
Source: Barren River Occupational Outlook 2008-2018. The projected average annual openings were multiplied by 3 (2013-2016) and 6 (2013-2020) to project anticipated growth.

**Figure 6: Critical Workplace Skill Deficiencies**



Source: South Central Kentucky Manufacturing Survey, conducted February 2012.

**Figure 7: County Education Levels (percent of population)**



Source: Kentucky Department for Workforce Investment, Labor Market Information ([www.kylmi.ky.gov](http://www.kylmi.ky.gov)).

## Current Workforce, Education and Training Programs

In developing this Call to Action, information and data on current workforce, education, and training programs were collected through a combination of Internet research, surveys and personal interviews.<sup>12</sup> Data collection was limited to Warren County with the intent of developing a model manufacturing-related education and training delivery system that could eventually be replicated in other counties in the region. Summarized below are the findings related to existing manufacturing-related workforce, education, and training programs in Warren County.

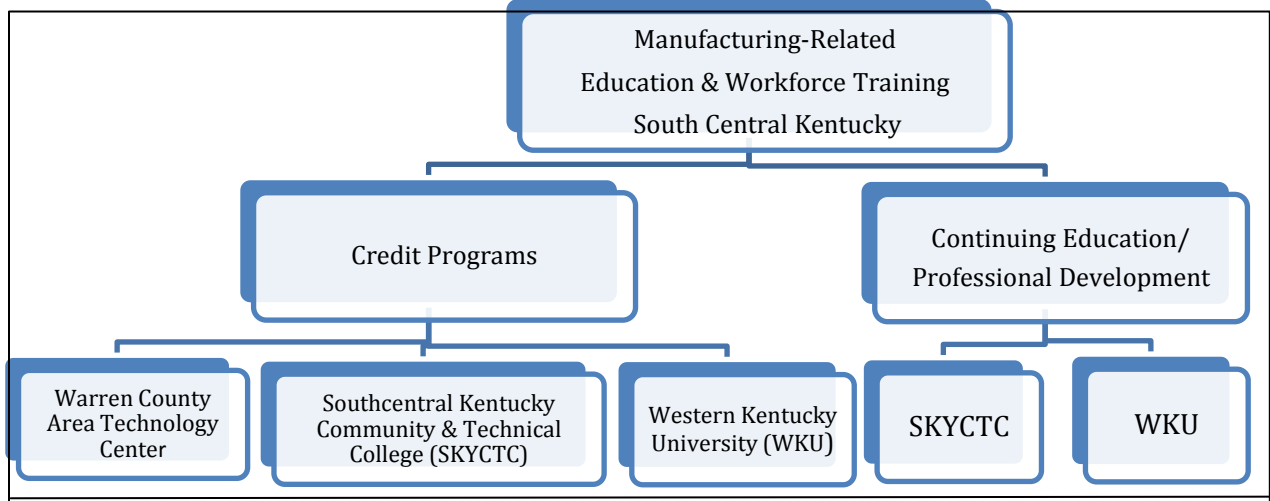
**Foundation and entry-level skills development in high school are limited.** Currently, opportunities are very limited for high-school students to go directly into the manufacturing workforce or to earn college credits for high school classes. The region does not actively promote the Warren County Area Technical Center, which is the primary provider of secondary career technical education in the region. The Center currently offers welding to 40 high-school students but has the capacity to serve 80 more students in industrial maintenance and machine tools, if given the resources to hire additional teachers and to promote its agenda.<sup>13</sup> Similarly, while the Bowling Green City Schools currently offer virtually no manufacturing-related programs, the superintendent expressed significant interest in providing manufacturing career awareness and promoting Science, Technology, Engineering and Math (STEM) skills in the city high school.<sup>14</sup>

**Few direct feeder systems exist to capture talent pools into manufacturing.** Dislocated workers, returning veterans, underemployed young adults, and others are typically targeted as potential pools of workers to fill manufacturing positions. While the regional Workforce Board 2012 Strategic Plan suggests that six of its eight (75%) targeted industry areas are in manufacturing,<sup>15</sup> there was little evidence that the One Stop Center is actively identifying, preparing or referring a robust pool of potential candidates for manufacturing vacancies and only 20% of its current funding is allocated in support of manufacturing. Links with Adult Basic Education and other adult workforce programs need to be strengthened.

**Two institutions dominate post-secondary education.** Two comprehensive educational institutions offer manufacturing-related, for-credit degrees as well as continuing education/professional development in the region: Southcentral Kentucky Community and Technical College (SKYCTC)<sup>16</sup> and Western Kentucky University (WKU)<sup>17</sup>. These two institutions provide the vast majority of manufacturing-related education and training in the area (*See Figure 8: Post-Secondary, Manufacturing-Related Delivery System*).

**For-credit available program offerings are significant.** Collectively, SKYCTC and WKU offer sixteen degree-granting, manufacturing-related programs culminating in an educational credential (*See Figure 9: Manufacturing-Related Programs, left column*). In addition, SKYCTC has the capacity to grant over forty *Diploma and Certificate awards (right column)*, currently granted primarily to those individuals who do not earn enough credits for an Associate of Applied Science (A.A.S.) degree in their chosen field of study. Since the Diploma and Certificate programs are already approved by the state, the infrastructure exists to deliver education and training to a significantly greater number of students.

