Promoting adoption of management practices from the outside:

Insights from a randomized experiment

Abstract

We conducted a Randomized Controlled Trial (RCT) to explore the role of government information intervention on a firm's management practices and performance. Specifically, we studied whether providing managers with information regarding the benefits of Quality Management practice (QM) can enable government to influence manager perception and adoption of QM, output quality, and firm performance. Our main finding demonstrates that the information intervention improves manager perception of QM benefits; this, in turn, encourages managers to adopt QM, leading to improvements in quality and firm performance.

INTRODUCTION

A positive link between management practices such as Operations Management (OM) and firm performance has received considerable attention in the literature (Sousa and Voss 2008). Interestingly, we still observe large differences in the ways firms adopt these practices (Bloom et al., 2013). Knowledge regarding why firms do not adopt basic management practices is as important as the benefits of good management. Numerous firms—especially in emerging economies—do not employ many simple, already widespread practices, such as Quality Management (QM). Why is this so, and what can be done to encourage firms to adopt these practices?

Our study contributes to the literature by focusing on the role of government intervention in promoting firms to improve QM practice. An emerging strand of literature has shown that improving business practices through consulting services can improve firm performance and growth (e.g., Bloom et al., 2013; Anderson et al., 2017; and Bruhn et al, 2017). Management consulting, however, can be costly and, from a policy perspective, not easily scalable for reaching many firms. In this study, we explore an alternative solution by exploring the role of the government intervention. Specifically, expanding insights from extant studies, we take a step back and show that by simply providing information on the benefits of sound business practices—such as QM—the government can encourage firms to make a change for the better in management practices, resulting in superior performance. By doing so, we make an interesting contribution to the literature and provide policy-relevant findings.

Focusing on the role of government intervention in promoting the adoption of QM practice, our study also joins and expands emerging literature that examines the link between external factors and a firm's internal changes, especially in the area of sustainability.

Nguyen (2018) noted that governments have dedicated tremendous resources to regulatory policies and incentive mechanisms, to encourage firms to invest in technology such as energy efficiency improvements. Dhanorka et al. (2017) showed that government intervention can have a significant impact on a firm's environmental improvements – using two different approaches. First, the government can force firms to change through punitive tactics. The second approach encourages firms to change, through supportive strategies. Likewise, Zhao et al. (2015) explored the impact of command-and-control regulation versus market-based intervention - on Chinese firm behavior and competitiveness. The authors noted that both approaches promote change in the firm's behavior towards green development, and enhance the firm's competitiveness.

Another contribution of this study is to address a practical operations management question. Ketokivi and Schroeder (2004) noted that identifying drivers of firm performance has always been an important question in operations management research. However, researchers face a significant challenge in exploring the causal relationship between management practices and firm performance. In cross-sectional studies, for example, endogeneity from omitted variables can confound the researcher's ability to quantify the effect of QM practice on firm performance. Likewise, reverse causality concerns can preclude directional conclusions about the impact of information. For example, does better performance offer firms more opportunity and resources to collect relevant information, or, conversely, does better information improve firm performance?

To address the above challenges, we conducted a Randomized Controlled Trial (RCT) with 328 small firms. We first administered a survey to firm managers to elicit their perceptions about the benefits of adopting QM. Next, we randomly assigned firms into control, placebo, and treatment groups. The main difference between these groups is that only managers in the treatment group received information about QM benefits. Finally, to

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evaluate the impact of the information provision both in the short term and long term, we collected end-line data on the managers' perceptions and firm's outcomes after 12 months and 24 months of the experiment.

The main results can be summarized as follows. We find a considerable variation in managers' perceptions of QM benefits. Providing information/statistics significantly decreased the managers' misconceptions about QM benefits. This result suggests that part of the dispersion in perceived benefits came from the managers' lack of information/statistics. Regarding the effect of the intervention, we notice that managers who received the information updated their perceptions about QM benefits. Once this was done, they were more likely to adopt QM; this behavioral change led to improved firm performance. Finally, it is worth noting that the intervention took effect not only after the first year of the experiment but also continued in the following year.

