

Social and Technological Impacts of Samuel Slater and Eli Whitney's Innovations

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ABSTRACT

The first American Industrial Revolution was a period of technological innovations that led to the mechanization of American industries along with the proliferation of factories. This essay introduces the inventions and innovations of Samuel Slater and Eli Whitney, and analyzes the effects of their inventions on Industrialization and the textile industry. Eli Whitney and Samuel Slater's innovations influenced Industrialization in America and mechanized the textile and cotton industry, leading to prominent social impacts such as reorienting the roles of women and increasing the utilization of child labor. This paper will demonstrate the social impacts brought forth by Whitney and Slater's innovations, while also articulating their impacts on the American Industrial Revolution.

The importance of cotton in the progress of man is nearly as indispensable as iron and as useful and widely used. No single article gives remunerative employment to a larger number of persons. The large addition which is made to its value between the hands of the producer and the back of the wearer constitutes the lifeblood of whole communities and governments, without which, so far as we can see, they could hardly exist. Cotton was undoubtedly a game-changing plant that influenced the entire world. Due to its durability, flexibility, and ease of dying, cotton was the most common and profitable raw material amongst textile industries, especially during industrialization. Before the industrial revolution and the mechanization of textile industries, the production of goods was known as the cottage industry. Production was inefficient and slow since most production was done in small homes. However, industrialization allowed for more efficient forms of mass production in factories, mechanizing the cotton industry during the first American Industrial Revolution.¹ During the 1760s Great Britain was the first country to industrialize due to its geographical location and abundance of coal mines. With one of the largest colonial empires in the eighteenth century, raw materials were ubiquitous within Britain. Using mercantilist policies, Britain was able to plunder its colonies for raw materials and resources, providing them a huge advantage in the process of industrialization. The textile industry started to experience a steady growth with the appearance of technological breakthroughs. John Kay's invention of the flying shuttle in 1733 allowed more cloth to be woven more efficiently, while James Hargreaves's invention of the spinning jenny in 1763 allowed multiple cotton threads to be spun together at once. Moreover, Richard Arkwright's invention of the water frame granted industries more durable thread. A decade later, James Watt's modification of the steam engine in 1776 mechanized many British industries, including textile industries. These innovations improved

¹ The first Industrial Revolution was a period of technological innovations that began in the early 1700s in Europe. These technological innovations led to the proliferation of factories, allowing industries to manufacture goods at a larger scale while also being more efficient. Industrialization begun in the US during the 1790s and beginning of the 1800s.

the overall efficiency of producing textiles. The mechanization of the textile industry not only expanded the cotton industry but also influenced the American Industrial Revolution.

Samuel Slater made one of the greatest contributions to the American Industrial Revolution. Born in Britain, Slater was a clever and ambitious teenager who worked at a water-powered cotton mill. Slater's talent with machinery caught the eye of his manager Jedidiah Strutt. Strutt took Samuel Slater as his apprentice and taught him the process of constructing a working cotton mill. After his apprenticeship, Slater became an entrepreneur and decided to take his chance in the United States. The United States was avaricious towards the British textile industry since they were unable to produce textiles at the same quality. Slater headed to Pawtucket, Rhode Island, where he constructed the first water-powered cotton mill in the United States by implementing the knowledge that Strutt had taught him. While operating the cotton mill, Slater was always in need of more employees. To resolve this issue, he invented the Rhode Island system where he employed entire families to work in mechanized factories, thus laying the foundation for later methods of factory production. Slater's construction of the cotton mill and creation of the Rhode Island system profoundly impacted the first American Industrial Revolution.

Eli Whitney was another innovator that influenced the first American Industrial Revolution. In 1793, Whitney invented the cotton gin, which sorted cotton more efficiently. Before the innovation of the cotton gin, cotton had to be hand-cleaned in order to remove the fibers and seeds. The cotton gin sped up this process and allowed for much faster production of the resource. Demand for raw cotton was escalating dramatically both domestically and in British textile mills due to Whitney's cotton gin. More cotton was planted in the Southern United States in order to achieve the quantity demanded. This also led to the escalating utilization of enslaved individuals within the United States, especially in the deep south.² Along with Samuel Slater's water-powered cotton mill and his Rhode Island System, Eli Whitney's cotton gin mechanized the cotton industry and pioneered the first American Industrial Revolution.

