

Automation and Craft-Based Management

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Abstract:

The principal thesis of this paper is that organizations, especially those affected by automation, require craft-based management to have an engaged and effective workforce. The first premise supporting this thesis is that automation reduces the algorithmic nature of work and increases the non-algorithmic nature of work involving creativity, context-sensitivity, and collaboration. The second premise supporting this thesis is that non-algorithmic work cannot be managed through the model of management as science but rather must be managed through the model of management as craft. In the paper, I examine the nature of non-algorithmic work and craft-based management as an alternative to algorithmic work and scientific management. I conclude by considering some general implications for selecting, organizing, and educating managers.

Keywords: Automation, Craft, Nature of Work, Management Philosophy, Practical Wisdom, Virtue

Word Count: 2723 (not including notes)

Main Text:

I: Automation and the Changing Nature of Work

Automation is not a new concept. As early as the fourth-century BCE, Aristotle speculated about the economic effect of statues that could perform the work of human beings.¹ A couple of hundred years ago, Karl Marx predicted that mature forms of capitalism would involve high levels of automation.² What does seem to be distinctively modern in current discussions of automation is a widespread anxiety about the disruptive effects of automation on the nature of work in technologically-advanced economies. Pessimistic forecasts of such disruption envision the elimination of a wide range of occupations – particular attention is given to the retail, food-service, and transportation, and manufacturing sectors, which employ a great number of people³; pessimists foresee a future without work for large groups of people along with associated social problems. Optimists, by contrast, accept that automation will disrupt the economy, but hold that new occupations will develop and expand to accommodate workers displaced from jobs lost through automation. One common example, cited by optimists, is the adoption of automated teller machines (ATMs) at banks from the 1970s and onward; instead of eliminating the occupation of bank teller, the number of teller positions increased as a result of banks being able to open more branches. While much of this debate concerns the scope of occupations that will be eliminated through automation and computerization, I think that it is more fruitful to think not so much about which jobs will be lost, but about how the character of work is changing as a result of technological developments.

It is unclear whether the example of the ATM will be representative of future disruption and displacement in other sectors of the economy (and so, whether this example warrants either the optimism or the pessimism described above). What is clear, however, is that automation has changed the character of retail banking to being more of a service-based profession: instead of processing deposits or doing other calculative tasks, tellers spend a lot of their time helping bank customers in a variety of non-calculative activities. While one can speculate about which types of occupations will be created and destroyed in the future, what can be observed now is the way in which automation is changing the character of a wide range of occupations. In general, I argue that work is becoming less algorithmic and more what I will call ‘phronetic’ in nature and that this has important implications for the structure of management within organizations.

Algorithmic labour is work that can be formalized into a series of discrete, well-defined steps that involve processing a given input to a determined output. Examples of algorithmic labour by human beings include such things as operating a keypunch, guiding an object down an assembly line, or even underwriting insurance. Due to its

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¹ *Politics* 1.1253b

² 'Fragment on Machines', *The Grundrisse*

³ See, for instance, the influential 2013 Oxford Martin study by Frey and Osborne, "The Future of Employment: How Susceptible are Jobs to Computerisation?".

algorithmic nature, such labour is highly susceptible to automation – indeed, the first example above represents a task that has been fully computerized and is no longer done by human beings; the second has been significantly automated with the use of robotics; and the third is beginning to be automated through artificial intelligence systems. Many, if not most, occupations involve some degree of algorithmic labour. Where such labour constitutes the entirety of an occupation, the occupation is at risk of being automated entirely. But a large number of occupations are only partly composed of algorithmic labour. In cases where automated processes are more efficient and cost-effective at performing such labour, these occupations will become less algorithmic in nature as people in these professions focus more on tasks that cannot be automated (or are much more difficult to automate). This has fairly serious implications for job design, so I will argue.

In contrast to algorithmic labour, there are tasks involving creativity, ambiguity, context-sensitivity, and social interaction, which cannot be neatly framed within the bounds of a well-defined algorithm. Such tasks are extremely difficult to automate, if not impossible. This type of labour is phronetic in character. The word ‘phronetic’ derives from the Ancient Greek word *phronesis*, which is often translated into English as ‘practical wisdom’.

