AEA Papers and Proceedings 2024, 114: 582–585
https://doi.org/10.1257/pandp.20241075

MANAGERS, FIRM PERFORMANCE, AND WORKER OUTCOMES[‡]

Creating the "American Way" of Business: Evidence from WWII in the United States[†]

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The Second World War (WWII) was arguably one of the largest shocks to the US economic and production system in history. Historians, business historians, and economists have largely discussed the stimulus of WWII to US technological advancements. For instance, Chandler (1977, 281) noted how wartime created "an extraordinary surge of growth" referring to the development of new products. However, its effect on US "managerial technology" innovations has been largely ignored except for very few qualitative works (Armsby 1946; Dinero 2005).

In this paper, I argue that managerial technology played a key role in shaping US WWII production and its capacity to defeat some of the most advanced economies in the world. The large-scale diffusion of innovative management practices to US firms involved in war production acted as a technology that put them on a higher growth path for decades. Moreover, it made US managerial practices internationally distinctive and helped create the so-called American Way of business, which was exported to war-torn European and Japanese economies in the aftermath of the war (Womack 1990; Giorcelli 2021).

In economics, the idea that managerial technology affects firm productivity and performance goes back at least to Walker (1887), who argued for its centrality in explaining firm heterogeneity. Later on, differences in managerial talent were emphasized in the Leibenstein (1966) X-inefficiency theory and in the Lucas (1978) model of firm size. However, until recently, managerial or "soft" inputs have been relegated to the residual of the production function, famously defined by Abramovitz (1956) as the "ignorance term."

More recent works have incorporated managerial technology in the production function (Bruhn and Schoar 2010; Bloom et al. 2015). Consider a production function where value added y is produced as $y = A k^{\alpha} l^{1-\alpha}$, where A is an efficiency term, k is nonmanagerial capital, and l is labor. Assuming that $A = f(M)$ is a function of managerial capital M, management acts as a technology in the sense that it raises productivity.

A major empirical challenge in quantifying M is that management is hard to define and measure. However, by surveying thousands of firms across the world, Bloom and Van Reenen (2007) codified a specific set of managerial practices that can be systematically and consistently measured across firms, countries, and years. This data has shown that managerial practices are strongly associated with firm-level productivity and profitability. Moreover, a few papers have employed randomized control trials (RTCs) that randomly provided free managerial consulting to firms to show that management has a causal effect on firm productivity and performance (Bloom et al. 2013; Bruhn, Karlan, and Schoar 2018).

Studying the development of managerial technology during WWII will shed light not only on a new technology largely neglected so far but also one that may have played a crucial role in US firm productivity. It will also improve

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[†]Go to https://doi.org/10.1257/pandp.20241075 to visit the article page for additional materials and author disclosure statement(s).

our understanding of the long-term impact of the adoption of managerial practices. Moreover, it will be informative as to what extent managerial practices can be diffused across firms and countries.

I. US Innovation during WWII

Even before the United States officially entered WWII, military, politicians, scientists, and businessmen became increasingly aware that "warfare had become a test of the relative total scientific, engineering, and management capacities of the belligerent nations," and the development of new technologies would have been essential to succeed (Armsby 1946, 6).

A notable step in this direction was to increase support for scientific research by financing R&D expenditures. Between 1940 and 1945, the US government sponsored more than 2,200 R&D contracts in industry and academia, an investment that, at its peak, amounted to roughly 2 percent of the nation's annual total gross domestic product (Bush 1946). While there is widespread consensus about the importance of such investments in shaping US innovation and the interaction between government and science, empirically grounded research has been scant until recently. Gruber and Johnson (2019) show that US R&D investment not only allowed for many important breakthroughs in science and technology—such as the radar, digital computers, jet engines, and eventually the internet—it also expanded the US middle class by creating jobs in newly created industries. Gross and Sampat (2023) document how R&D investment during the war years had a profound impact on the US innovation system, catalyzing technology clusters across the country and increasing high-tech entrepreneurship until at least the 1970s.

However, the US government soon realized that too many firms were receiving an increasing number of war-related orders that exceeded their productive capacity. To deal with these issues, expanding scientific research was not enough. It was necessary to efficiently organize, coordinate, and supervise firm production and train the huge numbers of new workers that had to replace those gone to war as soon as possible (Khurana 2010). For this reason, in 1940 the Training Within the Industry (TWI) Program was created.

