NEWARK'S MANUFACTURING COMPETITIVENESS

FINDINGS AND STRATEGIES

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FINDINGS AND STRATEGIES

NISHA MISTRY WITH JENNIFER S. VEY AND RICHARD SHEARER

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Executive Summary

Home to a diverse array of manufacturing activities—from food, apparel, and chemical production to metal fabrication—the city of Newark's industrial legacy is widely appreciated. However, the city's manufacturing sector, like the nation's, has transformed dramatically in recent decades, reshaped by local, regional, and global economic forces. Today, most of Newark's 400 manufacturers are small businesses that compete under different constraints than they and their predecessors did only a generation ago. Some have adapted well to shifting conditions, while others have stagnated or struggled to stay competitive.

Newark manufacturing is a small but promising sector that stands at an important crossroads. Yet, in recent years, trends regarding the structure, scale, and value of the sector to the city and region have neither been well-documented nor well understood. Instead, as in many American cities, misconceptions about manufacturing persist in Newark, compounding challenges for businesses and resulting in lost economic opportunities.

This report seeks to alter that paradigm. It is the culmination of the initial year of the Newark Manufacturing Initiative (NMI), which has included a collaboration with the Brookings Metropolitan Policy Program. This collaboration has focused on the development of transformative strategies to improve the local and regional climate for manufacturing. Informed by both in-depth quantitative analysis of Newark's manufacturing sector and engagement with local stakeholders, this report argues that Newark manufacturing can play a key role in supporting a local and regional transition to a more resilient "next economy"—one driven by the creation of quality jobs and broad-based inclusion in innovative, low-carbon, export-intensive industries.

To this end, the report advances ***three primary messages:***

1 Newark has key assets upon which to build a more innovative, sustainable, and opportunity-rich manufacturing sector. Together, these assets—location, density, scale, and diversity—have the power to support new product development and processes, facilitate expansion into new markets, and create more and better-paying career pathways in Newark and its region.

Location and Density. Few, if any, cities in the nation can match Newark's prime location and density of resources and infrastructure. Indeed, New Jersey has the greatest density of people in the United States, while the New York City-Northern New Jersey-Long Island area has the nation's highest level of business concentration. Newark's industrial landscape both reflects, and benefits from, these development patterns: The largest share of New Jersey's industrial activity (274,399 manufacturing jobs) is in the northeastern part of the state, with Newark as a prime hub. This industrial base utilizes the nation's densest network of Class I, II and III railways; an elaborate industrial processing, warehousing, and distribution network; and an extensive network of multimodal links, including six major highways, Port Newark/Elizabeth, and an international airport. These are key assets for "next generation" supply chains, which rely on just-in-time (JIT) production (i.e., short-run, quick turnaround, low volume) and create value with each mile of goods movement.

Similarly, New Jersey's density of innovative human capital is tremendous. With 29.8 scientists and engineers per square mile, the state has the highest such density of any place in the world. Newark's access to this technical talent—as well as its density of working-age residents and educational and innovation resources—offer a competitive advantage for production. The proximity of industrial sites to residential areas further enhances the benefits of density. The highest concentration of industrial businesses in Newark is in the city's East Ward, which is also where the city's densest residential section, "the Ironbound," is located. Many production workers in this area walk or bus to East Ward industrial sites. Critically, Newark neighborhoods are also well-networked to the region—and vice versa—by one of the nation's densest transit nodes; in 2010, the region ranked seventh in the United States for its share of working-age residents with access to public transit.

Scale and Diversity. Newark is home to hundreds of companies that produce both durable (e.g., metal parts) and non-durable goods (e.g., baked goods) for a varied set of industries and end-consumers. According to Brookings research, such a diverse industrial mix is an asset for communities, like Newark, that are located in large, high-performing metropolitan areas. This is, in part, due to the fact that manufacturers in these areas are

likely to have access to a wide array of services that support their processes—such as design, engineering, IT, repair, logistics, and financial services. This is also due to the proximity of diverse manufacturers to affluent, dynamic regional markets, supportive infrastructure, and the ability of local firms to effectively retool and respond to spikes in demand. Newark's diversity and proximity to concentrated domestic markets are advantageous even in traditionally lower-wage, nondurable industries like packaging/printing, food, and apparel. Given niche market demand in the region and superior access, Newark has an opportunity to stress "high road" and value-added practices that have the potential to boost innovation and productivity for this group of regionally-savvy suppliers. There is also potential to expand the local and regional manufacturing base to accommodate a broader mix of technologically intensive companies.

The scale of domestic manufacturing also has major implications for "the next economy." America's innovation landscape is now driven by small manufacturers, and Newark firms are even smaller than the U.S. average. In 1981, over 70 percent of U.S. R&D was conducted by companies with over 2000 workers. Today, however, small and medium-sized manufacturers are responsible for designing and producing a growing amount of the content of manufactured goods. This is a potential benefit for manufacturing innovation. The smallness of Newark's suppliers is conducive to a spectrum of collaborative problem solving and innovation activities, from big-budget R&D to minor, incremental product and process improvements.

2 **Newark's manufacturing sector faces several challenges that are undermining its overall competitiveness.** Newark has significant assets and advantages that, if more fully leveraged, could help to improve its manufacturing competitiveness in the next economy. Yet employment declines, low productivity, and flat wage growth in the sector reveal that Newark manufacturers also face a number of challenges that continue to undermine their ability to improve daily operations and logistics, invest in product and process innovation, fortify their supply chains, hire skilled talent, and navigate markets.

Newark manufacturers' investment in new product and process development has been limited. The redefinition of manufacturing industries and technologies and restructured global markets have given rise to an urgent innovation imperative for U.S. manufacturers. Yet, despite stated enthusiasm for more innovation-focused activities in the region, Essex County data suggests that Newark manufacturers are under-investing in their product and process capabilities. This trend can largely be attributed to the fact that small suppliers, which predominate in Newark, are the most likely to lack in-house capacity to ramp up innovation functions. It is also due to the composition of Newark's manufacturing base, as the most prevalent industries in Newark (e.g., fabricated metal products, food manufacturing, printing/packaging) are generally less technologically intensive and low- to moderate-R&D intensive. However, these explanations alone are incomplete, given corresponding statewide and national patterns. A 2011 survey of New Jersey manufacturers released by NJ Manufacturing Extension Program (NJMEP) finds that 26 percent of New Jersey manufacturers have less than one percent of their sales invested in new product development/R&D, which is lower than the national average among manufacturers.

A lack of coordination and capacity have prevented many Newark manufacturers from adopting sustainable solutions to supply chain optimization and resource management. Supply chain sustainability and resource efficiency promote environmental goals as well as manufacturing innovation and cost-competitiveness. Local manufacturers and Newark leaders exhibit a growing interest in these areas, but several barriers exist to strategic action. First, industry **perceptions of sustainability** are mixed, as many perceive "green" practices to be expensive and time-consuming. A second challenge to the

As in many American cities, misconceptions about manufacturing persist in Newark, compounding challenges for businesses and resulting in lost economic opportunities.

adoption of sustainable supply chain and resource efficiency practices is the **"data deluge"** that confronts manufacturers nationwide. E-commerce and global data flows require manufacturers to skillfully collect and manage mounting quantities of information, including new industry standards and fluctuating price trends. Yet, small manufacturers in the region often lack the tools and guidance needed to secure relevant information and proceed with early-stage steps toward more sustainable operations. At the same time, there is a **dearth of quality** information about sustainability options available through local and regional networks. Newark's small manufacturers in particular typically lack the capacity to retain external consultants, and there are few local networks for sharing best practices.

Small Newark manufacturers are isolated from resources and tools to maximize access to new clients in regional and global markets. Newark is located as a prime gateway for industries to strategically connect with inland U.S. markets and a growing network of foreign markets. But, while the city's locational and infrastructure assets provide ripe opportunities for Newark manufacturers to expand their reach, small and mid-sized companies in Newark lack sufficient support to take advantage of them. Their biggest challenges in the area of global exports are identifying top opportunities for market entry and navigating the administrative channels required by trade regulations. Interviews suggest that some manufacturers perceive there to be minimal scope to promote their products overseas or have concluded that any payback from global export opportunities are unlikely to justify associated cost and resource expenditures. And while ample state and federal resources exist to help companies expand export options, input from local firms suggests that there is limited awareness of export assistance options.

Newark manufacturers of wood furniture, fabricated stone products, baked goods, apparel, and paper and plastic packaging are more likely than manufacturers in other industries to primarily serve NY-NJ metropolitan and Northeast, rather than global, markets. The manufacturers in this demographic report a desire for greater visibility and more forums for structured networking and marketing across the greater region that could help boost the competitiveness of their products.

Newark struggles with a manufacturing skills gap that hampers its ability to respond to existing and future market demand. The majority (67 percent) of survey respondents in Newark indicate that an "aging workforce" will pose a challenge to their success over the next five years. At the same time, a number of barriers exist to strengthening manufacturing career readiness in Newark and growing career pipelines between city and regional manufacturing companies:

- Many Newark workers **lack basic math and literacy skills needed for manufacturing jobs or training programs.** As of the 2010-2011 academic year, 60 percent of Newark students are not proficient in math and reading after the 7th grade. Meanwhile, findings suggest that public educational capacity in science, technology, engineering, and

math ("STEM") areas is waning in inner-city communities across New Jersey, including Newark.

- Manufacturers in the greater Newark region are often **isolated from networks and tools that could facilitate the recruitment and hiring of talent** from community colleges and high schools in the greater Newark area, including Essex County. Among survey respondents and interviewees, the majority of manufacturers depend on online engines (e.g. Craigslist, Monster) and word-of-mouth endorsements for recruitment and hiring.

- Interviews in Newark indicate that **core competencies, career pathways, and opportunities for advancement in the manufacturing sector are poorly understood** and that general perceptions of manufacturing are largely inaccurate.

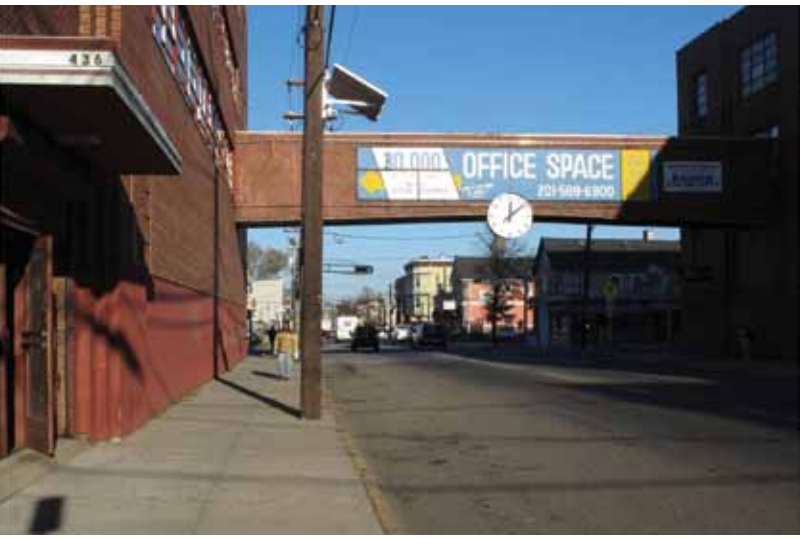
- Students or incumbent workers who are interested in acquiring manufacturing skills face a **lack of accessible training and credentialing options that meet employer needs.** Moreover, interviews reveal that there are few opportunities to match Newark's secondary and post-secondary students with paid internships or jobs in manufacturing settings, despite manufacturer interest in such options

- Finally, while Newark's public transportation system is well-networked, there appears to be **limited coordination to align opportunities for youth, workers, and businesses based on their relative location to each other.** With nearly half of Newarkers without a car of their own, 80 percent of survey respondents report that "transit access for employees" is an important factor in keeping their operations in Newark.

Today, there is tremendous potential to engage more Newarkers and local businesses in the most inclusive, environmentally sustainable, and high-value segments of the economy.

Newark faces several land, space, and infrastructure constraints that impact manufacturing competitiveness. Newark's physical fabric and infrastructure reflect its character as a mixed-use residential/commercial community and Port city with a strong industrial tradition. Yet, these same features bestow certain constraints to industrial redevelopment and goods movement, both of which support manufacturing. For example, according to Newark's Master Plan, "fragmented ownership" and related land use patterns present a major challenge to industrial site assemblage and preparation, particularly in industrial areas surrounding Port Newark and Newark Liberty Airport. Gaps in strategic valuation among the land owners, businesses, government agencies, and Newark stakeholders prevent the overall business climate of the Port/Airport areas from becoming more competitive and more conducive to value-added industrial activities, including production. Meanwhile, with over 700 brownfields in Newark, and many derelict buildings, the actual and perceived condition of industrial sites renders the redevelopment of certain Newark properties very challenging, due to cost barriers.

3 Newark stakeholders need to implement a set of strategies designed to address the challenges facing the manufacturing sector and to capitalize on assets and opportunities that can help small and mid-sized suppliers compete. The goals and associated strategies presented here draw on ongoing and emerging efforts of organizations and institutions from around the city and region and directly respond to the market analysis, project findings, and stakeholder feedback garnered through the Newark Manufacturing Initiative (NMI) process. They seek to address the innovation, sustainability, workforce, infrastructure, and other challenges that have hampered firms' ability to succeed and grow in an increasingly competitive and complex marketplace. Most importantly, they underscore opportunities in the sector that will help Newark support its "next economy." Today, there is tremendous potential to engage more Newarkers and local businesses in the most inclusive, environmentally sustainable, and high-value segments of the economy; to better utilize Newark's land, infrastructural and institutional assets to support a stronger ecosystem for production and innovation; to connect more Newark suppliers to innovation and business resources, as well as robust markets; and to leverage Newark's assets to improve supply chain competitiveness and resource efficiency.



➤ GOAL 1: ACCELERATE INNOVATION TO IMPROVE PRODUCTIVITY, PROCESSES, AND PRODUCT DEVELOPMENT

1

Changes in business models and supplier demographics/supply chains are demanding a broader range of tools and solutions for improving production processes and developing products. To this end, Newark's small and mid-sized suppliers must better connect to customized, "small bore" innovation solutions, in addition to broader R&D activities.

STRATEGY 1.1. Make Newark a hub for open innovation strategies that target small and mid-sized manufacturers in the region. Newark's resources should be harnessed to cultivate activities that support more fluid, diversified, and open channels for product and process innovation, with small-scale production and STEM activities at the center. The goal of open innovation, in this sense, would be to help more manufacturers capture inspiration and value from external sources of ideas and technologies—from other manufacturers to educational institutions.

STRATEGY 1.2. Encourage the co-location of ideation, design, production, and R&D functions, as well as business development and technical assistance. Newark stakeholders should explore and implement a new set of approaches and partnerships that co-locate and connect existing innovation efforts and partners in ways that facilitate and sustain a fertile, citywide innovation "ecosystem."

2 ➤ GOAL 2: PROMOTE RESOURCE EFFICIENCY AND SUSTAINABLE SUPPLY CHAINS

Despite a surging interest in "green business" practices and energy efficiency in Newark, existing efforts are disjointed and there is a void of leadership and capacity to connect local and regional manufacturers to sustainability opportunities, including those focused on their supply chains. Strategies thus need to focus on closing resource and network gaps, promoting coordination, and expanding access to new and emerging tools—such as web-based, B2B platforms—that support business and supply chain competitiveness.

STRATEGY 2.1. Create a "one-stop" resource in Newark for manufacturers to access customized support in the area of supply chain sustainability, including assistance with supplier readiness and business planning. To address data deluge problems and network gaps that hamper supply chain sustainability, Newark should designate a regional point of contact and create a "one stop" resource that connects manufacturers and supply chain professionals that understand supplier-buyer dynamics.

STRATEGY 2.2. Connect Newark manufacturers to more face-to-face (F2F) and business-to-business (B2B) networks that promote regional supply chain competitiveness through domestic sourcing and align these efforts with Newark's "sustainable economy" goals. Newark partners can support more regional sales connections by developing a web-based directory and/or "matchmaking" platform for Newark suppliers. This can also be achieved through the organization and sponsorship of industry-specific networking forums (e.g., a Building Materials Roundtable) and workshops that help companies learn about the cost-savings benefits associated with specific resource efficiency and sustainability practices.

STRATEGY 2.3. Support partnerships between industry consortia, the city of Newark, and regional intermediaries to promote industrial resource efficiency strategies. In conjunction with the city's Sustainability Action Plan (SAP), Newark could focus on two areas that have high potential for short- or medium-term collaboration and impact: (a) an industrial energy aggregation effort—which would take advantage of a state law to allow Newark to procure electricity in the wholesale power market on behalf of collectives of manufacturers, and (b) a pilot for byproduct synergy—whereby the city of Newark's Sustainability Office and NJMEP would facilitate waste collection from manufacturers for recycling and/or reuse in the development of new products.

3 ➤ GOAL 3: CONNECT MANUFACTURERS TO NEW MARKET OPPORTUNITIES

The density of Newark's manufacturing base, proximity to regional markets, and ability to reach global customers are boons to local and regional economic development. Existing and emerging Newark companies have the potential to capture a higher-value, diverse cross-section of market opportunities, while taking advantage of its transportation and land assets.

STRATEGY 3.1. Deepen existing connections and develop new partnerships that will provide specialized resources to manufacturers seeking to enter overseas markets. Local intermediaries should work to improve basic connectivity between Newark manufacturers and existing export assistance providers in the region, such as the Newark-based Northern New Jersey Export Assistance Center, part of the U.S. Commercial Service. Newark should also design a strategy to screen small and mid-sized manufacturers for export and growth potential and work with their senior management to identify and pursue overseas market opportunities.