Phronetic labour, then, should be understood as work that requires practical wisdom to be done effectively.⁴ For Aristotle, the ancient Greek philosopher, practical wisdom has two important aspects: first, it is an intellectual virtue, or power, that involves deliberating about the appropriate means to achieve a given end or goal in situations of uncertainty; and second, it is a moral virtue that involves choosing and performing the right action at the right time in keeping with the development of a good character.⁵ It is often the presence or lack of practical wisdom that respectively determines whether a professional is effective or ineffective in their work. For instance, a good physician neither overprescribes nor underprescribes medications, but prescribes the right amount to promote the health of her patients and does so with integrity of character. Phronetic labour involves reasoning about means and goals where flexibility and attention to context is important; and it has a social dimension, such that the moral virtues are necessary for it to be done effectively.

Understanding the phronetic aspects of work – especially as the algorithmic aspects of work become increasingly automated – has important implications for job design theory. It is better to consider jobs not as static positions that are fully-specified within a regimented system, but rather as dynamic, flexible, and semi-autonomous roles understood within the model of a craft. Amy Wrzesniewski, a specialist in organizational behavior, argues that employees should be seen as active crafters of their work in how their job is designed.⁶ Job-crafting consists in an employee being able to deliberate about how best to realize certain goals relevant to her role within an organization and it involves structuring a position to include variety, complexity, skill development, limited autonomy, and a sense of how one’s work contributes to the welfare of others. Job-crafting can be applied to a broad range of occupations and it has the effect of increasing employee engagement.⁷ As Wrzesniewski shows in her research, hospital custodians with an understanding of the goals and purpose of their organization and the freedom to exercise judgment in their work regarding that purpose report high levels of job satisfaction.⁸ These high levels of job satisfaction in turn increase employee engagement and effectiveness which makes an organization more productive.

⁴ My discussion of phronetic labour is indebted to Keith Breen’s discussion of phronetic production in ‘Production and Productive Reason’, pp. 619-623.

⁵ *Nicomachean Ethics*, VI.5

⁶ ‘Crafting a Job: Revisioning Employees as Active Crafters of their Work’

⁷ According to the psychologist Barry Schwartz, organizations are capable of both vicious and virtuous cycles when it comes to structuring their work environment (*Why We Work*, p. 27). A virtuous cycle occurs when an organization provides employees with an environment that allows them to flourish in the ways described above: this leads to better work, which yields positive emotion that in turn leads to even better work. A vicious cycle, however, occurs when an organization suffers some setback and implements a system of rules and incentives, which in turn creates further setbacks by disengaging employees from their work. Underlying this vicious cycle, according to Schwartz, is a faulty view of human nature that sees human beings as primarily motivated by extrinsic factors such as money and fear, rather than the intrinsic value of their work (*Why We Work* p. 11ff.).

⁸ ‘Crafting a Job: Revisioning Employees as Active Crafters of their Work’, pp. 191-192

As Jeffrey Pfeffer argues in *The Human Equation*, the success of a company overlaps with its capacity to provide meaningful work for its employees.

II: Models of Employee Management

In the previous section, we made a distinction between algorithmic and phronetic labour in understanding the character of the work done by employees. A related distinction can be made regarding the nature of managing these different forms of labour: algorithmic labour is best organized by management as science, but phronetic labour is best organized by management as craft. In this section, I wish to develop the distinction between these two models of management and argue for the superiority of craft-based management with regard to the increasingly phronetic character of work.

Scientific management owes its origins largely to Frederick Winslow Taylor's *The Principles of Scientific Management* published in 1911.⁹ Taylor argued that workers, much like machines, could be scientifically managed in such a way as to be more efficient and productive. Taylor contrasts his new form of management with an older form of arranging work, a kind of craft-based management. In the older form, according to Taylor, workers were largely responsible for the manner and method of production. The role of management was limited to cultivating the initiative of the worker through different forms of incentive; Taylor argues that this form of management leads to great inefficiencies since too much is left to the initiative and judgment of the worker. In place of the old 'worker-first' system, Taylor proposes that workflow should be partitioned into discrete tasks, each of which is analyzed, systematized, and ultimately optimized for the sake of productivity. In this picture, the old 'rule-of-thumb' of the worker is replaced by scientific standardization, in which a centralized management takes the traditional knowledge of the worker and classifies, tabulates, and reduces it to a system of rules, laws, and formulae. Work, then, essentially becomes subdivided into a series of algorithmic tasks that maximize productivity. Taylor thinks that this systematization can be applied very broadly; indeed, he notes that one of the principal objects of his text is to illustrate that 'every single act of every workman can be reduced to a science'.¹⁰ But this is an overstatement and reads more like an aspiration than a well-grounded fact. It is, however, beyond the scope of this paper to resolve the question whether all forms of labour, including phronetic labour, can be characterized algorithmically – and, in so doing, making it possible that all forms of labour might be automated. What can be said, however, is that there is a wide range of labour, especially phronetic labour, that cannot be framed within the bounds of well-defined algorithms and thus that cannot be managed scientifically. Accordingly, space should be made for a craft-based model of management, but one more robust than the version described by Taylor.

