Technological Change and Employment Conditions in Traditionally Heavily Unionized Industries

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In recent decades a shift has occurred from long-term and full-time employment in basic manufacturing and large, blue-collar enterprises to shorter-term and nonstandard employment in the service sector and in smaller firms. The technological change that has fostered or accompanied much of this transition has been adopted to help companies become more competitive. Sometimes the effects of technological change are highly beneficial for workers, but in other settings new technology brings trauma and job dislocation. In some industries, for example, deregulation or privatization has caused upheavals. Labor relations inevitably occur at the crossroads of all the economic and social pressures.

This symposium brings together six articles analyzing how technological change affects labor relations in traditionally heavily unionized private sector industries. The six studies are clustered into three groups of two articles each. The first set analyzes the railroads; the second set examines construction; and the final set investigates mining. We tried to achieve a mix of industry studies and firm-based case studies, and blended a smattering of both U.S. and Canadian perspectives.

We asked the authors to apply this simple question to a specific industry: To what extent has technology affected work and labor relations? Given the conventional wisdom that technological change has created widespread change and dislocations everywhere, the answer to this question occasionally was surprising. For example, both studies of the construction industry show the difficulties of adopting new technologies in a very traditional economic sector in which there is no ready substitute for manual labor. In contrast to severe job security impacts in railways, technology has not caused dramatic job losses in construction. All the authors have carefully documented both the benefits and threats to workers of technological change. The articles are balanced and forthright institutional studies of the technological change phenomenon. Amidst the hype and sometimes even the hysteria so often associated with technological change, we find these studies quite refreshing.

The first article by Ann Schwarz-Miller and Wayne K. Talley examines technological changes in U.S. railroad and port industries. Labor's reaction to technological

JOURNAL OF LABOR RESEARCH Volume XXIII, Number 4 Fall 2002 change has ranged from anticipating it through restrictive work rules to mitigating its effects through employment and income-protection agreements. More recently there have been attempts to participate in the benefits of technology adoption in the form of pay supplements. Major job losses have occurred in both industries. Most railway unions are unlikely to bargain with respect to technological change. When forced to do so, the authors predict that unions are likely to continue using defensive strategies that limit and mitigate the negative impacts of technology on workers. Unions also will expect gains for their members in exchange for accepting productivity-enhancing measures. The authors conclude that while the bargaining power of rail labor has declined, that of union port dockworkers has increased temporarily because of shipping deregulation effects and the rapid expansion of international trade. A shortage of dockworkers exists at some ports. The authors expect that dockworker power will diminish as management takes more aggressive steps to address concerns over productivity and the removal of inefficiencies at the ports.

The second paper on the railway industry takes a different perspective. In a detailed case study of one of the icons of the Canadian industrial landscape --- "the stuff of Canadian legend," Canadian Pacific Railway - A. Tarik Timur and Allen Ponak trace how technological change alters the relationship between management strategies and union responses. The quotes from confidential in-depth interviews are noteworthy for capturing the richness and complexity of technological change on all the parties involved. The article documents the strategies and tactics used by managers, unions, and even individual workers as they grapple with change. Sometimes mistakes are made. The company knows that new technologies are crucial for productivity increases and to meet competitive challenges posed by rail and trucking companies. The unions are also aware of the importance and inevitability of technological change, but they are less than enthusiastic about its effects. One of the positive outcomes of the unions' historic attempts to resist technology is that management now pays more attention to industrial relations. Many line-managers who previously would have preferred to bypass the labor relations function now know that ideas must be vetted with the industrial relations staff well in advance, and unions increasingly are being brought into the planning picture earlier than they had been in the past. Unions have tried to ameliorate the impact of the inevitable introduction of new technologies on their members. Notwithstanding unions' attempts to protect workers, the employment effects of technological change in this company have been particularly grim. One of the most interesting of the findings of the Timur-Ponak study is that technological change comes at a hefty price, quite apart from the actual costs of the technology. In order to assure labor peace and stability in this highly unionized environment, the company must offer workers financial compensation. As the authors observe, "some new technology may never pay for itself after income security, job protection, and material change provision costs are factored in."

The relationship between technology and labor relations in the construction industry is quite a contrast from that found in railways. A.J. Thieblot describes an industry that remains labor-intensive. Technological change has had its greatest impact in the sometimes-turbulent reconfigurations on the traditional jurisdictional lines and work rules of this craft-based, heavily unionized environment. Adherence to the artisan guilds and the journeyman-apprentice relationship is now quite strained. Two major responses are evident as the construction industry struggles with technological change. First, the skill requirements have decreased in many respects. Whereas at one time artisans and craftsmen created building materials, today there are standardized factory-made products that are amenable to rapid assembly on-site. Second, there have been new trades and skills that emerged from the tremendous growth in previously unknown technologies, and these do not readily reside with any particular historic craft union's jurisdiction. The story told in this chapter is of an industry sliced into craft specializations now coping with the emergence of construction techniques that force greater flexibility and different training requirements.