The TWI Program aimed at offering free in-plant consulting to managers of around 11,000 US war contractors. It was designed around three main training programs, called J-modules. The Job-Instructions (J-I) module taught managers how to reduce production disruptions, such as defective products, scrapped output, worker injuries, and equipment breakdowns. The Job-Relations (J-R) module taught managers how to make improvements methodically by assigning workers to the most appropriate tasks and making the best use of machines and materials to produce greater quantities of quality products in less time. The Job-Methods (J-M) module taught managers how to introduce improvements to current production processes, managing their inventory more efficiently, improving production planning, and tracking production to prioritize customer orders by delivery deadline.

Bianchi and Giorcelli (2022) show that the results of the TWI Program were impressive and long lasting. The productivity of firms that received the training experienced a 6 percent jump in the year after the training and continued to increase, reaching a cumulative impact of 27 percent after 10 years. The three J-modules complemented each other in boosting firm outcomes, and the beneficial impact of the TWI Program was transmitted into the supply chain of trained firms.

Indeed, the idea of increasing firm productivity through training was not new to WWII. During World War I, following a tenfold demand increase in shipbuilding, the US Emergency Fleet Cooperation launched a training program, based on learning by doing, for its newly hired workers that led to a dramatic production increase (Huntzinger 2016). However, the TWI Program introduced a conceptual change relative to previous training programs. It did not train the workers but instructed the managers who in turn diffused new managerial knowledge in their firms. In doing so, the program could reach a higher number of workers and allowed managers to adapt the managerial principles to their companies, generating long-lasting effects.

II. (Re)Educating High-Skilled Workers

The effort to increase US managerial and technological advancements was somehow constrained by an insufficient number of highly educated and trained technical personnel who could be mobilized for the war effort (Armsby 1946). Under the auspices of the US Office of Education, the US government decided to launch one of the largest free educational programs in its history, second only to the G.I. Bill: the Engineering, Science, and Management War Training (ESMWT) program. The goal of the ESMWT program was to "provide without charge college and postgraduate education to engineers, scientists, and managers" employed at war industrial facilities (Armsby 1946, 10). Despite accounting for only 0.025 percent of the entire WWII spending, the program trained almost 1.8 million workers in a mere six years, equivalent to 40 percent of the college population in 1940.

The ESMWT program offered engineers, physicists, and chemists three-month-long courses on specific war-related topics, such as war explosives, bombproof structures, and aircraft and tank design. Training for managers, by contrast, lasted 18 months and included comprehensive business education with a strong focus on analytic tools to systematically organize and measure production. Considered a prototype for the modern MBA program, the ESMWT program was beneficial for both enrolled managers and their firms. Giorcelli (2023) shows that managers who took the ESMWT classes had a substantially higher probability of reaching both middle and top management positions during their career and engaged systematically more in innovative entrepreneurial activities than similar managers who didn't pass an entry exam. At the same time, their firms increased their productivity by up to 7 percent in the 18 months after the training and adopted several managerial practices, reducing production bottlenecks.

While a careful evaluation of the ESMWT program would need more evidence on the impact of its other components on innovation and its long-lasting effects on the US management education system in peacetime, its role during WWII can hardly be overstated. The sustained production growth in the United States during WWII would have been difficult to achieve without a proper investment in high-skilled workers. This aspect represented a crucial difference between the United States and other technologically comparable countries, such as Germany, which focused on increasing production but invested little in management and workforce education (Giorcelli 2024). Finally, the impact of the ESMWT program was not confined to the war effort but also affected workers, who were given the chance to return to school and update their education with state-of-the-art training.

While the end of WWII meant the end of both the TWI Program and the ESMWT program, their influence continued outside of US borders. Between 1952 and 1958, the United States sponsored the Productivity Program, which offered management training trips for European managers at US firms. This program helped European small- and medium-sized firms to dramatically improve their productivity and reduce the gap with their US competitors (Womack 1990; Giorcelli 2019; Giorcelli 2024). In the same years, the US Occupation Authority included the TWI principles in a wider program to rebuild Japanese industry and offered training to thousands of Japanese managers and engineers (Giorcelli 2021). Ultimately, the diffusion of this managerial innovation contributed to creating the Toyota-inspired Lean Manufacturing System, which made Japanese firms the world's most productive during the 1980s (Appelbaum and Batt 1994).

III. Conclusion

The papers described above indicate that US government's massive investment in management in the early 1940s was pivotal for winning WWII and created a distinctive "American Way" of doing business that was exported worldwide in the aftermath of the war.

Moving forward, more research should be done to connect WWII managerial innovation with scientific and technological advancements. For instance, better managers may have put their workers in more favorable conditions to produce innovation, creating a valuable complementary between firm managerial and scientific capital. At the same time, R&D investments and engineers' training may have improved production methods, helping managers to increase productivity.

With more data on firms and personnel involved in the WWII effort becoming available, researchers should be able to study more in depth such complementarities and understand whether and how they worked.

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