UNDERCURRENTS OF THE CHANGES TO WORK THAT AUTOMATION BRINGS

DISSERTATION

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Chapter One: Introduction

Introduction

Background of the Problem

It seems self-evident that technology changes what work means to the individual worker. Yet, a worker may never even consider how his or her experiences with his or her work changes due to such technological changes. The worker may simply experience uneasiness or a feeling of loss due to a sense of no longer being relevant. There are ample examples found in news reports of how technology has altered how work is understood by industries, businesses, and the individual worker. My interest and subsequent inquiry into what automation and technology means to work and the worker's understanding of it began when I sought to learn about the unionized sheet metal workers' resistance to or readiness for change that I was charged with bringing to the union of which I am a proud member. For me, this all started when I had a conversation with two business managers of two different local sheet metal worker unions. The business manager is the leader, the Chief Executive Officer, of his or her respective local union, chartered under the former Sheet Metal Workers' International Association (SMWIA) and now The International Association of Sheet Metal, Air, Rail, and Transportation Workers (SMART). My conversation with these two business managers focused my curiosity on three phenomena. I was curious about the effects of technology on my specific union and its members, on working people in general being concerned about the quantity of work or jobs available, and finally, on the quality of the work available to the individual worker, which is embodied in satisfaction with one's work.

As evidence of these phenomena, one need only look at the jobs-related positions of the current, as of the time of this writing, Democratic and Republican American Presidential nominees; jobs are a primary focus of their respective campaigns. Hillary Clinton, the

Democratic nominee, states that she wishes to "create incentives for companies to bring back jobs to the U.S…" (Hillary For America, 2016). Implicit to Ms. Clinton's statement is the inference that jobs that were once filled by Americans were lost and she would work to returned these jobs to Americans. Donald Trump, the Republican nominee, states that his plan will, "reclaim millions of American jobs…" (Donald J. Trump for President, Inc., 2016). Here, Mr. Trump implies that the jobs were lost and that he would work to have the jobs returned. He takes the issue a step further by stating that that these jobs were stolen by "sweatshops" and "pollution havens." Regardless of the differences in rhetoric between Ms. Clinton and Mr. Trump, one can easily infer that the pollsters who work for both Ms. Clinton and Mr. Trump respectively have concluded that jobs is a primary issue for the average American voter. While a focus on bringing back jobs to Americans may not be a new political tactic, it has new and more profound meaning due to the automation of work.

Additionally, jobs and the quantity of available jobs are not unique to the people of the United States (U.S.). The very recent, at the time of this writing, results of the "Brexit" referendum, the United Kingdom's (U.K.) referendum vote that resulted in the U.K. leaving the European Union (EU), was in large part due to the perceived threat that globalization poses to jobs available to Britons (Whitely & Clarke, 2016). Therefore, while the rhetoric is that of politicians pandering to their constituents with the idea of returning something lost to its rightful owner, the anxiety caused by job availability and the changing definitions of what work means to working people is real, especially in "first world" nations. Workers seek security and assurances that they will be gainfully employed during their working years. Yet, at this same time in history, technology's effects on work extends beyond "first world" nations to working people of all nations through deskilling work and resulting in some worker's skills to be outright obsolete.

Whether job opportunities may appear to be shrinking in the United States, data shows that by many economic measures there is more manufacturing output in the United States at this point in history than at any other point (Ikenson, 2016). Given this fact, the question then arises of what actually is occurring since workers and consequently politicians believe that quality work opportunities are shrinking at the same time that American manufacturing output is increasing. I theorized that there is a false narrative that is accepted due to a paradigmatic understanding of what work is and how the information age has altered that paradigm of work. Those who feel as though "America doesn't manufacture anything anymore" are, to some degree, seeing it simultaneously correctly and incorrectly, which I believe is caused by the historic paradigmatic understanding of work and the new paradigm that the information economy brings to work. For although manufacturing output is actually higher than at any other point in American history and there has been an increase in manufacturing jobs in recent years, the fact is that the number of manufacturing jobs is overall lower relative to manufacturing output (National Association of Manufacturers, 2016). To put it another way, while there is an increase in the number of manufacturing jobs available to Americans, the increase in productivity as a result of automation has resulted in a lower number of jobs available to workers relative to the amount of goods being manufactured.