The first American Industrial Revolution was driven by the textile industry and the need for independence from Britain. The mechanization of the cotton and textile industry led to massive urbanization which provided more opportunities for impoverished families.³ This paper will scrutinize and investigate the technological impacts of Samuel Slater and Eli Whitney's inventions on the American Industrial Revolution before 1850, while also look at the ways in which they effected the social structure of the working class.

Many historians have investigated the impacts of the cotton industry and industrialization through a social and technological perspective, such as urbanization and the changing role of enslaved individuals. Delmar Hayter elucidates the advantageous properties of cotton for textile industries and analyzes the growing importance of cotton towards American society in his article "Expanding the Cotton Kingdom." Hayter elucidates that it was the social impact of cotton that led to the employment of massive numbers of individuals, therefore leading to the first Industrial Revolution. Hayter acknowledges the construction of the cotton mill by Samuel Slater and cotton gin by Eli Whitney, and remarks that "these two events led to increased demand, and the ability to provide greater amounts of fiber."⁴ Since the cotton gin allowed for more efficient ways of sorting cotton, more lands

² Eli Whitney's contribution was not limited to the cotton industry. He also developed the concept of interchangeable parts and established his own musket factory.

³ Mechanization in this paper will be defined as the introduction of machines, technology, or automatic devices into the production process.

⁴ Hayter, "Expanding the Cotton Kingdom," pp. 225-233.

were utilized as plantations in the South. According to Hayter, “cotton was a natural resource particularly adaptable to the South, and the citizens made the most of it.”⁵ More people migrated to the South in hopes of obtaining lands for building cotton plantations and making greater profit.

While the invention of the cotton gin led to greater demand, it also reinvigorated the use of enslaved individuals. In his article “African Americans and the Industrial Revolution,” Joe William Trotter identifies the effects of technological innovations such as the cotton gin on the roles of enslaved African Americans. Trotter notes that “the cotton gin effectively separated the fiber from the seed and fueled demand for increasing numbers of field hands to plant, cultivate, and pick cotton for national and international markets.”⁶ Since there was increasing demand for cotton by textile industries due to the invention of the cotton gin and mechanized factory production, more enslaved individuals were utilized in plantation fields. As cotton dominated foreign exports, new textile mills were soon set up in other states. Trotter points to the massive relocation of enslaved individuals to the South and explains that “nearly a million blacks migrated under the lash from the upper South states of Virginia and Maryland to the deep South states of Georgia, South Carolina, Alabama, Mississippi, and Louisiana.”⁷ This illustrates the escalating demand for human labor and enslaved individuals in plantation fields in order to meet the demands for cotton by highlighting the extensive number of forced migrants. Ronald Bailey also explores the relationship between industrialization, the cotton industry, and slavery. According to Bailey, it was innovations in the cotton and textile industry that led to industrialization in the United States. The adaptation of the cotton gin and mills in factories exemplifies this process of industrialization. However, the cotton industry would never have flourished without the use of enslaved individuals. Bailey argues that “the industrialization of New England and the United States – a process that also centered in the textile industry, was also intricately linked to the slave[ry] trade.”⁸ It is certainly true that the flourishing cotton industry relied greatly upon the use of enslaved individuals. Increased production of cotton enabled the domination of cotton in American foreign exports, driving the industrial economy into a new era. Furthermore, the rising demand for cotton increased the domestic trade in enslaved individuals. Other historians such as Stuart M. Blumin also linked the process of urbanization in the early 1800s to the growing textile industry. In his article “Urbanization and Industrialization in the Nineteenth Century,” Blumin claims that “the factory, the mill, or the congeries of outworking shops, is a more powerful population magnet than even the busiest of import export businesses, particularly in the era when the latter sent as many of its workers out across the globe as it drew to its dock and warehouse.”⁹ With Samuel Slater pioneering factory production with his Rhode Island System, many industries adapted his method of employment, causing massive urbanization and greater employment in factories. This laid the foundation for later urbanization, which continued after the Civil War during the second Industrial Revolution, when factories were prevalent across the country.

⁵ Ibid, 5.

⁶ Joe William Trotter, “African Americans and the Industrial Revolution,” *OAH Magazine of History* Vol. 15, No. 1 (Fall, 2000): pp. 19-23.

⁷ Ibid, 3.