**Figure 8: Post-Secondary, Manufacturing-Related Education and Training Delivery System**



**Figure 9: For-Credit Manufacturing-Related Programs Offered by SKYCTC and WKU**

<p><b>Master’s Degree (WKU):</b></p> <ul style="list-style-type: none"> <li>MS Engineering Technology Management</li> </ul> <p><b>Bachelor’s Degree (WKU):</b></p> <ul style="list-style-type: none"> <li>Advanced Manufacturing: Manufacturing &amp; Industrial Distribution</li> <li>Advanced Manufacturing: Food Processing</li> <li>Industrial Education</li> <li>Technology Management</li> <li>Electrical Engineering</li> <li>Mechanical Engineering</li> <li>Business Management</li> </ul> <p><b>Associate’s Degrees (WKU and SKYCTC):</b></p> <ul style="list-style-type: none"> <li>A.A. Manufacturing Management (WKU/University College)</li> <li>A.A. Business Management (WKU/University College)</li> <li>A.A.S. Vocational/Industrial &amp; Technical Teacher Education (WKU)</li> <li>A.A.S. Industrial Maintenance Technology (SKYCTC)</li> <li>A.A.S. Computerized Manufacturing &amp; Machining Technology (SKYCTC)</li> <li>A.A.S. Robotics &amp; Animation/Engineering Technology (SKYCTC)</li> <li>A.A.S. Electrical Technology (SKYCTC)</li> <li>A.A.S. General Occupation/Technical Studies (Welding Technology) (SKYCTC)</li> </ul>	<p><b>Diplomas and Certificates (SKYCTC):</b></p> <ul style="list-style-type: none"> <li>Diploma - Industrial Maintenance</li> <li>Diploma - CNC Machinist</li> <li>Diploma - Robotics &amp; Automation</li> <li>Diploma - Construction Electrician</li> <li>Diploma - Industrial Electrician</li> <li>Diploma - Combination Welder</li> <li>Certificates - Exploratory Machining, Machine Operator, Machine Operator II</li> <li>Certificates- Electrical Construction, Industrial Electrician, Electrician Trainee L1 &amp; L2, Residential Electricity L1 &amp; L2, Electrical Motor Control L1 &amp; L2</li> <li>Certificates – Automation Technician I, Electronics Technician I &amp; II, Electronics Tester, Industrial Technician I &amp; II, Maintenance Technician I &amp; II, Mechatronics Systems Operator, Robotics &amp; Automation Tech, Robotics &amp; Automation Helper</li> <li>Certificates – IM Machinist Mechanic, IM Electrical Mechanic, IM Mechanic L1 &amp; L2</li> <li>Certificates – Welder Helper, Gas Welder, ARC Cutter, Tack Welder, Production Line Welder, ARC Welder, Pipeline Welder, AWS National Skills Standards L1, Shielded Metal ARC Welder, Gas Metal ARC Welder, Gas Tungsten ARC Welder</li> </ul>
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**Customized training and professional development offerings are extensive.** Both WKU (through its Career and Workforce Development Division<sup>18</sup>) and SKYCTC (through its Workforce Solutions Division<sup>19</sup>) offer a broad range of both customized training and professional development classes. While the delivery systems serve all industry sectors, both institutions provide customized training to regional manufacturers in areas such as supervisor training, leadership, health and safety communication, computer and lean training. Most programs are offered or can be offered for college credit; 90% of training at SKYCTC's Workforce Solutions is credit-based.

**Post-secondary institutions have significant strengths.** Employers and institutional representatives alike recognize numerous strengths in the current post-secondary, manufacturing offerings.