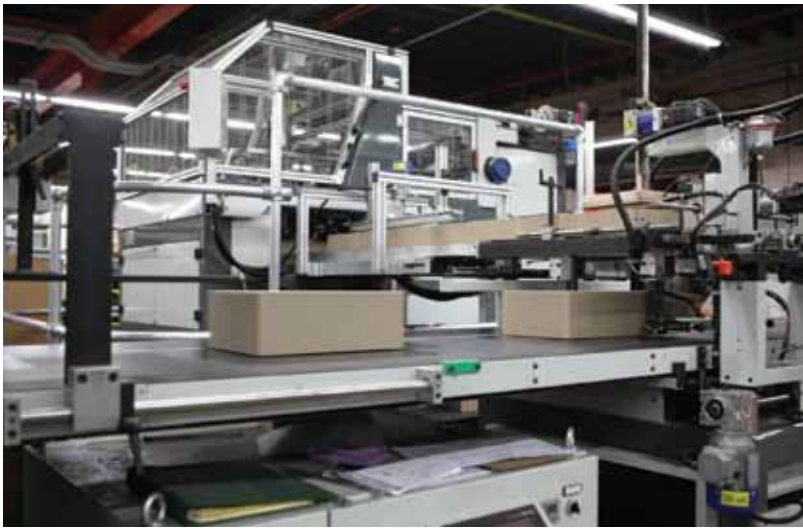
STRATEGY 3.2. Boost the visibility of Newark as a competitive port city and logistics hub for "next generation" suppliers. Local stakeholders, including BCDC, Made in Newark, and the Port and Airport, should launch a communications campaign that features the city's major logistics assets—Port Newark, Newark Liberty Airport, highways, and rail—and showcases the value of the region's small suppliers and assemblers.

STRATEGY 3.3. Develop a Food Sector Strategy for the city of Newark focused on production and linkages to non-production industries and opportunities. Newark should develop a citywide food sector strategy that focuses on regional food supply chains, local food production, and linkages with related sectors (processing, distribution, packaging, hospitality, etc.).

4 ➤ GOAL 4: CREATE A 21ST CENTURY MANUFACTURING WORKFORCE

Manufacturers in Newark report that manufacturing career readiness and workforce development are areas in which partnership-based action would help them sustain or grow their businesses in Newark. Newark and Essex County are taking steps to respond to these demands, but further coordination and support are needed to improve manufacturing career readiness and create regional talent pipelines.

STRATEGY 4.1. Strengthen local collaboration to promote manufacturing career readiness among Newarkers and expand manufacturing talent pipelines to regional manufacturing companies. Newark should continue to engage with county, regional, and state partners to advance efforts around manufacturing skills assessment and credentialing, while locally focusing on manufacturing career readiness and resolving math and reading literacy gaps. The central focus should be on opportunities for Newarkers in "middle-skill" production occupations.



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STRATEGY 4.2. Launch a pilot program that will offer industry-recognized manufacturing credentials to a cohort of Newark veterans. Using a 2012 Middlesex Community College pilot program as a model, Newark stakeholders should design, operationalize, and launch a multi-week skills training option for a cohort of veterans, with the goal of integrating training with recruitment and placement through employer/manufacturer engagement.

STRATEGY 4.3. Establish a bridge program that combines English literacy and manufacturing skills training. Newark stakeholders should explore the potential to design and launch a Newark-based bridge program that combines adult ESL education and skills training by pairing a literacy or adult basic education (ABE) instructor with a technical instructor.

STRATEGY 4.4. Support experiential and contextual learning by developing more opportunities for Newark/Essex County high school and postsecondary students to secure paid internships with regional manufacturing companies. Newark's educational leaders and stakeholders should create and/or refine mechanisms to more effectively match secondary and postsecondary students with regional manufacturers that need interns.

5 GOAL 5: LINK PHYSICAL TRANSFORMATION TO ECONOMIC TRANSFORMATION

The aspirations of Newark and Essex County Master Plans are supported by the New Jersey State Development and Redevelopment Plan, which encourages Newark to support "effective planning" that furthers "enhance[d] opportunities for attraction and growth of industries of statewide and regional importance," including manufacturing. Implementation of these plans will be critical to Newark's ability to attract and accommodate new waves of manufacturing start-ups, as well as the ability of existing local manufacturers to stabilize or grow their margins and improve operations.

STRATEGY 5.1. Continue to build Newark's knowledge about the condition and marketability of its industrial land supply, including potential models for site redevelopment and management. The city of Newark, BCDC, community stakeholders, and regional and state agencies should continue to advance current research, strategy development, and partnership-building efforts aimed at deepening knowledge of the city's industrial land supply and expanding local capacity to better serve and grow the local manufacturing sector.

STRATEGY 5.2. Collaborate with the Port Authority on Port Newark's supply chain/manufacturing "narrative" and continue to develop infrastructure, job creation, redevelopment, and marketing strategies to coincide with Port expansion. In order to better understand—and prepare for—emerging opportunities associated with the growth of Port Newark in the coming years, and the overall densification of goods movement along the East Coast, Newark stakeholders must look beyond established circles of support. They should forge creative, strategic partnerships with regional partners—including, potentially, Port Authority of NY-NJ and Rutgers Business School in Newark—to strengthen awareness about the interdependence between production and logistics in the region.

STRATEGY 5.3. Continue to explore alternative models for the reactivation/redevelopment and financing of underutilized, low-barrier small industrial parcels, focusing on their scope for value-added, light production. Drawing on findings from the city's 2012 Master Plan and growing knowledge base about Newark's industrial sites, Newark partners should develop a more strategic and coordinated approach to the development and modernization of small industrial parcels for light, high-value, low-carbon production—including the financing and incentivization of such activities. Alternative models for site management may also be explored.

The Newark Manufacturing Initiative both grows from, and will hopefully contribute to, the growing pool of knowledge on the challenges and opportunities facing urban manufacturers and the resources and strategies needed to support them. This report offers a holistic framework that seeks to improve Newark manufacturers' competitiveness based on business performance and value, spurred by innovation, strong talent pipelines, modern infrastructure, and inclusive partnerships. The framework and recommendations offered here will hopefully also serve to sustain and advance dialogue about the possibilities of "next economy" manufacturing in Newark and its region—why it matters, who will lead key efforts, which resources are to be allocated, and ultimately, how manufacturing 'success' will be defined by the area's communities and businesses in the coming years. ■

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I. INTRODUCTION

From its position as an early innovator in leather and iron fabrication to its famed association with Thomas Edison and Seth Boyden, the city of Newark's manufacturing legacy is widely appreciated. Thanks to concentrated sea, rail, air, and ground links, the city has also long been a logistical engine powering a formidable regional economy. Over the years, Newark's contributions to U.S. innovation, production, and goods movement have paved the way for impressive manufacturing advances and entrepreneurial success stories.

However, the city's economy and manufacturing base have transformed dramatically since America's postwar boom, reshaped by local and global trends, from public disinvestment to trade pressures. The greater Newark area is currently home to an estimated 800 manufacturers. About half of these firms—roughly 400—are located in the city of Newark and employ an estimated 10,000 workers.[1] But unlike in the past, most Newark manufacturers are small businesses—many of them contract suppliers—that compete under different constraints than they and their predecessor did only a generation ago. Some have maintained a steady competitive edge over time by diversifying or adapting their product lines and processes to market shifts and shocks. Others have not.

Newark manufacturing today is a small but promising sector that stands at an important crossroads. Yet, current trends regarding the structure, scale, and value of manufacturing in the city and region have neither been well-documented nor well understood. Instead, as in many American cities, misconceptions about manufacturing persist in Newark, compounding challenges for businesses and resulting in lost economic opportunities.

This report seeks to alter that paradigm. In the wake of the Great Recession and on the heels of Hurricane Sandy, it calls on Newark leaders to re-evaluate the city's manufacturing sector and seize upon prospects for production-focused growth.

As a driver of innovation and wealth creation, manufacturing offers bright possibilities for Newark. The city is home to hundreds of companies that supply highly diversified industries—from dairy and apparel to chemicals and fabricated metals. It enjoys proximity to large metropolitan markets with supportive niche industries, such as design, research, and specialty services. Newark is one of the East Coast's prime commercial throughways, responsible for driving value along supply chains across the region and country. Port Newark/Elizabeth, Newark Liberty International Airport, six highways, and major freight rail lines form a strategic logistics node, connected to Northern New Jersey's dense distribution and warehousing networks as well as global markets. The city also benefits from access to one of the largest and fastest growing labor pools in America and a potential pipeline of young manufacturing talent and entrepreneurial leadership.

By better capitalizing on these assets, and overcoming a concomitant set of challenges, Newark manufacturing can play a key role in supporting a local and regional transition to a more resilient "next economy"—one that prioritizes the creation of quality jobs and broad-based inclusion in innovative, low-carbon, export-intensive industries. It was with this ambition in mind that in March, 2012 the city of Newark launched the Newark Manufacturing Initiative (NMI), a multi-year effort aimed at designing and implementing transformative strategies to improve the area's climate for manufacturing business growth, innovation, and job creation.

This report is the culmination of the initial phase of the Initiative. A collaborative effort with the Brookings Metropolitan Policy Program, its development involved an in-depth quantitative analysis of Newark's manufacturing sector, as well as extensive engagement with local and regional stakeholders. Input was collected through interviews and roundtable meetings with dozens of leaders representing the city of Newark, Essex County, and State of New Jersey, community-based organizations, and local schools, community colleges, and universities. Made in Newark (MIN) was a key partner in this endeavor; MIN is a collaborative, B2B-focused network comprised of the city's chamber of commerce (Newark Regional Business Partnership), Brick City Development Corporation, New Jersey Manufacturing Extension Program, and Star Ledger. Other active partners included New Jersey Advanced Manufacturing Talent Network and the Newark Workforce Investment Board (WIB).

Feedback from local industry was also an essential aspect of this process. Outreach included interviews with Newark manufacturers, site visits, plant tours, and a citywide written/web-based survey of Newark's manufacturing managers. This research helped the project team identify and articulate key priorities and goals for Newark's manufacturing base and explore workable strategies for partnerships and action.

The report begins with an overview of Newark's manufacturing sector, highlighting the **relevant market dynamics and manufacturing trends.** It then describes Newark's **key manufacturing assets and opportunities**, as well as the top **challenges** that are undermining firms' competitiveness. Finally, the report presents a set of **goals and strategies** to strengthen the city's manufacturing sector, focusing on **five priority areas**:

- Product and process innovation
- Enhanced regional and global market access
- Sustainable supply chains and resource efficiency
- Manufacturing career readiness and talent pipelines
- Physical transformation

Effective implementation of these strategies will not be an easy endeavor. It will require a dedicated alignment of policy and programmatic priorities across Newark and more robust informational resources and collaborative relationships. It will also require ongoing relationship-building between city agencies, partner institutions such as schools and universities, community organizations, and—most vitally—manufacturing companies throughout the region. As such, this document represents only the first step in what needs to be a long term effort to renew and grow Newark's productive capacity. ■

DEFINITIONS

Manufacturing: Manufacturing is the production and assembly of goods (NAICS Codes 31-33). In the United States, it is a subset of industrial activities that includes utilities, transportation and warehousing, and quasi-service activities, such as equipment testing and repair.

Value-Added: Value-added is the process of changing the form of a commodity to produce a high-quality end product, by modifying conditions such as time, place, process, materials, and/or intended utility. Examples include customization or on-site services that supplement production. The goal of improving "value added" is to ensure competitiveness by meeting customer demands.

ABOUT THE NMI SURVEY OF NEWARK MANUFACTURERS

With the assistance of Katie Himmelfarb (Bloustein School of Planning and Public Policy, Rutgers University), and in collaboration with Made in Newark, BCDC, and the NJ Manufacturing Talent Network, NMI designed Newark's first survey of manufacturing managers. The survey sought manufacturers' input on a range of topic areas, including their product lines, facility ownership/leasing status, participation in incentive programs, worker recruitment practices, perceived challenges to business growth, and geographic location of customers and competitors. The survey was administered between July and September 2012. A sample of 195 Newark manufacturers was sent an email invitation to participate in a web-based survey; 250 Newark manufacturers (i.e., those with non-verifiable email addresses) were sent an identical hard-copy invitation and survey by postal mail. Approximately 9 percent of the manufacturers surveyed responded, by postal mail (hard copy), and web. Several of the Newark manufacturers that responded to the survey were contacted by phone and/or email for an in-person interview at their respective facilities.

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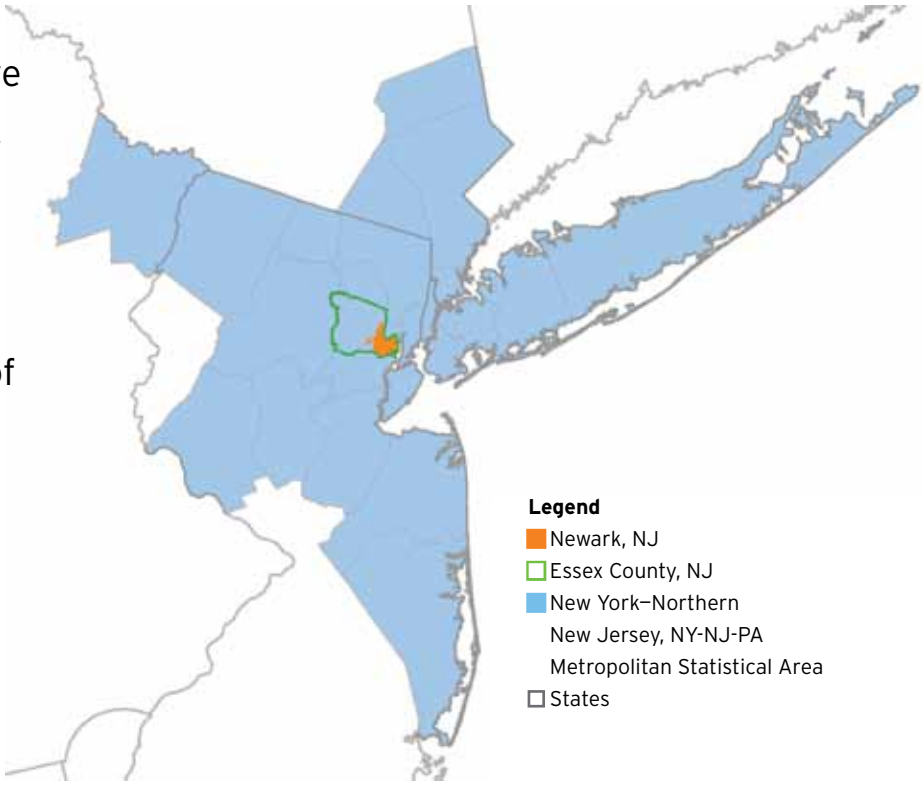
II. NEWARK'S MANUFACTURING MOMENT

Many older U.S. cities have struggled through the nation's recent economic downturn mired in fiscal distress and uncertainty about their prospects for sustainable recovery. Newark has been no exception: For example, between 2007 and 2011 the city shed over 6000 jobs, and unemployment rose by 7 percentage points.[2] Although Newark's unemployment rate has grown at a slower pace than New Jersey's, due in part to a major construction boom, today it stands at twice the national average.[3] Meanwhile, between 2000 and 2011, median household incomes in Newark steadily declined by 9.7 percent, mirroring national trends.[4] The city's child poverty pattern remains a challenge—two in five Newark children live below the federal poverty line—and families with children continue to represent the largest share of those living in poverty in the city.[5]



To create jobs and increase economic opportunity for their residents, Newark and its peer cities need to transition to a stronger, more resilient "next" economy. To do so, local government, civic, and business leaders must embrace an economic framework focused less on consumption—of retail, housing, and government, for example—and more on production, innovation, low-carbon solutions, diverse career pathways, and trade. Leveraging the nation's growing competitive advantages in manufacturing should be a key part of this approach. (See sidebar.)

Examples of deliberate strategy building around industrial retention and manufacturing can be found nationwide, reflecting a renewed understanding of the importance of production-oriented activities to regional economic growth. Nearly a decade ago, Los Angeles' former Mayor James K. Hahn launched an Industrial Development Policy Initiative with the mission of studying challenges and opportunities in Los Angeles' industrial sector and advancing policies aimed at the "creation, retention and expansion of quality manufacturing businesses and jobs for [the] local economy" and "increas[ing] city revenues from industrial activity."[6] The number of such efforts has grown in the past several years. In 2011, for example, Mayor Edwin Lee of San Francisco—a city with roughly 3,000 manufacturing workers—launched FashionSF, a plan to retain and support apparel manufacturing.[7] Mayor Michael Nutter of Philadelphia recently created a citywide task force to assess local manufacturing opportunities and deliver recommendations.[8] And Northeast Ohio's metropolitan centers of Youngstown, Akron, and Cleveland are now working to implement a collaborative regional business plan that supports business competitiveness in prime manufacturing growth areas (e.g., medical devices and electric vehicles).[9]

The local strategies needed to grow and support a robust local manufacturing sector need to be highly tailored, however: Although manufacturers everywhere share certain concerns, their needs and capacities vary substantially from place to place, and from industry to industry. As such, cities seeking to revitalize manufacturing as part of a broader economic and community development agenda must first establish a data-focused knowledge base and network of partners that can serve as a springboard for action. To that end, they should develop an understanding of their manufacturing sectors that are fact-based and nuanced; inventory available resources and assets (some of which may be lodged in unlikely places); and identify and understand industry-specific challenges, resources gaps, and barriers to progress. These steps, then, set the stage for city leadership and local communities to build appropriate and responsive strategies. Importantly, the city of Newark's goal of developing a manufacturing strategy was based on an appreciation of its geography, market positioning, and concentration of manufacturing assets of metropolitan and regional relevance.