The second construction industry article by James W. Platner and Xiuwen Dong examines the impact and potential of digital information networks. The traditional nature of the industry, with its mobile and transient operations, has posed an obstacle to the adoption of computer technologies. Construction workers lag somewhat behind the general work force in their use of computers. The authors comment that high technology on many construction sites "is still limited to cell phones." However, technologies clearly exist to improve the way in which work is done at construction sites, even though the workplaces are impermanent, often seasonal, and rely on hiring temporary contract workers. How can technology be introduced when employees work for three to fifteen employers in a given year? The coordination of efforts by multiple employers with local unions, a feature well-embedded in the construction industry, may facilitate the introduction of change. Certain technological advances such as wearable and palm computers may be uniquely suited to construction work, allowing the advantages of portability and coordination in a strict project-management environment. The authors devote considerable attention to the potential benefits to construction of new technologies. Finally, workers also may find that e-mail and electronic communication will lead to better information sharing among workers, perhaps enhancing their collective voice. An interesting feature of the construction industry is that the portion of construction workers engaged in craftwork has remained relatively stable, but there has been a large reduction of support staff and a doubling of management. Technological change has affected the distribution of employment within the construction industry without necessarily posing a direct job security threat to the "shop-floor" workers engaged in craftwork and general labor.

The last set of articles focuses on mining. Richard Chaykowski examines the technological advances and their effects on work and industrial relations in the Canadian mining industry. The focus is mainly on metal mining, and the article illustrates developments via a case study of Inco Limited, a leading Canadian company. Chaykowski describes the use of communications, robotics, and remote, real-time equipment control that he finds comparable to space technologies used by NASA. He walks the reader through various temporal stages of technological change, from the industrial engineering innovations of the early-1900s to the 1980s, through remote-controlled mining, to the contemporary, automated, and self-deploying systems. These technologies will likely transform production, work, and labor relations, but also at a macro level are part of a larger societal transformation to the "new economy." The impact on employment levels is addressed directly. He provides detailed company-specific information and also precise examples of union response within collective agreements and in strategies for dealing with change. In the end, the reader is left wondering how unions can possibly respond to the arrival of the "Robominer." His main thesis is that technological advances in mining are so profoundly transforming of production systems — and therefore of employment, the workplace, and industrial relations — that they will be the defining factor shaping the new industrial relations in Canadian metal mining.

The final article by Albert N. Link and Donald Siegel examines one particular new technology, automated mining systems engineering equipment on real-time control system technology. The benefits to workers and firms, according to engineers who advocate the new technology, are a reduction in miner fatalities and injuries, and an increase in productivity. The article describes the development and implementation of real-time control systems. This portion of the article is an interesting example of technology transfer. The authors then contribute to knowledge about the effect of unionization on technology in mining using survey data from managers and coal miners. Unfortunately, a lack of plant-level data on unionization and technology usage precludes an econometric analysis of the determinants of technology adoption. Link and Siegel develop an alternative research design. The study is based on the 1998 participation by managers in ten Pennsylvania and West Virginia companies. Each manager arranged to have at least 20 miners participate in the study. The survey instrument was developed with joint union-management input. Union and nonunion responses to a set of questions were compared. The conclusion is that union activity may constitute an obstacle to the adoption and use of this new technology.

Let us end this discussion by considering the types of questions raised by this symposium:

- · How does technological change affect job security?
- Do companies ensure labor harmony by compensating their workers for the dislocations and traumas engendered by technological change? Are there other ways to ensure harmonious labor relations?
- What of companies that are struggling financially? How can they afford both new technologies and the cost of coping with labor relations in a time of change?
- What is the real cost of technological change? When the cost of labor disruption is factored in, along with all the benefits of change, what is the final tally?
- How are workers absorbing new technologies and acquiring the skills necessary to be effective in the new environment? What are the public policy issues?

- What is the role of unions as companies introduce new technologies? Are they merely buffers, relying on traditional defensive tactics, or can unions develop new roles and responsibilities? Should unions change, or are they more effective in providing a strong watchdog function?
- Is the industrial relations function increasing in importance within unionized firms as a result of the conflicts engendered by the introduction of new technologies?

The six articles in this symposium seem to indicate that the answers to these questions depend greatly on the particulars of the industry being studied, its institutional characteristics, and its history of union-management relations.