DistrictDigest

Increased Productivity and Trade Have Reduced Manufacturing Employment

BY SONYA RAVINDRANATH WADDELL

The goods-producing sector — which includes the subsectors of construction, natural resources and mining, and manufacturing — has been falling steadily as a share of Fifth District industry for quite some time. The story of the decline, however, is really a story about the changing face of the region's manufacturing base. Before the turn of the century, most of the manufacturing decline was centered in the textile, apparel, and furniture industries. Today, cutbacks have deepened and spread across subsectors of manufacturing as both the number of establishments engaged in manufacturing and employment in the sector have decreased considerably.

Some of the recent employment losses can be attributed to the globalization of manufacturing and the off-shoring of some manufacturing operations. But much of the reduction can be traced to increased labor productivity.

According to the Bureau of Labor Statistics, the goodsproducing sector in 1990 comprised 20 percent of all business establishments in the Fifth District and 30 percent of all employment. By 2008 those shares had fallen to 16 percent and 19 percent, respectively. This corresponds not only with a decline in goods-producing employment, which fell nearly 18 percent in the past two decades, but also with the rise of the service sector — employment in that category has expanded almost 50 percent over the same period.

To speak of broad trends in goods production, however, can be misleading. Employment in the District's manufacturing sector has fallen by more than a third (35 percent) since 1990, and the number of establishments engaged in manufacturing has dropped almost 3 percent. Meanwhile, employment in the Fifth District natural resources and mining sector has been generally steady over the past 20 years and, although the number of establishments has recently stagnated, it remains above 1990 levels. In construction, too, employment and firm levels are 28 percent and 29 percent above their 1990 mark, respectively, despite a recent deterioration in activity.

The Shrinking Manufacturing Firm

Although employment in Fifth District manufacturing has been declining steadily since 1990, the number of factories actually grew by more than 10 percent from 1990 to 2000. Starting in 2000, those levels began to drop, and by the third quarter of 2008, the number of establishments had fallen by more than 12 percent. Not surprisingly, employment declined more dramatically as the number of establishments



fell. Manufacturing employment fell by 6.5 percent in the 1990s, but since 2000 has dropped more than 30 percent.

As the number of manufacturing establishments grew and total employment fell through the 1990s, the size of the average establishment clearly fell. Despite the decline in the number of establishments that began in 2000, however, the shrinking in average establishment size has continued falling from almost 65 workers per firm in 1990 to about 54 workers in 2000 and down to 43 workers in 2008.

There are two possible explanations. First, there could be a general decline in factory size across the District. Second, more large factories could be closing relative to smaller factories, leaving the District with smaller manufacturing establishments on average. The data do not provide an unequivocal answer, although most likely the explanation is some combination of the two.

The Changing Face of Manufacturing

Manufacturing in the Fifth District is not concentrated heavily in a particular product. In the third quarter of 2008, only two products came close to accounting for 10 percent of all manufacturing activity as measured by employment: food and transportation equipment.

Transportation equipment has certainly been a growing subsector of Fifth District manufacturing over the past two decades as employment in the industry grew 4.5 percent and the number of factories grew about 45 percent. Fabricated metal products manufacturing, which transforms metal into intermediate or end products (other than machinery, computers and electronics, or metal furniture), has also seen considerable growth in the District. Employment in that subsector grew 7.5 percent as the number of establishments increased almost 23 percent since 1990. The most notable structural change in the District's manufacturing base, however, occurred in the textile, apparel, and furniture manufacturing. The decline in those subsectors accounted for 72 percent of employment losses and 63 percent of all firm closings from 1990 to 2008. Over time, however, these subsectors' contributions to total losses diminished: They accounted for basically all employment losses (92 percent) in the 1990s, but only about half of all losses since 2000.

Manufacturing activity in the Fifth District is not distributed evenly across states, and therefore states have been affected differently by the manufacturing decline. North Carolina — which houses 38 percent of District manufacturing firms and 43 percent of manufacturing employment — has been hit the hardest. The Tar Heel State accounted for about 50 percent of the gross decline in employment and establishment numbers since 1990. That year, more than 32 percent of North Carolinians worked in manufacturing; the share has dropped to slightly more than 15 percent today.