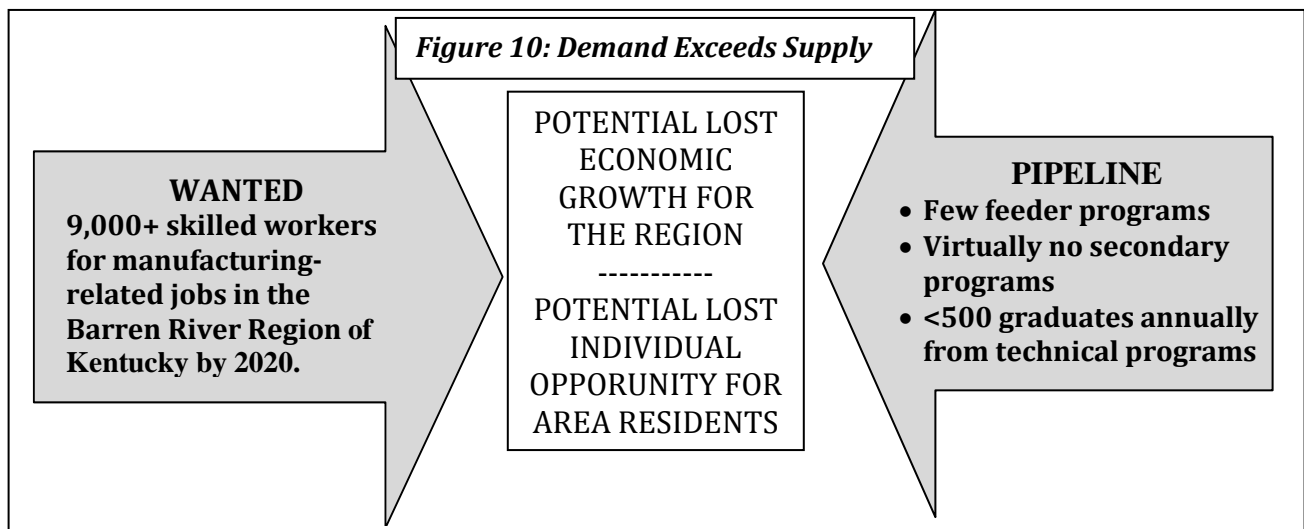
- **Adequate facilities and equipment.** Instructors report that labs for teaching and research at both schools are adequately equipped, and, in some cases, state-of-the-art, although keeping up with the rapidly changing technology is challenging.
- **Dedicated leadership and faculty.** Employers report that their interactions with the regional institution are generally positive, and that the institutional leaders and faculty are dedicated and responsive. Many professors and instructors report use of their own connections with local businesses to arrange co-ops and internships for their students to facilitate possible employment, down the road.
- **Emerging new educational leadership.** Within the next few months, new education leaders will be in place: President of the community college; Superintendent of the county school system, and Principal of the county technical high school. This provides an outstanding opportunity to shape a new vision for the region in manufacturing education.
- **Significant statewide investments.** The region benefits significantly from two statewide funding programs. KY WINS (Kentucky Workforce Investment Network System) provides assistance to qualifying companies for training, testing and assessment services through Workforce Solutions at SKYCTC.<sup>20</sup> The Bluegrass State Skills Corporation provides workforce training grants for individual companies, as well as companies affiliated with the Training Consortium of South Central Kentucky.<sup>21</sup>
- **Several strong “umbrella” organizations.** The region has a few umbrella organizations dealing with education and training. WKU and SKYCTC join forces, along with local industries and the Chamber of Commerce, for the Training Consortium of South Central Kentucky, to offer professional development and technical training at a reasonable cost.<sup>22</sup> Another unique business-education partnership model is the WKU Engineering Industrial Partnership, which has nine partner manufacturing companies who pay annual dues of \$5,000 to gain access, via special events, to the highest-achieving engineering students.<sup>23</sup> Manufacturers viewed both models as effective ways to address the workforce needs of multiple companies and advocated for their expansion and/or the creation of similar consortium activities.

## Disconnects between Employer Needs and Current Delivery Systems

While current education and training providers do have significant strengths when compared with employer needs, disconnects do exist.

### **Disconnect #1: A significant mismatch exists between projected employment needs for “middle-skill” jobs and the current output from existing workforce and education/training programs.**

- **Demand far exceeds supply.** Over the next three years, the region will need thousands of skilled workers. Currently there is no strong feeder system into manufacturing, and the technical school and community college together are graduating only several hundred students a year from manufacturing related programs, particularly in mid-level, technical-type positions. (See Figure #10).
- **Potential worker pools need to be bolstered.** Talent pools need to be expanded, including high school graduates, underemployed adults, dislocated workers, returning veterans, disabled adults, and others available for work. After assessment, some may need only on-the-job training or short-term training to enter the workplace.
- **Many jobs will not require a two-year degree.** Manufacturers reported that many middle skill jobs do not require a two-year degree. That would suggest that SKYCTC could market its short-term certificate and one-year diploma programs as having value in the marketplace, not just to be awarded if an individual fails to complete a two-year degree.
- **University talent needs to be captured.** Not surprisingly, WKU is graduating many more engineers than will be needed by area manufacturers, since four-year schools provide education to individuals beyond the local labor market. The opportunity here is for the region’s manufacturers to capture the best and brightest talent, and keep it in the region. It also means the region could recruit an engineering firm headquarters to locate and take advantage of the talent pool.



**Disconnect #2: Clearly articulated manufacturing career pathways (high-school through university) are not in place; programs are not aggressively promoted to area residents.**

While SKYCTC offers some dual credit programs to introduce high-school students to manufacturing careers, and some programs articulate between the community college and university, a bona fide manufacturing career pathway system does not exist in the region.

- **Foundation programs and feeder systems are weak.** Employers stressed the importance of basic employability and applied academic skills in the workplace, yet the programs that would offer those skills – public schools and the workforce system – currently don't to a significant degree, particularly as it relates to manufacturing.
- **Few articulated programs of study.** The high school/technical school, community college and university do not routinely collaborate to provide comprehensive programs of study in manufacturing and manufacturing-related areas. In a career pathways system, individuals would know exactly what programs lead to which jobs, and how much those jobs pay. What will I learn, and how much will I earn?
- **Most manufacturing programs are not aligned with industry certifications.** Few technical programs offered in the region are aligned with and offer industry certification, a tool for validating performance in the workplace. Competitor states such as Indiana have embraced industry certifications, and can boast a “certified” workforce in manufacturing.
- **Career opportunities in manufacturing aren't aggressively promoted.** While individual providers promote individual programs to some extent, no “campaign” to promote the career opportunities available in manufacturing was evident.

