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Skill Formation, Outsourcing, and Craft Unionism in Air Transport

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Cyrus Bina and Bart D. Finzel

Abstract

The purpose of this article is twofold: (1) to rekindle old debates surrounding the efficacy of craft unionism (as opposed industrial unionism) in the age of globalization in order to provide insight into recent contentions by the Airline Mechanics Fraternal Association (AMFA) regarding the potential for craft strategy among mechanics in the air transport industry; and (2) to present a theoretical framework that combines the process of skill formation and technological change in a consistent and unifying manner. The theoretical framework offered here illuminates the transitory nature and meaning of skills in capitalism. Given the transitory meaning of skills and their extrinsic determination by the fast-pace of technology, to maintain reliance on the intrinsic value of skills alone—as AMFA seemingly does— should invite skepticism.

Three global trends are identified that affect mechanics in air transport: the diminished role of major carriers, the change of fleet composition, and the growing use of outsourcing. These developments are discussed and their consequence for skilling and deskilling is examined. These tendencies align with the view that universal labor contingency is an aspect of contemporary globalization. In view of this fact, the article urges labor educator and union activists to carefully evaluate AMFA's strategy.

KEYWORDS: : airlines; craft unionism; globalization; outsourcing; skill formation

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INTRODUCTION

In the midst of the financial distress, consolidation, and organizational restructuring brought on by the September 11th attacks, worldwide recession, and globalization of the airline industry, a small independent labor organization, the Airline Mechanics Fraternal Association (AMFA), has organized new members by stressing the strength derived from not simply members but their craft-members' skills. Their underlying premise is that a union that represents airline mechanics only best serves airline mechanics. AMFA's approach is one element of a larger struggle for control of the workplace in the airline industry. Its attitude, it should be noted, is an echo from the early American Federation of Labor (AFL). Is craft unionism a viable mechanism to enhance workplace control in an industry buffeted by change? Given the turbulence in the airline industry, which is the historical product of deregulation of the industry—a prerequisite of global alliances and globalization—can AMFA succeed? This question needs to be examined in view of the progressive labor contingency that has resulted from rapid skilling and de-skilling of labor in this hypercompetitive environment (Bina and Davis 2002).

This article begins with a brief description of labor relations in the air transport industry, AMFA's insurgency and the historical lessons of craft unionism. It continues with a theoretical discussion on the nature of innovation, both organizational and technological, and how the dynamics of innovation are reflected in an ongoing process of skill creation and/or elimination of existing skills. Three global trends within air transport affecting airline mechanics—the diminished role of major carriers, the change in fleet composition, and the growing use of outsourcing—are subsequently discussed to highlight universal labor contingency in this industry.

LABOR RELATIONS IN AIR TRANSPORT: AMFA'S CRAFT UNIONISM

The air transport industry remains one of the most heavily unionized in the United States. The Bureau of Labor Statistics reports that nearly one-half of all aircraft mechanics are covered by union agreements. The principle unions representing mechanics are the International Association of Machinists and Aerospace Workers (IAM), to which the AFL granted exclusive jurisdiction over airline mechanics, in 1934, and the Transport Workers Union of America (TWU). Unionized workers in air transport participate in a system of labor relations and collective bargaining that is unique (see Cappelli 1987).

The bargaining structure that evolved under government regulation of air transport was very de-centralized, carrier-by-carrier, with separate unions by *craft*. To some extent, this structure is a result of the Railway Labor Act of 1926

(RLA), which stipulates a system-wide bargaining process and, seemingly, bargaining units based on occupational crafts (Cappelli (1987). Even so, RLA would permit unions to bargain together at the same airline. With few exceptions, however, the union representing different crafts has not jointly engaged in collective bargaining (Walsh 1994). Another reason for the decentralized bargaining is the fact that these unions have had little incentive to do otherwise. Prior to deregulation of the industry in 1978, barriers of entry prevented higher wage carriers from being at a competitive disadvantage. Moreover, individual carriers were vulnerable to strike action by their craft unions, which might have led to passengers shifting to other carriers. By staggering negotiations across the carriers and using the threat of strike, the craft unions could first secure more favorable contact terms in one carrier and then attempt to spread the terms to other carriers throughout the industry (Cappelli 1987). Hendricks et al. (1980) finds that contract terms and compensation levels in the airline industry were superior to similar jobs in other industries.

Poor financial performance by carriers, merger activity, the entrance of low-cost competitors, and corporate restructuring during the deregulation era put strains on labor-relations practices in the industry. Considerable effort has been made to change the level and structure of compensation. Until recently, labor cost accounted for 60% of the differential cost of strong and low-cost carriers, while it also stood for nearly 35% of total airline costs in 2000 (Dooley 1994, Klein 2001). This cost is "one of the few cost items that is controllable" with "fuel, ownership, and most elements of other costs" being "fixed in the short-run by an airlines' fleet and network characteristics" (Dooley 1994: 175). While labor cost containment is not unique to the air transport industry, the "strength of this effort, the magnitude of the changes, and the turbulence with which these changes have occurred reflect the industry's history of regulation and subsequent deregulation…" (Hirsch and Macpherson 2000: 129).

Regardless of the efforts that airline management has made in order to lower labor costs, until recently, there is little evidence that relative earnings in the air transport industry had been significantly influenced by the 1978 deregulation (see Card 1986, Hendricks 1994). Most analysis would find that deregulation has put downward pressure on compensation levels in the last few years (Card 1998, Hirsch and Macpherson 2000). Card (1998) reported that relative compensation has fallen, in the range of 10% across all occupations in the industry, except for mechanics. Hirsch and Macpherson (2000) find that "the airline industry wage advantage has fallen over time" and that "any remaining premium is union related" (p. 148). Interestingly, Hirsch and Macpherson (2000) and Cremieux (1996) also find that relative earnings have declined less for mechanics than for pilots and flight attendants.