⁸ Ronald Bailey, “The Other Side of Slavery: Black Labor, Cotton, and Textile Industrialization in Great Britain and the United States,” *Agricultural History Society* Vol. 68, No. 2 (Spring, 1994): pp. 35-50.

⁹ Stuart M. Blumin, “Urbanization and Industrialization in the Nineteenth Century,” *OAH Magazine of History* Vol. 20, No. 3 (May, 2006): pp. 4.

Scholars have also investigated the economic and social effects of Samuel Slater and Eli Whitney's inventions. In his book *The Coming of Industrial Order*, Jonathan Prude describes the process of industrialization in the cities of Dudley and Oxford and analyzes the impact of Industrialization on the small communities.¹⁰ Prude categorizes the industrial order into three basic economic characteristics. The three characteristics are as follows: "first, the increased, but still significantly limited, commercial involvement of agriculture. Second, the dramatic expansion of small business establishments, and third, the appearance of manufactories along the streams of the two communities."¹¹ With Slater's construction of the cotton mill, the textile industry started to thrive as more mills were set up in factories. Prude explains that Slater's mills took a paternalistic form in Oxford and Dudley. Furthermore, Slater also created a new town for his mills called Webster. As the industrial order developed within those towns, the arrival of immigrants led to a sharp population increase. "The occupational structure altered sharply," Prude argues, "with farmers becoming but 13 percent of the labor force – in 1860, nearly 70 percent were textile operatives, laborers, or shoemakers."¹² Construction of more mills and factories attracted countless immigrants and altered the occupational structure, while at the same time giving rise to a growing industrial economy.

The widespread popularity of cotton created a global demand for this cash crop and catapulted the American Industrial economy. Sven Beckert notes in his article "Empire of Cotton," "by the late 1850s, cotton grown in the United States accounted for 77 percent of the 800 million pounds of cotton consumed in Britain. It also accounted for 90 percent of the 192 million pounds used in France, 60 percent of the 115 million pounds spun in the Zollverein, and 92 percent of the 102 million pounds manufactured in Russia."¹³ The cotton industry prospered due to the invention of the cotton gin and the widespread utilization of cotton mills, along with the escalating number of enslaved individuals working in cotton plantations. Cotton soon dominated American exports and was mostly sold to British textile industries. John Lauritz Larson breaks down the causes of the Market Revolution in the United States, and mentions that "planters on worn-out tobacco farms may have felt paternalistic toward their 'black families,' but their sons nevertheless took those slaves to the cotton or sugar frontier where their worth (and their hardships) dramatically increased."¹⁴ This emphasizes the reliance of the growing industrial economy on enslaved individuals since more enslaved individuals were utilized on cotton plantations. More than that, this quote illustrates that profits were more important than human beings. Those enslaved individuals expanded both the cotton industry and the industrial economy by working on cotton and sugar plantations, the cash crops that dominated American exports. The cotton industry influenced the Market Revolution, generating huge changes within the United States.¹⁵

Despite the growing economy, the thriving cotton industry still took a detrimental hit during the American

¹⁰ Johnathan Prude, *The Coming of Industrial Order: Town and Factory life in Rural Massachusetts, 1810-1860* (Cambridge: Cambridge University Press, 1983): pp. 17-364.

¹¹ Kristine Bruland, "The Coming of Industrial Order. A Review Article," *Comparative Studies in Society and History* Vol. 30, No. 2 (April, 1988): pp. 388-396.

¹² Ibid.

¹³ Sven Beckert, "Empire of Cotton," *The Atlantic*, December 12, 2014, accessed August 13, 2022, <https://www.theatlantic.com/business/archive/2014/12/empire-of-cotton/383660/>.

¹⁴ John Lauritz Larson, "The Market Revolution in Early America: An Introduction," *OAH Magazine of History* Vol. 19, No. 3 (May, 2005): pp. 4-7.

¹⁵ The Market revolution differs from the industrial revolution in that it mainly transformed American businesses and global trade economically.