NMI's ambition in Newark is to capitalize upon America's manufacturing moment by examining, understanding, and then leveraging the assets and opportunities discussed below, while aggressively working to overcome the challenges that are holding the sector back. This analysis is a central piece of this process.

NEWARK'S MANUFACTURING SECTOR

With 277,000 residents, the city of Newark, New Jersey is the second most populous municipality in the New York City-Northern New Jersey metropolitan area and New Jersey's largest municipality. Flanked by the Passaic River, the 24-square-mile city is located in Northern New Jersey, eight miles west of New York City's Manhattan and within a 10-mile radius of 1 percent of the U.S. population. The city is home to 10,000 private businesses employing 140,000 people. Its largest sector is services, representing 41 percent of employment in the Newark economy, followed by the industrial sector (manufacturing, construction and utilities) (13 percent of employment) and transportation and warehousing (12 percent of employment).[10]

THE U.S. MANUFACTURING MOMENT

In recent years, trade liberalization and corporate restructuring have introduced new, fierce competition from foreign suppliers. As a result, between 2000 and 2010, one out of every ten American manufacturing plants shuttered, contributing to the loss of one-third of U.S. manufacturing jobs. The U.S. share of global manufacturing value also declined.[11]

Yet after years of off-shoring, global cost factors are becoming more favorable to domestic production. There are several reasons for this. First, labor costs have been rising rapidly in Asia, narrowing the gap with domestic labor costs, as U.S. manufacturing productivity continues to climb.[12] Global shipping costs, moreover, have risen considerably over the past decade, making it increasingly cost prohibitive for manufacturers to transport and distribute goods over long distances.[13] Meanwhile, as global supply chains have become increasingly complex and fragmented, they have become more vulnerable to costly disruptions from natural disasters, war, or other factors. In today's marketplace, shorter lead times, price stability, and predictable delivery conditions—in other words, greater control over supply chains—confer important advantages for U.S. manufacturers.

Beyond cost competitiveness, successful manufacturing business models are increasingly those that focus on product quality, process innovation, product customization and/or specialized services, in order to improve value-added growth. In this regard, conditions are also favorable for U.S. manufacturers, for five key reasons.

First, manufacturing remains the major source of commercial innovation in the United States. In 2009, manufacturing firms accounted for 70 percent of all U.S. corporate R&D spending, and employed 35.2 percent of the nation's engineers. In fact, between 2006 and 2008, 22 percent of manufacturing companies introduced a new or improved good or service, compared to just 8 percent of non-manufacturing companies. The same shares applied to companies' adoption of new production and distribution processes. These improvements and investments contributed to a 22-percent increase in manufacturing output per worker between 2008 and 2010—16 percentage points greater than the non-manufacturing growth rate.[14]

Second, manufacturing innovation is central to efforts to tackle the global climate crisis. In fact, the manufacturing sector accounts for 26 percent of the 2.7 million jobs in the "clean" economy, as compared to 9 percent of U.S. jobs overall.[15] Sustainable and environmentally focused products and low-carbon technologies emerge from a range of industries, driving both domestic and global solutions to renewable energy, waste management, energy efficiency, and agricultural challenges, among others.

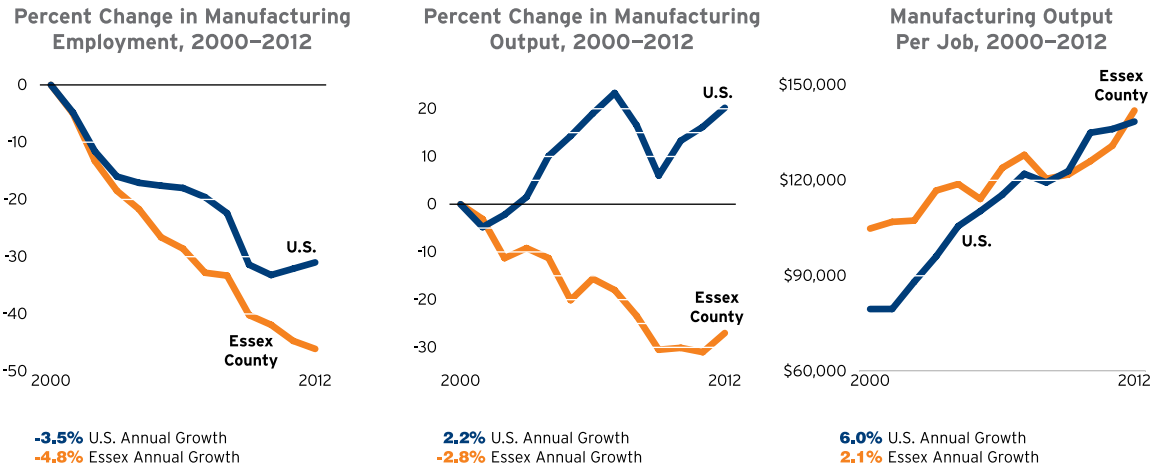
Third, manufactured goods comprise the majority of U.S. exports, making the sector a crucial force in reducing the nation's foreign trade deficit. In 2012, manufacturing represented only 11 percent of the U.S. economy but 60 percent of total U.S. exports. While the export of U.S. services has been rising—it grew 3.5 percent between February 2012 and February 2013—the nation's troubling trade deficit cannot be resolved by growth in the services sector.[16]

Fourth, the manufacturing sector continues to expand pathways to economic security for American families, contributing to a stronger, more vibrant middle class. Since early 2010, the nation's manufacturing sector has added 480,000 jobs over 11 straight quarters of growth—the fastest and longest period of manufacturing job growth in the United States in over 25 years. Today, U.S. manufacturing provides nearly 12 million jobs of relatively high-wage jobs for virtually all types of workers. From 2009 to 2010, these jobs paid an average of $943.06 per week—20 percent higher than the average for jobs in non-manufacturing sectors.[17]

Finally, customized, value-added services are increasingly integral to manufacturers' business models, including those associated with innovative technologies. Today, American manufacturers are increasingly integrating value-added services into their business models to achieve higher performance, e.g., design, assembly, IT/system solutions, and maintenance services.[18] Some of these value-added services also support environmental sustainability; service consolidation at a production site can reduce fuel and resource consumption and thereby improve resource efficiency.

Global dynamics and market trends continue to shift the calculus of manufacturing competitiveness, placing more emphasis on how urban networks of business leaders, government agencies, civic institutions, educators, and workers provide energized, conducive places for production. This creates new opportunities for American cities—like Newark—to craft strategies that seize this moment to grow and sustain a competitive local manufacturing sector. ■

ESSEX COUNTY'S MANUFACTURING SECTOR HAS UNDER-PERFORMED THE NATIONAL SECTOR



Source: Brookings analysis of Moody's Analytics estimates.

Newark's 400 manufacturers employ nearly 10,000 workers, accounting for 7 percent of all jobs in Newark and 50 percent of all manufacturing jobs in Essex County.[19] The vast majority of manufacturing firms in the city are small to mid-sized, with fewer than 10 employing over 100 workers.[20] Newark's manufacturing activity is concentrated in the East and South Wards, with scattered light production in the city's North Ward. Some industrial corridors, such as Lister Avenue, are in close proximity to residential communities, particularly low-income housing developments.

Several key trends characterize the sector:

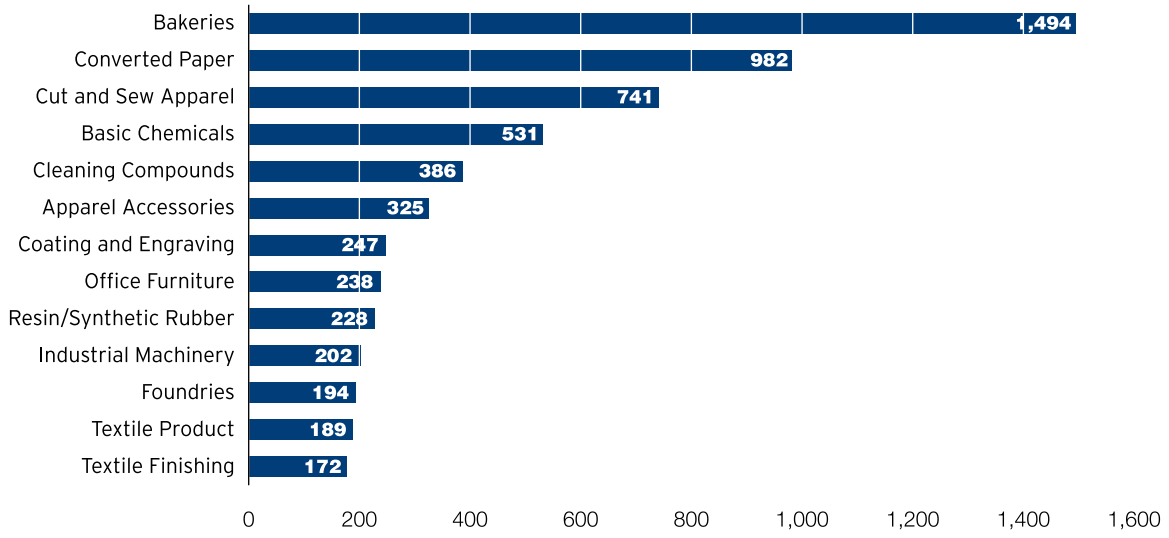
Manufacturing employment has experienced a steep overall decline, but some subsectors are growing. Between 2000 and 2011, manufacturing employment in Essex County declined nearly 5 percent per year on average, at the same time that manufacturing employment nationwide declined by just 3.5 percent annually.[21] Market shifts and job losses have left Newark's manufacturing base more dependent on lower wage, less technologically intensive industries—like apparel, food production, and synthetic rubber manufacturing—than Essex County as whole. These industries, which pay $56,578 per year on average, have seen growth in Newark in recent years even as they have undergone net job losses at the national level.[22] The food production industry, for instance, employs more workers in Newark than any other single manufacturing industry.[23]

Manufacturing productivity has increased, but its growth lags that of the U.S. Manufacturing productivity in Essex County increased by 17 percent between 2000 and 2010 (as compared to 12 percent in non-manufacturing sectors), and today, the average manufacturing worker in Essex County produces $120,061 in output per year, roughly on par with the average level in the New York-Northern New Jersey area. However, annual manufacturing productivity growth in the county (2.1 percent) was lower than that of the national sector (6.0 percent), indicating that many firms are not staying on the cutting edge of innovation.[24]

Newark manufacturers employ workers from throughout the region. Close to 70 percent of the city's manufacturing workforce commutes into Newark to work at plants located in the city. Most

A HANDFUL OF INDUSTRIES ACCOUNT FOR MOST OF NEWARK AND ESSEX COUNTY'S MANUFACTURING JOBS

ESSEX COUNTY'S EMPLOYMENT BY MANUFACTURING SUB-SECTOR 2011



Source: Brookings analysis of Moody's Analytics estimates and U.S. County Business Patterns data.

of these workers come from neighboring communities such as Elizabeth, Jersey City, Irvington, and East Orange, New Jersey. However, some commute to Newark from as far away as Queens County, New York. Meanwhile, about 69 percent of Newark's manufacturing workers commute to manufacturing plants outside of the city limits for work.[25]

Essex County manufacturing jobs are comparatively high wage. Manufacturing jobs in the County pay $72,509 per year on average, 42 percent more than the average annual wage in Newark ($35,659).[26] Although wage growth in the local manufacturing sector has been relatively flat since 2000, Essex County manufacturing wage levels remain about 24.5 percent higher than the national average.[27] Higher compensation is driven in part by the 29.7 percent of Essex manufacturing jobs that are in advanced industries, i.e. those that invest an especially high portion of their revenue in research and development and employ a high share of knowledge workers like scientists and engineers.[28] These include chemicals, pharmaceutical and medicine manufacturing. Many of these more advanced manufacturing firms are located outside of Newark.

The majority of Newark manufacturers compete primarily in the regional and wider domestic marketplace. The overall share of Essex County's international exports from manufacturing goods is relatively small (38.5 percent by dollar volume compared to 66 percent of all U.S. exports).[29] This is due to both the overall small size of the sector and, as will be discussed in this report, the reticence of many manufacturers to explore global markets. In fact, 65 percent of global exports of locally manufactured goods and materials were generated from the chemicals industry alone; the remainder is dominated by machinery, food, computers, electronics, and medical equipment. Newark-based companies contribute solidly to the area's export volume: In 2007, the top 5 facilities in Essex County responsible for generating the highest volume of outbound export tonnage were located in Newark.[30]

NEWARK'S MANUFACTURING ASSETS

Despite employment declines and low productivity growth, various factors hint at the possibility of a new "manufacturing moment" in Newark. If tailored to key opportunities, Newark's locational, logistical, and institutional strengths can be mobilized to make this "moment" a reality.

Specifically, Newark can leverage its superior access to high-demand markets, proximity to a diverse industry mix and large labor pool, small supplier characteristics, and proximity to (and concentration of) services and resources that support innovation and sustainability. Together, these assets—**location, density, scale, and diversity**—have the power to drive the development of cutting-edge solutions and products, as well as urban wealth creation, through more daring innovation, more value-added production, and more and better-paying career pathways in Newark and its region. Moreover, they can be strategically leveraged and enhanced to support an ecosystem—what Gary Pisano and Willy Shih call an "industrial commons"—that truly responds to industry, consumer, and community demands.

Location and Density

Few, if any, cities in the nation can match Newark's prime location and density of resources and infrastructure—providing it with key competitive advantages for manufacturing productivity, innovation, talent development, and supply chain competitiveness in the next economy.

DENSITY AND THE NEXT ECONOMY

Density confers advantages for production in "the next economy" in five major ways.

First, urban business density can improve manufacturing productivity. Brookings findings show that "manufacturers are more productive in locations with a high density of businesses," because the "advantages of clustering and diversity are greatest in those locations."[31] This is supported by Federal Reserve Bank research based on output-per-worker data, which indicates that a doubling of metropolitan density increases productivity by 2 to 4 percent.[32]

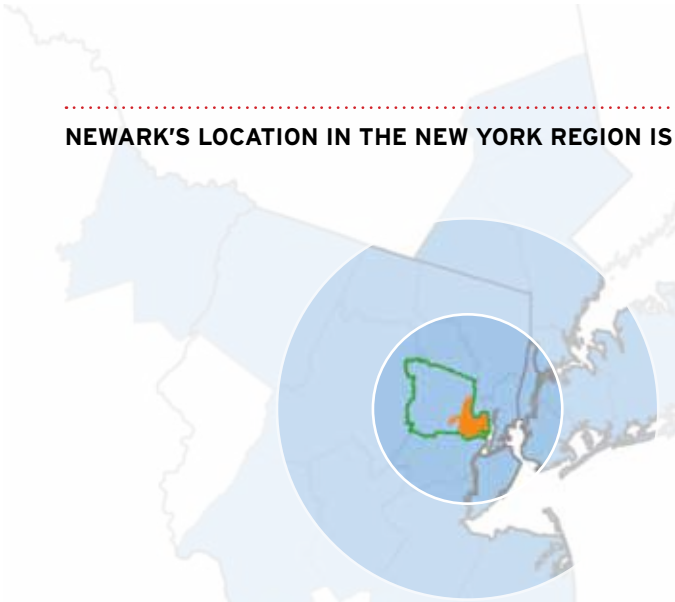
Second, density is a boon for innovation. Brookings research on the geography of U.S. manufacturing innovation indicates that "firms that locate near other firms (whether these firms are in the same industry or diverse industries) are more innovative." Unsurprisingly, U.S. patenting patterns are skewed toward cities; since 1976, 93 percent of all U.S. inventors of granted patents have lived in metro areas.[33]

Third, metropolitan density encourages talent development, due to industry-specific knowledge sharing within large, concentrated networks of skilled workers, educators, and entrepreneurs. The positive effects of human-capital density—that is, the density of highly skilled workers—has been shown to be the greatest in industries that rely on creative exchanges of ideas, such as design and manufacturing.[34]

Fourth, with strategic planning and a focus on spatial efficiency, density can create opportunities for time-based cost savings for manufacturers and greater supply chain competitiveness. This can be achieved with smarter logistics/goods movement and denser supply chains—for example, through better integration and/or consolidation of production, intermodal logistics, intermediary processing (e.g., assembly, bar-coding), and warehousing and distribution in ways that boost value-added. In addition to enhancing competitiveness by speeding up time-to-market, "fewer delivery miles" and "delivery efficiency" are also important sustainability goals.

Finally, density creates opportunities for greater resource and cost efficiency—offering the potential to off-set the higher costs associated with doing business in major urban areas. According to a 2011 study by the United Nations Environment Programme, as urban density increases, the cost per unit for urban infrastructure systems (e.g., water, sewage) can theoretically be lowered.[35] Density can also streamline resource sharing (e.g., physical space, back-up generators, IT services), as well as resource and energy efficiency strategies, particularly between small businesses. ■

NEWARK'S LOCATION IN THE NEW YORK REGION IS A MAJOR ADVANTAGE FOR MANUFACTURERS



18.9m
people make the region the largest consumer market in the U.S.