All Fifth District states have lost more than 30 percent of their manufacturing jobs over the past two decades, most since 2000. North Carolina has led the Fifth District in net employment losses, shedding over 300,000 manufacturing jobs since 1990. The other states in the District have also seen manufacturing employment decline, but not as severely. Virginia shed 121,670 jobs and South Carolina lost 112,060 jobs in manufacturing since 1990. (In both states, more than 80 percent of the job losses occurred since 2000.) Although the South Carolina economy has shed more factory jobs than Virginia, South Carolina has also added 13,900 jobs in transportation equipment over the last two decades, and in 2008 was home to about 275 automotiverelated companies.

The Manufacturing Sector Since 2000

The data from 1990 to 2008 show the loss of textile, apparel, and furniture manufacturing and the rise in transportation equipment and fabricated metal production. Yet employment has declined in all Fifth District subsectors of manufacturing since 2000. The number of factories in the

Fifth District has dropped, and employment has fallen even more precipitously.

Textile and textile products still accounted for about 30 percent of manufacturing job losses since 2000, and apparel and furniture accounted for about 10 percent each. But the computer and electronic products industry's contribution rose to account for about 8 percent of losses. In addition, electrical equipment, wood products, chemicals, plastics, and machinery each contributed between 4 percent and 5 percent of total losses.

More than half of the manufacturing



sector's job cuts since 2000 were in North Carolina. Fortyseven percent of those cuts were in textiles, textile products, or apparel manufacturing, with an additional 14 percent in furniture. In fact, these four subsectors in North Carolina accounted for 30 percent of manufacturing cuts in the District. North Carolina also saw sizeable losses in computer and electronic products (7 percent), and electrical equipment and appliances (6 percent).

South Carolina and Virginia have continued to see their manufacturing base move away from textile products, apparel, and furniture. In addition, although many subsectors of manufacturing saw employment losses, certain industries, such as computers and electronic products, contributed more than average to the decline. Thirteen percent of Virginia's employment loss (and 15 percent of Maryland's) was in computer and electronic products.

Although manufacturing employment has declined at the aggregate level, there are still some bright spots at the state level. Employment in food manufacturing grew 8 percent in North Carolina and almost 10 percent in South Carolina between 2000 and the third quarter of 2008. South Carolina also saw growth in transportation equipment (6 percent) and petroleum and coal products (5 percent). Virginia saw growth in petroleum and coal product employment (24 percent), as well as in textile product mills (5 percent). Meanwhile, employment in plastics and rubber products grew more than 6 percent in West Virginia.

Deciphering the "Slump"

There are a few potential explanations for why the District has seen such precipitous declines in manufacturing employment, particularly since 2000.

The first theory is that the demand for manufactured goods — domestic or international — simply might have declined and the lower demand spurred a cut in production. A second theory is that foreign firms have outcompeted domestic firms in production. A third theory is that American firms have found it more profitable to manufacture goods

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abroad. Finally, the manufacturing sector in the Fifth District simply might have become more productive as firms have found ways to produce the same output with fewer establishments and workers.

The first theory — a general decline in demand — might explain a more recent decrease in manufacturing activity. However, a decade of booming American consumer spending and rising percapita incomes around the world does not suggest a reduced demand that could explain a decade-long decline across the Fifth District manufacturing sector.

The second and third theories — that overseas firms are more competitive or that formerly domestic jobs are moving overseas — have been commonly cited reasons for shuttered factories in textiles, apparel, and furniture

production. North Carolina State University economist Mike Walden says the decline in textiles, apparel, furniture, and cigarette production may be due to increased imports and outsourcing.

But Walden reports that productivity accounts for declines in other sectors. In fact, this final theory is critical to understanding the manufacturing decline. It is virtually undisputed that manufacturing across the United States has become more productive. According to data from the Bureau of Economic Analysis and the Federal Reserve Bank of San Francisco, overall manufacturing productivity in the United States, as measured by the real value of output per worker, grew almost 40 percent from 2000 to 2007. This trend held true across Fifth District states, especially in North Carolina and Maryland.

Of all manufacturing subsectors in the Fifth District,

the computer and electronic products industry had the highest productivity growth. In that subsector, output per worker grew about three and a half times in South Carolina and Virginia and more than quadrupled in Maryland and North Carolina between 2000 and 2006. The data provide evidence that much of the drop in computer and electronic product industry employment — that accounted for almost 10 percent of Fifth District manufacturing employment losses over the decade — is due to increased productivity.

