

Moving Companies: How U.S. Engineering Consulting Firms Created the Global Assembly Line, 1949-1969

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PROJECT SUMMARY AND PRÉCIS

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Project—Status and Context

This work in progress is part of a book on the history of export processing zones, entitled *Cold War, Hot Products: The Rise of the American System of Globalization*. The aim of the book is to show that the globalization of production, which became a qualitatively new, observable trend beginning in the late 1960s, was founded on two decades of American Cold War planning for a *unilateral*, globalized system of production.¹ The system was structured to enable American firms to produce the goods in the developing world that the latter needed to sell to America in order to complete the kind of reciprocal trade cycle required to maintain stable international trade balances. The aim of this paper is to explore one aspect of this “American system” of globalization: the role of American engineering consulting firms in the rise of export processing zones.

Introduction: The Nature and Significance of Export Processing Zones

A key dimension of the rise of the American system of global production was the establishment of *planned, flow-oriented production nodes* having a special legal status. Known as export processing zones (EPZs),² these nodes are tracts of land in developing countries that are designed and prepared in advance to accommodate industrial occupancy by a range of foreign firms, producing for export. EPZs are generally between 50 and 500 acres in size, i.e. up to two square miles.³ They are strategically located with respect to transportation infrastructure, so as to maximize their flow potential. They are also usually physically separated from their surroundings by fencing, but even when there is no fencing, EPZs always operate under a distinct legal regime relative to the countries in which they are located, notably with regard to laws and regulations concerning tariffs and customs duties, profits and investment, taxation, bureaucratic and licensing procedures, transfer of currency, and sometimes with regard to labor laws and other national

¹ This trend, known as “the new international division of labor” cannot be understood merely as a quantitative expansion of the rise of the multinational corporation. The book will explain this issue further. See also Folker Fröbel, Jürgen Heinrichs, and Otto Kreye, *The New International Division of Labour: Structural Unemployment in Industrialised Countries and Industrialisation in Developing Countries* (Cambridge University Press, 1982).

² EPZs are known by many names besides the common term, “export processing zone.” Among the other terms in use are free zones, free industrial zones, free economic zones, special economic zones, and maquiladoras. Behind the names, and despite variations, they share the key characteristics of legal separateness, flow, and organization for industrial occupancy by foreign firms producing for export. For simplicity, they will be referred to as EPZs here.

³ However, the largest, in China, cover thousands of square miles.

legislation. In fact, one of the key reasons for fencing EPZs is to keep these distinct *legal* spaces physically separate from their surroundings.

EPZs are *cutting-edge* production spaces, in the sense that they are pre-equipped with technological and administrative amenities, like power, water, sewer, advanced telecommunications, and efficient financial, bureaucratic, and postal services. Yet these production nodes are typically set down in poor regions and countries known for inadequate, dysfunctional infrastructure and cumbersome, obstructionist bureaucracy. EPZs thus represent technologically advanced *enclaves*—oases of modern industrial culture—built within landscapes of poverty and technological deprivation.

EPZs are designed to handle, encourage, channel, monitor, and control diverse flows linked to production. They are a crucial element of what Manuel Castells calls the “space of flows” of the global, network society. According to Castells, this new kind of space is “the material organization of time-sharing social practices that work through flows.”⁴ The global production of Mattel’s Barbie dolls, to take one example, is now streamed and coordinated in real time in a complex commodity chain extending over global distances. The sites that Mattell uses for this process include EPZs in Mexico (Tijuana), Philippines (Bataan), China (Shenzhen), and Malaysia (Penang), among others. Another example is the designer label, Liz Claireborne. Claireborne’s designs are made in New York, sent electronically to a computer in Taiwan that produces a pattern, which is then used to create a garment in the Taiwan factory, which is then displayed two days later in a showroom back in New York.⁵

American technical planners pioneered the use of EPZs in developing countries, seeing these “industrial oases” as the most efficient means to attract American companies. Third world governments endorsed them partly through economic necessity, but also because they provided a mechanism to “contain” and monitor the impact of foreign companies operating within their territory. The EPZ solution represented a kind of Faustian bargain between America and third world governments, each side hoping to get the best end of the deal. In many cases, the host government owned and operated the EPZs within its territory, although some EPZs were established as private, profit-making enterprises, notably in Mexico.

As consumers, we are all intimately connected with the world of EPZs. The ever-changing “hot products” that populate our lives and routines (cameras, cell phones, luggage, lingerie, clock radios, in-line skates, light bulbs, garage door openers, running shoes, automobiles, blenders, to name just a few) have passed through an EPZ at some point in their creation. Every major multinational corporation that produces physical goods makes use of EPZs—car makers, oil companies, electronics firms, pharmaceutical companies, clothing companies, chemical companies, and so on. According to International Labor Office statistics compiled in 2006 and 2007, there are now some 3,500 EPZs distributed among 130 countries employing at least 66 million workers. In fact this number underestimates their true impact because EPZ’s generally subcontract significant portions of their work to local supplier firms that are not located within the EPZ, but remain economically dependant on it. EPZs have become one of the main engines of the global production system. In 1950, however, there were no export processing zones. Where did the idea for them come from, how and when did they emerge, and how and why did engineering consulting firms become involved in this process?