16k
manufacturing establishments make the region the 2nd largest network in the U.S.

340k
manufacturing workers make the region the 3rd largest labor market in the U.S.

Source: Brookings analysis of Moody's Analytics data, County Business Patterns data, and Census Population Estimates

Indeed, New Jersey is the densest state in the nation, with 1,134 people per square mile in 2007 (as compared to the U.S. average of 80 people per square mile in the same year).[36] The New York City-Northern New Jersey-Long Island area has the highest business concentration in the United States, with 79 business establishments per square mile.[37] Newark has a higher employment density than the region and nation in numerous industries (e.g., health care, transportation, and finance and insurance).[38] Newarkers also have a relatively high income density per square mile—6.5 times greater than its region—as the city's residential population continues to rise.[39]

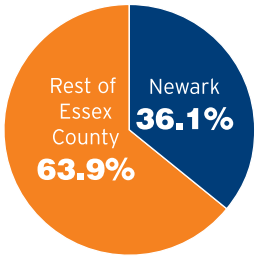
Newark's industrial landscape both reflects, and benefits from, its dense development patterns, as well as the overall density of its state and the New York City-Northern New Jersey region. The largest share of New Jersey's industrial activity (274,399 manufacturing jobs) is in the northeastern part of the state, with Newark as a central hub.[40] Newark is also at the heart of the nation's third largest manufacturing network, with over 16,000 manufacturing plants in the metropolitan area.

This industrial base utilizes the nation's densest network of Class I, II and III railways and an elaborate industrial processing and distribution network. In fact, in 2006, Northern New Jersey's network of almost 687 square feet of warehousing and distribution space (predominantly located along the New Jersey Turnpike and major highways) was, according to Brookings, "one of the nation's largest concentrations of industrial development."[41] Greater Newark area industries also benefit from a dense and extensive network of multimodal links, including two interstate highways (I-78 and 1-280), Port Newark/Elizabeth, and a major international airport (Newark Liberty International Airport, the nation's 9th busiest domestic freight airport, which connects Newark and its region to 164 domestic and 84 global cities). These are key assets for "next generation" supply chains, driven by just-in-time (JIT) production (i.e., short-run, quick turnaround) which drives value with each mile of goods movement.

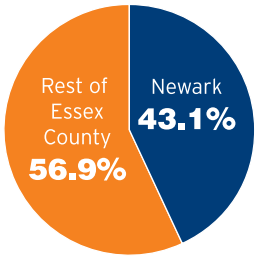
Similarly, New Jersey's density of innovative human capital is tremendous: With 29.8 scientists and engineers per square mile, the state has the highest such density of any place in the world. Newark's access to this technical talent—as well as its density of working-age residents and educational and innovation resources—offer a competitive advantage for production.[42] Newark is home to

NEWARK COMPRISES A LARGE PORTION OF ESSEX COUNTY'S POPULATION AND EMPLOYMENT BASE

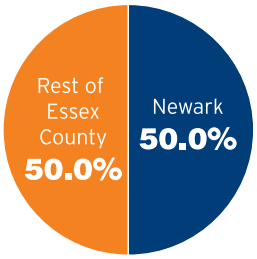
Newark's Share of Essex County's Population, 2011



Newark's Share of Essex County's Total Employment, 2011



Newark's Share of Essex County's Manufacturing Jobs, 2011



six major institutions of higher education, located within the dense and walkable University Heights and Downtown districts, including two large, public research universities—New Jersey Institute of Technology (NJIT) and Rutgers University-Newark, which includes the downtown Newark campus of Rutgers Business School. This academic community also includes Seton Hall School of Law, the University of Medicine and Dentistry of New Jersey at Newark (whose two medical schools are due to merge with Rutgers), Essex County College, and an Essex County vocational-technical high school—Newark Tech High School—that is one of four such schools in Essex County. These institutions are located in one of New Jersey's three "Innovation Zones," areas designated under the state's Economic Development Administration (NJEDA) as qualifying for financial incentives to support the technology-driven companies based there—including those that support manufacturing and design innovation. Five of Newark's universities and colleges are located in an overlapping district (in the Central Ward) known as "Science Park." In total, approximately 50,000 students, faculty and staff are part of the city's higher education and research community.[43] Thousands more are accessible by regional transit: There are 19 professional schools, four-year colleges, and community colleges within a 20-mile radius of Newark's University Heights.[44]

Newark's mixed-use character and proximity of industrial sites to residential areas further enhance the benefits of density. Newark is distinctive in this respect given the spatial segregation of residential/industrial uses that defines many urban communities; the highest density of industrial businesses in Newark is in the city's East Ward, which is also where the city's densest residential section, "the Ironbound," is located. Many production workers in this area walk or bus to East Ward industrial sites. Critically, Newark neighborhoods are also well-networked to the region—and vice versa—by public transportation. The New York City-Northern New Jersey-Long Island region represents one of the nation's densest transit nodes and heaviest worker/commuter flows via public transit; in 2010, the region ranked 7th in the United States for its share of working-age residents with access to public transit, with 89.6 percent coverage within that group.[45] The East Ward's Ironbound neighborhood and industrial areas are cut by commuter arteries of regional significance—such as Amtrak/NJ Transit's Northeast Corridor—and are proximate to key trucking routes, including Routes 1 and 9. Newark's Light Rail system, regional PATH lines between New York and New Jersey, and NJ Transit rail lines buses also enhance worker access to industrial sites. These are formidable and far-reaching networks as compared to their counterparts nationally—NJ Transit, for instance, is the nation's 3rd largest provider of regional rail transit.[46]

Finally, Newark's density of public utilities and fiber optics offer a competitive advantage for production, including greater resource efficiency. Specifically, Newark houses more than 50 telecom

carriers on Halsey Street. Newark's fiber optics capacity is a potential asset within the region for innovators and manufacturers that compete on high-speed and high-volume data transfers as a part of operations.[47]

Scale and Diversity

The mix of manufacturers in the New York-Northern New Jersey area is not as specialized as some other U.S. metropolitan regions (e.g., the Midwest's "auto belt"). Indeed, Newark's manufacturing base is very diverse and includes chemicals, fabricated metals, food, textiles, printing, and furniture. Contrary to assumptions, this combination—high diversity, limited specialization, and a prevalence of small suppliers—can offer many advantages for ynext economy" production.

According to Brookings research, a **diverse industrial mix** is an asset for communities in the nation's 100 largest metropolitan areas—including Newark, located in the New York City-New Jersey region—"where the economic benefits of diversity are greatest." This is because manufacturers in these areas—particularly small, nimble suppliers with an internal culture of streamlined collaboration—are more likely to have access to non-manufacturing services that support product improvement, e.g., design, engineering, as well as supportive financial, legal, IT/technology, and logistics services. This is also due to the proximity of diverse manufacturers to large markets and affluent regional consumers, and their ability to quickly retool and respond to spikes in demand. This proximity of Newark manufacturers to concentrated, high-demand markets and localized/regional supply chains is highly advantageous, and potentially a driver of higher wages. A recent Brookings study highlights an example of this effect:[48]

> Printing workers in the Bridgeport area earn $14,000 above the national average ($45,000) for their industry. The metropolitan area is one of the most costly in the country but its proximity to the publishing industry in New York likely makes higher wages profitable even in this relatively low-wage industry.

In this same way, Newark's diversity and proximity to dynamic domestic markets are advantageous—even in traditionally lower-wage, nondurable industries like packaging/printing, food, and apparel. Given this niche market demand and access, however, Newark now has an opportunity to stress "high road" practices that have the potential to boost innovation and productivity for this group of regionally-savvy suppliers.

The scale of manufacturing, too, has major implications for "the next economy." America's innovation landscape has radically shifted over the past 20 years to be driven by small manufacturers, and Newark firms are even smaller than the U.S. average. In 1981, over 70 percent of U.S. R&D was conducted by companies with over 2000 workers. Today, the National Science Foundation reports that "small businesses produce many of the radical innovations that lead to groundbreaking new products and even new industries."[49] Brookings findings support this; a recent report states that "plant size matters for the health of American manufacturing, because small and medium-sized manufacturers are responsible for designing and producing an increasing amount of the content of manufactured goods."[50] This is a potential benefit for manufacturing innovation. The smallness of Newark's suppliers is conducive to a spectrum of collaborative problem solving and innovation activities, from big-budget R&D to minor, incremental product and process improvements. ■

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III. NEWARK'S MANUFACTURING CHALLENGES

Newark has significant assets and advantages that, if more fully leveraged, could help improve its manufacturing competitiveness in the next economy. Yet the long term employment declines, lagging productivity growth, and flat wage growth discussed above reveal that Newark manufacturers also face a number of challenges that continue to undermine their ability to improve their operations, invest in product development, green their supply chains, and tap new markets.

Many challenges facing Newark manufacturers are common among their peers across the United States. Contract metal parts suppliers to the automotive industry, for instance, have been especially sensitive to cost pressures due to increasingly fragmented supply chains.[51] And many apparel and textile manufacturers have been unable to overcome the effects of certain trade agreements on the terms of U.S. tariffs. Transformations in technology and communications, such as the Internet, have also altered the landscape and conditions of manufacturing competition. Still, many Newark manufacturing firms face numerous localized and regional challenges—such as perceptions of public safety and a void of institutionalized partnerships around manufacturing—which have undermined their competitiveness over time.

Some of the challenges facing Newark—such as high energy and health care costs and perceptions of taxes—are industry agnostic. Others, such as imbalanced investment in innovation, are affected by industry-specific trends and market pressures, as well as business ownership structure, technological intensity, and supplier relationships. For example, fabricated parts manufacturers in the Newark area are more likely than bakeries to cite talent recruitment and retention as a barrier to growth, given the range of competencies these firms need to maintain competitive operations in their industry. Similarly, certain Newark industries—such as chemical additives—are much more R&D intensive than others.[52] This, in turn, affects their hiring and marketing decisions, as well as decisions about siting (e.g., the location of research facilities).

Business size, finally, is a challenge to Newark's manufacturing base that cuts across diverse industry types. Small Newark manufacturers have less capacity than their larger counterparts to ramp up functions that are vital to competitiveness, such as talent recruitment, process improvement, and marketing. This reflects a statewide trend, as indicated by NJMEP's observation that "smaller manufacturers [in New Jersey] have trouble implementing change… Most likely [due to] smaller staffs and scarce resources."[53]

Small Newark manufacturers have less capacity than their larger counterparts to ramp up functions that are vital to competitiveness.

As documented through interviews, roundtable discussions, and survey responses, the above can be boiled down to five key challenges that are having the most significant impact on the sector's overall health.

1. Newark manufacturers' investment in new product and process development has been limited.

The redefinition of manufacturing industries and technologies and restructured global markets have given rise to an urgent innovation imperative for U.S. manufacturers.

Newark manufacturers understand this imperative. Yet, despite stated enthusiasm for more innovation-focused activities in the region, Essex County data suggest that Newark manufacturers are under-investing in their product and process capabilities. This trend can largely be attributed to the fact that small manufacturers, which predominate in Newark, are the most likely to lack in-house capacity to ramp up innovation functions.[54] It is

also due to the composition of Newark's manufacturing base, as the most prevalent industries in Newark (e.g., fabricated metal products, paper/packaging, food manufacturing) are generally low- to moderate-R&D intensive.[55] However, these explanations alone are incomplete, given corresponding statewide and national patterns. A 2011 survey of New Jersey manufacturers released by NJMEP finds that 26 percent of New Jersey manufacturers have less than one percent of their sales invested in new product development/R&D, which is lower than the national average among manufacturers.[56]

According to the owner of a Newark die casting company that has improved its operations by expanding robotics capabilities, these trends are troubling. He states:[57]

> *"Many manufacturers don't invest in their businesses. They should throw some of their money back into the business. The supplier base doesn't always maintain the competitive edge." But, he adds, "There is enough blame to go around"; these same businesses are being squeezed by a shrinking selection of suppliers, as "[suppliers are] going out of business."*

This precarious cycle of underinvestment and dwindling competitiveness has been especially taxing for those companies in industries with long, volatile supply chains and intense global competition. Thus, Newark's metal parts manufacturers are more likely to have seen their competitiveness erode due to innovation stagnation than cheese and cookie manufacturers that have regional brand-recognition and stable supply chains.[58] In the absence of a commitment to "continuous improvement," certain Newark manufacturers will continue to be very cost-sensitive in the marketplace and uncompetitive on value and performance.[59]

Innovation gaps affect Newark manufacturers differently based on their R&D intensity, supply chain characteristics, and the competitive/market dynamics of their respective industries. Ultimately, however, investments in product and process innovation can pay off for manufacturers across industry types, including those deemed low-R&D intensive. From apparel companies that rely on rapid-response, high-end designs to serve the fashion industry, to stone fabricators that use modern precision machining technologies, manufacturers representing all segments and sizes provide examples for how to stay on the cutting edge.[60]

2. A lack of coordination and capacity have prevented many Newark manufacturers from adopting sustainable solutions to supply chain optimization and resource management.

Supply chain sustainability and resource efficiency are two areas that promote environmental goals as well as manufacturing innovation and competitiveness. In Newark, there is a strong need for coordination and collaboration to improve outcomes in both areas.

Strategic supply chain management is a key value-driver in modern manufacturing, particularly for small suppliers.[61] Indeed, according to a 2011 Deloitte study, "60 to 70 percent of a company's cost-base is attributable to its supply chain." [62] While factors of cost and risk continue to dominate manufacturers' supply chain concerns, in recent years, the role of supply chain sustainability in production has become more prominent, as awareness has grown about the environmental and social impacts associated with supply chain decisions. Today, supply chain sustainability is at the center of global policy discourses on local sourcing and corporate responsibility, and is viewed as a tool in addressing challenges such as freight-related greenhouse gas emissions and supplier labor violations. Through mindful sourcing, supply chains can positively affect outcomes along these "sustainability" metrics, and others, while responding to customer demand. Sustainable supply chains also have the potential to improve community well-being and security, especially in cities, as in the case of improved "food self-sufficiency"

WHAT IS MANUFACTURING INNOVATION?

Manufacturing innovation has many connotations. This analysis employs a broad definition of innovation; it includes the assimilation of new or existing technologies into manufacturing processes (process innovation) and the introduction of manufactured products that are "new or significantly improved" in terms of their "characteristics or intended uses" (product innovation).[63] Innovative manufacturing processes and product developments vary in scale and technological intensity.[64] Product innovation may involve an R&D-intensive upgrade of materials or coatings or the introduction of new technical specifications. Alternatively, it may entail a simple packaging solution, such as putting paint in new spouted bottle (as one local manufacturer has done).

Process innovation may involve, for instance, the inclusion of new mechanisms for water conservation or waste reduction at a manufacturing facility. Research underscores that today, more than ever, an ethos of "continuous improvement" is vital to the enhancement of productivity and performance.[65] This in turn can expand firms' capacity to hire more workers.[66] Meanwhile, deferred investments in improvements (or failures to invest entirely) can threaten the competitiveness of individual businesses and, over time, regional supply chains. ■

in areas that are over reliant on food imports.[67] As a business matter, supply chain sustainability can boost a company's reputation and image, contributing to enhanced market performance and profits.[68] Due to all these advantages, supply chain sustainability has gained both industry and policy momentum, as evidenced by its inclusion in the United Nations' Global Compact in 2010.[69]

Increasing resource efficiency through process and/or product modifications is one key strategy for "greening" manufacturing operations while improving cost competitiveness. As the marketplace for manufactured products has transformed in recent decades—along with industry and regulatory standards—many manufacturers have been pushed to find new ways to manage company functions and resource flows, e.g., by improving fuel efficiency, using high-tech IT systems, reducing water consumption, or embracing practices such as byproduct reuse or recycling. Product innovation, too, is increasingly related to resource efficiency as advances in product design can reduce materials consumption and overall waste. With escalating energy and resource-related costs putting pressures on entire networks of interdependent suppliers, a resource-efficiency approach to manufacturing sustainability and competitiveness is more important than ever before.[70]

Roundtables with Newark manufacturers and city leaders reveal a growing interest in the application of sustainable supply chain and resource efficiency solutions, on a business-by-business and collective basis. Several barriers exist, however.

First, Newark manufacturers' perceptions of sustainability are mixed, which is a hurdle to the integration of sustainable supply chain operations and resource efficient operations. Roundtable discussions with manufacturing managers reveal that many perceive "green practices [i.e., processes]" to be "expensive."[71] In addition, Newark manufacturers perceive that increasingly prevalent "green requirements," such as special certifications and "ecolabeling," involve too much time and cumbersome paperwork—a potential strain on staff and distraction from short-term targets.[72]

Studies show that these perceptions extend beyond Newark and hinder efforts toward widespread manufacturing sustainability. In 2011, NJMEP found that New Jersey manufacturers had "achieved little… in the way of green performance metrics" relative to national benchmarks, and a mere 11 percent described their supply chains as "advanced."[73] Nationally, although strides have been made, there is also room for progress. A 2010 study finds that many small- and mid-sized

manufacturers associate sustainability practices with new time and cost expenditures and anticipate little financial return.[74]

A second challenge to the adoption of sustainable supply chain and resource efficiency practices is the **"data deluge"** that confronts manufacturers nationwide, including in Newark.[75] Today, e-commerce and global data flows require manufacturers to skillfully collect and manage mounting quantities of information, including directories of service providers, new industry standards, and fluctuating price trends. Much of this information is unstructured.