**Disconnect #3: Educational institutions offer fairly traditional approaches to service delivery.**

In order to address pressing gaps in education and training, educational providers will have to become innovative... and do it quickly. Both WKU and SKYCTC have fairly traditional educational approaches with few accelerated innovative delivery models. Embracing new delivery models and moving to competency-based education systems would more quickly fill the pipeline of skilled workers.

**Disconnect #4: Virtually no programs exist in transportation, distribution and logistics.**

Despite the fact that there is a growing need for workers in the transportation, distribution and logistics sector, virtually no programs of study are offered in the area at either the community college or university.

**Disconnect #5: Employers report the short-term training landscape is cluttered.**

WKU and SKYCTC are basically in competition for continuing education and professional development, in a relatively small market area. There are so many offerings it is difficult to understand what is offered, how to navigate through the maze, and who to contact. Numerous programs are redundant/duplicative, and potentially confusing to the end customer.



## Major Findings and Recommendations

Four major system findings and recommendations emerged from an analysis of the data, as summarized in the table below.

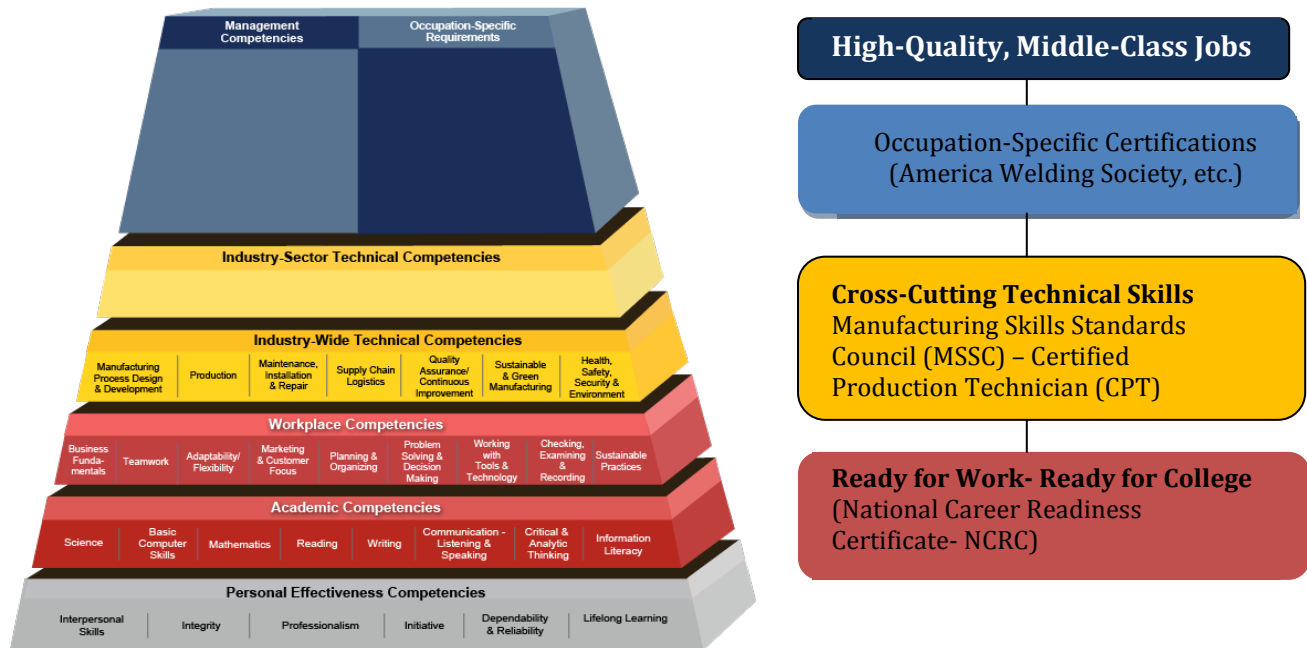
**Figure 11: Major Findings and Recommendations**

	<b>Finding</b>	<b>Recommendation</b>
#1	Education and training providers function in relative isolation.	Build an articulated career pathway system designed to address manufacturers' needs and strengthen <b>education-education partnerships</b> .
#2	Business-education partnerships happen as disconnected pockets of activity.	Greatly expand and coordinate <b>business-education partnerships</b> to link real-world experiences with classroom learning.
#3	No aggregated "business voice" exists to drive and monitor change.	Implement a "network of networks" business model to promote <b>business-business partnerships</b> .
#4	No coordinated marketing/outreach campaign is in place to promote career opportunities.	Launch a <b>regional marketing/outreach plan</b> to promote the high-wage career opportunities available in manufacturing.