Cappelli (1987) describes the position of the mechanics in the air transport industry as endowed with unusual bargaining power. The reasons he cites include their high skill and certification requirements, their mobility among carriers, and strong demand for their skills in similar work outside the air transport industry. He also argues that IAM, the largest airline union and the representative of the majority of airline mechanics, contributed to their power. In IAM's highly centralized structure, the *international* has the power of approval over *local* contracts. The international leadership used this power to limit the local bargaining units from making concessionary agreements. Moreover, IAM was successful in negotiating a pattern contract for many of the major carriers in the industry. This uniform bargaining approach resulted in relatively consistent levels of earning across airlines throughout the consolidations and merger activities that were brought on by deregulation (Cremieux and Audenrode1996).

IAM's relative success in maintaining earnings levels for those it represents in the air transport industry makes it all the more surprising that a small, independent union—the Airline Mechanics Fraternal Association (AMFA)—has gained membership among mechanics at certain U.S. carriers.

AMFA describes itself as "a craft oriented, independent aviation union. It is not an industrial union. AMFA is committed to elevating the professional standing of Aviation Maintenance Technicians and to achieving continual improvements in the wages, benefits, and working conditions of the skilled craftsmen it represents" (www.the-mechanic.com). Further, "AMFA supporters are generally adherents to the *craft ideology*, which holds that labor unions derive the bulk of their strength from member's skill…" (Ibid.).

AMFA was established in 1962 after contention by some mechanics who believed their interests were not adequately addressed within bargaining units in which they obtained a minority job classification. AMFA would be a union "where the mechanics would be the majority in their own union and would negotiate their own contract" (Ibid.). During its early years, AMFA won certification at some small regional carriers, including Ozark Airlines and Hughes Airwest. These bargaining units were lost when Republic bought Hughes in 1980 and Ozark merged with TWA in 1984. For the next decade, the organization survived on the voluntary contributions of associate members.

As Table 1 illustrates, in recent years, AMFA's fortunes have improved. Formerly non-union Mechanics at Atlantic Coast Airlines (1994) and Mesaba Airlines (1996) have joined AMFA. Unhappy with representation by IAM, the mechanics and grounds workers at Alaska Airlines also voted to certify AMFA (1998). AMFA's largest victory came in 1998, when , in a "David just slew Goliath" upset (Thurston 1998), they won a bitter election to represent Northwest Airlines (NWA) mechanics and cleaners who had previously represented by IAM, which had represented airline mechanics since 1946. At NWA, IAM had represented 27,000 workers, including more than 11,000 clerical, office and passenger service employees; nearly 7,000 baggage handlers, ramp workers and stock clerks, a handful of security guards, flight kitchen workers, and over 9,300 mechanics and cleaners (Tevlin and Kennedy 1998). IAM continued to represent these other job classifications after the mechanics and cleaners chose affiliation with AMFA.

Although still small, the NWA victory increased AMFA's membership by more than five-fold. Membership increased again when mechanics at American Trans Air (2002), Southwest Airlines (2003), and United Airlines (2003) certified AMFA as their bargaining representative.

Table 1: AMFA'S Membership
(1994-2005)

Year	AMFA'S Membership
1994	1,685
1995	957
1996	439
1997	927
1998	2,176
1999	11,067
2000	11,434
2003	12,762
2005	16,617

Source: *LM-2 Reports, 1994-2000; AMFA, 2003 and 2005*.

In its campaigns for representation, AMFA is highly critical of the "industrial unionism" practiced by IAM, the Transport Workers Union (TWU), and the International Brotherhood of Teamsters (IBT), which represent mechanics at other U.S. major carriers. It should be noted that the extent to which airline employees belong to "craft" or "industrial" unions varies. For instance, at one extreme, the overwhelming majority of U.S. airline pilots belong to one union: the Air Line Pilots Association (ALPA). With respect to other job classifications (e.g. flight attendants, mechanics), some workers are represented by industrial unions and some by craft unions. Ground service personnel and passenger service employees are overwhelmingly represented by industrial unions.

According to AMFA, industrial unions have a "catch-all" philosophy dependent on the assumption that "labor unions derive the bulk of their strength through sheer numbers of members" and that all workers "should belong to one big union." Their success "was not rooted in the proven demand for highly trained professionals, as is true of craft unions", but rather conditioned upon circumstances that previously "prevailed in the U.S., particularly in highly regulated sectors such as…airlines" (www.amfa.org).

Although the arguments made by AMFA are more pointed the competition among airline unions is not new. Walsh (1994), citing a study by Joseph Krislov, reports that of "fifty-nine representation elections between 1970 and 1986 in which more than one union participated, forty-four (75 %) involved raids, twelve (20 %) stemmed from carrier mergers, and only three (5 %) concerned previously unorganized units….Virtually all the raids took place between AFL-CIO affiliates and independent unions" (p. 53).

The arguments made by AMFA are compelling to workers that believe their position should be elevated within the industry. There are several reasons though for mechanics' separate craft identity. First, most airlines require that mechanics hold A (airframe) & P (power plant) license issued by FAA. A mechanic with an "A" license is authorized to sign the aircraft logbook for work they perform on the aircraft structure. An "A" mechanic with a "P" license is authorized to perform work on aircraft engines and associated systems. Similarly, "A" license is required for work on aircraft electric systems. Licensing requires 1900 hours of training (normally, a two-year program), followed by three FAA written and two oral and practical exams.

Secondly, the labor-relations structure of the industry is also contributing to the *de facto* separation of craft identity. As Walsh (1995) points out: "[o]rganization along craft lines …has several ramifications for inter-union relations. Perhaps, most obvious, it reinforces identification with a distinct craft and arguably provides a sense of exclusivity that complicates relations with unions representing other crafts" (p. 145). Finally, aircraft maintenance is distinguished from other similar occupations because licensing confers authority as well as responsibility not found elsewhere. Luby (1995) notes of FAA regulations that "certified mechanics traditionally have had the *legal* responsibility to exercise independent judgment on the adequacy of a repair, and [thus] generally develop professional and personal pride in the quality of the work preformed…" (p. 207).