> *"[Manufacturers are] swimming in a sea of providers, literally Googling to find answers," states the owner of a small Newark manufacturing company.*

Manufacturers that can navigate and filter new information in a targeted fashion and translate their research into workable metrics and plans are the most likely to reach their sustainability goals. However, according to a field representative with NJMEP, many manufacturers in the region lack the tools and guidance needed to secure relevant information and proceed with early-stage steps toward more sustainable operations, such assessments of internal operational deficiencies; often, they do not know how to get started.[76]

A final, related, obstacle to improving manufacturing sustainability in Newark is the **dearth of quality information** about sustainability options available through local and regional industry networks. Most Newark manufacturers lack access to business-to-business ("B2B") networks that would encourage peer mentoring and referral sharing, thereby helping to cut through the challenges of "data deluge." At roundtables, Newark manufacturers indicate that their limited visibility and cohesion relative to businesses in other sectors, such as retail or restaurants, make it hard to build networks that would help to "foster manufacturing sustainability locally." Again, manufacturer experiences and needs appear to be differentiated based on their size. The city's small manufacturers are the least likely to have the capacity to retain external consultants and the most likely to lack networks for sharing best practices. They are also the most likely to feel overwhelmed by the prospect of sustainability-related transitions, which include operational and cost changes. Even well-designed sustainability services and resources can be easily overlooked by small manufacturers amidst the whir of everyday operations. There is a strong need to close network gaps and disseminate tools that would help existing and new companies evaluate sustainability opportunities, particularly in the areas of supply chains and resource efficiency.

Newark manufacturers' biggest challenge in the area of global exports is identifying top opportunities for market entry and then navigating required adminstrative channels.

3. Small Newark manufacturers are isolated from resources and tools to maximize access to new clients in regional and global markets.

As manufacturing supply chains have reconfigured at home and globally, it has become clear that the most competitive companies are those that are nimble enough to identify and respond to a

broad base of customer needs and capitalize on demand in niches of existing and rising markets. In the words of one Newark manufacturer, the competitiveness of many of today's manufacturers relies on their ability to be responsive "jacks of all trades" in the marketplace.[77]

Newark is strategically located as a prime gateway for metropolitan industries to connect with inland U.S. markets and a growing network of foreign markets. Port Newark is part of Port Newark-Elizabeth Marine Terminal, the East Coast's largest maritime freight handling complex. It covers 2,100 acres and supports 280,000 jobs.[78] The Port is also located within a Foreign Trade Zone (FTZ) that moves billions of dollars of goods annually.[79] But while these assets provide ripe opportunities for Newark manufacturers to expand their reach, small and mid-sized companies in Newark lack sufficient support to take advantage of them.

Newark manufacturers' biggest challenge in the area of global exports is identifying top opportunities for market entry and then navigating the administrative channels required by trade regulations. There are ample state and federal resources to support more manufacturing exports in Northern New Jersey, including in Newark. However, a large majority of survey respondents report that assistance with "identifying global export opportunities and entering foreign markets" would be "helpful," suggesting that there is currently a lack of awareness of export assistance options. This is likely the result of insufficient outreach and links between manufacturers and regional and state intermediaries that possess the expertise needed to help companies evaluate their export options. These intermediaries include the New Jersey Business Action Center (NJBAC), Northern New Jersey Export Assistance Center, and federally funded State Trade and Export Program (STEP).[80]

In instances where outreach or an export campaign is effective, customized follow-up by either service providers and/or manufacturers may be lacking. A Newark manufacturer noted that her company's participation in a federal export mission did not yield positive results, due to poor follow-up by organizers. In turn, senior staff at the Northern New Jersey Export Assistance Center observes that manufacturers in the region, who represent a small share of their client base, also sometimes fail to follow up—for example, by not preparing specific materials needed to take advantage of their services. "Some businesses don't do the necessary homework," said a manager at the center.[81] These comments confirm that commitment, planning, and cooperation are requisites for export success. They also imply that there may be a need for more front-end (pre-counseling) support to streamline fact-gathering and paperwork; manufacturers often find these steps cumbersome or time-consuming, thereby preventing them from reaping the full benefits of the counseling process. Additional research is needed to clarify the most appropriate method of improving or modifying the administration of specific export programs.

Conflicting perceptions of the global export potential of local manufacturers may also be contributing to under-exporting in the region. Approximately half of survey respondents in Newark report that expansion into overseas markets is "not important" for their companies' medium-term success. Interviews suggest that some manufacturers perceive there to be minimal scope to promote their products overseas or have concluded that any existing global export opportunities are unlikely to yield sufficient payback to justify associated cost and resource expenditures.[82] Findings reveal that these perceptions and related challenges are shaped by firm size and the type of products manufactured, as well as the geography of business competitors. Small, single-site manufacturers are more likely than large companies to underestimate their export potential and perceive barriers to export assistance.[83]

Newark companies in "lower-R&D intensive" industries—e.g., wood furniture, fabricated stone products, baked goods, apparel, and paper and plastic packaging—are more likely than manufac-

turers in other industries to primarily serve NY-NJ metropolitan and Northeast markets.[84] These firms report a greater desire to maximize domestic (especially regional) distribution and sales than to break into overseas markets.[85] Their emphasis on regional competitiveness reflects broader market and trade trends, shaped by the unique niche market demands and dynamics that they are responding to.[86] For example, research shows that there is strong metropolitan market demand today for value-added consumer goods, as in the case of specialty foods (e.g., gluten-free, vegan) and homecare medical products.[87] The manufacturers in this demographic report a need for greater visibility and more forums for structured networking and marketing across the greater Newark region and Northeast that could help boost their respective profiles and the competitiveness of their products.

4. Newark struggles with a manufacturing skills gap that hampers its ability to respond to existing and future market demand.

Numerous national studies point to an alarming shortage of career-ready and skilled talent able to meet 21st century U.S. manufacturing demands.[88] Despite a relatively high-skilled workforce, New Jersey communities have witnessed similar trends, across both cities and suburbs.[89] The biggest challenges are in the areas of worker attrition (i.e., an aging workforce), limited career readiness and skill development options, and inadequate talent pipelines to the sector.

With the average age of a high-skilled manufacturing worker in the United States standing at 56, the attrition of skilled production workers is a real and growing issue.[90] In fact, the majority (67 percent) of survey respondents in Newark indicate that an "aging workforce" will pose a challenge to their success over the next five years. Certain industries appear to be more acutely affected by this trend than others. Durable goods manufacturers in industries such as chemicals, commercial packaging, and fabricated metals production are more likely than Newark's food and apparel manufacturers to cite this factor as a barrier to successful operations. (The latter, notably, are lower-wage industries that appear to employ younger and middle-aged immigrants, mostly Latinos, mirroring urban industrial employment patterns nationwide.)[91]

> *"The average age of my employees is 59 years old," states a long-time Newark manufacturer of shelving units. "I have guys out there [on the shop floor] in their sixties and seventies."*

Fabricated metal shops in Newark relay similar experiences, as skilled operators, machinists, technicians, and tool and die makers continue to exit the region's workforce.

For the past decade, manufacturing managers and human resources staffs in the greater Newark area have struggled with recruitment, hiring and retention, particularly with respect to production positions.[92] More recently, however, Baby Boomer attrition has sparked a sense of urgency to improve these outcomes within the region, as many Newark manufacturers indicate that they are currently looking to hire new employees at their respective facilities. However, Newark faces difficulties in its efforts to tackle this trend.

> *"Skilled labor is hard to find, and it's a shame," explains an East Ward manufacturer. "Skilled help is the big key," notes another business owner. "There are too many truck mechanics around here; no one seems to want [manufacturing] jobs."*[93]

In fact, among surveyed manufacturers, a majority of respondents indicate that an "inadequate supply of appropriately skilled labor" is a "moderate" or "major" challenge to their competitiveness over the next five years. Across industries, Newark manufacturers report that middle-skilled production workers (for example, machinists, technicians, and operators) and middle-management (e.g., plant managers) are the most difficult to recruit,

as compared to senior management and entry-level workers.[94] However, findings indicate that entry-level workers may have higher turnover rates than other groups.[95] R&D workers are moderately difficult to recruit and hire in Newark.

There are currently several barriers to strengthening manufacturing career readiness in Newark and growing career pipelines between Newark and regional manufacturing companies.

First, many Newark workers **lack basic math and literacy skills needed for manufacturing jobs or training programs.** As of the 2010-2011 academic year, 60 percent of Newark students are not proficient in math and reading after the 7th grade. The high school graduation rate in Newark is 55 percent, and over 50 percent of Newarkers either lack a high school diploma or have less than a ninth-grade education.[96] Meanwhile, public educational capacity in science, technology, engineering, and math ("STEM") areas has been waning in inner-city communities across New Jersey, including Newark, whose public schools are run by the State of New Jersey. In 2012, although the Newark Public Schools (NPS) District improved under some state performance metrics, some local schools lacked science labs and struggled to fill positions for math and science teachers.[97] While progress at certain schools is encouraging, wider trends will continue to be problematic for local and regional manufacturing competitiveness; reading comprehension and the effective application of math concepts are among the core set of skills and competencies that are essential for entry into, and advancement within, the manufacturing sector.

Second, manufacturers in the greater Newark region are **isolated from networks and tools that could facilitate the recruitment and hiring of talent** from community colleges and high schools in the greater Newark area, including Essex County. Among survey respondents and interviewees, the majority of manufacturers depend on online engines (e.g. Craigslist, Monster) and word-of-mouth endorsements for recruitment and hiring. Explains one Newark manufacturer: "Where do you find quality control staff? We go to Monster."

Small manufacturers lack human resources staffs and are the most likely to hire walk-ins for entry-level positions and/or to recruit applicants through internal referrals and from newspaper ads. These are remarkably poor recruitment tools. Indeed, a 2011 report by Deloitte and The Manufacturing Institute stresses that "informal methods such as word-of-mouth recruiting," while commonplace among small businesses nationwide, fail to efficiently connect manufacturers and today's job and career seekers.[98]

In addition, interviews in Newark indicate that **core competencies, career pathways, and opportunities for advancement in the manufacturing sector are poorly understood**, particularly among secondary school students and their parents/guardians and guidance counselors. Technical educators and manufacturers report that manufacturing suffers from a poor public image and lack of marketing cache and respect relative to other sectors, such as nursing.[99] This problem stems from a lack of engagement and discourse at all levels, from households to schools.

> *"There is a real need to 'train the trainers' [on manufacturing] right now," explains Dr. Michael Pennella, Superintendent of Essex County's Vocational-Technical School District, which includes a vocational-technical school in downtown Newark.*[100]

Leadership at Essex County College (ECC), also located in Newark, is similarly eager to build capacity to train manufacturing talent but acknowledges a strong need for facilitators "to open doors to information and [manufacturing] employers," so that ECC can "retool" to meet regional industry demands. According to Nelida Valentin, Director of Newark's Workforce Investment Board, such awareness-raising among educators and administrators could help to combat outdated perceptions of manufacturing among

Newarkers. She notes that many "still associate manufacturing with dirty, lower-skilled factory jobs."

A fourth barrier to manufacturing career readiness is the **lack of accessible training and credentialing options for Newark's youth and incumbent workers** who are interested in manufacturing skills training, especially in production positions. This challenge is closely related to the wider lack of awareness about opportunities in the sector. There is a need for a more nuanced understanding of manufacturing skill gaps in Newark and potential options for coordinated training responses in the region. For example, increased automation in certain regional industries (e.g., chemicals, packaging, custom fabrication) may necessitate better and/or more training options for prospective machinists or process technicians with specialized competencies. To date, a manufacturing competencies assessment has not taken place in Essex County. As a result, there are also no customized training options for veterans in Newark/Essex County (a community of 18,000 in the greater Newark area) or limited-English-proficient Newarkers, a large and growing percentage of the industrial workforce.[101] Limited training options in Essex County also reflect a lack of appropriately fitted space and available equipment, such as CNC fabricators, on which to train potential manufacturing talent for jobs in the sector.[102] Moreover, interviews reveal that there are few opportunities to match Newark's secondary and post-secondary students with paid internships or jobs in manufacturing settings, despite manufacturer interest in such options and growing manufacturer.

Finally, the **convenience of transit options to industrial sites also affects career development and talent recruitment in the region's manufacturing sector.** Nearly half of Newarkers do not own cars. Many secondary and postsecondary students, as well as young graduates in the greater Newark region, are also carless, and thus dependent upon buses, commuter trains (PATH, NJ Transit), and Newark's Light Rail system. While

Most Newark manufacturers (80 percent of survey respondents) report that "transit access for employees" is an important factor in keeping their operations in Newark.

Newark's transportation system is well-networked, there appears to be limited coordination to align opportunities for youth, workers, and businesses based on their relative location to each other.

> *"The biggest problem is logistics," notes an instructor with Essex County Vocational-Technical School District. After describing the arduous process of trying to place technical students in part-time opportunities with manufacturers, he states, "At $4 a gallon for gas, if we can keep [manufacturing opportunities] within the area, that's great."* [103]

Manufacturers concur. Irrespective of neighborhood, most Newark manufacturers (80 percent of survey respondents) report that "transit access for employees" is an important factor in keeping their operations in Newark.[104]

Certain common trends underlie all of these challenges: Newark stakeholders report that **there are too few points of access between local institutions, communities, manufacturers, and allied industry professionals.** Manufacturers perceive there to be too few options for recruiting work-

ers that possess the adaptability and acumen to succeed on the job, whether on the factory floor or handling sales in the back office. Misguided perceptions resulting from limited access/communication and collaboration in support of manufacturing poses a risk to manufacturing competitiveness in the Newark region.

Previous studies have documented these trends in New Jersey. A 2004 report states that "inaccurate and outdated knowledge about [manufacturing] jobs… combined with the bias of a K-12 educational system that is increasingly geared toward college preparation, has resulted in… major workforce challenges."[105] Nearly a decade later, these same concerns persist in Newark. The approaching generational shift in the sector, as well as rapidly evolving market and technological trends, demand better coordinated responses and meaningful solutions.

5. Newark faces several land, space, and infrastructure constraints that impact manufacturing competitiveness.

Newark's physical fabric and infrastructure reflect its character as a mixed-use residential/industrial community and Port city with a strong industrial tradition. Yet, these same features bestow certain constraints to industrial redevelopment and goods movement, both of which support manufacturing. These most directly concern the industrial areas of Newark that support Port Newark-Elizabeth and Newark Liberty Airport (the Port/Airport "support lands"); major industrial corridors, such as Frelinghuysen, Doremus and Lister Avenues; and inland industrial pockets of the South, East, and North Wards.

First, according to Newark's Master Plan, "fragmented ownership" and related land use patterns present a major challenge to industrial site assemblage and preparation, particularly in industrial areas surrounding Port Newark and Newark Liberty Airport.[106] There are approximately 600 property owners occupying 1,200 parcels in these areas, though many of the commercial uses are not Port-dependent. In off-port industrial areas, ownership patterns appear to affect business activity: For instance, some small manufacturers that lease space report that building owners do not tend to proactively make upgrades, such as façade improvements and facility modernization.[107] Gaps in valuation among the land owners, businesses, government agencies, and Newark stakeholders prevent them from assembling parcels and closing transactions to make the overall business climate of the Port/Airport areas more competitive and more conducive to value-added activities. For example, better coordination is needed to accelerate the process of determining costs, risks, and opportunities associated with industrial remediation, site acquisition, and financing, and ultimately, to deliver more state-of-the-art facilities to the market that can accommodate 21st-century production processes.

Second, the actual and perceived condition of industrial sites renders the redevelopment of certain Newark properties very challenging, due to cost barriers. There are approximately 700 brownfields in the city of Newark.[108] According to a 2010 analysis for the city of Newark by the Port Authority of NY-NJ, "the city's subsurface conditions, especially in the Port Support Area… which is mostly land made by filling in marsh, add significantly to the cost of developing new facilities."[109] In some instances, the need for demolition can also impose extra costs. Many developers and owners are averse to absorbing these costs without resources to close cost gaps. Unlike Newark's sites for refrigerated warehousing, which can carry higher revenues that offset development, the development of spaces for small-scale manufacturing is not perceived to be an attractive proposition purely on a cost basis.

Finally, the city of Newark has not fully positioned itself to capture manufacturing-related opportunities in Newark's off-port/inland industrial areas that will arise from the upcoming expansion of Port Newark in 2015 and projected increases in container and freight flows in the coming decade.

For example, not enough effort has been made to identify and investigate market opportunities associated with Port-dependent supply chains—e.g., intermediary processes such as subassembly, final assembly, post-production, packaging, and even logistics R&D—and match existing and incoming businesses with appropriate sites and resources accordingly. In addition, Newark has not fully prepared plans to face the challenge of intensifying truck congestion and diesel emissions in the Port and Airport support areas.[110] Newark stakeholders report that they need support in better understanding site-specific transportation and infrastructure challenges, such as heavier truck loads, in order to help specific neighborhoods and the region better manage volume flows. Community stakeholders and the city of Newark's Office of Sustainability emphasize a need to ensure greener operations and more efficient trucking (e.g., less truck idling, per the Port Authority's Clean Air Plan and the city of Newark's Sustainability Action Plan), given the proximity of Newark's industrial areas to residential communities, as in the city's Ironbound section. ■

THE NEXT GENERATION OF NEWARK "MAKERS"?