The productivity data also provide evidence to dim some of the Fifth District

Manufacturing Subsector	1990	2008	
Apparel	10.0	1.7	
Beverage and Tobacco Product	2.0	2.3	
Chemicals	7.0	8.4	
Computer and Electronic Product	6.8	7.1	
Electrical Equipment and Appliance	3.4	4.0	
Fabricated Metal Product	5.2	8.5	
Food	6.1	10.0	
Furniture and Related Product	7.1	5.6	
Leather and Allied Product	0.4	0.1	
Machinery	5.3	7.0	
Nonmetallic Mineral Product	3.2	3.7	
Paper	3.2	3.9	
Petroleum and Coal Products	0.3	0.3	
Plastics and Rubber Product	4.5	6.8	
Primary Metal	2.8	2.5	
Printing and Related Support	3.6	3.9	
Textile Mills	15.3	5.3	
Textile Product Mills	2.5	1.6	
Transportation Equipment	5.9	9.4	
Wood Product	3.4	4.7	
Miscellaneous	2.3	3.1	
SOURCE: Bureau of Labor Statistics/Haver, Quarterly Covered			

Share of Total District Manufacturing

SOURCE: Bureau of Labor Statistics/Haver, Quarterly Covered Employment and Wages

"bright spots." Although employment in food production grew about 8 percent in North Carolina and about 10 percent in South Carolina from 2000 to 2008, output per worker in the subsector grew only 5 percent in North Carolina and fell 9 percent in South Carolina from 2000 to 2006.

On the other hand, transportation equipment manufacturing in South Carolina actually appeared to be a bright spot, as employment in the state subsector increased 6 percent even as output per worker in motor vehicle production more than doubled. (Productivity in the "other transportation" category in South Carolina also grew.) Productivity in West Virginia's motor vehicle production jumped notably as well, but the state accounts for only about 4 percent of all

transportation equipment manufacturing in the District.

Meanwhile, some subsectors saw a decrease in both productivity and employment. Job losses in the chemical subsector accounted for almost 5 percent of total losses in Fifth District manufacturing employment while productivity in that sector actually declined in three of the five states in the District.

Productivity increases are also not likely to account for the steep employment losses in the apparel, textile, and furniture industries. Increased imports and labor outsourcing probably played a larger role in those subsectors' work force reductions.

Looking Forward

As the marginal productivity gains — particularly in newer manufacturing industries such as computer and electronic

products - start to decrease, we might begin to see the decline of manufacturing employment stabilize. New sectors such as biotechnology seem promising. Already, North Carolina is a leading state for biotech with 450 companies involved in some phase of research, development, or manufacturing. Nonetheless, with the increasing globalization of industry and freedom of trade, the urbanization of our region, and the continued productivity improvements, the share of our District devoted to manufacturing may remain on a downward trajectory for some time to come. RF



Statistic's Quarterly Covered Employment and Wages (QCEW) data comes from quarterly tax reports of more than 8 million employers and some federal agencies. This data includes 99.7 percent of all wage and salary civilian employment.

Smaller Textile Industry Reaches New Markets

BY BETTY JOYCE NASH

J eff Ward's mother kicked him and his business, Innovative Geotextiles Corp., out of the garage in 1983. "I moved. And so today we're in a 10,000 square foot manufacturing plant," he says. He calls his business category "rejuvenation," because he finds new purposes for old products. His first effort was to take the polypropylene commonly used as dust covers under sofas and chairs and re-purpose it as landscaping fabric. "I developed a retail product you use for weed block — it lets the water through, but not the sun."

Rejuvenation also describes the District's diverse, but much, much smaller textile industry today. Even with all the layoffs and outsourcing, North Carolina remains the No. 1 textile mill employer and yarn producer as well as the No. 4 apparel producer in the nation. Today, however, the textile and apparel sector accounts for less than 2 percent of the state's employment, and the industry's labor-intensive production has been replaced by ideas. These technological innovations include carbon fiber that will be used in the "airbus" slated to be built in Kinston, N.C., to fabric that serves as a structure for new skin growth on burn patients. The definition of what qualifies as a "textile" appears unlimited.