Craft identity combined with AMFA's linkage of craft having to do with bargaining strength has apparently proved to be a winning argument in the minds of some mechanics. Here, comparisons made with the relative success of the pilot's unions, which exclusively organize on the basis of craft, are telling:

> The pilots can make between $180 and $250 per hour because their skill and knowledge, and we say why can't we make $60 to $80

> per hour? We are skilled and knowledgeable and have lives and responsibility in our hands as well. The answer is representation for, of and by mechanics, just like the pilots who represent their own craft [www.the-mechanic.com/amfapage.html].

To provide a philosophical basis for their organizing by craft, AMFA draws upon the historic successes of the early AFL, whose national union affiliates were nearly exclusively skilled craftsmen. Historically, trade unions initially were small groups operating locally within a single industry in the United States (Foner 1947). The membership of these unions was comprised of individuals in a single craft or skill. Skill in this context was synonymous with craft and represented the ability to perform all tasks included within an occupation. Early in the industrialization process, there was little division of labor in the production of commodities and workers in one shop rarely came into contact with individuals from another trade. As Foner (1947) notes, “It was natural for these workers to form strictly craft unions” (p. 73).

Foner (1964) suggests that a secure basis for craft unionism exist in industries in which the individual skill and craft knowledge of workers is of predominant importance. By the mid-nineteenth century, as concentration and centralization of capital increased, the local craft organizational form proved inadequate. A variety of pressures brought on by the extension of markets, the rise of the big firm, and innovations, among other things, compelled these organizations to form national organizations (Ulman 1966: 27). Thus, one can very well argue that the “national trade union is the child of the national market” (Ibid.). Once goods made elsewhere could be sold in the same market as that made by local labor, the local union members could no longer afford to ignore the economic position of their counterparts in different locales.

Moreover, as firm size and thus the size of *regulating capital* increased, it has become possible to elevate the level of mechanized production with further division of tasks and eventually reduction of (craft) skill requirements (i.e., de-skilling). At the same time, introduction of new technology and further innovations led to the formation of new skills, outside of the sphere of control demarcated by the craft unions. In this case, union members could no longer ignore the economic position of their counterparts both inside and outside of their firm. This is the result of the *de facto* operation of skill formation explained in the next section of the article. As a result of the process, the basis for craft unionism in the United States was being slowly undermined.

Innovation and the transformation of organizational structures also put pressure on craft organizations. Innovations challenge craft unionism in at least two ways. First, as discussed below, the process of innovation leads to a struggle for survival between incumbent and newly innovative firms serving the expanded market. This struggle makes it difficult to establish stable bargaining relationships as firms are compelled to seek competitive advantage. Indeed all established business practices, let alone the tasks assigned to craft unionists, are under constant competitive pressure. Ulman (1966) notes, for example, that development of the railroad in the U.S. in the mid-nineteenth century subjected local monopoly producers to intense competition from firms serving the wider market. The widening of the market also permitted the use of "capital-using" innovations. The combination of new firms and existing firms innovating simultaneously brought on problems of excess capacity, a resultant decrease in the number of firms, a wave of merger activity, and ultimately, the development of multi-plant firm. Similarly, entry of new airlines after deregulation, followed by consolidation, regional airline integration with national and international carriers through the use of code-sharing and global alliances, the use of third parties for labor intensive maintenance functions, and the maximization of the load factor of aircraft through hub systems, are all elements of the struggle for survival in air transport.

Second, innovation might also take the form of rendering traditional craft skills obsolete. Confronted with innovation, members of craft unions fought mainly to preserve their skill by protesting employment of "learners, runaway apprentices, and half-way journeymen" (quoted in Foner 1947: 73). Yet, the division of labor gradually made headway into the crafts, as journeymen were compelled to train apprentices in a particular phase of work, for which these learners would assume responsibility. These more quickly trained, specialized workers would then become the competitors of their teachers and soon drive down the wages of the more highly skilled. Indeed, Samuel Gompers, an architect of the craft union model of the early AFL, recognized this danger: "The artisan of yesterday is the unskilled laborer of tomorrow, having been displaced by the invention of new machines and the division and sub-division of labor" (quoted in Foner1964: 198).

For aircraft mechanics, work-rule changes, permitting removal of work from mechanics with full licensure to those with less training, is already occurring. The staffing requirements and skill level of those responsible for aircraft "pushback" from the gate have been eroded (Cappelli 1987). Moreover, the standardizing of aircraft fleets with fewer types of aircraft, computerization to improve diagnostics, the use of modular systems in order to speed repairs and parts replacements, the gradual replacement of three and four engine aircraft with two engine aircraft, plus outsourcing of these activities to highly specialized third parties and off-shore maintenance bases, are all examples of trends threatening traditional craft skills in the industry.

Regardless of the threat brought to the craft union model by the expansion of the market and innovation, many craft unions, much like AMFA, were opposed to aligning with “unskilled” workers, fearing that their interests would not be protected. On this issue, Andrew Furuseth, AFL vice-president, declared:

> There is another current thought in the trade-union movement which has received the name of 'Industrialism', the primary meaning of which seems to be the coming together in one union, or one federation, that men working together for the same employer should cease work together when in their opinion such employer is unfair… the danger always will exist of a ruthless disregard of the interests of the minority, hence dissatisfaction and disintegration as a result thereof [quoted in Foner 1964: 197].

To the founders of AFL, trade unions were meant to be the "organizational centers of the skilled aristocracy of labor in order to enable craftsmen to protect their monopoly of the job at the expense of the unskilled and semi-skilled workers" (Foner 1947: 517). As noted above, in the context of new machinery, new processes, or new organizational forms and the associated breakdown of traditional craft lines, the “unskilled” can rapidly become the competitors of the skilled. Even as industries—given heightened concentration and centralization of capital—rendered more and more functions of crafts redundant, many craft unionists "still maintained the fiction that the possession by a worker of a personal skill enabled him [or her] to bargain effectively for better working conditions, and also confidence that the organization along trade lines, based on the skill of the members, could enable each craft union to present a strong front to management" (Foner 1964: 182). The theoretical critique of this notion is presented in the next section.

