Managerial Practices for Improved Productivity of Skilled Workers in the UK

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Sector(s): Environment & Energy, Firms

Sample: 335 airline captains

Target group: Workers

Outcome of interest: Productivity

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Research Papers: The Impact of Management Practices on Employee Productivity: A Field Experiment...

Partner organization(s): Virgin Atlantic Airways (VAA), University of Chicago

Understanding what managerial practices help skilled workers improve productivity is an under-researched question. Researchers worked with an airline to test the impact of different types of information and incentives on pilots' productivity, as measured by pilots' implementation of fuel-saving practices. Provision of personalized targets for achieving these fuel-saving practices led pilots to implement them more frequently without increasing flight delays.

Policy issue

Managerial practices can greatly influence worker productivity. Meanwhile, worker performance, particularly that of skilled laborers, can greatly affect firm productivity and costs. In the commercial aviation industry, some benefits of improving management strategies for airline captains include lowered fuel costs, reduced flight delays, and higher safety. These outcomes also matter for other stakeholders: reduced fuel usage leads to lower greenhouse gas emissions, and flight timeliness and safety improvements are significant to consumers and governments. However, limited evidence exists on the impact of management interventions on productivity for skilled laborers such as airline captains.

Context of the evaluation

Researchers worked with Virgin Atlantic Airways (VAA), a United Kingdom-based commercial airline. In 2007, VAA launched its sustainability program, "Change is in the Air," with the goal of reducing carbon emissions.[1] Additionally, VAA maintains strict safety standards that captains must adhere to and prioritize in all flight-related decision-making.

There are various ways that pilots can impact the productivity of their airlines, in line with these concerns of emissions and safety. In this study, three measures of productivity for airline captains were considered: pre-flight fuel load, efficient flight, and efficient taxi. Just before each flight, captains can recalculate how much fuel to onload using total plane weight after boarding. During each flight, captains can request information from air traffic control to make flight path adjustments or control speeds to decrease fuel usage based on real-time weather changes. At landing, airplanes with multiple engines do not require all engines to taxi on the ground, so captains can save fuel by shutting off unneeded engines. By saving fuel in all three of these practices, airline captains

can reduce fuel costs and emissions, contributing to VAA's sustainability goals.

However, in a pre-study, 13-month observation of average behavior with all 335 eligible VAA captains, the researchers found that pilots performed the standard pre-flight calculation of fuel needs based on the boarded aircraft's weight in 42 percent of flights compared to VAA's target of 100 percent. As for in-flight adjustments, pilots were found to complete flights using more fuel than was projected in 31 percent of flights. While avoiding safety risks does occasionally require pilots to sacrifice fuel efficiency, this attainment level is seen as low compared to the likelihood of such safety risks. Lastly, captains shut down an engine while taxiing to gate post-flight in 34% of flights in this pre-study measurement.

In general, airline captains have a strong sense of professional identity, social obligation, and organizational mission characterize their roles. They also are characterized by high human capital investments and earn high incomes. However, wage and other incentive structures in the airline industry are difficult to alter to encourage desirable behaviors in captains.



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Details of the intervention

In partnership with VAA, researchers conducted a randomized evaluation to test the impact of several different management practices on fuel-related productivity by commercial airline pilots. All captains received an initial letter stating that VAA would be undertaking a study on fuel efficiency, and that there would be monitoring of the pre-flight, in-flight, and post-flight behaviors listed above. The letter assured them that their results and responses to surveys would be anonymous and VAA would not have access to individual-level responses. It also listed the four different groups to which they might be randomly assigned:

1. *Comparison (monitoring) group (85 captains):* Captains who were assigned to the comparison group were aware from the letter that their behaviors would be monitored but did not receive any further intervention.
2. *Informational performance feedback (85 captains):* Captains received feedback on the percentage of flights in the preceding month where they successfully implemented each of the pre-flight, in-flight, and post-flight metrics.

3. *Target setting (81 captains):* Captains received the same type of feedback in the informational performance feedback group, as well as written encouragement to achieve personalized targets set at 25 percentage points above their pre-experimental attainment levels.
4. *Prosocial incentives (84 captains):* Captains received the same type of feedback and personalized targets received in the prior two groups, but in addition, they also were informed that achieving personalized targets for a given metric would result in £10 donations to a charity of their choice, allowing them to 'donate' up to £30 to their chosen charity per month if they met targets for all three metrics.

Captains in the three latter groups received letters one week before the start of study interventions informing them of what changes they should expect in the coming months, which varied according to their assigned group.

Results and policy lessons

Measures of pilots' productivity improved most in the target setting intervention group. Given the comparison group received notice that researchers were monitoring their performance data, the researchers used techniques other than randomized impact evaluation methods to discern the apparent impacts on performance in the comparison group in addition to those in the treatment groups.

Pre-flight calculation of fuel load: Pilots in the comparison group increased their performance of this practice compared to before they were aware of monitoring. Importantly, this result was measured within the same group of pilots over time, not accounting for other potential influences changing over time. None of the intervention groups increased their practice of calculating fuel load before the flight significantly more than the comparison group.

Efficiency during flight: Similarly, pilots in the comparison group increased the number of efficient flights compared to before they were aware of monitoring, as estimated by non-randomized methods. The group that received personalized targets in addition to information on their monthly performance increased in-flight efficiency measures compared to the comparison group more than the other two intervention groups. Six months after ending the intervention, the researchers found that intervention groups decreased their performance of the efficient flight practices, suggesting that repeated performance feedback would be beneficial.

Efficiency after landing: Again, pilots in the comparison group increased the frequency with which they turned off redundant engines after landing compared to before they were aware of monitoring, as estimated by non-randomized methods. Personalized targets led to greater post-landing fuel efficiency. On average, pilots in the personalized targets group implemented efficient taxi on 19 percent more flights than the comparison group, an increase of almost 10 percentage points. The addition of prosocial incentives did not significantly change this impact.

Other impacts on airline operations: Using a fixed estimate of emissions at 3.15 tons of CO_2 per ton of fuel, the intervention groups' increased implementation of fuel-saving practices compared to the comparison group prevented almost 4,300 tons of CO_2 emissions. When including the impact of monitoring on the comparison group, as estimated by non-randomized methods, the decrease in CO_2 emissions approximately equals 24,472 tons of CO_2 emissions. None of the interventions increased flight delays.

Pilot well-being: While the captains in the prosocial incentives group did not increase their implementation of fuel-saving productivity practices more than other intervention groups, they did report a .37 percentage point, or 6.5 percent, increase in a reported job satisfaction rating compared to captains in the control group.

Following this research, the researchers played various roles in supporting a start-up, Signol, that focuses on efficiency in the aviation and maritime industries.

1. Virgin Atlantic. “The Environment. Our Three Priorities.” Accessed February 2, 2024. https://flywith.virginatlantic.com/us/en/stories/the-environment-our-three-priorities.html