Mansour Mohamed founded and serves as the chief scientific officer of 3TEX based in Cary, N.C. Formerly the head of the department of textile engineering, chemistry, and science at the North Carolina State University College of Textiles, he and his colleagues have put the firm's patent portfolio to work. Among other products, the firm engineers and manufactures armor systems using its patented fabrics and composite systems. The 3TEX technology includes three-dimensional, noncrimped woven fibers known for strength.

"We are also gearing up for a new focus on wind energy — windmill blades," Mohamed says.

While giants such as Milliken in South Carolina, and International Textile Group, Unifi, and Glen Raven in North Carolina remain, a wide variety of firms — small and large, old and new — make up the textile sector today. And, like 3TEX, the products they engineer and fabricate would surprise many people.

Like nonwoven fabrics, for instance — think diapers and wipes. They're not woven or knitted, and they comprise a growing piece of the industry, which began with the development of synthetic fibers during World War II. The category has exploded in recent years. The United States produces and uses more nonwoven products than any other country, and North Carolina has more nonwoven fabric producers than any other state. These include firms like Freudenberg (the world's biggest producer of nonwovens), Kimberly Clark, and PGI Nonwovens, which operates four locations in North Carolina.

"It's a very inexpensive way of putting materials

together," says Ian Butler, who keeps statistics for INDA, the industry association for nonwoven goods. But it's also an industry that requires little labor, he says. Machines churn out 1,000 baby diapers per minute.

Textile firms have also specialized in "performance fabrics" that retard flame and bacteria growth and moisture, and even keep socks and shirts from getting smelly. Textile firms have also found military products to be a growing niche, in part thanks to the 1941 Berry Amendment. The amendment was made permanent in the U.S. Code in 2002 and says military products must be manufactured in the United States. Milliken, for instance, has a military division that makes flame-resistant flight suits and boots, among other products, using various trademarked fabrics. In 2008, the U.S. Department of Defense purchased \$133 million in North Carolina textile goods.

Medical textiles is also a growing segment. "That is the hot area now," says Blanton Godfrey, the dean of the North Carolina State University College of Textiles, "where you're growing peoples' organs on textile scaffolds, a fiber base." Other products include artificial arteries and hernia patches. Those products are almost all made in the United States, some in Canada. These new niches supply a stillrobust part of the market. Until recently, automotive textile suppliers were doing well.

Four years ago, a group of researchers, under a grant from the North Carolina Department of Commerce, documented the textile industry in the state. Researchers from North Carolina State, the University of North Carolina at Chapel Hill, and Duke University merged a variety of databases and identified 1,846 textile company locations in North Carolina and more than 900 in South Carolina. They established Web sites to connect firms in those states.

The North Carolina Hosiery Technology Center at Catawba Valley Community College began 19 years ago to train technicians and operators, but now helps firms test, develop prototypes, and market products. The center's testing lab sees a lot of action these days, according to director Dan St. Louis. "We test for a ton of people, like major brands Nike, Lands End, Kmart; it could be for durability, fit, moisture management, antimicrobial properties, compression testing," St. Louis says. Before firms choose which products to buy, they have the samples tested. It doesn't hurt that the center has the resources of the North Carolina State University College of Textiles behind them, among other expertise.

Manufacturing textiles today, says St. Louis, is not about price. Thorlo, for instance, makes high-end athletic and outdoor recreation socks in Statesville, N.C. "They focused on quality," he says, adding that they monitor to the "nth degree." Given the variety they now handle, the center's name is being changing to the Manufacturing Solution Center. **RF**