New Jersey's manufacturing executives are older, on average, than their counterparts around the nation. Statewide, 83 percent of respondents to a 2011 NJMEP survey report that they are "led by a chief executive who is older than 50 years old." Forty-four percent of these managers are older than 60 years old, and a sizable majority is male.[111]

Aging management and impending worker turnover are self-reported challenges for many of Newark's manufacturers, many of which are multi-generational, family-owned businesses. The findings in Newark suggest that succession planning is not an immediate-term challenge for most companies, but that it is likely to become a greater threat to sustained operations five to ten years from now. "I've seen Newark manufacturers disappear [in the last year] due to this issue," remarks Mitch Cahn of Made in Newark, adding that many companies "resist talking about succession planning."[112] NJMEP cites similar concerns. Better succession planning options, as well as stronger industry partnerships with University Heights, may help to ensure that a new generation of talent will be positioned to enter the region's manufacturing sector and help it to grow and innovate.

To that end, Newark possesses real opportunities to engage a new generation in the manufacturing sector. Newark is a relatively young city, as nearly half of Newarkers are under the age of 34.[113] However, the city is located in a region with an increasingly depressed job market for teenagers and young adults, particularly those from low-income families. Among those with jobs, many hold seasonal or temporary positions. Moreover, even access to seasonal employment opportunities is shaped by income disparities; in 2012, low-income youth in New Jersey were three times less likely than their upper-income peers to find summer employment.[114] Prospects for college graduates in New Jersey cities are also troubling. A 2011 Heldrich Center study reveals that only half of those who graduated from college in New Jersey between 2006 and 2010 are employed full-time.[115]

Experts project that this troubling pattern of youth disengagement from metropolitan labor markets—as well as mismatches between job seeker skills and expectations and employer/industry needs—is likely to worsen in the near future without better coordinated vision, investments, and action. If relevant educational and civic resources are marshaled and targeted appropriately, supported by deliberate collaboration, Newark can potentially unlock new career pathways in manufacturing for its youth and young workers—the next wave of "Newark makers." ■

IV. FRAMEWORK FOR COLLABORATION: GOALS AND STRATEGIES

A 2012 article by Bruce Katz and Jennifer Bradley of the Brookings Institution describes the "habits of highly effective networks" that support urban and regional economic development. Among these is the push to "measure what matters."[116] According to Katz and Bradley, "by measuring and gaining a more thorough understanding of their most important economic assets... metros [are] better able to build on their strengths and compete." Pre-recession American cities were often "measuring the wrong things" Katz and Bradley argue. Urban economic development activities were skewed to "speculation rather than innovation, parochial demand rather than global trade, [and] real estate appreciation rather than productive returns." For too long, this outlook shaped metropolitan priorities and channeled energy and resources to ad hoc projects that lacked broader goals and inclusive frameworks for meeting community needs and industry demands.

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The Newark Manufacturing Initiative has strived to "measure what matters," with the goal of better understanding the role and potential of manufacturing in the Newark economy and regionally. The goals and strategies presented here are the results of this effort, and directly respond to the market analysis, project findings, and stakeholder feedback garnered through the process. They seek to address the innovation, sustainability, workforce, infrastructure, and other challenges that have hampered firms' ability grow, improve, and compete in an increasingly competitive marketplace. Most importantly, they underscore opportunities in the sector that will help Newark grow its next economy: the potential to engage more Newarkers and local businesses in the most inclusive, environmentally sustainable, and high-value segments of the economy; to better utilize Newark's land, infrastructural, and institutional assets to support a stronger ecosystem for production and innovation; to connect more Newark suppliers to innovation and business resources, as well as robust markets; and to leverage Newark's assets to improve supply chain competitiveness and resource efficiency.

These goals and their associated strategies draw on ongoing and emerging efforts of organizations and institutions from around the region. They are both aspirational and results-focused, and ultimately aim at a single outcome: greater manufacturing competitiveness and more viable economic opportunities for Newark residents and regional manufacturers.

PRINCIPLES FOR A NEWARK MANUFACTURING STRATEGY

Newark's strategic framework for manufacturing competitiveness should be undergirded by the following set of principles, which have been developed through input from the NMI Advisory Network, NMI working group, and local manufacturers:

1. **Build on Newark's competitive advantages in the next economy.** It is critical that cities and regions maintain inventories of their industry base and capacities and continuously evaluate their strengths and opportunities. Newark's many locational advantages, access to a diverse workforce, and dense networks of small, nimble suppliers create competitive advantages that should be better cataloged, understood, and leveraged.
2. **Promote a "high road" vision of manufacturing.** A recent Brookings study reports that too many American localities "pursue policies that encourage firms to compete on the basis of low wages, using low-skilled workers and leaving innovation to chance." In contrast, a "high road" approach to local and state manufacturing policy emphasizes well-paid career pathways for a diversity of workers, investments in innovation, environmental sustainability, and value-based competition.
3. **Think and act regionally.** The strength and success of Newark's manufacturers are deeply related to the health of companies regionwide and the value of regional supply chains. Strategic planning and coordination should therefore account for, and extend beyond, city borders.
4. **Leverage existing knowledge, strengths, and capacities citywide.** Strategies should align with local and regional efforts around manufacturing and build on existing institutional and organizational knowledge, such as that embodied in Newark's recently adopted Master Plan, Newark's forthcoming Sustainability Action Plan, and New Jersey's latest State Strategic Plan.
5. **"Open doors" and forge strategic partnerships.** Effective programs and policies in support of a robust manufacturing sector necessarily require coordinated public and private planning, action, and investment. Partners should understand the imperative of a "high road" vision for a competitive and sustainable manufacturing base.
6. **Support outreach, inclusion, and civic engagement.** The manufacturing sector has the power to support opportunities for a broad base of Newarkers. Community consultation and community-based cooperation are critical for industrial excellence, including with regional employers. ■

SNAPSHOT: GOALS AND STRATEGIES

The following strategies were developed over the course of a year with considerable input from local advisors, stakeholders and manufacturers. They seek to **target Newark's manufacturing challenges; leverage its strengths as a diversified, dense, and agile supplier base; and maximize its locational, logistical, and institutional assets.**

In its effort to boost local and regional manufacturing competitiveness, Newark should:

1. **Accelerate innovation to improve productivity and product development**
   - **1.1** Recommit to the vision of Newark's Science Park and Innovation Zone and make Newark a hub for open innovation strategies that target small manufacturers.
   - **1.2** Encourage the co-location of ideation, design, and R&D functions, as well as business development and technical assistance.

2. **Promote resource efficiency and sustainable supply chains**
   - **2.1** Create a "one-stop" site for manufacturers to access customized support in the area of supply chain sustainability, including assistance with supplier readiness, market research, and integrated business planning.
   - **2.2** Connect regional manufacturers to face-to-face (F2F) and business-to-business (B2B) networks that promote supply chain competitiveness by boosting domestic sourcing and distribution.
   - **2.3** Strengthen budding partnerships between industry consortia, the city of Newark, and local and regional intermediaries to promote resource efficiency strategies.

3. **Connect manufacturers to new market opportunities**
   - **3.1** Deepen existing connections and develop new partnerships that will provide specialized resources to Newark manufacturers that are currently under-exporting.
   - **3.2** Boost the visibility of Newark as a competitive port city and logistics hub for "next generation" suppliers.
   - **3.3** Develop a Food Sector Strategy for the city of Newark focused on production and linkages to non-production activities and opportunities.

4. **Create a 21st century manufacturing workforce that responds to regional industry demand**
   - **4.1** Strengthen Newark/Essex County collaboration to promote manufacturing career readiness among Newark entry-level and incumbent workers and expand manufacturing talent pipelines to regional manufacturing companies.
   - **4.2** Launch a pilot program that will offer industry-recognized manufacturing credentials to a cohort of Newark veterans.
   - **4.3** Establish a bridge program that combines English literacy training (i.e., adult basic education ESL) and manufacturing skill development.
   - **4.4** Support experiential and contextual learning by developing a stipend fund and more opportunities for Newark's high school and postsecondary students to intern with regional manufacturing companies.

5. **Link physical transformation to economic transformation**
   - **5.1** Continue to build a comprehensive inventory and knowledge base about the condition, redevelopment prospects, and marketability of Newark's off-port industrial sites, including along inland corridors.
   - **5.2** Collaborate with Port Authority of NY-NJ on Port Newark's "manufacturing narrative" and continue to develop infrastructure, job creation, sustainability, and site marketing strategies related to pending Port expansion.
   - **5.3** Explore practical, site-specific models for the reactivation/redevelopment and financing of underutilized, low-barrier small industrial parcels, focusing on their scope for value-added, light production.

1 ➤ GOAL 1: ACCELERATE INNOVATION TO IMPROVE PRODUCTIVITY AND PRODUCT DEVELOPMENT

Changes in business models, size, and supply chains are demanding a broader range of innovative tools and solutions for improving how and what goods get made. Yet research shows that small manufacturers in diversified metropolitan areas conduct "little or no R&D and receive little benefit from the kinds of R&D performed at research universities." Rather, their primary need is for assistance with incremental product and process innovation rather than with radical product innovation."[117]

The findings in Newark support this assertion. To address this issue, Newark's small and medium-sized suppliers must better connect to customized, "small bore" innovation solutions, in addition to broader R&D activities.

STRATEGY 1.1. Make Newark a hub for open innovation strategies that target small manufacturers in the region.

Newark's resources should be harnessed to cultivate activities that support more fluid, diversified, and open channels for product and process innovation, with small-scale production and STEM activities at the center. The goal of open innovation, in this sense, would be to help more manufacturers capture inspiration and value from external sources of ideas and technologies.

The impulse behind "open innovation" approaches is hardly new or novel. However, it does run counter to popular assumptions about manufacturing innovation, which focus on large, well-capitalized and iconic companies—such as multinational electronics and pharmaceutical companies.[118] This "traditional" vision of manufacturing innovation assumes companies will maintain internal product ideation, design, and R&D functions. Yet this innovation structure is not applicable to many small suppliers in metropolitan communities, like those in Newark, as it fails to reflect their goals and capacities. At the same time, many Newark manufacturers face steep barriers to integrating even basic innovation processes into their business models and operations, due to their smallness, leanness, and limited access to potentially useful tools and networks. This, in part, reinforces an internal workplace culture that is not oriented to innovation, which is a challenge statewide. In Newark, local manufacturers struggle with planning for and benchmarking innovation, conducting research that could lead to product development, and reorganizing for greater efficiency and sustainability (which may incorporate innovation).[119]

As American technology and knowledge-transfer systems have rapidly evolved, more varied methods of innovation—and benchmarks for tracking innovation—are becoming popular, relevant, and profitable.[120] Opening up new forums for innovation exchange in Newark—and expanding the participation of Newark manufacturers in existing innovation initiatives, such as at NJIT—are practical and responsive approaches to innovation challenges.[121] There are several potential steps that Newark can take to build its capacity to serve as a regional center for open innovation.

To start, stakeholders could focus on small industrial firms and phases of ideation through prototyping. This could be accomplished, for example, by developing a pilot community of manufacturing innovation consortia, led by NJIT, that form industry-specific roundtables, e.g., focused on building materials or fiber sciences. This would enable the city to draw on prime competitive advantages—its diverse industry mix and the smallness and agility of regional manufacturing suppliers. A growing body of research indicates that open innovation methods are increasingly likely to help small manufacturers harness high-quality ideas and designs from multiple communities of suppliers, startups, and/or other external partnerships, helping to fortify their competitive edge in niche, fast-growing corners of higher-value industries.[122] The low-risk and inclusive format of "open innovation" resources is especially likely to appeal to small

suppliers in moderately technologically intensive industries—for example, machinery and high-end textiles—that are the most likely to benefit from opportunities to connect/collaborate in the areas of ideation, design, and new product development.

Second, Newark should leverage its concentrated educational spaces and resources to foster an atmosphere that advances open innovation—for instance, through more knowledge sharing forums and industry roundtables. Strategies that support and advance the innovation efforts of small manufacturers would ultimately support the vision of Newark's Innovation Zone/Science Park. This area is easily accessible to Newarkers and the region and can be leveraged to serve as a regional center for innovation activities. NJIT currently offers dozens of undergraduate and graduate degree programs in technical fields and boasts strong competencies in several areas that support manufacturing technologies, including medical device innovation (e.g., in wellness management); applied bio-derived and biotechnology and cellular science fields; information technologies; and sensor and scanner technologies. The university is also home to an Enterprise Development Center (EDC), which houses numerous life sciences businesses. NJIT and EDC regularly support innovation/product development competitions. Despite NJIT's central location and prime resources, Newark's manufacturing community is largely isolated from these opportunities, as well as targeted innovation supports, such as costly consulting services.[123]

Third, Newark and regional manufacturers need to be more engaged in existing University Heights/Innovation Zone/Science Park activities. Strong and attentive partnerships led by both industry and academic/research stakeholders in University Heights, e.g., NJIT, would help strengthen Newark's role as a leading powerhouse around industrial collaboration and a regional hub for open innovation. At the same time, more expansive partnerships between local, state, and regional entities—for example, BCDC, Made in Newark, and NJMEP—would create the possibility for more targeted, incremental product and process improvements for small suppliers. A successful example of this can already be seen in Newark: BCDC recently "graduated" a cohort from its Innovation Engineering Pilot Program, a successful collaboration with NJMEP aimed at helping Newark manufacturers grow their top-line products through innovation.

Finally, while small-scale and incremental innovation should be championed, Newark should also consider exploring the potential for local suppliers to participate in innovative, cluster-based activities in tandem with larger, technologically intensive companies in the region, e.g., in New Jersey's solar industry. New Jersey's industry composition is a potential asset to Newark, if small suppliers can effectively connect to broader regional networks. This strategy would leverage and strengthen local and regional supply-chain synergies.

STRATEGY 1.2. Encourage the co-location of ideation, design, and R&D functions, as well as business development and technical assistance, near manufacturing production sites.

Even in this era of high-speed communications across time zones and continents, geographic proximity and face-to-face (F2F) collaboration continue to improve the depth of manufacturing innovation.[124] This is partly because the fate of manufacturing is increasingly tied up with that of the service sector and non-production functions, like R&D and IT. Meanwhile, fragmented, globalizing supply chains are likely to pose new and growing challenges in the coming years for innovators and consumers alike. For these reasons, experts such as economist Gregory Tassey argue that "co-location synergies" will only become more vital to manufacturing innovation and competitiveness as the sector evolves.

While it is difficult to predict the precise effects of co-locating manufacturing ideation, design, and R&D functions in Newark, manufacturer and stakeholder feedback—as well as research on urban economies, technological innovation, and

industrial workplaces—confirms that "face-to-face contact" remains a superior method of communication and creates a distinct advantage for technical innovation.[125] Indeed, deliberate co-location and collaborative, experimental spaces (from prototyping centers and testing labs to shop floors) connect manufacturing education, innovation, and production—areas that have always needed each other to flourish but have become unnaturally siloed over the years. Rising fuel costs and threats to supply chains, moreover, further boost the incentive to localize cooperative efforts toward manufacturing innovation.

The value of co-location is well-understood among Newark manufacturers and their advocates at Newark's research institutions. For instance, some Newark chemical manufacturers report that it has been advantageous for them to site R&D units alongside, or within, production facilities. NJIT reports numerous success stories through its business incubators, including a small manufacturer that moved out of the incubator to develop a production facility in Newark. Moreover, Newark's growing interest in fabrication labs, more business/technology incubators, and emerging collaborations in support of "makerspaces" are steps in the right direction, linking STEM education and team-based youth opportunities to the world of "making." For example, over the past two years, the Newark Museum and Essex County have allocated new resources, space, machines (e.g., 3D printers) and programming that are helping to integrate innovation and production in Newark.

Newark stakeholders should explore and implement a new set of approaches that better connect existing innovation aspirations and efforts. Current partnerships are largely weak, informal, and lack the support needed to sustain a fertile, citywide innovation "ecosystem." Tight-knit partnerships designed and led by institutional stakeholders in Newark's Innovation Zone/Science Park have the potential to positively impact manufacturing innovation regionally. Stakeholder commitment—across and within institutions—is needed to identify and align resources and investments that would operationalize these partnerships.

A vision of "co location" should also underpin Newark's industrial business retention and attraction decisions more generally, as co-location is a potential driver of value-added production. For instance, it could be part of a 'place based' economic development approach to production, led by partners such as BCDC and the city of Newark, which frames manufacturing innovation, education, sustainability, and business competitiveness as interdependent goals. These goals could be realized by fostering the physical clustering of functions and activities that support production, e.g. design, training.

➤ GOAL 2: PROMOTE SUSTAINABLE SUPPLY CHAINS AND RESOURCE EFFICIENCY

2

Thanks to a variety of efforts—including those by Made in Newark, NJMEP, Newark's Sustainability Office, and Ironbound Community Corporation—there appears to be a growing appreciation in Newark for the cost and market-based benefits of sustainable industrial practices and greater resource efficiency. This is particularly critical given the excessive volume of waste transfers and energy consumption concentrated in the Newark area, which are projected to grow in the years ahead.

Despite a surging interest in "green business" practices and energy efficiency in Newark, existing efforts are disjointed and there is a void of leadership and capacity to connect local and regional manufacturers to sustainability opportunities, including those focused on their supply chains. Strategies thus need to focus on closing resource and network gaps and expanding access to new and emerging tools—such as web-based, B2B platforms—that support supply chain and business competitiveness.

STRATEGY 2.1. Create a "one-stop" resource in Newark for manufacturers to access customized support in the area of supply chain sustainability, including assistance with supplier readiness and business planning.

