

THE MANAGEMENT – PRODUCTIVITY CONNECTION

Erik Brynjolfsson and John Van Reenen

Research shows that a particular cluster of management practices at American manufacturing plants is associated with significantly higher productivity.

It's long been known that management styles and practices are important even though they vary dramatically among individual managers, companies, and industries. What researchers have not been able to determine is what those differences mean for the productivity of the business, the industry, and for economy as a whole. That's why we worked with Nicholas Bloom and Megha Patnaik at Stanford University, Lucia Foster and Ron Jarmin at the U.S. Census Bureau, and Itay Saporta-Eksten, at Tel Aviv University, to analyze a large, new data set. We wrote our findings in an IDE [working paper](#), “[What Drives Differences in Management?](#)”

Economists' interest in management goes at least as far back as the 1887 paper “[On the Sources of Business Profits](#)” by Francis Walker, the founder of the American Economic Association and the Superintendent of the 1870 and 1880 Census. This interest has persisted until today. For example, Syverson's (2011) survey of productivity devotes a section to management as a potential driver, even within the very same firm, though he notes that “no driver of productivity has seen a higher ratio of speculation to research.”

Now, we have a manufacturing data resource to help us more clearly understand how a particular cluster of management practices can explain productivity differences. Previous research evaluating differences in management was limited to smaller samples of plants (e.g. Bresnahan, Brynjolfsson and Hitt 2002; Ichniowski, Shaw and Prenushi, 1997), developing countries (e.g. Bloom, Eifert, Mahajan, McKenzie, and Roberts, 2013, and Bruhn, Karlan and Schoar, 2016), or historical episodes (e.g. Giroselli, 2016).

A 2010 U.S. Census dataset on management practices – the Management and Organizational Practices Survey (MOPS) – offered an opportunity to study the topic anew. This first mandatory government management survey covers over 30,000 manufacturing plants across more than 10,000 firms. The size of the dataset, its inclusion of units within a firm, its links to other Census data, as well as the comprehensiveness of industries and U.S. geographies, made it particularly useful for addressing some of the major gaps in the management literature.

This paper also examines the first large sample of firms in a developed country. While earlier work like Bloom, Sadun and Van Reenen (2016), and Bresnahan, Brynjolfsson and Hitt (2001), measured differences in management across firms, there was no large-scale work on the variations in management *within* and *between* firms.

Using the data, we analyzed what we term structured management practices, which involve fine-grained and frequent use of performance monitoring, stringent hiring and firing practices, and strong incentive plans. Our analysis revealed striking variations *within* the same firm. A total of 37,177 responses were received, reflecting a very high response rate of 78%.

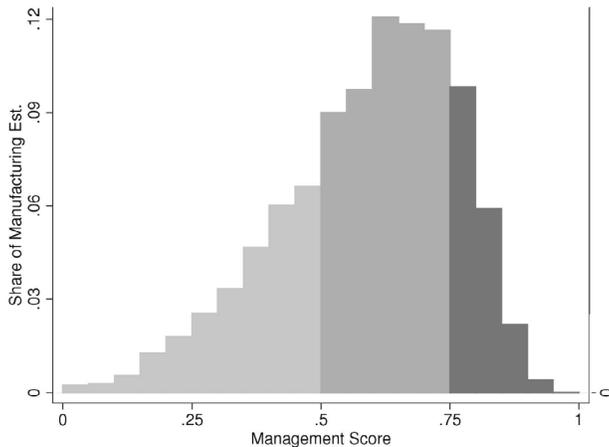
MORE STRUCTURED MANAGEMENT PRACTICES ARE CORRELATED NOT ONLY WITH HIGHER PRODUCTIVITY, BUT ALSO WITH IMPROVEMENTS IN OTHER MEASURES OF PERFORMANCE INCLUDING PROFITABILITY, INNOVATION, AND GROWTH.



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Figure 1: The Wide Spread of Management Scores across Enterprises



Note: The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0-1 scale.

The data confirmed that the structured management practices we identified are tightly linked to performance and that enormous variation in management practices exist; 40% of this variation is across plants, even within the same firm.

In fact, these structured practices account for about 20% of the spread in productivity across firms. Additionally, the effects of management policies and practices are equal to or larger than the Total-factor Productivity when measuring the impact of technological factors such as R&D or IT on the business. In other words, the productivity gap caused by uneven management practices is just as important to productivity as R&D investments, and over twice as important as IT implementation. The management index accounts for just under a fifth of the spread of productivity between the 90th and 10th percentiles, a similar fraction to that explained by R&D, and over twice as much as IT.

Drilling down further, we uncovered four causal drivers that are central to increasing the implementation of structured management practices. They are:

- Product market competition
- Individual state business environments
- Learning spillovers
- Human capital resources

METHODOLOGY

We aggregated the results from 16 check-box questions into a single measure of structured management. The monitoring section of the survey, for instance, asked firms about their collection and use of information to monitor and improve the production process.