### **Recommendation #1: Build an articulated career pathway system designed to address manufacturers' needs and strengthen education-education partnerships.**

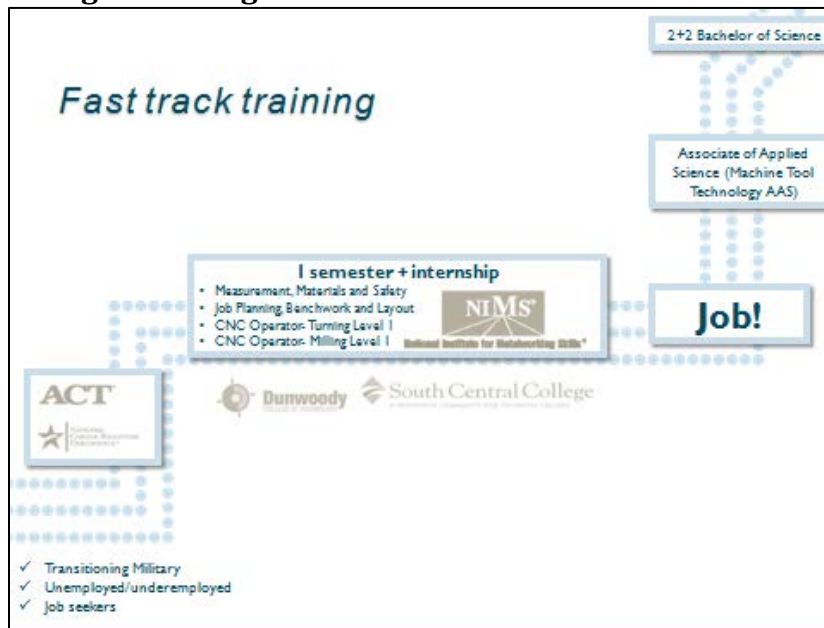
- **Accelerate the identification of workers available for middle skill jobs.** Potential pools of workers would include: high school graduates, underemployed adults, dislocated workers, returning veterans, disabled adults, and others available for work.
- **Create functional "feeder systems"** to identify potential workers and assess their current employability and foundation skill levels. Such feeder systems would include area high schools, One Stop Centers, Adult Basic Education programs, etc. Assessment centers could be established at the One Stop and community college.
- **Build a manufacturing career pathway system.** Enhance existing and/or build new manufacturing- related programs of study (high school/community college/ four-year) that support projected high-growth industry sectors and high-demand occupations. Articulate programs so that credits fully transfer from one institution to the next. Expand opportunities for dual credit.
- **Emphasize critical foundation, workplace and cross-cutting technical skills.** Greatly expand manufacturing-related programs offerings at the high school level. Build workplace skills (including critical thinking, team work, and problem solving) into all levels of curriculum. Emphasize cross-cutting technical skills such as safety, maintenance awareness and quality assurance.

**Figure 12: Advanced Manufacturing Competency Model and Certification Alignment**



- **Embed industry-certifications into credit programs.** Adopt the NAM-Endorsed Skills Certification System, a system of stackable credentials that applies to manufacturing industries. Students earn not only education credentials, but also industry-validated, nationally portable industry certifications with real value in the marketplace. (See Figure 12)

**Figure 13: Right Skills Now Model**



- **Deliver accelerated technical training in high-demand occupational areas.** Adopt the “Right Skills Now” model for accelerated training that combines one semester of technical training and one semester of internship with several industry certifications and a high probability of job placement. (See Figure 13)

- **Enhance Science, Technology, Engineering and Math (STEM) skills.** Enhance STEM skills at all levels of the curriculum. Develop a STEM Coalition across the three institutions. Adopt the Project Lead the Way curriculum at the middle, high school and community college levels.

**Project Lead the Way** develops the critical-reasoning and problem-solving skills that will help students become productive and innovative workers.

- Students are engaged in activities-, projects-, and problem-based learning, which provide hands-on classroom experiences.
- Students create, design, build, discover, collaborate and solve problems while applying what they learn in math and science.
- Professionals from local industries supplement the real-world aspect of the curriculum through mentorships and workplace experiences.

- **Consider an Applied Bachelor’s Degree at WKU to facilitate transfer of Applied Associate of Science (AAS) graduates from SKYCTC.** Promote articulation models that allow students to receive full credit for course-work completed as part of an AAS degree.

**Indiana State University** recently launched a Bachelor’s in Applied Science (BAS) degree for professionals who have earned an associate of applied science degree and who are interested in furthering their career in a technology-related field. The BAS offers career-oriented instruction, fewer general education courses, and more project-based learning. The BAS promotes industry certifications and prepares individuals to manage people, projects and information.

### **A Pennsylvania Case Study**

A Seamless Pathway from High School to University with Embedded Industry Certifications

Driven by the needs of regional industry, a Bachelor of Applied Science (BAS) in technical leadership degree program was created through a cooperative effort among three institutions: Lehigh Career & Technical Institute (a secondary career & technical school), Lehigh Carbon Community College, and Bloomsburg University (part of the Pennsylvania State Schools of Higher Education system). This is the first program of its kind in the state and is a career-oriented degree based on knowledge and skills needed by technical professionals.