Embargo. In her article “The effect of the American Embargo, 1807-1809, on the New England Cotton Industry,” Caroline F. Ware illuminates the effects of the American Embargo on the cotton industry while also arguing that American industries needed no artificial stimulus for its growth because the market and industries were already established before 1807 by entrepreneurs who were influenced by Samuel Slater. She rebuts against other historians who claimed the American Embargo was a chance that cotton industries used to set up a market by clarifying that there was already a flourishing market for cotton before the embargo due to high demands.¹⁶ However, the price of raw cotton was lowered during the Embargo which generated a misleading impression of earning high profits. Ware claims the actual increase in mill building was mainly because of these misleading impressions. In fact, she asserts that the only benefits the embargo brought to the cotton and textile industries was that “it stimulated Western migration, and in New England released labor and capital which turned to an industry already prosperous.”¹⁷

The majority of historians would correlate Samuel Slater and Eli Whitney’s innovations to the escalating utilization of enslaved individuals. Many focused solely on the social impact that Whitney’s cotton gin brought on enslaved individuals. However, many fail to acknowledge other prominent social impacts of the mechanization of the textile and cotton industry such as the reorientating role of women and escalating employment of child worker. The social structure was altered significantly due to Slater’s Rhode Island system as women and children were employed by factories more frequently than before. This essay will enunciate the prominent social impacts that Slater and Whitney brought forth with their inventions, while also articulating the influences of their innovations on the process of industrialization.

Samuel Slater’s construction of the first water-powered cotton mill in Rhode Island and his creation of the Rhode Island system paved the way for the developing industrial order by mechanizing the American textile industry, influencing the construction of more factories, and developing new methods of employment that provided greater overall efficiency. In his book *Dawn of Innovation: The First American Industrial Revolution*, Charles R. Morris explains that Slater obtained the methods of constructing Arkwright’s spinning machine from his mentor Jedidiah Strutt and used it to build the first water-powered cotton mill in Pawtucket, Rhode Island.¹⁸ Slater’s spinning frame was also known as the 48-spindle spinning machine, which was a modified version of Arkwright’s spinning machine, allowing the spinner to spin 96 threads at once.¹⁹ This was a huge improvement from the original American cottage industries during the early 1700s, in which yarns were hand spun one thread at a time. Slater’s adaptation of Arkwright’s spinning machine was adopted by other developing textile mills. By 1809, more than 20,400 spindles were operating within Rhode Island, and Slater’s firm alone had more than 1400 spindles in 1804.²⁰ More entrepreneurs followed Slater’s footsteps, constructing their own operating mills.

¹⁶ Caroline F. Ware, “The effect of the American Embargo, 1807-1809, on the New England Cotton Industry,” *The Quarterly Journals of Economics* Vol. 40, No. 4 (August, 1926): pp. 672-688.

¹⁷ *Ibid*, 687.

¹⁸ Charles R. Morris, *Dawn of Innovation: The First American Industrial Revolution* (United States: PublicAffairs, 2012), pp. 80-81; Richard Arkwright invented the spinning machine.

¹⁹ “Samuel Slater’s Spinning Frame”, Smithsonian Institution, accessed August 13, 2022, https://www.si.edu/object/1790-93-samuel-slaters-spinning-frame:nmah_675085.

²⁰ Thomas Coles, “Report on Domestic Manufactures,” *Connecticut Herald* (New Haven, Connecticut) VII, No. 347, June 19, 1810, <https://infoweb-newsbank-com.proxy.library.cornell.edu/apps/readex/doc?p=EANX&docref=image/v2%3A109DD9F476B90880%40EANX-10A7DE3FEC8625C8%402382318-10A7DE4001F7B920%400-10A7DE411987B888>.

Francis Cabot Lowell, for instance, established his own textile factory in Massachusetts in 1812. By 1850, Lowell managed to construct 10 mill complexes employing more than 10,000 workers in the city of Lowell.²¹ Lowell's construction of his own mill town illustrates Slater's growing influence on the American textile industry. Numerous entrepreneurs across the United States – including William Potter, Dutu Arnold, Oliver Bartlett, John Pitman, and Smith Wilkinson – hoped to make their fortunes in the textile industry. Furthermore, Georgia alone had 33 mills operating and producing approximately 500,000 yards of cloth per week during the early 1860s.²² This evidence demonstrates Slater's technological impact on the mechanization of the textile industry such as the proliferation of factories and mills, and also articulates the rise of the industrial order because more textile mills were operating efficiently in the United States.