⁴ Manuel Castells, *The Information Age: Economy, Society, and Culture The Rise of The Network Society*, Vol. 1: *The Rise of the Network Society*, 2nd ed. (Oxford: Blackwell, 2000), p. 442.

⁵ Barbie Doll example from Jeffrey Frieden, *Global Capitalism*; Liz Claireborne example from Robert C. Haywood, “Economic Realities and Free Trade Zones,” available at <http://www.wepza.org/article4.html>

The Context of American Involvement in Third World International Development Planning

This section of the paper will explore the U.S. policy contexts that contributed to a pattern of strong political and economic support for a globalized production system involving the third world. Briefly, the key factors were the Cold War and American policy makers' desire to contain the spread of Communism in the developing world (which included acknowledgment of the need for living standards to rise in the third world); the desire to protect foreign sources of strategic raw materials; a constant emphasis on policies supporting big business and U.S. foreign direct investment abroad; and continued concern over structural trade and balance-of-payments problems between America and the developing world. These overarching policy aims were followed through the presidential administrations of Truman, Eisenhower, Kennedy, and Johnson, and they were linked to a reworking of U. S. legislation in several areas, including tariffs, taxation, and intellectual property.

How American Engineering Consulting Firms Became International Development Planners

This section of the paper will explain how and why engineering consulting firms became involved in international development projects. The earliest example appears to be the Arthur D. Little firm. Established in the nineteenth century, it began as a firm that did chemical testing and analysis, but in the twentieth century the kinds of projects it took on expanded. For example, it was hired by large financial investors to analyze poorly performing firms, in order to determine the reasons for their unprofitability—this kind of work demanded expertise in both technical and economic/financial/managerial aspects of industry. Arthur D. Little's first international development contract came from Puerto Rico, an American protectorate, in 1942. The firm was hired—following advice to Puerto Rican authorities from Washington bureaucrats—to suggest viable industries that could be established on the island. This first contract evolved into a long-term relationship, leading to Puerto Rico's famous "Operation Bootstrap" industrial development program, inaugurated in 1949, which became a worldwide model for the development of export processing zones. The Arthur D. Little firm played a central role in developing, implementing, and promoting Operation Bootstrap. American engineering consulting firms were also drawn into development work through Truman's Point Four program for technical assistance to developing countries, through United Nations development programs like UNIDO, and through USAID contracts in developing countries.

The "Prehistory" of Export Processing Zones

This section of the paper will explain that EPZs, as a technical development tool, emerged from two prior developments: the "free port" and the industrial estate (or industrial park). Free ports became important development tools from the late nineteenth century. Although they have long historical antecedents, the "modern" free port is a product of the rise of protective tariffs, and it represents a "customs outland" that allows producers and traders to store and manipulate goods in a specified area without having to pay import fees and the like. The industrial estate (not to be confused with an industrial district) emerged at the very end of the nineteenth century, with the opening of the Trafford Park industrial estate in Manchester in 1897. An industrial estate has been defined as

a tract of land which is subdivided and developed according to a comprehensive plan for the use of a community of industrial enterprises. The plan must make detailed provision for streets and roads, transportation facilities, and installation of utilities. The plan may provide for the erection of factory buildings in advance of sale or lease to occupants.⁶

⁶ William Bredo, *Industrial Estates: Tool for Industrialization* Glencoe, Illinois: Free Press, 1960, p. 1. Note that author Bredo was Senior Economist at the Stanford Research Institute, in its International Industrial Development Center.

This section of the paper will trace the growing involvement of Arthur D. Little and SRI in using, adapting, and eventually linking these two techno-organizational forms into a single “package”: the EPZ.

Arthur D. Little in Puerto Rico and Mexico⁷

This section of the paper will first trace Arthur D. Little’s role in Puerto Rico’s industrial development programs, culminating in Operation Bootstrap, launched 1949. Briefly, Arthur D. Little designed the program, helped to prepare the legislation necessary to implement it, and then worked as a key publicist and promoter of the program in the United States, holding promotion seminars and helping and encouraging U.S. firms to relocate to Puerto Rico. Puerto Rico became a model for EPZ development worldwide, shaping the subsequent creation of the first wave of EPZs in Mexico, Asia (Taiwan and Korea), and elsewhere in Latin America. The fact that Puerto Rico became a “trial run” for EPZs worldwide was fundamentally linked to its unique status as an American protectorate, which affected key tariff and taxation issues, later replicated in EPZs worldwide.