In an increasingly networked and complex marketplace, tools and templates for iterative assessment can be transformative in terms of cost savings and sustainability, particularly for small manufacturers susceptible to volatility. They can help to make risks and opportunities more transparent. This is especially true as OEMs and large retailers continue to tighten their sustainability standards and other codes for suppliers.

Creative resources are needed to support small and mid-sized manufacturers in the greater Newark region that lack the in-house capacity to conduct rigorous and speedy market research, internal evaluations, and supplier assessments—and to help address the data deluge problems and network gaps that hamper supply chain sustainability. To this end, Newark should designate a regional point of contact and create a "one stop" resource center that can assist contract suppliers with supply-chain related needs, through quality research and related business counseling. The formation of a "one stop" hub could be accomplished through a new, Newark-based partnership that connects manufacturers and savvy supply chain professionals that understand supplier-purchaser dynamics. For example, Rutgers Business School's Center for Supply Chain Management, located in downtown Newark and staffed by expert faculty, could serve as an intermediary to facilitate the development of a partnership and coordination of "one stop" resources.

STRATEGY 2.2. Connect Newark manufacturers to more face-to-face (F2F) and business-to-business (B2B) networks that promote regional supply chain competitiveness through domestic sourcing, and align these efforts with Newark's "sustainable economy" goals.

To remain competitive, Newark's small and mid-sized manufacturers need to stay abreast of new opportunities on both ends of their supply chain—and new technologies for doing so. For example, recent national initiatives, such as SBA's Supplier Connect, represent a new and growing wave of online platforms that help small suppliers connect to the nation's largest companies/buyers. They are mirrored by emerging local and regional initiatives, like San Diego's Connectory (part of CONNECT's Nearsourcing Initiative), which serves as a "matchmaking" database for production companies. F2F networks will also continue to be a vital way to foster supplier connections, even as technology-based options expand.

Local partners, such as Made in Newark, could play a key role in helping Newark manufacturers better connect to both web-based platforms and F2F networks that are responsive to supplier needs.

First, Newark partners can support more regional B2B connections by serving an intermediary role in raising awareness about "virtual" platforms for suppliers, and in so doing, help to encourage firms to incorporate them into their business and marketing strategies where appropriate. The emerging web-based connector Maker's Row, for example, offers the potential to link domestic designers and suppliers to manufacturers, including within a given city or region. Such platforms, and others, can help manufacturers generate new leads—for ideation and design collaboration, as well as product sales.

Second, local partners have the potential to expand F2F (B2B) networks that help local—and potentially regional—businesses improve their bottom lines. Made in Newark could do this, for example, by developing a web directory and/or "matchmaking" platform for local suppliers. In addition, local partners, e.g., Made in Newark and the city of Newark's Sustainability Office, could potentially sponsor networking forums and workshops that help companies learn about the cost-savings benefits associated with specific resource efficiency and sustainability practices. There are

presently early-stage efforts underway in Newark to explore these options.

If implemented, this specific strategy has the potential to support and align with Newark's emerging "Buy Newark" framework, recommended in a study by PolicyLink in 2012. That report proposes the adoption of a comprehensive "Buy Newark Initiative," which will tentatively involve the "develop[ment] of a citywide plan for [initiative] implementation and partnerships." If and when Newark proceeds with the formalization of a "buy local" plan and partnerships, the goals and recommendations herein should be accounted for and 'folded into' that process/effort.

This element of Newark's manufacturing strategy should also align with the recently adopted Sustainability Action Plan (SAP). This groundbreaking effort proposes the adoption of several agendas, some of which align with Newark's manufacturing strategy, including: a "Zero Waste" agenda (e.g., better waste management, electronics recycling), diesel mitigation for improved air quality, and the creation of a Food Policy Council. Critically, the SAP calls for the creation of a Taskforce on Sustainable Economy in Newark, which will "[set] clear policies and [boost] demand for green goods and services." Newark manufacturers should be engaged in this taskforce—possibly through the Made in Newark network or NJMEP.

STRATEGY 2.3. Support partnerships between industry consortia, the city of Newark, and regional intermediaries to promote industrial resource efficiency strategies.

As noted above, the Sustainability Action Plan (SAP) sets out a number of goals that align with current efforts toward manufacturing resource efficiency in Newark. The SAP encourages Newark to reduce energy consumption and "support technical assistance… to assist local businesses interested in…using secondary market materials in their production processes." While perceptions about the cost and viability of resource efficiency are mixed among manufacturers, businesses and Newark stakeholders have expressed sufficient interest in exploring opportunities to link the implementation of the SAP to Newark's emerging manufacturing goals.

To start, Newark could focus on two areas that have high potential for short- or medium-term collaboration and impact: industrial energy aggregation and byproduct synergy.

The first strategy—energy aggregation—would leverage New Jersey legislation, known as Community Choice Aggregation (CCA), which allows cities in the state to procure electricity in the wholesale power market on behalf of collectives of residents and businesses. This framework has proven effective in other states with CCA legislation, including Massachusetts and Rhode Island. Newark stakeholders—including the city of Newark's Sustainability Office, BCDC and Made in Newark—are currently exploring the potential to form a bidding bloc of Newark businesses that would benefit from a collectivized energy arrangement.[126] Most Newark manufacturers run energy-intensive operations and are especially sensitive to New Jersey's high energy prices, which are among the highest in the nation. Thus, manufacturers are a key target group in Newark's aggregation effort, and preliminary outreach to them is currently underway. While the prime benefit of energy aggregation for manufacturers would be cost savings, this strategy could also help to reduce the environmental impact of energy consumption in Newark, one of the objectives in the city's new Sustainability Action Plan.

Newark should also implement a pilot initiative that would identify and engage a group of manufacturers in a byproduct synergy (BPS) or byproduct exchange (BPX) project. The city of Newark's Sustainability Office and NJMEP could partner to form and guide a Newark-based BPS group that would facilitate waste collection from manufacturers—of commercial electronics, for example, or plastic—for recycling and/or reuse in the development of new products. Implementation of this

resource efficiency strategy would support Newark's Zero Waste approach, as outlined in its SAP. Houston and Chicago—two U.S. cities that have formed BPS groups to generate new resources and profits from waste—are instructive case studies.[127]

3 ➤ GOAL 3: CONNECT MANUFACTURERS TO NEW MARKET OPPORTUNITIES

The density of Newark's manufacturing base, proximity to regional markets, and ability to reach global customers are boons for Newark's economic development. Newark has the potential to capture emerging local, regional, and global market opportunities for diverse industry groups, while taking advantage of its transportation and land assets.

STRATEGY 3.1. Deepen existing connections and develop new partnerships that will provide specialized resources to manufacturers seeking to enter overseas markets.

At a 2010 export forum at Rutgers Business School in Newark, Mayor Booker underscored the need for partnerships that will "[make] sure that businesses throughout Newark are capitalizing on [export] opportunities."[128] Understanding such opportunities is vital to the ability of firms to reach new markets abroad.

A *two-pronged approach* is needed to resolve gaps in market-entry and global export assistance for Newark manufacturers.

First, basic connectivity between Newark manufacturers and existing export assistance providers in the region, such as the Newark-based Northern New Jersey Export Assistance Center (part of the U.S. Commercial Service), needs to improve. Intermediaries such as BCDC, Newark Regional Business Partnership, and Made in Newark are positioned to lead and coordinate such an effort—for example, by publicizing export workshops with state and federal partners, such as Small Business Development Centers, U.S. Commercial Service, and NJMEP. These forums should target regional manufacturers both at large and in specified industries (e.g., apparel, chemicals). At the same time, Newark business intermediaries should continue to explore opportunities to increase the city's position as a regional convener for manufacturer networking, trade shows, and conferences that spotlight export opportunities and allow for peer-to-peer sharing about emerging and established best practices. This form of export promotion may be accomplished, for instance, through partnerships with colleges and universities in the region.

Second, Newark should design a strategy to screen small and mid-sized manufacturers for export and growth potential and work with their senior management to 1) cultivate an internal workplace strategy and culture oriented to new markets, and 2) identify and pursue overseas opportunities by drawing on quality, real-time research. This could potentially be achieved by offering customized market analysis and business planning through intermediaries that are trained to help companies target their resources around high-value global opportunities for specific product lines, particularly in niche markets.[129]

STRATEGY 3.2. Boost the visibility of Newark as a competitive port city and logistics hub for "next generation" suppliers.

Newark stakeholders recognize the need to better understand, market, and capture opportunities related to port-side and off-port production and global supply chains, including assembly. Yet, Newark has not developed a visible identity as a port city with regional and global relevance. Pending the expansion of the Panama Canal and Port Newark/Elizabeth growth, such visibility and identity will be increasingly vital for competitiveness, as East Coast and Gulf ports continue to aggressively retool in order to tap emerging opportunities, such as near-sourcing and more inland distribution.

A multi-stakeholder communications campaign that features the city's major logistics assets—Port Newark, Newark Liberty Airport, highways, and rail—and showcases the value of the region's small suppliers and assemblers would improve the overall profile of Newark as a competitive cross-

roads for trade. This campaign could potentially be coordinated with the city's efforts to promote "Made in Newark" products and local procurement. Participating stakeholders could include, for instance, BCDC, Made in Newark, Port Authority of NY-NJ, Newark Liberty Airport, and major industry representatives.

STRATEGY 3.3. Develop a Food Sector Strategy for the city of Newark focused on production and linkages to non-production industries and opportunities.

Newark's food industries, such as baked goods production, and refrigerated warehousing, are among the city's most competitive and closest-to-market, and domestic market opportunities are expected to grow. According to the Newark Master Plan, there is scope to introduce more food production and processing to the city. The sector provides lower educational barriers to entry than other manufacturing industries and are driven by very small ("micro-") entrepreneurs, both of which can meet the needs of Newark workforce and are well-matched with the small-scale character and small footprints of the city's industrial base.

Newark should develop a citywide food sector strategy that focuses on regional food supply chains, local food production, and linkages with related sectors (processing, distribution, packaging, etc.). This strategy could leverage resources, efforts, and talents in the city's Sustainability Office, as well as regional partnerships, and align them with "Made in Newark" objectives. For example, the strategy might include an element focused on small-scale incubators or shared kitchens for batch production, in conjunction with entrepreneurship workshops and technical training. A number of cities have already successfully launched comprehensive food strategies, including Boston, Toronto, Vancouver, and London (U.K.); further investigation of existing policies and strategies for urban food production would help to inform a budding food strategy for Newark.

If implemented, this strategy will support and align with the SAP's "action item" to "establish a citywide Newark Food Policy Council," intended to serve as a partnership-based intermediary that convenes a range of voices to coordinate around food-sector policy, programming, and advocacy in Newark.

➤ GOAL 4: CREATE A 21ST CENTURY MANUFACTURING WORKFORCE

4

Manufacturers in Newark report that they would like support from regional partners in tackling challenges related to manufacturing skill and worker shortages. In fact, over half of survey respondents report that manufacturing career readiness and workforce development are areas in which partnership-based action would help them to sustain or grow their businesses in Newark. Newark and Essex County are taking steps to respond to these demands, but further coordination and support is needed to improve manufacturing career readiness in the city.

STRATEGY 4.1. Strengthen local collaboration to promote manufacturing career readiness among Newarkers and expand manufacturing talent pipelines to regional manufacturing companies.

Recognizing manufacturers workforce challenges, Newark's economic development leadership has already been exploring opportunities to work with Essex County partners on manufacturing skills assessment, career readiness, and credentialing through existing and new programming. For example, during New Jersey's first "Manufacturing Week" in October 2012, the city of Newark, Made in Newark, and Essex County partnered to host a career fair with regional manufacturers at Essex County College (ECC) and sponsored factory tours in Newark's East Ward. Essex County's Vocational-Technical School District also participated. This collaboration was aligned with the goals of "Manufacturing Week," organized by the NJ Manufacturing Talent Network, as it encouraged intra-regional cooperation to showcase and celebrate career opportunities in manufacturing.

Local and regional stakeholders have expressed interest in deepening this collaboration and building on the momentum and knowledge base created by the state's Talent Network. "Newark's manufacturing pipeline is right here [in University Heights]... [NJIT] would like to work more closely with ECC," explains Dr. Gale Spak, an NJIT administrator. According to educators and administrators at Newark Tech High School, Essex County is also eager to collaborate with Newark partners to ensure manufacturing career readiness, and to that end, is preparing to convene an advisory group to design high school curricula and adult training offerings using manufacturing technologies.

Newark should continue to engage county, regional, and state partners in these nascent efforts, while locally focusing on manufacturing career readiness and resolving math and reading literacy gaps. To start, the Newark Workforce Investment Board could partner with Essex County and regional stakeholders (e.g., NJ Manufacturing Talent Network, and New Jersey Community College Consortium for Workforce and Economic Development) to identify in-demand manufacturing skills and competencies in the regional market. Top areas of manufacturing employment (by job title) could also be evaluated.

Based on these findings, partners might then evaluate certification and credentialing options (e.g., industry-recognized credentials) that could be offered in Essex County. Arrangements for recruitment and case management support, as well as strategies for meaningful employer engagement, might also be assessed.

STRATEGY 4.2. Launch a pilot program that will offer industry-recognized manufacturing credentials to a cohort of Newark veterans. There are currently 10,000 veterans in the greater Newark area, many of whom struggle to identify and secure basic resources upon their return to civilian life in the city, such as housing, employment, and educational resources. Since 2008, Newark's unique G.I. Go Fund has served as an intermediary for local veterans making this transition, through a comprehensive transition center based at Newark City Hall. To date, however, the GI Go Fund team has faced challenges with identifying and building ties to manufacturers due to minimal B2B and partnership-based networking opportunities within the sector.

To boost employment and training opportunities for Newark veterans in manufacturing, Newark stakeholders should design, operationalize, and launch a multi-week skills training option for a pilot cohort of veterans, with the goal of integrating training with recruitment and placement through employer/manufacturer engagement. To start, credentials would be offered in a specified skill area, such as welding or CNC machining. Marketing, outreach, recruitment, and case management/administrative support for potential trainees could potentially be handled by the city of Newark's G.I. Go Veterans Transition Center. The training program could be coordinated through a partnership between the G.I. Go Veterans Transition Center and regional and/or state partners, such as Essex County or state business/trade associations.

A successful model for this type of training already exists. Last year, New Jersey's Department of Labor (LWD), New Jersey Community College Consortium, and the New Jersey Business and Industry Association's Manufacturers Network ran a 12-week pilot training for ten adults at Middlesex Community College, also in New Jersey. This fabricated metal product training resulted in 100 percent job placement for all graduates, either during the training phase or within weeks following graduation. This could serve as an initial/pilot model for implementation purposes, with a strong focus on manufacturer engagement and buy-in.

THE VALUE OF MANUFACTURING INTERNSHIPS

According to U.S. educators and professional associations, internships have become increasingly commonplace over the past 20 years. There are **three key reasons** why making paid internships more accessible for students and college-going adults has the potential to yield positive results in Newark.

First, extensive research supports the importance of experiential learning. This is especially critical for the assimilation and application of math concepts, such as precision measurements, to the real-world shop floor. It is also important that students have a chance to grasp and weigh their post-college work prospects; research indicates that recent New Jersey college graduates working in fields related to their degree or major have higher median starting salaries and rates of job satisfaction that their peers.[133] Yet, secondary and postsecondary students in Newark seeking to gain exposure to manufacturing career opportunities—from shop-floor production and quality control to back-office marketing and IT—have limited access to paid internship placements with regional manufacturing companies. They also lack a supply of readily accessible, cutting-edge machines on campus that would allow for semi-independent and self-directed "tinkering," as well as team-based exploration. Meanwhile, a survey of recent New Jersey college graduates—many from Newark institutions—indicates that 82 percent of them worked during their school years. Thus, there is an opportunity to increase the number of Newark students/residents that are exposed to manufacturing careers prior to degree completion.

Second, Newark is situated in one of the highest cost regions in the United States, and paid experiential learning opportunities are increasingly critical to off-setting costs of education and living. New Jersey's public colleges and universities are the 3rd most expensive in the nation.[134] Housing and energy costs are among the nation's highest. Newark institutions, including NJIT, attract thousands of New Jerseyans who are first-generation college-goers, many of whom are from immigrant and/or low-income families that are unfamiliar with modern-day manufacturing career options and also need supplemental income/resources during a student's educational years. Thus, there is a strong need for internship and cooperative-learning based stipends in manufacturing in Newark, in addition to need-based financial support for working adult Newarkers seeking to uprgrade their skills.

Finally, the absence of resources to recruit, screen, and train young talent hurts industries in the long term—especially as Baby Boomer workers and managers leave the workforce in greater numbers over the next 5 to 10 years. Without a supportive "ecosystem" focused on experiential learning—which, in past eras, was insured through employer-driven training and well-resourced apprenticeship programs—small manufacturers have few opportunities to groom future employees and entrepreneurial talent. They also have fewer chances to add productive capacity in the short term, e.g. during busy seasons or peak production, including during summers, or to find extra support for specific orders or projects. ■

STRATEGY 4.3. Establish a bridge program that combines English literacy and manufacturing skills training.

The percentage of foreign-born New Jerseyans has grown faster in Northern New Jersey—including Newark/Essex County—over the past 15 years than anywhere else in the state. Today, roughly 20 percent of Newarkers speak a language other than English but have limited English language ability; 13 percent of residents speak Spanish. As the ESL/LEP (limited English proficiency) population has grown, so too have waiting lists for ESL courses at schools like Essex County College (ECC). At the same time, there is a complete absence of offerings that integrate technical skill development with basic language courses.