State Data, Q4:08 -

	DC	MD	NC	SC	VA	wv
Nonfarm Employment (000's)	707.0	2,576.3	4,080.0	1,894.9	3,721.5	759.8
Q/Q Percent Change	-0.4	-0.8	-1.3	-1.5	-1.2	-0.4
Y/Y Percent Change	1.3	- 1.3	-2.1	-2.7	-1.3	0.2
Manufacturing Employment (000's)	1.4	126.1	497.9	235.8	258.8	55.2
Q/Q Percent Change	-12.5	-1.5	-2.8	-2.5	-2.0	-1.5
Y/Y Percent Change	-17.6	-4.0	-6.7	-5.1	-5.3	-5.3
Professional/Business Services Employment	(000's) 152.7	399.5	487.0	215.1	650.5	60.1
Q/Q Percent Change	-0.3	0.1	-3.4	-1.9	-1.3	-0.8
Y/Y Percent Change	0.0	0.0	-3.7	-4.9	-0.4	-2.0
Government Employment (000's)	234.8	488.3	718.0	343.4	697.6	147.5
Q/Q Percent Change	-0.7	-0.1	1.3	0.1	0.1	0.2
Y/Y Percent Change	0.8	1.4	3.6	0.7	1.8	1.4
Civilian Labor Force (000's)	332.9	3,007.4	4,578.3	2,182.1	4,164.3	804.7
Q/Q Percent Change	-0.3	0.3	0.6	1.0	0.8	0.0
Y/Y Percent Change	0.9	0.6	1.4	2.5	1.9	-0.9
Unemployment Rate (%)	8.0	5.1	7.5	8.3	4.6	4.4
Q2:08	7.2	4.5	6.6	7.2	4.1	4.2
Q3:07	5.7	3.6	5.0	5.7	3.3	4.4
Real Personal Income (\$Mil)	31,897.6	224,316.3	262,490.3	117,934.5	275,775.9	45,643.6
Q/Q Percent Change	1.5	1.3	1.1	1.1	1.3	1.7
Y/Y Percent Change	1.6	0.8	0.8	0.8	0.9	2.9
Building Permits	42	1,889	8,058	3,441	5,033	403
Q/Q Percent Change	-72.4	-50.5	-44.7	-48.7	-20.2	-53.8
Y/Y Percent Change	-74.7	-45.9	-49.4	-53.2	-33.4	-67.7
House Price Index (1980=100)	614.2	493.0	346.2	325.0	448.7	229.4
Q/Q Percent Change	-1.2	-1.5	0.1	-0.2	-0.9	-0.1
Y/Y Percent Change	-6.0	-7.7	1.1	0.3	-4.6	-0.5
Sales of Existing Housing Units (000's)	6.8	58.4	121.2	63.2	105.2	22.8
Q/Q Percent Change	-5.6	-11.0	-21.1	- 21.4	-16.8	-9.5
Y/Y Percent Change	-15.0	-14.6	-34.7	-31.0	3.1	-17.4

NOTES: Nonfarm Payroll Employment, thousands of jobs, seasonally adjusted (SA) except in MSAs; Bureau of Labor Statistics (BLS)/Haver Analytics, Manufacturing Employment, thousands of jobs, SA in all but DC and SC; BLS/Haver Analytics, Professional/Business Services Employment, thousands of jobs, SA in all but SC; BLS/Haver Analytics, Government Employment, thousands of jobs, SA; BLS/Haver Analytics, Unemployment, thousands of persons, SA; BLS/Haver Analytics, Unemployment, thousands of jobs, SA in all but DC and SC; BLS/Haver Analytics, Professional/Business except in MSA's; BLS/Haver Analytics, Building Permits, number of permits, NSA; U.S. Census Bureau/Haver Analytics, Sales of Existing Housing Units, thousands of units, SA; National Association of Realtors*

Nonfarm Employment Change From Prior Year First Quarter 1998 - Fourth Quarter 2008



99 00 01 02 03 04 05 06 07 08

98

Change From Prior Year First Quarter 1998 - Fourth Quarter 2008



FRB—Richmond Services Revenues Index First Quarter 1998 - Fourth Quarter 2008





First Quarter 1998 - Fourth Quarter 2008



Fifth District

Unemployment Rate Metropolitan Areas Change From Prior Year





FRB—Richmond Manufacturing Composite Index First Quarter 1998 - Fourth Quarter 2008



Real Personal Income

Change From Prior Year First Quarter 1998 - Fourth Quarter 2008





Building Permits

Change From Prior Year First Quarter 1998 - Fourth Quarter 2008



House Prices

Change From Prior Year First Quarter 1998 - Fourth Quarter 2008



NOTES:

 FRB-Richmond survey indexes are diffusion indexes representing the percentage of responding firms reporting increase minus the percentage reporting decrease.

The manufacturing composite index is a weighted average of the shipments, new orders, and employment indexes.