SKILL FORMATION, TECHNOLOGY AND ORGANIZATIONAL CHANGE

This section tends to capitalize on Bina and Davis (1996), Bina (1997), Bina et al. (1998, 1999), Bina and Davis (2000), and Bina (2001), proposing an alternative view of change in technology from the standpoint of heterodox literature. We focus on Schumpeter’s theory of innovation and its critique, and attempt to demonstrate that the phenomenon of technological innovation is intimately connected with the actual process of skill formation in capitalism; hence the necessity for a unifying theory that depicts their mutuality. Our point of departure is Schumpeter’s theory of “creative destruction,” which tends to reveal some of the mysteries of what is known as the “black box of technology” (see Rosenberg 1982). This alternative view is also related to (1) Bina’s hypothesis of “destructive creation,” an analogue of “creative destruction,” being *synthesized* with the latter and (2) articulation of technological change and the process of skill formation.

The endogenous treatment of technological change and its impact on the structure of economies are somewhat rare and in many cases long neglected in the economics literature in the last two centuries. Such contributions, as Babbage (1832), Marx (1867), and Schumpeter (1928, 1942) on the dynamics of technological change in the nineteenth and early twentieth centuries are indeed exceptions to the rule. These scholars attempted to connect the phenomenon of technical innovations to the larger issues pertaining to the dynamics of accumulation and transformation of capitalism. Schumpeter interpreted the impact of technological innovation in terms of "creative destruction." He contended that it is through the contradictory dynamics of "creative destruction" that the old products, techniques, organizational structures and industries are being replaced by the new. Schumpeter's theory of competition has now been widely accepted in the profession, thus vigorously challenging the realism and relevance of conventional wisdom in mainstream (orthodox) economics.

Schumpeter's Contribution

Schumpeter's theory of innovation with respect to capital accumulation is dynamic and stems from an evolutionary process. Schumpeter neither strives for a "stationary state" (an objective of the Classical school) nor seeks the state of "general equilibrium"—a popular aim of the modern neoclassical economics of today. To him "[c]apitalism … is by nature a form or method of economic change ... [that can never be] stationary (1942: 82). Schumpeter remarks:

> But in capitalist reality as distinguished from its textbook picture, it is not that kind of competition [i.e., neoclassical competition] which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization (the largest-scale unit of control for instance)—competition which commands the decisive cost or quality advantage and *which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives* [1942: 84, emphasis added].

Hence, the question of competitive war of survival on the part of modern corporations resides at the center of Schumpeter's theory of innovation. Schumpeter focuses on the structure of capitalism's continuity and change based upon the cycles of *living* systems rather than the *dead* state of equilibrium. He describes the technological innovation as a contradictory process of rejuvenation in capitalism. “Creative destruction” is the immediate reflection of this transformation, which, not unlike human body, regularly replaces the underpinning of the old structure by the new. Importantly, technological innovations to Schumpeter include innovative organizational forms brought on by merger activity, formation of new marketing networks, alliance formation, as well as changes in technology (e.g., small jets with greater range) in the traditional sense. In the last twenty years or so, the airline industry is a prime example of Schumpeterian *change* in technology.

Approaching the Question

The concept of “creative destruction” by Schumpeter brings us a giant step closer to recognition of the ongoing dynamics of chaotic accumulation in capitalism. He places the phenomenon of technological change within the accumulation process in a remarkably dynamic manner, thus mimicking the contradictory reality of late capitalism. Yet, he does not foresee that the pattern of technological change in advanced capitalism may also take the form of “destructive creation.” In other words, while he is remarkably cognizant of the built-in instability in the system, he does not see the crucial point that any attempt at creation (at its very inception) is *instantaneously* destined for destruction. Since *creation* in capitalism has no meaning without the preemptive attempt at destruction—the latter being much more intensified than Marx’s concept of “moral depreciation” (Marx 1977 [1867]). Simultaneous skilling and de-skilling of labor, which arise from actual changes in technology and institutional structure of capitalism, are the proof of this preemptive attempt. As, for instance, the recent experience of the last two decades of fast-paced technological and organizational change shows, this skilling and de-skilling process is to some extent true for all workers—blue, pink, and white collars alike—including technical, manual and intellectual workers.

Prior to the spread of capitalism, the guilds were responsible for setting the requirements and certification of appropriate skills in each craft. For instance, a cobbler had become a cobbler after certain period of apprenticeship upon the approval of the particular guild in which he (mostly he!) obtained his membership. So long as he had managed to maintain his membership in the guild, he usually worked as a cobbler for the rest of his life, untouched by any de-skilling resembling our current experience.

Contrary to this non-capitalist, *intrinsic* definition of skill, “skill formation” in capitalism has to satisfy both a *necessary* (intrinsic) and a *sufficient* (extrinsic) condition. On the one hand, tasks requiring ability, experience, education, and training are a *necessary* condition for a particular skill to be recognized and confirmed by the marketplace. In the jargon of political economy, following the classical tradition, this is called *use-value* of skills. Clearly, as is discussed above, airline mechanics are highly skilled in this sense. On the other hand, these qualifications are by no means *sufficient* without the proper validation of existing technology, market competition, and the control of capital at individual units of production (i.e., due to the extrinsic forces). This reflects the *exchange value* of skills.