It was important to determine what extent the variations in management practices across plants occur *within* rather than *between* firms. The established case-study literature on management practices often highlights the importance of variations both within and between organizations, but until now it has been impossible to measure these separately due to the lack of large samples. The large MOPS sample offered access to multiple plants per firm, making this the first opportunity to accurately evaluate variations *within* and *between* firms.

The survey contained 16 management questions in three main sections: monitoring, targets, and incentives. These were based on Bloom and Van Reenen (2007) and Bresnahan, Brynjolfsson and Hitt (2002), which borrowed from the principles of continuous monitoring, evaluation, and improvement that define Lean manufacturing (e.g. Womack, Jones and Roos, 1990). The survey also includes questions on organizational practices, as well as background on the respondents.

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KEY FINDINGS

Our examination of the variation in management practices across plants yielded three key results. First, that the lack of consistent management practices across plants is massive. While 18% of establishments adopt three quarters or more of basic structured management practices for performance monitoring, targets, and incentives, 27% adopt less than half of such practices.

Second, almost half of this variation in management practices occurs across plants within the same firm. That is, in multi-plant firms there is considerable variation in practices across units. The analogy for universities would be that variations in management practices across departments within the same universities are just as large as variations at other universities.

Third, these management variations increase along with firm-size: larger firms have substantially more discrepancies in management practices.

We then turned to testing out whether –and to what extent–our management findings were linked to corporate performance. We correlated the data and found that plants using more uniform management practices have greater productivity, profitability, innovation (as measured by R&D and patent intensity), and growth. This relationship is robust to a wide range of controls including industry, education, and firm age; it takes into account potential survey errors. The relationship between management and performance also holds over time within and across establishments.

For instance, enterprises that adopted more standardized practices between 2005 and 2010 also saw improvements in their productivity and profitability during those years, and were more likely to grow and survive after 2010. Plants within the same firm that have more structured management practices also achieve better performance outcomes than plants in the same firm with less structured practices.

As noted, our analysis focused on four primary factors to explain these measurements: Product market competition, business environment, learning spillovers from large manufacturing plant entry (primarily plants of multinational corporations), and education.

Specifically, we found the following:

1. To evaluate the causal impact of **product market competition**, we used two strategies. First, we calculated the [Lerner index](#), a measure of market power, for our plants. Second, we exploited changes in exchange rates that differentially affect industries over time. We found a positive impact on management practices, particularly for those in the lower tail of the structured management distribution. Tougher competition is significantly correlated with more structured management practices: Policies intensify when competition increases, probably as a condition for survival. In particular, competition prompts more diligent management practices among poorly managed companies, which will be forced to exit the market if they don't adapt.
2. To evaluate **business environments**, we considered both the location of plants around the border between “right-to-work” and non-right-to-work states, and also the location of firms' founding plants to identify the impact of business environments on management practices. We found that right-to-work rules –which proxy for the state business environment including reduced influence of labor unions as well as “pro-business” policies, such as more lax environmental and safety regulations– seem to increase structured management practices around firing and promotions, but seem to have little impact on other practices.

THE MANAGEMENT – PRODUCTIVITY CONNECTION

Erik Brynjolfsson and John Van Reenen

3. To investigate **learning spillovers** we built on Greenstone, Hornbeck and Moretti's (2010) identification strategy using what they called "million-dollar-plants" – large investments for which both a winning county and a runner-up county are identified. Comparing the counties that "won" the large, typically multinational plant, versus the county that narrowly "lost," we find significant causal impacts on management practices, productivity, and wages. Interestingly, this is only if the winning plant was also a manufacturing plant, suggesting localized management practice spillovers tend to be mainly within the same sector.
4. We also found significant effects on management practices and **human capital** as a result of educational opportunities and proximity to a land-grant college. This was true despite a range of controls for other local variations in population density, income, and other county- and firm-level controls.

Furthermore, we found that the more structured management practices are correlated not only with higher productivity, but also with improvements in other measures of performance including profitability, innovation, and growth.

Both plant- and firm-level factors are important in explaining differences in management practices across plants. Nearly half (48.7%) of differences are across plants at the same firm. Moreover, the share of management practice variations accounted for by the parent firm declines along with the overall size of the firm, as measured by the number of establishments. This is presumably because larger firms find it harder to fully align practices across their plants, generating a wider spread within the firm.

Although all of our causal drivers are qualitatively important, their quantitative size is not enormous, with

our estimations suggesting they account for about 30% to 50% of the variation in management practices. This leaves ample room for new theory, data, and designs to help understand one of the oldest questions in economics and business: Why is there such large heterogeneity in management practices?

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The original research paper, *What Drives Differences in Management?*, was published by the National Bureau of Economic Research, March, 2017, [here](#).

Read the blog summarizing this research in *Sloan Management Review* [here](#).

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