Slater successfully mechanized the textile industry after establishing his cotton mill. Less than a year after setting up his first mill, Slater managed to set up a factory containing carding, roving, and spinning machines, all of which were powered by water looms. At first, Slater mostly employed young teenage boys between 7 and 12.²³ Young children were ideal employees because employers could pay them less and force them to conduct minute tasks, such as cleaning the spinning machines. During his factory's third year of operation, Slater had roughly 30 employees, the majority of which were children. With the development of labor unions and worker's rights, Slater created a new method of employment that influenced many latter factories, which became known as the Rhode Island System. In this system, he hired entire families to work in his cotton mill, generating greater overall efficiency and profit. Slater's new method of employment was advocated in New England Newspapers. For example, Edward Lawton advertised in *The Rhode-Island Republican* for “[t]wo families, with a number of children in each, from 9 to 15 years of age, and several girls, from 18 to 28 years of age, may receive constant employment and generous wages, at the cotton manufactory of *Almy, Brown & Slater*, at *Pawtucket* – unquestionable recommendation as to character and morals will be required.”²⁴ This excerpt of an advertisement from an 1811 newspaper clearly illustrates Slater's revolutionary method of employment. Hiring entire families resolved the issue of having to hire employees individually, making the employment process more efficient. Slater managed to attract more workers after he established Slatersville in 1803, the first mill town in American history. His town not only had Slatersville mill, the largest cotton mill of the day, but also two houses for his workers and a company store.²⁵ With the proliferation of factories during the 1840s, many factories adopted Slater's employment system. By 1861, 131,000 factories were operating with more than 1 million workers, many of which were children.²⁶ With the breakout of the Civil War, both textile and ammunition demands were high,

²¹ Gray Fitzsimons, “Mill Life in Lowell, 1820-1880: An Introduction,” LibGuides, accessed August 13, 2022, <https://libguides.uml.edu/c.php?g=492497&p=3369423>.

²² “Civil War Industry and Manufacturing,” New Georgia Encyclopedia, accessed August 13, 2022, <https://www.georgiaencyclopedia.org/articles/history-archaeology/civil-war-industry-and-manufacturing/>.

²³ “Early American Manufacturing,” National Parks Service, accessed August 13, 2022, https://www.nps.gov/lowe/learn/photosmultimedia/early_american.htm.

²⁴ Edward W Lawton, “Employment,” *The Rhode-Island Republican* (Newport, R.I.), 24 July 1811. *Chronicling America: Historic American Newspapers*. Library of Congress. <<https://chroniclingamerica.loc.gov/lccn/sn83025561/1811-07-24/ed-1/seq-4/>>

²⁵ “The Slatersville Mill Village,” Samuel Slater and the Slatersville Mill Village, accessed August 13, 2022, <http://www.woonsocket.org/slatersville.htm>.

²⁶ “United States: Industrialization capacity 1861,” Statista, May 6, 2015, <https://www.statista.com/statistics/1010518/industrialization-capacity-home-fronts-1861/>.

resulting in the construction of more factories and mills. Apart from textile mills, arms and ammunition factories that produced interchangeable parts were also prevalent and adopted Slater's Rhode Island system. This exemplifies the influence of Samuel Slater to the developing factory system since more factories were following Slater's lead by establishing mills and utilizing his revolutionary Rhode Island System.

Eli Whitney also made substantial contributions to the first Industrial Revolution. With his invention of the cotton gin, Whitney mechanized the cotton industry, making industries more efficient and cotton the most profitable cash crop in the United States. Indeed, the dominance of cotton in national exports during the 1800s can be attributed largely to Eli Whitney's cotton gin. A year after graduating from Yale in 1792, Eli Whitney invented his revolutionary cotton gin, also known as the Saw-gin, in 1793.²⁷ Prior to Whitney's invention, British textile mills were craving more cotton. Before utilizing Whitney's cotton gin, each cotton plant was sorted individually by hand since the cotton fibers adhered to the seed. The cotton gin immediately quickened the cleaning process and hastened the availability of cotton fibers in the textile industry. At first, many expressed skepticisms towards Whitney's invention, doubting the legitimacy of his gin. Whitney combatted criticism and justified the legitimacy of his invention by publishing customer reviews in the newspaper. According to a newspaper published in 1795, customer Abel Buel claimed "that said patent machine is in my opinion a very useful invention, and that it doth not in any way or manner injure staple of the cotton."²⁸ In addition, subscribers William Mintosh and John Erving also commented that "the cotton cleaned by Mr. Whitney's spins well, makes good yarn, and that from our own experience we find that his methods of extracting the seeds from the cotton, does no injury to the staple, and we believe his machine to be the most useful of any heretofore invented for the cleaning of cotton of every kind."²⁹