Competition of contending production units in search of sustainable cost-reduction measures frequently leads them to adopt new technology or organizational form. In the airline industry, alliances, code-sharing agreements, and outsourcing to specialized providers are illustrative of this practice. Here deregulation of the industry and its globalization are sequential steps as worldwide competition transforms the air transport industry. The adopted technology creates new skills, which in turn leads to partial or, in some cases, total replacement of existing workers—having to do with *de facto* redundancy of their skills. Here, for example, there is some evidence that airline mechanics are vulnerable. As air passenger traffic has been expanding, employment of flight attendants and of pilots has increased in tandem with the increased passenger traffic. The employment of mechanics, on the other hand, has dropped slightly. The growth has been limited by greater use of automated inventory control and modular systems that speed repairs and replace parts, and also innovations that lead to the replacement of three and four engine aircraft with two-engine aircraft (Van Giezen 1996).

The impacts on mechanics are further accentuated in the case of transnational firms whose expansive networks (and alliances, in the case of airline industry) have already been extended across several industries, markets, and geographical locations beyond the boundaries of nation-states. One threatening prospect resulting from these developments for mechanics, explored below, is that some of their work may be *outsourced* to lower wage areas. Recall that the skills of airline mechanics have to satisfy both a *necessary* and a *sufficient* condition if they are to be maintained in the context of a new technology or new organizational structure. Outsourcing translates into a decline of the exchange value of the work mechanics do, with the consequence being an undermining of the sufficient condition for the skills of their counterparts located offshore. Therefore, outsourcing eliminates skills domestically while at the same time diminishes their intrinsic value offshore.

The Theoretical Context

There has been a great deal of debate surrounding the issue of skilling and/or de-skilling of labor in the economics literature. Historically, the controversy over skill formation has been discussed in relation to technological change in capitalism (see, among others, Babbage 1963 [1832], Braverman 1974, Schumpeter 1942, Marglin 1974, Landes 1969, Finzel 1989). The current transformation of the world economy, and the contemporary process of globalization provide a unique opportunity for addressing the effects of technological change on skills and, more importantly, on union strategies across the economic landscape. Technology and technological change are the levers of global transformation, which have a direct effect on skill formation and the universal contingency of labor across the globe. (On the issue of globalization see, for example, Vernon 1966, Palliox 1977, Cypher 1979, Shaikh 1979, Shaikh 1980, Frobel et al. 1980, Radice 1984, Bina and Yaghmaian 1991, Picciotto 1991, Bryan 1995, Bina and Davis 1996, Bina 1997.)

There is little dispute that skilling and/or de-skilling of labor exhibit an intimate relation with the change in technology. What is contested, however, is somehow centered on (1) the nature and meaning of skills (i.e., skilling) vis-à-vis the technology, (2) degrading of skills (i.e., de-skilling) associated with the replaced technology, and (3) the dynamics of technological change and skill formation in general.

Neoclassical economics contends that as technology advances it creates new skills that are conducive to its diffusion and further application. This view of skill formation follows the pattern of a moving average, thus gradually upgrading the skill levels of the entire economy (see, for instance, Jerome 1934, Woodward 1965). According to this view, an average worker obtains more skill via change in technology throughout time. In contrast, many neo-Marxian scholars argue that technological change leads to degradation and 'polarization' of workers' skills in capitalism (see Braverman 1974). Thus individuals who are affected by the new technology suffer a reduction in their skills. In these approaches, skill requisition and skill redundancy are seen exclusively in terms of skill's *necessary* conditions alone. For instance, in Braverman (1974), the emphasis is on *deskilling* alone which appears to have no limit, while, at the same time, there is also no room to account for the *real* meaning of *skilling* in capitalism.

Yet, skilling and de-skilling are part and parcel of a unified process that finds its origin in the change of technology rather than the *intrinsic* characteristics of skills themselves. Thus, whether workers are *more* or *less* skilled is the matter of dominance and dynamics of existing technology. Technological change, in practice, leads to the wholesale devaluation of commodities (including the exchange value of skills) and, as such, it also diminishes the intrinsic value of both commodities and skills. It is only outside of capitalist production (such as, medieval economy) that such intrinsic attributes would remain sufficiently intact. It is possible that the technical "usefulness" of particular skills (or any other objects of exchange) remains intact, while their corresponding market value diminishes entirely. For example, a substantial portion of the value of a newly arrived computer may be lost through the application of newer technology that has already been embodied in a yet newer model due to be reaching the market in a matter of weeks. To illustrate, in the airline industry the change in route structures and the formation of new alliances to facilitate maintenance offshore would eliminate some existing services, diminishing the market (exchange) value—and by implication, also diminishing the intrinsic (use) value—of the skills needed to do these services. At the same time, this creates an alternative mode of service provision.

Similarly, the workers' skills can be diminished in value (de-skilling) by virtue of a fast-paced technological change. Hence, just as the lost value of the newly arrived products, skills may not necessarily—and intrinsically—hold the value of their own. It is rather the accumulation process, via marketplace, that tends to impute value on skills. Within the dynamics of "destructive creation," at its very inception and within the larger macroeconomic framework, any attempt at creation is already destined for destruction of value. These dynamics would represent a perpetual contraction and expansion in the magnitude of value, and thus have impact on destruction and creation of use value (i.e., capital, various skills, institutional structure, etc.) as the result of technological innovations. This is none other than crisis of restructuring in modern capitalism. As a result, "creative destruction" and "destructive creation" are part and parcel of the unified process of value formation in capitalism—the former zooms on the use value, the latter focuses on exchange value: hence, via Marx, the viability of Schumpeter-Bina synthesis.

Today, in response to global competition ever-larger quantities of means of production are turned into output with the aid of new technology. In this manner, so long as the majority of producers have not yet adopted the new technology, those who have access to it, by virtue of being in the forefront of innovation, will obtain higher than average rate of profit. However, soon after the generalization of this new technology (through fierce competitive struggle) is forced upon the industry as a whole, the new wave of innovative activity (usually by a few) generates a newer technology, thus rendering the products, methods, organizational structures, and the existing skills virtually redundant. Hence, technological change is a shorthand expression of such a warlike universal restructuring and transformation of the system.