Students begin their college education while in high school at Lehigh Career & Technical Institute (LCTI) through dual enrollment at Lehigh Carbon Community College (LCCC) and Bloomsburg University. In some cases, students can begin as early as ninth grade preparing for industry credentials used for advanced standing at LCCC and the award of college credits in the Bachelor of Applied Science (BAS) program. For instance, Welding Technology and Machine Technology students can be awarded up to 30 college credits by earning AWS or NIMS certifications while still in high school.

The BAS degree provides a seamless pathway for students who have earned an associate of applied science (AAS) degree which was previously thought of as a “terminal” degree. The program is offered in a 2+2+2 format with multiple entry points to serve students in career-technical high schools, community colleges and working professionals.

## Recommendation #2: Greatly expand and coordinate business-education partnerships to link real-world experiences with classroom learning.

- **Expand work-based learning opportunities, especially co-op.** Expand the number of opportunities students at all levels have to participate in work-based learning opportunities. Adopt an Employer Participation model that allows companies to participate at a variety of levels: Career Talks, Workplace Tours, Job Shadowing, Internships, Youth Apprenticeship, Mentoring and others. Implement hybrid models that build co-op experiences into regular for-credit classes.
- **Restructure the Training Consortium of SCKY.** Promote the benefits of the Consortium more widely in order to expand membership. Offer a broader range of training options and be more flexible in terms of meeting members' changing needs, i.e., move away from an annually planned set of offerings. Charge a more substantial fee for membership and revise administrative procedures to eliminate unnecessary paperwork.
- **Re-energize Education Advisory Boards/Workforce Investment Board.** The region has several dozen Advisory Groups that advise on manufacturing education and training. Revisit the numerous groups to evaluate their viability; consolidate as appropriate. Link the work of these various groups to this larger Action Plan so businesses can help drive a common agenda for change.

### **Toyota Motor Manufacturing Supports Internships and Certifications**



Toyota has helped to drive change in San Antonio, Texas, by offering internships and preferring industry-based certifications in its Motor Manufacturing facility. In partnership with Alamo Community Colleges Advanced Technology and Manufacturing Academy (MTMA), high school juniors and seniors spend 2½ hours each day at Alamo campuses completing an industry-driven curriculum to develop work ready skills in manufacturing.

The dual-credit program, which is at no personal cost to students or parents, allows participating students to graduate high school with 27-35 credit hours, the equivalent of a college occupational diploma or one-year certificate in manufacturing technology. Students also earn their National Career Readiness Certificate (NCRC) and the Certified Production Technician credential from the Manufacturing Skill Standards Council (MSSC). With support from the San Antonio Manufacturers Association (SAMA), students participate in internships—like those at Toyota—and can earn as much as \$2,800 during the summer.

**Recommendation #3: Launch a “network of networks” business model to promote business-business partnerships in manufacturing.**

- **Advanced Manufacturing Industry Partnership within the Chamber.** Sustain and expand membership on the Industry Partnership within the Chamber to serve as the “aggregated voice” of manufacturing in the region. Add members with leadership on other regional manufacturing advisory boards to create interlocking leadership groups.
- **Establish a High Performance/Lean Enterprise Consortium.** Companies across the county pursuing common lean goals have developed consortia models that help them “cooperate to compete.” Work with the regional Manufacturing Extension Partnership to launch a High Performance Regional Consortium. Aggregate training needs across high-performance companies.

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**Emerald Valley High Performance Enterprise Consortium**  
**A model for fostering a “learning network” among small and mid-sized employers**

<b>Project Partners</b>	Local Businesses in Lane County, OR; Lane Workforce Partnership, Lane County Economic Development, Lane Community College Small Business Development Center
<b>Problem to be Solved</b>	How can manufacturers sustain economic competitiveness in local to global markets?
<b>Customer</b>	Small and medium sized businesses and their workforce.
<b>Overview of Initiative</b>	<p>Formed in 2007, EVHPEC is a business-led consortium of local companies learning and implementing Lean /High Performance practices. Companies learn and share best practices to continuously improve business, job retention, and job growth. With a focus on product quality, timeliness, and managed costs, companies are able to be more successful in attracting and retaining customers in local to global markets. Trainings focus on increasing value-added and decreasing non-value added activity (waste). The business improvements apply across the enterprise in transformational processes that create goods and services.</p> <p>EVHPEC has had a steady membership of twelve companies that pay annual dues to support the costs of providing trainings and project management. EVHPEC is organized as a business league: 501-c-(6) nonprofit. Members are companies in the key industries of Electronics Manufacturing, Transportation Equipment, Plastics, Metals Fabrication, etc.</p>
<b>Results</b>	From 2007 through 2011 the Consortium has provided workforce training in 15 specialized topics supporting Lean and business improvement practices. There have been 908 enrollments from local businesses in the focused training and learning events. Examples of results include increasing production at a workstation by 50%, reducing costs of a production process by 65%, reducing inventory levels by 30 % in raw materials and 75% in finished goods, better “flow” in manufacturing processes, and reduced work in process by 80 %, and improved throughput by 54%. These results translate into longer term job retention and business sustainability.
<b>Costs</b>	Trainings range from \$500 for half day events to \$5,000 for full day conference type events. Consortium project management on a part-time basis is \$25,000 to \$40,000 yearly depending on the scale of training events and consortium activities produced.