Programs that connect language and hard skills training could go a long way in helping ESL/LEP Newarkers gain entry into meaningful, full-time employment. To this end, Newark stakeholders should explore the potential to design and launch a Newark-based bridge program that combines adult ESL education and skills training by pairing a literacy or adult basic education (ABE) instructor with a technical instructor. In its exploratory phase, stakeholders might include regional community colleges, technical schools, and community-based organizations that serve limited-English-proficiency Newarkers, such as Ironbound Community Corporation and La Casa de Don Pedro. Such a program could serve the region's incoming and incumbent immigrant manufacturing workforce, particularly within Spanish speaking communities.

A Newark-based program could potentially draw inspiration or guidance from nationally recognized models; instructive examples include a skills assessment and training collaboration between Chicago's Truman College and Admiral Tool and Washington State's "Integrated Basic Education and Skills Training" program ("I-BEST"), which report successful outcomes thanks to strong, creative partnerships.[132]

STRATEGY 4.4. Support experiential and contextual learning by developing more opportunities for Newark's high school and postsecondary students to intern with regional manufacturing companies.

In Newark and cities nationwide, a problematic disconnect exists today between student perceptions of their career landscapes, barriers to education financing (especially in high-cost areas like Newark), and employer expectations of new hires. Extensive research supports the importance of experiential learning, e.g., through internships, apprenticeships or on-the-job training (known as "OJT"), for manufacturing businesses and workers. (See sidebar.) However, without supports in place, students in the region lack chances to sharpen their talents through real-world interactions, apply their problem solving acumen in work settings, gain a close-up understanding of business operations, and form relationships with mentors—all of which have been proven to support career pathways to manufacturing success and leadership.[130]

Newark's educational leaders and stakeholders should create and/or refine mechanisms to more effectively match secondary and postsecondary students with regional manufacturers that need interns. Potential strategies might include creating a new, application-based stipend program for Essex County College and NJIT undergraduates (particularly those in the Bachelor of Science in Engineering Technology (B.S.E.T.) program) that funds and advises students seeking manufacturing internships in the region. Newark stakeholders should also explore the potential to establish a high-school based internship and/or career development program for students interested in manufacturing careers. The Newark WIB and Essex County are well-positioned to serve as collaborators in this effort, potentially in conjunction with NJIT.

There are currently efforts underway to explore potential avenues for collaboration. Made in Newark and/or the Newark WIB could potentially serve as an intermediary to connect educators and administrators to manufacturers; currently, there

is no effort in place to create a database of participating manufacturers. However, industry buy-in and meaningful participation would be critical for implementation.

5 ➤ GOAL 5: LINK PHYSICAL TRANSFORMATION TO ECONOMIC TRANSFORMATION

Newark's master planning process, which culminated in 2012, confirmed that the city's location, density, and diversity are strengths that offer a host of opportunities, some of which are still untapped. The Essex County Master Plan also highlights areas for physical transformation and industrial growth—including "new industrial development… in which is now the Newark industrial District [in the East Ward]."[131] The aspirations of Newark and Essex County Master Plans are supported by the New Jersey State Development and Redevelopment Plan, which encourages Newark to support "effective planning" that furthers "enhance[d] opportunities for attraction and growth of industries of statewide and regional importance," including manufacturing. The city has not yet fully capitalized on opportunities to attract new waves of manufacturing start-ups and to help existing manufacturers stabilize or grow their margins, expand facilities, and improve operations.

STRATEGY 5.1. Continue to build Newark's knowledge about the condition and marketability of its industrial land supply, including potential models for site redevelopment and management.

The density of Newark's industrial base, proximity to regional markets, and ability to reach regional and global customers are boons for local economic development. However, many studies and reports in recent years—as well as NMI's research and outreach—have documented the city's inability to fully leverage these assets. Most recently, the Newark Master Plan has recommended strategic evaluation and redevelopment of key industrial sites and corridors, including within Newark's Port District and inland areas. In furtherance of these goals, Newark stakeholders—notably the city and BCDC—have taken several steps to deepen their knowledge of the city's industrial land supply and expand its capacity to better serve and grow its industrial sector:

- As a partner in NMI and participant in regional dialogue about brownfields redevelopment and Port activities, BCDC has deepened its inventory of industrial sites over the past year and developed a sharper strategic focus around the condition and fate of Newark's industrial sites.
- Earlier this year, BCDC engaged state and federal agencies in a strategy development and partnership-building session with the recently resurrected Brownfields Interagency Working Group, which convenes at NJIT with the intention of providing multi-agency technical/advisory support to New Jersey localities on brownfields issues. The forum allowed BCDC to field insights and input from a cross-section of agency leaders, including Port Authority of NY-NJ, about challenges such as flooding and trucking congestion.
- In 2013, BCDC added additional staff with specialized knowledge in brownfields remediation and redevelopment, an in-house asset that will augment its wider efforts to retain and attract high-value industrial activity—including light production and assembly—along industrial corridors and in Newark's Port/Airport support areas.
- Ironbound Community Corporation and La Casa de Don Pedro, two of Newark's largest community-based organizations, are proactively exploring and building local partnerships aimed at generating quality jobs and striking a responsible and sustainable balance between residential and industrial activities at the neighborhood scale—especially in congested, mixed-use areas along the Passaic River.

These efforts signal Newark's commitment to supporting a more job-intensive, productive and competitive industrial mix—a key pillar of the Business & Industry Element of Newark's Master Plan. The city of Newark, BCDC, community stakeholders, and regional and state partner agencies should continue to advance this work.

STRATEGY 5.2. Collaborate with the Port Authority on Port Newark's 'manufacturing narrative' and continue to develop infrastructure, job creation, redevelopment, and marketing strategies related to Port expansion.

Newark has made strides toward better understanding Port-related challenges and opportunities, as outlined in a range of reports spanning 2009 through 2013, including the city of Newark's 2009 "Shifting Forward" study, 2012 Master Plan, and 2013 Sustainability Action Plan. However, several converging factors warrant more focused attention on Port-specific opportunities, especially potential training, employment, and business opportunities for small suppliers, that may emerge from intensified goods movement through the area. This might include, for example, new market opportunities for light, high-value assembly in off-Port areas that could grow out of the Panama Canal expansion.

In order to better understand—and prepare for—this and other emerging opportunities associated with the growth of Port Newark and the densification of goods movement along the East Coast, Newark stakeholders must look beyond established circles of support to forge creative, strategic partnerships with regional partners. This most notably includes PANYNJ, which possesses useful market expertise and analytical tools that can support Newark's economic development goals.

Stakeholders should also explore other partnerships that leverage regional supply-chain resources, including those made available through Rutgers Business School's Center for Supply Chain Management (CSCM). For instance, Newark may consider teaming up with CSCM experts and Rutgers' MBA students to develop customized business planning and research services for Port-based suppliers trying to better orient their operations to regional supply chain trends. CSCM, NJIT, and/or Rutgers Bloustein School of Planning & Public Policy might also consider developing a hands-on, studio course for Rutgers students that will track various metrics and market trends associated with Port expansion and, based on these findings, develop land use, economic development, and manufacturing workforce targets for Newark.

STRATEGY 5.3. Explore alternative models for the reactivation/redevelopment and financing of underutilized, low-barrier small industrial parcels, focusing on their scope for value-added, light production.

Findings from the city's master planning process and growing knowledge base about Newark's industrial sites demonstrate that developing parcels for manufacturing use remains complex. Addressing these issues will require a more strategic and coordinated approach to the development and modernization of small industrial parcels for light, high-value, low-carbon production—including the financing and incentivizing of such activities.

There are promising signs of commitment to such an approach. BCDC, the city of Newark, and community-based organizations are exploring the potential for a project to assess models and strategies for reactivating off-Port/inland industrial areas in Newark, on a targeted site-by-site basis. This project may potentially explore alternative redevelopment and financing scenarios for sites; alternative models for site management (including, for example, non-profit models, e.g., Greenpoint Manufacturing and Design Center); and creative marketing approaches to more easily identify and engage desired end-users.

Upon implementation, the project would explore the opportunities and constraints of specific industrial sites, focusing on high-value-added, light activity rather than low-value-added and passive

THE STATE ROLE: "MAKING IT" IN NEW JERSEY

Like cities and counties, states set agendas and make critical investments that impact the health of manufacturing, in areas such as R&D, education, and infrastructure. State regulations also impact the vitality of manufacturing in a myriad of ways, directly and indirectly; policies that control vacant land disposition, renewable energy, technical training, development incentives, logistics/transportation, and local procurement are just some of those that affect a region's overall business climate and capacity for innovation and production. Ad hoc, isolated measures and outdated policy tools are increasingly inadequate to meet 21st century manufacturing demands—thus, a state-led agenda premised on collaboration and engagement of manufacturers and other local and regional stakeholders will be vital.

New Jersey's State Strategic Plan includes advanced manufacturing as one of six target areas for state economic success. As a result, in 2011, New Jersey's Department of Labor & Workforce Development created several "Talent Networks" to support pipelines to industry, including in advanced manufacturing. Since its launch in 2011, the state's Advanced Manufacturing Talent Network has led and facilitated a critical statewide dialogue about manufacturing career readiness, the need for advanced technical credentials statewide, and the need for effective partnerships to meet industry demand for higher-skilled workers.[135]

To date, however, the state of New Jersey has not committed to a statewide manufacturing plan or strategy. As such, existing policies and programs that impact manufacturers remain fragmented, making it difficult to shift local and regional policy agendas toward greater strategic resource allocation, institutional alignment, and collaborative networks—all of which are needed to cultivate and sustain a healthy manufacturing sector. Fragmentation also makes it difficult to reevaluate and retool programs to better address firm needs. For example, some New Jersey policies and programs that impact manufacturing are explicitly or de facto focused on big businesses and therefore marginalize manufacturers, most of which are small contract suppliers. The Urban Enterprise Zone program, for instance, requires that a company have at least 250 employees in order to be eligible for tax-exemption on utilities; the vast majority of manufacturers, however, employer fewer than 100 workers.[136]

In the meantime, several high-value opportunities to revitalize the sector statewide remain untapped. For instance, while New Jersey is home to the corporate headquarters of numerous U.S. industrial giants—such as Honeywell, Lucent Technologies, Campbell, Johnson & Johnson, and Panasonic North America (the latter will soon relocate to Newark)—these companies have little or no associated production operations in the state. Similarly, Lockheed Martin and Boeing—large OEMs that have a business unit and helicopter upgrade plant in Moorestown and Millville, New Jersey, respectively—are positioned to do more business with suppliers in the region, including those in Newark.[137] There is great potential for New Jersey to strategically galvanize supply chain activities within the state that are more closely connected to the needs of these in-state OEMs. Increased co-location of production, intermediary resources (e.g., R&D, assembly), and back-office activities (e.g., accounting) would maximize New Jersey's strong manufacturing assets: density, location, scale, and diversity.

States that leave manufacturing innovation, talent development and competitiveness to chance—without a concerted vision—are likely overlooking bright opportunities in the next economy. A growing number of U.S. states recognize this. In 2011, seven states—Kansas, Massachusetts, Illinois, New York, Colorado, Pennsylvania, and Connecticut—participated in a "policy academy" supported by the National Governors Association and focused on capturing growth opportunities for manufacturing "through innovation, entrepreneurship and investment."[138] A number of U.S. states have already developed—or are presently formulating—manufacturing strategies that build on their distinctive strengths and sectors. Recently, Massachusetts' Governor Deval Patrick launched a task force of industry, public sector, and education leaders called the Advanced Manufacturing Collaborative, which seeks to improve the competitiveness of state industries through improvements in workforce programs, access to capital, and innovative technologies. Simultaneously, Governor Patrick's proposed 2014 fiscal budget includes a provision to increase the operating budgets of 15 community colleges by $20 million dollars. Tennessee is also currently exploring a state manufacturing platform.[139] ■

industrial uses, e.g., the introduction of more innovative, small-scale production (possibly in "green" industries). The analysis might assess site-specific options for facility modernization and creating inland jobs that are tied to Port activities. A top priority will be to match innovative, light manufacturers with suitable, modern spaces that meet their needs and serves as a community development catalyst. Stakeholders should continue to explore the feasibility of this analysis, given its potentially transformative impact.

NEXT STEPS AND IMPLEMENTATION

The city of Newark will use the strategies put forth here to bolster ongoing efforts to support its manufacturing base and strengthen resources of regional importance. The city and its collaborators have already begun to lay the groundwork for progress. Early-stage implementation efforts include:

- the identification of resources for a pilot "one-stop" supply-chain solutions program at Rutgers Business School's Center for Supply Chain Management that will serve 10 local manufacturers over the next year;
- a commitment by the Newark Workforce Investment Board's Business & Economic Development Committee to identify high-potential training (i.e., credentialing, certification) options in mid-skilled production occupations for Newark residents, which will support skill-based pathways to companies region-wide;
- the prototyping of a web-based supplier directory and search platform for Newark manufacturers;
- exploratory conversations with Newark and Essex County leadership about strategies to strengthen makerspace programming and team-based student projects;
- collaborative planning, led by the city's Sustainability Office, to launch a byproduct reuse consortium and/or exchange by engaging local businesses;
- recent outreach to manufacturers, by the city of Newark and Brick City Development Corporation, regarding energy-savings opportunities through block bidding; and
- the exploration of options to increase small-scale, low environmental impact production at sites in Newark's Ironbound section, a joint effort by Brick City Development Corporation, the city of Newark, and Ironbound Community Corporation.

During the implementation process, accountability will be ensured through monitoring and evaluation on a project-by-project basis through the cooperation of designated institutional and community partners. Phasing, timelines, benchmarks, and funding sources will be agreed upon by and among partners that have committed to targeted projects. In the coming years, the implementation process will offer tremendous opportunity for diverse communities and leadership—across sectors—to join manufacturing partnerships and contribute ideas and energy to efforts within the NMI framework.

REFLECTING ON HURRICANE SANDY: PREPARING FOR "THE NEW NORMAL"

In October 2012, "super storm" Hurricane Sandy swept through New Jersey, killing dozens of residents and resulting in billions of dollars of damage. The storm left unprecedented damage in its wake—as well as business displacement and income loss—for many of the state's manufacturers. In Newark, damage to 25 surveyed manufacturers totaled over $100 million, due to week-long power outages and wind and water damage to equipment, tools, vehicles, and power units.[140] Some businesses suffered irrevocable damage to their offices and records. Many industrial businesses experienced disruptions to supply chains and access to essential service providers, such as utilities personnel and repair services.

Post-Sandy outreach reveals that some Newark manufacturers also experienced strains due to Hurricane Sandy in 2011, due to flooding, and others experience flooding more regularly due to the location of their facilities in low-lying areas along the Passaic River.

A post-Hurricane Sandy Made in Newark roundtable with NJMEP revealed common failures of manufacturers in the area of disaster preparedness. These include the failure to control critical supply chains; monitor threats; develop appropriate plans for and with employees at a facility; and prepare communications systems for crisis situations. "[Hurricane Sandy] revealed 'the new normal'," explains Rafael Zabala of Newark's Urban Enterprise Zone Office, stressing the need for better resources for business contingency planning and disaster recovery.[141]

Newark should partner and align with supportive organizations, such as NJMEP, to circulate disaster preparedness resource materials, including sample contingency protocols. For example, in February 2013, NJMEP announced a new "Super Storm Emergency Program" to provide support to hurricane-affected manufacturers in New Jersey. Local resources and B2B efforts, such as Made in Newark, could be mobilized to connect Newark's small manufacturers to this program and others, enabling them to improve supply-chain control and secure changes for IT/data recovery in the face of disasters and business disruptions. ■

V. CONCLUSION

Mission-driven partnerships, bottom-up cooperation, and well-resourced public sector, industry, and institutional networks have been shown to drive manufacturing competitiveness in metropolitan areas around the world. Recognizing this, federal efforts—such as President Obama's Advanced Manufacturing Partnership (AMP) and National Network for Manufacturing Innovation (NNMI)—are for the first time in years pulling lessons from local efforts and responding with new funding and programmatic commitments. These efforts reflect a growing awareness that local networks and regional partnerships around manufacturing—especially in American cities—ultimately affect national economic resilience, innovation, and ability to support an inclusive middle class.

The Newark Manufacturing Initiative both grows from, and will hopefully contribute to, the growing pool of national knowledge on the challenges and opportunities facing urban manufacturers and the supports and strategies needed to address them. The Initiative has incorporated a range of voices and concerns, from educational providers to shop-floor managers, and in so doing provides an honest and inclusive accounting of the issues. It offers a broad survey of local and regional resources, as well as resource and network gaps, all of which inform the goals and strategies presented here.

This report does not pick "winning" industries on which to focus, or prescribe a set of tax incentives. Rather, it offers a different, holistic framework that seeks to improve manufacturer competitiveness based on business performance and value, spurred by innovation, strong talent pipelines, and inclusive partnerships. It seeks to reduce barriers to industrial retention, business growth, manufacturing career readiness, and product and process innovation in the greater Newark region, because these are the building blocks of manufacturing competitiveness. However, it also recognizes that these building blocks must be bolstered by a respect and cultural appreciation for "making." To that end, the framework and recommendations offered here will hopefully also serve to sustain and advance dialogue about the possibilities of "next economy" manufacturing in Newark—why it matters, who will lead key efforts, which resources are to be allocated, and ultimately, how manufacturing "success" will be defined in Newark and its region in the coming years.

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