In sum, any change in technology leads to a change in the technical (and social) division of labor through the formation of new skills and/or the elimination of existing skills. This manifests as an ongoing process of skill creation and skill destruction. Given the fact that labor power is a commodity, skills also must have both use-value and exchange value of their own. Therefore, both use-value and exchange-value of skills are at the mercy of emerging new technology. Skills in modern capitalism have no intrinsic value by themselves. The production process, mediated through the application of technology imputes value to a particular skill and it is through competition and mediation of exchange that such a (new) value is being generalized over the cycles of production.

TRENDS IN AIR TRANSPORT

The process of destruction and creation of use value of skills is most evident in several global innovations in air transport, including the relative decline of the major airlines, changing fleet characteristics, and the expanded use of outsourcing. One trend, i.e., that of global alliance formation, has already been discussed in detail in Finzel and Bina (2003). However, the global alliance is, we feel, integrated with each of the trends we discuss. Alliances have reduced costs by linking hub-and-spoke route systems between allied carriers and increased the scope to feed passengers to long-haul destinations. These have given the major airlines new ways to improve the density and efficiency of their networks, but it appears to have simultaneously conferred large network advantages to smaller partner airlines, many of which are already advantaged by lower labor costs and more flexible work rules. However, competitive positioning vis-à-vis other major airlines have given them little choice. This structure has increased the competitive advantage and thus success of smaller, regional airlines when compared to that of the major carriers in the same alliance.

Of course, the benefits that smaller airlines receive from an alliance are dependent upon the presence of the major carriers in that alliance. The major airlines and their alliance partners, however, remain vulnerable to industry-wide, alliance versus alliance competition. The major carriers face competitive pressures within their alliances and from outside, other alliances that are competing fiercely in the global arena. This contributes to the instability of the industry as a whole. The resultant instability will continue until carriers reliant upon large domestic route structures are being pushed aside (i.e., via Schumpeter's "destruction") in favor of global alliance partners which will find themselves more competitive in their operations (via Schumpeter's "creation"). As a result, the major airlines are increasingly becoming hub to hub carriers, with smaller carriers playing an ever-increasing role. For the majors, the result has been a shrinking market, unprecedented financial losses, and enhanced efforts to control costs, especially through *outsourcing*. For mechanics, the result has been increasing pressure on wages and changing employment patterns that favors low wage allied carriers and threatens union work.

The increasing importance of regional airlines in the U.S. is one illustration of this global transformation. While major carriers in the U.S. have lost billions of dollars since September 11, 2001 (during which time US Airways and United declared Chapter 11 bankruptcy), regional airlines, as seen in Table 2,

Table 2: Regional Airline Traffic Statistics, 1981-2002

Year	Passengers Enplaned (million)	Revenue Passenger Miles (RPM) (billion)	Average RPM's per Carrier	Available Seat Miles (million)	Average Trip Length (mile)	Average Seating Capacity (seats p/ aircraft)
1981	15.4	2.09	8.5	NA	136	15.1
1983	21.8	3.24	16.3	NA	149	18.1
1985	26.0	4.41	24.64	NA	173	19.2
1987	31.7	5.0	29.6	NA	158	19.7
1989	37.4	6.77	44.84	NA	181	21.8
1991	42.1	7.8	54.14	NA	186	22.8
1993	52.7	10.61	81.59	21.64	201	23.0
1995	57.2	12.75	102.8	25.54	223	24.6
1997	66.3	15.3	147.1	27.79	231	25.9
1998	71.1	17.42	179.6	30.38	245	27.7
1999	78.1	20.81	214.49	35.76	267	29.8
2000	84.6	25.27	268.83	42.55	299	31.7
2001	82.8	25.74	282.83	44.16	311	33.5
2002	98.4	32.77	360.11	52.59	333	35.1

Source: *Regional Airlines Association*.

have continued to grow. Figures for passengers enplaned from regional airlines have increased by nearly six-fold during the period of 1981-2002. Revenue-passenger-miles have also increased by more than fifteen fold during the same period. In the meantime, available-seat-miles increased by more than 100% in the period of 1995-2002, and with it the importance of role played by the regional airline is underscored by changes in the range of markets they serve and the fleet composition of the industry (see Tables 4a and 4b). The length of an average trip via a regional airline more than doubled from 1981-2002, as has the seating capacity of the regional fleet. As this growth has occurred, while the major airlines have been struggling, the growth in passengers and revenue-passenger-mile has been far more modest as shown in Table 3.

Table 3: U.S. Airline Industry Traffic Statistics, 1981-2002

Year	Revenue Passengers Enplaned (million)	Revenue Passenger Mile (RPM) (billion)	Average Trip Length (mile)
1981	286.0	248.9	872
1983	318.6	281.8	887
1985	382.0	336.4	885
1987	447.7	404.5	904
1989	453.7	432.7	954
1991	452.3	448.0	991
1993	488.5	489.7	1005
1995	547.8	540.7	988
1997	594.7	603.4	1008
1998	612.9	618.1	1011
1999	636.0	652.0	1025
2000	666.2	692.8	1041
2001	622.1	651.7	1047
2002	714.0	641.0	898

Source: *Air Transport Association*.

Parallel to these changes, there has been a change in the composition of capital stock—i.e., aircraft—in the industry. The development of hub systems induced the airlines to add flights to small cities around their hubs. The aircraft suitable for hub to hub flying, however, are prohibitively expensive to fly over shorter distances that traverse these cities. This, in turn, increased the demand for small- and medium-sized aircraft. A case in point is the changing product mix over the last 35 years of order from Boeing, among the world's largest aircraft manufacturers. Data form Airbus, the main competitor of Boeing, is not available over the same timeframe that is necessary for meaningful comparison. In Table 4a, orders for Boeing's aircraft over the last 35 years are divided into five product categories: single-aisle short-range (SASR), single-aisle mid-range (SAMR), twin-aisle mid-range (TAMR), twin-aisle long-range, and twin-aisle twin-deck long-range (TDLR). The Table demonstrates the increasing importance of the single aisle mid-range aircraft. The trend is clearer when the additional seating capacity of the ordered aircraft is considered in Table 4b. The majority of planned additional seating capacity is on SAMR aircraft. These versatile machines, including some models of the Boeing 737 and the Boeing 757, can economically serve mid-size cities and the regional hubs of the hub- route structure. Yet, having a range of 5,000-10,000 kilometers and a seating capacity of 125-250, they provide needed flexibility and can be assigned to all but the longest point to point routes.