With these points in mind, I will turn back to my initial inquiry. However, before I detail the highlights of my conversation with the two business managers, it is best to provide context for the conversation. The sheet metal worker trade was, and still is, a skilled trade with a robust concentration of applied mathematics, among many other sciences that are requisite skills, which are used by the rank-and-file sheet metal workers on a daily basis. Historically an apprenticeship within the sheet metal trade had the individual learning applied calculus, "trigonometry, and

algebra" (U.S. News & World Report, 2015). Technology has had an impact on everything a sheet metal worker performs as work as well as on how he or she experiences such work; the work that a sheet metal worker once performed that is most relevant to this study centered on the applied calculus portion of a sheet metal worker's learning. It is in this area that the work sheet metal workers once performed has been effected the most.

The largest sector of the sheet metal industry is in air delivery systems, or ductwork. The word ductwork can mean different things to different trades; for the sheet metal worker, its meaning is based around delivering conditioned, either cooled or heated, air to various locations served by an air movement unit, such as furnaces, air-handling units, heat pumps, etc. Since each edifice that requires conditioned air has a unique design, the design of the air delivery system is equally as unique; this is where, historically, the sheet metal worker position of the bench layout person has thrived. It is important to note that the bench layout person was the individual who would learn the applied calculus necessary to create the required delivery system part, which was crafted from raw, flat sheets of metal.

Through the years, the bench layout person has been a highly valuable employee who was sought after by competing mechanical or sheet metal contractors. There were tens of thousands of bench layout person positions throughout the United States and Canada (the claimed jurisdictional area of the SMWIA), but this all changed beginning in the early 1980s. It was at that time that a unionized sheet metal worker, Richard Levine, invented and patented a machine, the plasma table, which began to replace the bench layout person (United States of America Patent No. 4,554,635, 1985). This new technology almost entirely eliminated the bench layout person's work and did so in less than a decade. Without question, the mechanical or sheet

metal contractor who did not purchase this new technology for his or her sheet metal shop soon found that his or her company had lost its competitive edge.

It was against this backdrop that a then colleague and I brainstormed about where we perceived the trajectory of technology was arcing as it applied to our trade. We concluded that our trade, especially within the shop, as opposed to the field where the physical edifice that is being constructed is being erected, would eventually be fully automated with robotic technologies. My then colleague and I obtained a patent from the United States for a fully automated sheet metal shop (United States of America Patent No. US8285413 B1, 2012). We assigned the patent to the International Training Institute for the Sheet Metal and Air-Conditioning Industry (ITI), a trust fund of SMART and an organization at which we were both employed at the time.

Our reasoning for assigning the patent to the ITI was that we, as members of SMART, had seen from an organizational perspective the loss of jobs and the resulting loss of membership that was a direct result of Levine's machine. We reasoned that it would be ideal to have our union in control of its own destiny in regards to any job loss that would occur with the advent of a fully automated sheet metal shop. Additionally, we recognized that Levine's machine equally benefited both non-unionized and unionized sheet metal contractors and their non-unionized sheet metal workers and we desired to preclude any non-unionized contractors and workers from benefitting from any robotic technologies. Since Levine's machine had eliminated what was perceived by those within the unionized industry as a competitive advantage, my colleague and I desired that history not repeat itself with robotic technologies.

When I discussed with the two business managers that we had obtained the patent from the United States Patent and Trademark Office and had assigned it to the ITI, their reaction was

not one that I had hoped for. Both business managers immediately looked down towards the floor; then, after a brief pause, one looked up at me and said, “That’s the most progressive thinking that I’ve ever seen” and the other said, “Oh man.” Then the first business manager said to me, “We’ll never get reelected promoting that!” The substance of that conversation became the impetus for this inquiry. Change brought about by computerized technology (CT) had already come to the sheet metal industry and the impact of information technology on the trade had not concluded; in fact, more changes were coming to the industry and from what I experienced, at least some of the leadership of the union demonstrated resistant behaviors towards these changes for selfish reasons. I was curious whether the rank-and-file sheet metal workers were as equally resistant to these coming changes or if they foresaw these changes and stood ready to accept them.