Following the success of its work in Puerto Rico, and within the broad context of the U.S. Alliance for Progress program⁸ established under Kennedy, and continued under Johnson, Arthur D. Little was hired in 1964 to prepare an industrial development program for Mexico’s northern border with the U.S., and out of this arose the Mexican maquiladora system (the official Mexican term for EPZs). The paper will trace the key highlights of this story, including the fact that the Arthur D. Little firm designed the first industrial park in Nogales, Mexico, south of Tucson, Arizona. To promote the Mexican maquiladoras, Arthur D. Little developed the “Twin plant” concept, whereby an American industry would establish the “high-tech” end of its business on the U.S. side of the Mexican border (e.g. in Los Angeles, San Diego, Tucson, El Paso, or Brownsville), and the labor-intensive end on the Mexican side in a maquiladora (e.g. in Tijuana, Nogales, Ciudad Juarez, or Matamoros). Among the first big American companies to move to Mexico was RCA. Another early example is Samsonite, which initially sought to keep its move to Mexico secret. As in the case of Puerto Rico, Arthur D. Little helped to recruit American businesses to relocate to Mexico, preparing brochures and holding information seminars for this purpose in New York City, for example. (Companies that wanted to implement the twin plant concept could also use Arthur D. Little’s expertise in Operations Research to help reorganize their production system.)

It is also worth noting that when the World Export Processing Zone Association was established in 1978, the director of the organization’s secretariat, and of its research institute, the Flagstaff Institute, was Richard Bolin, trained as a chemical engineer, who had worked for Arthur D. Little, first on Operation Bootstrap, and then writing the maquiladora plan for Mexico, and also designing the Nogales Industrial Park.

This section of the paper will also discuss the rise of “shelter firms,” consulting/service firms that would handle all the details involved in organizing an industrial space and workforce for American companies wishing to relocate to Mexico. These firms were closely linked with industrial parks. One of the earliest shelter firm was developed by the owner of the Nogales Industrial Park, Richard Campbell, together with Richard Bolin of Arthur D. Little (who helped

⁷ Based on Arthur D. Little Company papers, MIT, Special Collections. See also Samuel Schmidt, *In Search of Decision: The Maquiladora Industry in Mexico* (Universidad Autónoma de Ciudad Juárez & The Flagstaff Institute, 2000) (other studies of Mexican maquiladoras will also be cited)

⁸ This program was established in the wake of the Cuban revolution and had as its aim to promote Latin American industrial development (with US financial support) and encourage U.S. foreign direct investment in Latin America, with the aim of stopping the spread of Communism in Latin America. For some time, the Puerto Rican who ran Operation Bootstrap, Teodoro Moscoso, was put in charge of the Alliance for Progress. See Teodoro Moscoso MS Collection, Kennedy Presidential Library, Boston.

design the Nogales Industrial Park). Another early shelter firm, IMEC (International Manufacturing, Engineering, and Consulting) was established by Howard Boysen, who had worked first at Fairchild, opening their first factory in Tijuana. Most of the large American firms that established maquiladora operations in Mexico used shelter firms, including Ford, General Electric, Samsonite, ITT, etc. Not only did shelter firms help shield relocating companies from negative publicity, but they also took over legal liability for the Mexican operations, and handled all the red tape involved in relocation, and also recruited and hired all the necessary labor. The result, as suggested one shelter firm's publicity was "Instant Maquiladora" and quick profits (see below)

Keep it simple...



American Consulting Firms in Taiwan and Korea

This section of the paper will briefly trace the diffusion of the EPZ concept to Asia, again with US government financial support and direct policy encouragement. The first two Asian EPZs were established in Taiwan (1966) and Korea (1970). There was a direct connection between the Taiwan zone and the Puerto Rico model, and the Korean zone was in turn modeled on the Taiwan zone. The U.S. Department of Commerce moreover subsidized travel of Korean officials to tour the U.S. to interest American firms to establish operations in the Korean zone, and the U.S. government also helped to pay for the consulting services needed to plan the Korean zone.

(Some) Conclusions

- Export processing zones are complex techno-organizational systems that evolved in the context of U.S. Cold War foreign policy aims, generally with direct American political encouragement and financial support.
- Engineering consulting firms, especially Arthur D. Little and Stanford Research Institute played a central role in developing and promoting the EPZ as an international development tool consistent with U.S. foreign policy aims.
- The example of EPZs reminds us that historians of technology may need to use a "wide-angle lens" to research and understand the role of engineers and engineering in the

contemporary world. EPZs are complex “megasystems” that combine a series of technological and legal/organizational systems. These particular megasystems had the aim of making it easy and financially attractive for American companies to move and operate abroad. Rather than having to reconstruct the entirety of a developing country to make it open and accessible for American FDI, an EPZ could be established as an enclave with all the necessary laws, technical systems, and economic/bureaucratic support systems needed for quick investment and flow-oriented production.

- Although EPZs were an American innovation geared toward American Cold War foreign policy goals, they were never developed to exclude other developed nations from their use. Very early on, European and Japanese firms also began using EPZs,⁹ and today they have become a mainstay of world globalization.
- The case of EPZs shows that American “deindustrialization,” which accompanied the rise of EPZs cannot be understood merely as a free-market economic process. Rather, the rise of the American system of globalization required tremendous planning, extensive legal change, and enormous (unprofitable) infrastructure investment, and was pursued as an American Cold War foreign policy goal.

⁹ For example, American policy makers helped to insure that Japan would be closely involved in the development of Korea’s EPZs—this was part of American support for greater economic integration in Asia, modeled on its support for European economic integration.