Not captured in the Boeing data is the sharp increase in the number of jets in the U.S. regional fleet. Regional jets, introduced in the late 1980's, are small planes that fly shorter distances and have fewer seats than do large mainline jets. Importantly, however, the jets manufactured by Canada's Bombardier and Brazil's Embraer—the industry leaders—have a range up to 1,300 miles and seating capacity of 50-70. The turboprop aircraft they are replacing usually are confined to flights of 350 miles or less, and has seating capacity for only 20-40 passengers. Regional jets can also fly "thinner" routes that bypass congested airports and provide point to point service. The regional airlines constitute the domestic feeder networks for major airlines' hub-and-spoke systems. Regional airlines have benefited, as the majors—in an effort to lower costs—have removed 120-140 seat narrow body aircraft from money losing routes. These routes then served by the 50-70 seat regional jets (RJs) operated by the regional airlines. Major airlines have commitments to increase their deployment of RJs from 978 to 1773 between 2002 and 2005, while the number of regional aircrafts remained roughly constant at 2300 (Parker 2003). It is expected that regional jets will increase their market share from the current 11% to 20% of the global fleet over the next 10 years (Larsen 2003).

The reliance on regional airlines, and indeed, smaller allied airlines from around the globe for feeder traffic into hubs, can be recognized as a form of outsourcing—traffic is rising for those airlines with comparatively low wages for mechanics and other flight personnel. The advantage of maintaining a wide variety of aircraft, while under tremendous financial pressure has also led the major airlines to utilize more conventional outsourcing. While air carriers have used third-party repair stations in a limited manner for years in order to take advantage of lower labor costs, economies of scale and access to specialized expertise (e.g., engine repairs, etc.) requiring specialized capital equipment or maintenance personnel, such practices have grown rapidly in recent years. As cab be seen from Table 5, as of January 2003, reliance on third-party maintenance providers accounted for 47% of all maintenance expenditure.

Table 4a: Orders for Boeing Aircraft, 1978-2001

Number of Aircraft Ordered by Category

Year	SASR	SAMR	TAMR	TALR	TDLR
1978	146	21	74	17	17
1979	90	0	20	0	5
1980	98	64	0	0	0
1981	67	20	0	0	0
1982	93	0	0	0	0
1983	50	35	0	0	5
1984	92	94	0	0	0
1985	49	196	4	0	19
1986	65	67	1	9	2
1987	70	56	6	16	14
1988	91	256	0	34	5
1989	68	242	8	43	4
1990	48	74	21	45	8
1991	18	28	0	25	0
1992	6	78	0	17	2
1993	6	72	0	7	1
1994	4	30	0	5	2
1995	42	65	0	4	3
1996	18	388	0	60	15
1997	2	168	0	103	4
1998	48	229	6	70	1
1999	0	167	0	21	0
2000	13	320	0	61	0
2001	2	131	0	16	2

Classes

Single-Aisle Short-Range	SASR
Single-Aisle Mid-Range	SAMR
Twin-Aisle Mid-Range	TAMR
Twin-Aisle Long-Range	TALR
Twin-Aisle, Twin-Deck Long-Range	TDLR

Source: Compiled by the authors from http//:www.boeing.com.

Table 4b: Boeing Aircraft: Seats Added by Category, 1978-2001

Year	SASR	SAMR	TAMR	TALR	TDLR
1978	18185	4200	17177	3077	7684
1979	11341	0	4760	0	2260
1980	11957	12800	0	0	0
1981	7727	2560	0	0	0
1982	11661	0	0	0	0
1983	6848	5920	0	0	2260
1984	13113	12032	0	0	0
1985	7008	26060	1044	0	8084
1986	9745	9170	216	1629	904
1987	10504	7884	1566	3451	6271
1988	13855	41018	0	8216	2080
1989	10378	38992	2088	9762	1664
1990	7374	12324	6185	12314	3328
1991	2745	5492	0	5510	0
1992	930	11966	0	4188	832
1993	930	9720	0	1924	416
1994	620	4232	0	1090	832
1995	4452	9332	0	872	1248
1996	2790	57740	0	16298	6240
1997	310	26054	0	26711	1664
1998	6264	35281	1830	18022	416
1999	0	24634	0	4839	0
2000	1378	46558	0	19841	0
2001	212	22413	0	4097	832

Classes	
Single-Aisle Short-Range	SASR
Single-Aisle Mid-Range	SAMR
Twin-Aisle Mid-Range	TAMR
Twin-Aisle Long-Range	TALR
Twin-Aisle, Twin-Deck Long-Range	TDLR

Source: Compiled by the authors from http//:www.boeing.com.

Table 5: Percentage of Maintenance Outsourcing for Major Air Carriers, 1996-2002 (in billion dollars)

Year	Outsourcing Cost	Total Cost	Percentage of Outsourced Maintenance
1996	$1.5	$4.2	37
1997	$1.8	$4.8	38
1998	$2.2	$5.3	41
1999	$2.5	$5.5	45
2000	$2.7	$6.1	44
2001	$2.8	$5.9	47
2002	$2.5	$5.4	47

Source: *FAA 2003.*

Actual percentages vary considerably among the majors (see Table 6), yet the use of outsourcing has grown for each carrier. Significantly, several of the majors are developing profit centers around maintenance work, even as they rely more heavily on third parties for specialized work. This development parallels strategies undertaken by Lufthansa, Air France, and KLM. Delta, for example, has developed its Technical Operations Division that is staffed by more than 10,000 maintenance personnel from around the world in 46 facilities in 14 countries during the last several years. This provides in-house maintenance and engineering support services for Delta's fleet of aircrafts in addition to incoming customer aircrafts. Significantly, Delta is the only major U.S. airline whose maintenance personnel are non-union. As Delta's maintenance operations have grown, Delta is increasingly relying on *outsourcing* for some specialized work, thus doubling the use of its facilities from 19% in 1996 to 38% in 2002 (FAA 2003).