I thought about and reflected upon those workers from history who altogether lost their livelihoods due to the advent of a new technology. One example is the typographers who used to create the mechanical typesetting for daily newspapers and other printed materials. Surely, they must have recognized that their livelihoods were in jeopardy with the advent of computerized printing. In fact, “computers transformed the craft entirely…” as the number of members in the International Typographical Union, which dissolved in 1986, “fell from over 106,634 in 1964 to only about 38,000 working members by the mid-1980s” (Arnesen, 2007). In addition to this, there are many historical examples where a workforce in general and the individual worker in particular faced, whether they realized it at the time, uncertain personal economic futures due to technology’s impact upon their work. Technology, for better or for worse, has already had a dramatic effect on both the careers offered in the sheet metal industry and the career of individual sheet metal workers. Furthermore, it seems ominously clear that technology’s effects

on what work is, what work means to the worker, and how the worker experiences work are far from over.

As the ITI's Director of Building Information Modeling Technologies, I was assigned to usher in a computerized work curriculum, which naturally meant change to the industry. After years of naively expecting fellow sheet metal workers to see what I saw, I came to understand that my fellow sheet metal workers did not see the profound changes to our work that I felt was occurring as a result of technology; therefore, I wanted to know how the members of SMART saw and felt about the automation of much of their work. Were they resistant to these changes? Were they intimidated by CTs or did they embrace them? Did they foresee that change was inevitable and were ready for these changes? Did they maybe want to lead the change? What role did they want the union's leadership to take? How did they want their union to approach technology? Did they feel that technology would have a negative effect or positive one on their ability to find employment now and in the future? Did they have any sense of doom related to their career as a sheet metal worker? Were they bravely facing the effects that technology has on their work? Or, did they feel that all is lost? In short, are the members of SMART ready for or resistant to the changes presented by CT? In an effort to examine whether the rank-and-file workers of SMART were a diverse heterogeneous population and to conceptualize patterns of responses among a sample of these rank-and-file members, I conducted an online survey and applied latent class analysis (LCA) to the response data within this dissertation.

Statement of the Problem

It is a presumption to suggest that the working person likely spends little or no time thinking about paradigms in general and paradigms regarding work specifically. I believe that work for the vast majority is their portion of the transaction with an employer where they receive

from their employer the completion of the transaction in the form of wages, benefits, and/or other compensation. Little time is spent philosophically pondering what work is and the individual's relationship to it. For many, the relief and excitement of being chosen for that position by an employer can in short time lead to frustration with the work and devolve into the proverbial "you can take this job and shove it" attitude. However, no matter what the attitude may in fact be, a living wage job is a stressor for many and a need for all. There was a time not so long ago when an individual without a high school diploma could find work aplenty within the factories that were abundant within big and small cities alike. For those who lived in small cities or towns, one factory oftentimes supplied the majority of jobs to the townspeople. Those times are gone. For many workers, knowledge of the Rust Belt in the United States and its implicit loss of factory jobs combined with knowledge of sweatshop factories in "developing" nations can lead to feelings of resentment, betrayal, anger, and even xenophobia. However, as was discussed above, by some economic measures, there is more manufacturing output within the United States now than at any other point in its history (Ikenson, 2016). Therefore, while many people feel as though America no longer manufactures anything anymore, the paradigm shift of work, brought on by computer and information technologies, has eliminated many jobs and deskilled many others. For example, building information modeling (BIM) enables a mechanical engineer to create a model that simultaneously performs the work that a sheet metal worker once did as the engineer is creating a design model. Simply put, a design model and a construction model are created simultaneously, thereby eliminating work that a sheet metal worker would have performed and resulting in a decrease in the skills that are required of a sheet metal worker and a decrease in employment opportunities.