A craft-based model of management is the appropriate method for organizing phronetic labour to be productive within an organization. Within the craft-based model of management, the relationship between manager and employee is similar in many respects to the relationship between master and apprentice in the skilled trades or fine arts. If we understand work as a craft, the role of the manager is to facilitate the growth of judgment and skill within their employees – in other words, to guide workers to become better practitioners of their craft. To do this effectively, a manager must have some subject-matter expertise in the craft that they manage¹¹; they must,

⁹ Taylor, however, should not be given full credit here. His system largely owes to the prevailing ethos of the time that science could be used to mathematize descriptions of natural processes in order to predict and control them. Relatedly, part of the impetus behind the development of the human sciences, such as economics, was to mathematize descriptions of human processes in order to predict them and facilitate better forms of social organization. Taylor's work should be understood against this backdrop as an application of this ethos to the nature of management.

¹⁰ *Principles of Scientific Management*, p. 64. Taylor, furthermore, thinks that this system should be applied beyond industry to all walks of life, including the trades, agricultural work, churches, philanthropic organizations, government, the home, and the university.

¹¹ In large organizations, lower-level and front-line managers should themselves be good practitioners of the craft they manage (e.g., a kitchen should be managed by a chef, the construction of a bridge should be managed by an engineer, a university department should be managed by an academic, etc.). Senior-level managers, however, should be generalists with a broad understanding of the organization and its niche within the economy, but who also know

furthermore, possess a good character formed of certain virtues. To see why, it is helpful to think about the nature of work as a craft according to the philosopher Alasdair MacIntyre's concept of practices.

For MacIntyre, a practice involves both internal goods and standards of excellence. Music, for instance, possesses goods concerning beauty, intellect, and emotion. Concerning standards of excellence, we can tell the difference between good music and bad music with regard to the skill of the musician in facilitating these goods. Effective practitioners of any craft must come to appreciate these internal goods and to develop their skillset to meet the standards of excellence within their practice. A practice is social by nature: in order to master a craft, we must place ourselves in the appropriate relationship to other practitioners and beneficiaries of our craft. Good relationships amongst the various stakeholders of a practice are necessary for the healthy functioning of that practice. MacIntyre holds that certain virtues are necessary to sustain a practice:

We have to learn to recognize what is due to whom; we have to be prepared to take whatever self-endangering risks are demanded along the way; and we have to listen carefully to what we are told about our own inadequacies and to reply with the same carefulness for the facts. In other words, we have to accept as necessary components of any practice with internal goods and standards of excellence the virtues of justice, courage, and honesty.¹²

Managers of phronetic labour within a craft practice require both the knowledge of the practical aspects of the craft – its exercise and standards of excellence – and the virtues to develop and maintain the healthy relationships necessary to help form employees as effective practitioners.¹³

Contrary to Taylor's sharp distinction between scientific management and craft management, I think that the craft-based model of management can be framed to include not only phronetic labour, but also the scientific management of algorithmic labour. Many craft practices are composed of both phronetic and algorithmic tasks. For instance, designing computer software has an obvious algorithmic dimension; but it also has important phronetic aspects, such as determining whether software meets a user's needs or engaging in certain kinds of troubleshooting. A good manager requires the practical wisdom to know the difference between situations that involve algorithmic labour and those that involve phronetic labour and how to organize work in such a way that allows automated, algorithmic processes to support the phronetic craft development of employees. In particular, managers who overextend a model of scientific management may do serious harm to the productivity of an organization in the following ways: treating employees as machines to be inflexibly regimented; attempting to evaluate the health of an organization solely through quantitative measures; and in failing to evaluate whether automated processes are actually benefitting an organization and its stakeholders. Management itself is a phronetic activity that cannot be reduced to a science.

enough of the specific functions within the organization to coordinate lower-level managers. Another way of thinking of this is that lower-level managers are more closely engaged with the core productive practices of the organization while higher-level managers focus more broadly on sustaining the organization as an institution. For more on this, see Geoff Moore, *Virtue at Work*, pp. 108-109.