United Airlines, too, is rapidly changing its maintenance operations. It has recently closed two of its maintenance facilities. However, unlike Delta's strategy, United Airline's "United Services" is rapidly moving away from labor-intensive, relatively low-skilled activities toward developing "centers of excellence" around high-value areas, such as engine maintenance, landing gear, and avionics. These practices at United benefited from Chapter 11 renegotiation of its contract that permits a greater percentage of outsourced maintenance work (Rosenberg 2004).

Table 6: Major Airlines: Percentage of Maintenance Outsourcing
For 2002 (in million dollars)

Air Carrier	Outsourced Maintenance	Total Expenses	Percent of Outsourced Maintenance
Alaska	$129	$163.7	79
America West	$229.2	$298.1	77
American	$465.2	$1,212.4	38
Continental	$249.8	$384.2	65
Delta	$309.5	$823.5	38
Northwest	$286.2	$657.3	44
Southwest	$313.7	$481.8	65
United	$304.2	$919.4	33
US Airways	$215.1	$427.3	50

Source: *FAA, 2003*.

Cost is the most important factor driving the trend toward outsourcing. Estimated labor savings may be as much as 30 % to 40 % when air carriers outsource work to repair stations (FAA 2003). Costs may be even lower when foreign repair stations are used. Currently, there are approximately 650 foreign repair stations certified by the Federal Aviation Administration (FAA 2003). FAA reports that 138 FAA-certified repair stations are being monitored by the French, German, and Irish authorities under Bilateral Aviation Service Agreements. The remaining 512 FAA-certified repair stations in foreign countries are monitored by FAA inspectors.

FAA, however, does not report how much maintenance work is being done overseas. But anecdotal evidence suggests the practice is growing rapidly. Northwest, for example, is currently outsourcing the labor intensive heavy checks to a third party in China; Continental is outsourcing Boeing 777 maintenance to a third party in Hong Kong and 757 work to Canada. Table 7 shows the growth in the use of foreign outsourcing for one airline as officially reported by the FAA.

Although additional research is needed, the impact of these trends on the employment of airline mechanics employment is evident when we examine the number of maintenance personnel per revenue-passenger-mile for each of the major airlines, as shown in Table 8. Alaska Airlines, America West, and Southwest each utilize third parties for their maintenance work to a greater degree than do other carriers. America West, for example, generates more than four times the revenue-miles per mechanic as does U.S. Airways or American. In this

Table 7: Increase in Outsourcing to Foreign Repair Stations by one Major Air Carrier, 1996-2001 (in million dollars)

Year	Foreign Repair Station Outsource Maintenance Expense	Total Maintenance Expenses	Percent of Outsourced Maintenance Expense
1996	$26.6	$280.1	9
1997	$64.2	$389.8	16
1998	$47.8	$342.9	14
1999	$54.2	$259.7	21
2000	$68.4	$298.7	23
2001	$91.7	$347.2	26

Source: *FAA, 2003*.

Table 8: Major Airlines' Ratio of Revenue-Per-Miles (RPM's)/Maintenance Personnel: Average for the 1997-2001 Period

Major Airlines	RPM's/Maintenance Personnel (1997-2001Average in million dollars)
Alaska	20.298
America West	31.506
American	7.696
Continental	15.298
Delta	15.496
Northwest	11.99
Southwest	30.46667
United	7.948
US Airways	7.548

Source: *ICAO, ATA*.

case, the exchange value of the tasks done by mechanics at the major airlines has clearly decreased. This reduction undermines the basis for the "skilled" labor—dependent as it is on both intrinsic and extrinsic (exchange value) of skills—upon which craft unionism derives its purported power to control the workplace.

The increasing use of outsourcing at domestic and foreign repair stations, together with the increasing importance of regional carriers and smaller jets, are each a component of the competitive strategies carriers are utilizing to confront the intense competition embodied in globalization. Each of these strategies also has profound implications for a "craft" based unionism.

CONCLUDING REMARKS

Specialization and/or division of labor do not allow the worker to have control over the entire product and/or labor process. This has been recognized at least since the time of Adam Smith (Smith 1977 [1776]). In addition to this, specialization and skill formation in contemporary global capitalism puts the individual worker at risk of instant de-skilling, despite the seemingly intact "physical" attributes or use value of the skills themselves. This raises a crucial question about the redundancy of workers' skills and highlights the difficulty of reliance on "craft" skills to enhance workplace control. Skilling and de-skilling of the labor force are the inevitable result of the competitive pressures created by global technological change. Three global trends within air transport affecting airline mechanics—the diminished role of major carriers, the change in fleet composition, and the growing use of outsourcing—are symptomatic of heightened competitive pressure in this industry. A framework developed in this article, synthesizing "creative destruction" and "destructive creation", unifies the use value and exchange value of commodities (including those of skills), and thus presents a dynamic picture of commoditization of the labor process in the present stage of capitalism. This, both in theoretical and historical terms, challenges labor unions, such as AMFA—that are guided by the anachronism of craft orientation and often appeal to workers' sense of professionalism—and cautions to reevaluate their strategy. Minimally, the trends we have discussed and their impact on the skills of mechanics in air transport, raise troubling doubts regarding the ability of craft unions to successfully control the workplace. In view of this fact, labor educators and union activists should be skeptical of any inference that organizing along craft lines will improve the position of those working in the majority of workplaces in the globalized economy.

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