**Recommendation #4: Implement a regional communications/marketing plan to promote manufacturing.**



- **Leverage Dream It Do It**, the National Association of Manufacturers campaign to change the perception of manufacturing careers. Local manufacturers, schools, workforce boards, community organizations and other stakeholders can leverage a respected national platform sponsored by The Manufacturing Institute, an affiliate of the National Association of Manufacturers. The Bowling Green Chamber will be a sub-franchise to the Kentucky Manufacturing Association in launching the Dream It! Do It! campaign in October, 2013.



- **Endorse the NAM Manufacturer's Pledge.** Set annual goals to get manufacturers to sign and act on the Pledge to:
  - Invest/partner with education institutions
  - Promote a positive image of manufacturing
  - Stand as a policy leader

*We pledge to support the attraction, qualification, and development of world-class talent. We will engage our leadership, employees, business partners, or suppliers over the next year to take action in our communities. We will help to change the image of manufacturing, engage talent, and rebuild manufacturing education...*



- **Celebrate Manufacturing Day-October 4, 2013.** Use Manufacturing Day as a focal point to formally launch the Call to Action Plan in South Central Kentucky. Set a goal to have 10% (20) regional manufacturers offer tours and promote their workplaces.

*Manufacturing Day addresses common misperceptions about manufacturing by giving manufacturers an opportunity to open their doors and show, in a coordinated effort, what manufacturing is — and what it isn't. By working together during and after Manufacturing Day, manufacturers will begin to address the skilled labor shortage they face, connect with future generations, take charge of the public image of manufacturing, and ensure the ongoing prosperity of the whole sector.*

## Next Steps

The next step in the roll-out process of this Call to Action is to have working sessions among key stakeholder groups to review the recommendations and begin to plan for implementation. Like the development of this paper, implementation planning will be an employer-driven, collaborative process that will involve all partners and stakeholders.

Several critical actions will take place over the next few months (July-October):

- **Development of a collaborative, three-year Implementation Plan.** Key stakeholders will be invited to help develop an implementation plan to identify key strategic initiatives for years one, two and three.
- **Identification of key metrics to track progress.** The manufacturers leading the Industry Partnership planning process will begin to identify a few key metrics that can be used to track progress of the change effort against measurable outcomes. Metrics will not apply to individual institutions but rather to the manufacturing workforce, education, and training system as a whole.
- **Kick-off event:** A kick-off event will announce the formalization of the Advanced Manufacturing Industry Partnership and its three-year action plan. Ideally, an Annual Summit will follow each year to review progress against select metrics and celebrate success.

The Barren River region is pressing “reset” to take advantage of a great opportunity. Thousands of good jobs will be opening up to area residents in the exciting sector of advanced manufacturing. The kinds of systems changes outlined in this Call to Action will prepare residents with the knowledge and skills they need to compete and advance into those middle-skill jobs. As a result, manufacturers will be able to find the skilled workers they need to prosper, grow, and remain competitive in the global marketplace.

To achieve that success, education and workforce systems must achieve greater alignment with employer requirements. They must make more efficient and effective use of limited resources to achieve improved outcomes for both manufacturers and workers.

Enhanced communication efforts must be greatly expanded to raise awareness of the value of manufacturing in the region and promote its high-wage career opportunities to students, parents, guidance counselors, graduating students, and adults available in new careers.

By creating bold new partnerships among business, government and education, the region can position itself as the premier location nationally for finding a skilled and innovative manufacturing talent pool. The Advanced Manufacturing Industry Partnership is ready to step up and translate that vision into reality.

## Endnotes

<sup>1</sup> *Kentucky's Target Industry Sectors 2011* (EMSI and Maher and Maher)

<http://workforce.ky.gov/KYTargetIndustrySectors.pdf>; *Barren River Comprehensive Economic Development Strategy (CEDS) 2012* <http://www.bradd.org/index.php/publications/category/30-ceds.html?download=184:2012-ceds>; South Central Kentucky Regional Economic Development Partnership and the Bowling Green Chamber of Commerce website <http://www.southcentralky.com>; *Barren River Workforce Investment Board Local Plan (2011-12)* <http://www.bradd.org/index.php/workforce-development/workforce-development-board.html>

<sup>2</sup> As identified by using data from the Kentucky Cabinet for Economic Development in the Kentucky Business & Industry Information System (<http://www.thinkkentucky.com/KBIIS/>) and the South Central Kentucky INSITE (<http://www.southcentralky.com/Business---Industry-Search-Companies.aspx>). Wage data from Quarterly Census of Employment and Wages (QCEW), Research & Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Board.