2) Metropolitan area data, building permits, and house prices are not seasonally adjusted (nsa); all other series are seasonally adjusted.

SOURCES:

SOURCES: Real Personal Income: Bureau of Economic Analysis/Haver Analytics. Unemployment rate: LAUS Program, Bureau of Labor Statistics, U.S. Department of Labor, http://stats.bls.gov.

Employment: CES Survey, Bureau of Labor Statistics, U.S. Department of Labor, http://stats.bls.gov. Building permits: U.S. Census Bureau, http://www.census.gov. House prices: Federal Housing Finance Agency, http://www.fhfa.gov.

Metropolitan Area Data, Q4:08 -

	Washington, DC	Baltimore, MD	Hagerstown-Martinsburg, MD-WV
Nonfarm Employment (000's)	2,442.0	1,313.3	101.1
Q/Q Percent Change	0.1	-0.3	-0.0
Y/Y Percent Change	0.2	-1.2	-3.0
Unemployment Rate (%)	4.4	5.4	6.1
Q2:08	4.0	4.9	5.2
Q3:07	2.9	3.5	3.0
Building Permits	2,928	684	170
Q/Q Percent Change	-15.3	-57.8	-39.5
Y/Y Percent Change	-40.0	-49.0	-64.3

	Asheville, NC	Charleston, SC	Durham, NC	
Nonfarm Employment (000's)	175.0	854.1	293.9	
Q/Q Percent Change	-0.2	-0.1	0.6	
Y/Y Percent Change	-2.3	-2.7	1.3	
Unemployment Rate (%)	5.9	7.9	5.5	
Q2:08	5.2	6.8	5.2	
Q3:07	3.6	4.8	3.8	
Building Permits	263	2,018	339	
Q/Q Percent Change	-45.5	-23.6	-37.5	
Y/Y Percent Change	-55.3	-47.0	-40.6	

	Greensboro-High Point, NC	Raleigh, NC	Wilmington, NC
Nonfarm Employment (000)	364.0	519.6	144.6
Q/Q Percent Change	-0.3	-0.2	-1.4
Y/Y Percent Change	-3.2	-1.3	-2.0
Unemployment Rate (%)	7.9	5.9	7.3
Q2:08	6.9	5.2	5.9
Q3:07	4.8	3.6	4.2
Building Permits	584	1,224	505
Q/Q Percent Change	-14.0	-69.0	-47.8
Y/Y Percent Change	-39.7	-56.6	-44.4

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Metropolitan Area Data, Q4:08

	Winston-Salem, NC	Charleston, SC	Columbia, SC	
Nonfarm Employment (000's)	216.5	298.5	365.2	
Q/Q Percent Change	0.1	-1.0	0.0	
Y/Y Percent Change	-2.2	-1.0	-1.2	
Unemployment Rate (%)	7.1	6.9	7.1	
Q1:08	6.3	6.2	6.5	
Q2:07	4.5	4.4	4.8	
Building Permits	263	798	617	
Q/Q Percent Change	-25.5	-26.8	-55.1	
Y/Y Percent Change	-57.0	-35.4	-46.4	

	Greenville, SC	Richmond, VA	Roanoke, VA	
Nonfarm Employment (000's)	318.3	621.5	162.0	
Q/Q Percent Change	-0.1	-1.1	0.1	
Y/Y Percent Change	-0.9	-2.3	-1.3	
Unemployment Rate (%)	7.2	5.0	4.6	
Q2:08	6.4	4.5	4.1	
Q3:07	4.9	3.2	3.1	
Building Permits	312	1,045	103	
Q/Q Percent Change	-47.7	-7.4	-27.0	
Y/Y Percent Change	-73.0	-19.7	-42.1	

	Virginia Beach-Norfolk, VA	Charleston, WV	Huntington, WV
Nonfarm Employment (000)	767.1	152.8	120.7
Q/Q Percent Change	-1.1	-0.2	1.6
Y/Y Percent Change	-1.0	0.8	-1.8
Unemployment Rate (%)	4.9	3.3	4.9
Q2:08	4.4	3.3	5.0
Q3:07	3.3	3.4	4.1
Building Permits	648	57	5
Q/Q Percent Change	-50.2	-62.3	-37.5
Y/Y Percent Change	-47.4	54.1	-82.8

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