As more cotton gins were purchased by farmers, the cotton industry experienced a tremendous transformation. Greater amounts of fiber were provided by manufacturers since cotton was cleaned at a faster rate. Approximately 37,140 bales (a bale weighs 300 pounds) of cotton were exported to Britain in 1800, which was 35 percent of the total amount of cotton received in that year.³⁰ Since the demand for cotton was escalating at an astounding rate, planting cotton became a more lucrative business. With the Louisiana purchase, countless farmers and individuals seeking new opportunities migrated to the deep south, also known as the frontier, where they purchased thousands of acres of land for cotton plantations. Cotton plantations were especially prevalent in states extending from Maryland to East Texas.

The supply of raw cotton increased each year on account of the escalating cultivation of land and utilization of enslaved individuals. In 1790, prior to Whitney's invention of the cotton gin, only 3,000 bales of raw cotton were cultivated each year. However, that number increased to 178,000 bales by 1810, and eventually 3,841,000

²⁷ "Eli Whitney," Encyclopædia Britannica, accessed August 13, 2022, <https://www.britannica.com/biography/Eli-Whitney>.

²⁸ Miller, Phineas and Eli Whitney. "In the Public." *Southern Centinel and Universal Gazette* (Augusta, Georgia)

Vol 3, No. 137. January 21, 1796. <https://infoweb-newsbank.com.proxy.library.cornell.edu/apps/readex/doc?p=EANX&docref=image/v2%3A1103B6F1EC142A18%40EANX-110FBB33D3069B00%402401373-110FBB349010EA40%406-110FBB361950BE50%40Alleged%2BResults>

²⁹ Ibid.

³⁰ Hayter, "Expanding the Cotton Kingdom," pp. 225-233.

bales in 1860.³¹ Cotton soon dominated US exports with escalating supplies of raw cotton, accounting for more than fifty percent of US exports by the mid-1800s. Eli Whitney's cotton gin not only established a new cotton industry, but also sustained the industrial economy. His cotton gin was able to provide both domestic and British textile industries with more raw materials for producing cloth. This articulates the reliance of industrialization upon Whitney's invention since cotton soon dominated national exports. As more textile factories proliferated, Whitney's invention aided the success of these textile factories and laid the foundation for the US industrial economy.

Eli Whitney and Samuel Slater's innovations also resulted in profound social impacts, including the escalating utilization of enslaved individuals, the abuse of child labor, and the transforming role of women. Whitney's invention of the cotton gin did make cleaning cotton more efficient, but it also led to the increased demand for enslaved individuals. According to a newspaper, "Eli Whitney invented the cotton gin, and in that cotton gin existed the seeds of the greatest rebellion in human history. It developed the cotton interest, which made slavery profitable, and developed the slave power until it became dictator in American politics."³² Since the demand for raw cotton by textile industries increased each year, more human labor was needed on cotton plantations. The domestic slave trade flourished because of the growing cotton industry. With the increased demand for more cotton, more than one million slaves were sold from the Upper South to the Deep South to work on cotton plantations. While there were 1,375,000 enslaved individuals forced to work on cotton plantations in 1810, the number of those enslaved individuals increased to 2,325,000 in a just two decades.³³ Industrialization, slavery, and the cotton industry were all intricately linked to each other. The cotton industry relied greatly upon enslaved individuals, who harvested raw materials for the growing industrial economy. Whitney's invention contributed to the growth and longevity of the inhumane treatment of enslaved individuals in cotton plantations.

A significant social change that resulted from Slater's Rhode Island system was the increased employment of children in factories. As more factories employed entire families, child labor also increased significantly. With the proliferation of factories in the early 1800s, more children were hired to work in those factories. By 1870, there were more than 750,000 children under the age of fifteen working in factories.³⁴ Furthermore, children were often given dangerous tasks in factories, such as climbing into clogged machines in order to fix them. Tasks like these were extremely dangerous, often leading to serious injuries including severed fingers and broken bones. By 1830, 55 percent of the Rhode Island mill workers were children.³⁵ Many of the child workers had to work

³¹ "Cotton," Pearce Museum, accessed August 13, 2022, <https://www.pearcemuseum.com/education/fifth-grade-curriculum/cotton-2/>.