<sup>3</sup> Defined using NAICS (North American Industry Classification System) codes. All companies in the region that were coded as NAICS 31 -33 in one or more of the 21 industry sub-sectors, and employed 10 or more workers, have been included unless otherwise indicated. "Manufacturing-related industries" include the NAICS 31-33 companies and add those in the Transportation and Warehousing NAIC sub-sectors for Truck Transportation (484) and Warehousing and Storage (493).

<sup>4</sup> As identified by using data from the Kentucky Cabinet for Economic Development in the Kentucky Business & Industry Information System (<http://www.thinkkentucky.com/KBIIS/>) and the South Central Kentucky INSITE (<http://www.southcentralky.com/Business---Industry-Search-Companies.aspx>). Wage data from Quarterly Census of Employment and Wages (QCEW), Research & Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Board.

<sup>5</sup> As identified by using data from the Kentucky Cabinet for Economic Development in the Kentucky Business & Industry Information System (<http://www.thinkkentucky.com/KBIIS/>) and the South Central Kentucky INSITE (<http://www.southcentralky.com/Business---Industry-Search-Companies.aspx>). Wage data from Quarterly Census of Employment and Wages (QCEW), Research & Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Board.

<sup>6</sup> *2012 Wage & Benefit Survey, Region 3 Barren River Area LWIA Report*, (Kentucky Association of Manufacturers, 2011).

<sup>7</sup> As identified by Kentucky Cabinet for Economic Development, *2013 Kentucky Directory of Business & Industry: NAICS Product Guide*. ([http://www.thinkkentucky.com/kvedc/kpdf/All\\_Facilities\\_by\\_NAICS.pdf](http://www.thinkkentucky.com/kvedc/kpdf/All_Facilities_by_NAICS.pdf))

<sup>8</sup> As identified by Kentucky Cabinet for Economic Development in the Kentucky Business & Industry Information System (<http://www.thinkkentucky.com/KBIIS/>) and by the South Central Kentucky INSITE (<http://www.southcentralky.com/Business---Industry-Search-Companies.aspx>). Wage data from Quarterly Census of Employment and Wages (QCEW), Research & Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Board.

<sup>9</sup> *Barren River Area Occupational Outlook to 2018* (Research and Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Cabinet, 2011)

<sup>10</sup> *Barren River Area Occupational Outlook to 2018* (Research and Statistics Branch, Department of Workforce Investment, Kentucky Education and Workforce Development Cabinet, 2011)

<sup>11</sup> *Kentucky County Profiles* (Kentucky P-20 Data Collaborative, 2012)



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<sup>12</sup> Information and data on education and training programs in the region were obtained through Internet research, interviews and a detailed survey of educational providers in the region, completed by instructors and administrators of area institutions. The comprehensive survey questions included information on degrees/certifications offered, enrollment figures, co-ops and internships, costs, board members, industry certifications, and other data.

<sup>13</sup> Information on the Warren County Area Technical School was provided via telephone interview with Don Evans, the current principal.

<sup>14</sup> Information on the Bowling Green City Schools was provided via personal interview with Joe Tinius, Superintendent.

<sup>15</sup> Barren River Workforce Investment Plan

<sup>16</sup> Information on Southcentral Kentucky Community and Technical College was provided by survey responses, but additional curriculum information can be found on the SKYCTC website: <http://www.bowlinggreen.kctcs.edu/Academics>

<sup>17</sup> Information on Western Kentucky University was provided by survey responses, but additional curriculum information can be found on the WKU website, for the Ogden School of Science and Engineering: <http://www.wku.edu/ogden/>

<sup>18</sup> WKU's Career and Workforce Development (CWD) is part of their Continuing Education and Professional Development Department. Information about WKU's Workforce Training Center and CWD was provided via survey responses. However, the WKU website provides additional information: <http://www.wku.edu/cpd/>

<sup>19</sup> Information about SKYCTC's Workforce Solutions was gathered via survey responses. Additional information can be found at: [http://www.bowlinggreen.kctcs.edu/Workforce\\_Solutions](http://www.bowlinggreen.kctcs.edu/Workforce_Solutions)

<sup>20</sup> KY WINS funding: [http://www.kctcs.edu/Workforce\\_Solutions/KY\\_WINS.aspx](http://www.kctcs.edu/Workforce_Solutions/KY_WINS.aspx)

<sup>21</sup> The Bluegrass State Skills Corporation: <http://www.thinkkentucky.com/bssc/>

<sup>22</sup> The Training Consortium of South Central Kentucky is a collaborative effort. Information on the Consortium was gathered from multiple sources, via surveys and in person. The Bowling Green Chamber, WKU and SKYCTC all provided information. The Consortium website is: <http://www.southcentralky.com/The-Training-Consortium.aspx>

<sup>23</sup> Information about the WKU Engineering Industrial Partnership was provided in a telephone interview with program coordinator Debbie Berry. Additional information on the partnership can be found at: [https://www.wku.edu/engineering/engineering\\_industrial\\_partnership\\_program.php](https://www.wku.edu/engineering/engineering_industrial_partnership_program.php)