¹² *After Virtue*, p. 191

¹³ In addition to employee management, managers – especially those at senior levels – must focus more broadly on managing the institutional aspects of their organization, which sustain its core productive practices. Healthy organizations, for instance, need to be fiscally responsible, compliant with various regulations, and aware of wider economic forces. Failure in these and other areas may harm the core productive practice of an organization. A bankrupt auto manufacturer, for example, cannot design and build cars. But in focusing on these institutional issues, managers should never lose sight of promoting the core productive practices of their organization. Compromising the core practice of an organization for the sake of external goods – say, by cutting research and development funding to engage in stock buybacks when an organization is profitable – is a form of bad management. For the distinction between managing core productive practices and managing institutional aspects of organizations and balancing the two, see Moore, *Virtue at Work*, pp. 107-109.

III: Implications for Selecting, Organizing, and Educating Managers

The craft-based model of management suggests that managers should have a range of relevant qualitative and quantitative skills. Phronetic labour involves understanding the effective use of algorithmic processes in order to make a craft more productive. Managers must both understand the nature of the work they manage in its phronetic and algorithmic aspects and know how to guide the development of employees as effective practitioners. Frontline managers should be selected who are themselves good practitioners of the craft performed by the organization hiring them and senior managers should either be practitioners or demonstrate an aptitude to learn about the internal goods and standards of excellence associated with the core productive practice of their organization. In addition to the algorithmic and quantitative skills necessary for the job, managers should also be selected on the basis of possessing sound practical wisdom, including moral character (i.e., the virtues of justice, courage, and honesty) and the ability to deliberate about how best to achieve the goals of the organization, especially in situations of ambiguity and uncertainty. It is only on the basis of these traits that managers are able to facilitate the development of employees as craft practitioners and to run the institutional aspects of an organization to support its core productive practice.

By making a sharp distinction between managers and employees, scientific management has the tendency to create bloated bureaucratic structures that can weigh an organization down. Indeed, the example of efficient scientific management most touted by Taylor, the algorithmic loading of pig iron at Bethlehem Steelyard, was actually a failure: the consulting costs of Taylor and his team outweighed any savings brought about by the implementation of Taylor's methods. One can find examples of this type of failure up to the present day. In contrast to scientific management, craft-based management removes the sharp distinction between managers and employees in recognizing that all should deliberate about realizing the aims of an organization. As a result, some administrative responsibility can be given to employees as they demonstrate an ability to make decisions promoting the good of the organization as effective craft-practitioners. This has the benefit of making organizations administratively leaner. Here it is worth making a distinction between management – that is, the administrative tasks necessary for running any organization – and managers, professionals whose job is devoted to these tasks. In facilitating the growth of practitioners who are able to deliberate about how best to realize the goals of their organization, managers are able to download some of the function of management to employees. This decentralizing of management can benefit an organization by lowering the amount of administrative overhead and also by making it more flexible and effective in meeting day-to-day challenges as employees are empowered to make administrative decisions.

Management education should include a strong emphasis on the development of practical wisdom, in addition to gaining relevant technical skills. In particular, management should not be taught as though it were something essentially quasi-scientific, rational, and quantitative. While a high degree of numeracy and other quantitative skills are important for managers, management should be taught as an art with regard to making decisions and guiding practices in situations involving ambiguity and uncertainty where practical wisdom, virtue, and context-sensitivity are necessary. This means that the education of managers should broadly include a high degree of literacy, numeracy, critical thinking, and mentorship in practical wisdom. Examples of such education include taking a wide range of courses, using case studies that hone the traits described above, and having the opportunity to work with experienced managers in the field who possess practical wisdom.