³² "Alleged Results," *Deseret News* (Salt Lake City, Utah) VXII, No. 8. <https://infoweb-newsbank-com.proxy.library.cornell.edu/apps/readex/doc?p=EANX&docref=im-age/v2%3A1103B6F1EC142A18%40EANX-110FBB33D3069B00%402401373-110FBB349010EA40%406-110FBB361950BE50%40Alleged%2BResults>.

³³ "Cotton," Pearce Museum, accessed August 13, 2022, <https://www.pearcemuseum.com/education/fifth-grade-curriculum/cotton-2/>.

³⁴ "Child Labor," Social Welfare History Project, June 16, 2020. <https://socialwelfare.library.vcu.edu/programs/child-welfarechild-labor/child-labor/>.

³⁵ *Ibid.*

in harsh conditions for up to 14 hours a day with minimal breaks during the shift.³⁶ Factory owners adopted Slater's method of employing families, and the use of child labor soon escalated. During the first industrial revolution, child labor hit its peak between the 1860s and 1870s, in which children were hired to work in ammunition and textile factories after the breakout of the Civil War. Child labor was eventually banned in 1938 due to the abhorrent working conditions and to provide opportunities for a formal education.

Slater and Whitney's innovations also reoriented the role of women. Traditionally, women were expected to remain home and take care of their children while men work. However, Slater and Whitney's inventions and the resulting proliferation of factories changed the roles of women. After Slater invented his system of employing entire families, women were hired more frequently in factories. As poverty rates started to grow along with the rising number of single mothers in urban centers, women seized the opportunity to work in factories. In 1823, with Francis Cabot Lowell's construction of his mill factory, large numbers of young women migrated to the growing city, searching for opportunities. Lowell employed women between ages of 15 and 30, leading to the creation of the first union of working women known as the Lowell Mill Girls. This union was created to combat the horrendous working conditions and long hours.³⁷ Thereafter, the number of women working in factories gradually rose in the 1800s, from less than 8 percent in the beginning of the century to more than 11 percent in 1840.³⁸ It was during the second Industrial Revolution that the percentage of employed women escalated to about 28 percent in the 1940s.³⁹ Whitney and Slater indirectly impacted the changing role of women, by providing new job opportunities. This social impact is significant because of the creation of unions of working women and providing women stable working opportunities in factories.

Slater and Whitney's inventions influence the first American Industrial Revolution and aggrandized the cotton and textile industry. Prior to Samuel Slater's establishment of his cotton mill, textile manufacturing within the United States was operated in what's known as the cottage industry—a small scale, decentralized manufacturing business that often operated in small homes rather than large factories. Production was inefficient and industries manufactured at a small scale. Whitney's invention of the cotton gin granted industries greater amounts of raw materials while also escalating the demand for raw cotton. Slater's cotton mill influenced the proliferation of mill factories in the United States, allowing cloth to be produced at a larger scale. Both Whitney and Slater's innovations were dependent upon each other; the mechanized textile industries demanded more raw cotton, and it was Whitney's cotton gin that met those high demands in both British and US textile factories. Slater and Whitney's inventions were indeed revolutionary in the context of technological innovations; however, their inventions also brought forth significant social changes such as changing role of women in the United States. The industrial revolution granted women the opportunity to work in factories, leading to the establishment the first Union of working women in the Lowell mills since most women were not satisfied with the harsh working conditions. Other prominent social impacts include the increase of child labor in mills and factories, along with the reinvigoration of utilization of enslaved individuals in cotton plantations.

³⁶ "Childhood Lost: Child Labor During the Industrial Revolution," Eastern Illinois University, accessed August 8, 2022. <https://www.eiu.edu/eiutps/childhood.php>.

³⁷ "Lowell Mill Women Create the First Union of Working Women," AFL-CIO, accessed August 13, 2022, <https://aflcio.org/about/history/labor-history-events/lowell-mill-women-form-union>.

³⁸ "Historical Look At Women's Participation Rates In the Labor force," Free By 50, October 31, 2010, <http://www.freeby50.com/2010/10/>.

³⁹ Ibid.

Historian Charles R. Morris remarked, “For a century and a half after his death, Eli Whitney was virtually canonized as the Father of American Technology.”⁴⁰ It was Whitney’s invention of the cotton gin and his development of the concept of interchangeable parts along with Samuel Slater’s cotton mill that revolutionized American technology, leading to a new era of mechanization and industrialization.

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⁴⁰ Morris, *Dawn of Innovation*, Pg 107-108.

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