RELATED LITERATURE

The link between manager perception and strategic decision-making has attracted much attention in the literature (Gary and Wood, 2011; Helfat and Peteraf, 2015). For example, Gibbons and Henderson (2011, 2013) suggest that GM's lower performance in quality of output compared to competitors may be related to the manager's misperception—or the inability to recognize that the world is changing. Studies by Rosenbloom (2000), Taylor and Helfat, (2009), Tripsas and Gavetti (2000), and Helfat et al., (2007) also note that manager perception played a significant role in supporting a firm's transition to a new business model. More related to our paper, Sadun et al. (2017) observed that poor management practices might be linked with the manager's false belief that the firm's performance is merely satisfactory.

Given the role of managers' perception in corporate decision-making, it would be interesting to explore the following related questions: 1. Do managers have a correct belief/perception regarding benefits of sound practice such as QM? 2. Does providing managers with information about the benefits of QM promote change in the adoption of QM—resulting in changes in firm performance? To address these questions, we conduct an RCT to explore the role of government's information intervention. In doing so, we join the emerging literature on the role of information in firm decision-making (Haas et al., 2015; De Dreu et al., 2008). Focusing on a cost-effective intervention such as information provision, we also expand the existing literature, which examines interventions via which governments can promote firms to adopt internal changes (Dhanorka et al. 2017; Nguyen 2008; and Zhao et al. 2015). [1]

Before moving on, it is worth noting that it is possible for an information intervention to have no effect, for at least the following reasons: a. it fails to change the managers' beliefs, b. their beliefs do not change enough to induce an adjustment in their behavior, or c. those beliefs are irrelevant to the decision-making process. In this study, we expect that the government's information intervention induces a change in a manager's perception of QM benefit. Such change leads to change in the firm's adoption of QM practice. Finally, we would expect a positive link between change in QM adoption and firm performance.

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[1] An alternative approach is to explore whether the information intervention that relies on specific quantitative data vs. big picture, grand, qualitative data would yield similar outcomes. Would the information intervention that is introduced by "government" officials (authority figure) vs. non-government or private personnel vs. no-personal-contact/mail delivery yield similar outcomes? Also, if the institutional theory is used as the theoretical foundation, then the information presented to firms would be somewhat different and the focus may be geared towards the isomorphism of the firms in adopting certain practices. 5

STUDY CONTEXT

Our study focuses on textile firms in Vietnam. Goto (2012) noted that though most of these firms are small and medium-sized (SME), they play an important role in national socioeconomic development. The export value of textile and garment products in recent years has ranked number two among the contributors to the country's total export revenue (Goto, 2012). Yet, most textile firms have low productivity, which may be attributed to inadequate management practices (Nadvi and Thoburn, 2004; Goto, 2012). Along this line, it is a matter of natural interest to explore factors driving management practices among textile firms—and whether implementing a cost-effective intervention would encourage these firms to adopt QM, leading to improvement in productivity and performance.

It is worth noting that managers of these textile firms do not have much information/statistics about the benefits of basic management practices, although they are aware of these practices.[2] According to the Vietnam Small and Medium Enterprise Survey 2010 (VSME), many managers (84%) found it hard to estimate—or misperceived—the benefits of adopting certain basic management practices such as QM. This suggests that managers lack information/statistics about the benefits of adopting QM. This information gap may contribute to the low adoption of QM, despite its importance in improving firm performance.

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[2] Although Vietnam is an emerging country, it has access to QC practices from the rest of the world. Currently, the Ministry of Planning and Investment (MPI) organizes training and serves as a resource center to develop quality practices further. In addition, the presence of many multinational companies in Vietnam increases awareness of quality practices, implying that QC knowledge is widely available.

The role of government in promoting SMEs

Vietnam has long recognized the crucial role that SMEs play in the national economy. The government has established numerous specific programs and policies to support SME growth: examples include financial access, human resource development, technical support, and trade and export promotion (Cuong et al., 2007; Hoang, 2016). Importantly, the SME business support centers at the provincial and national levels have organized various training sessions to facilitate SME businesses to run more effectively and make a greater contribution to national economic development. Many of these training programs are government-funded. For example, the Hanoi Department of Planning and Investment has recently extended financial support to its SME Support Center to collaborate with the Institute of Business Administration (FSB) in organizing a training program for 250 managers on CEO knowledge of the Industrial Revolution 4.0.[3]

Given that the government has played an active role in promoting the growth of SMEs, it would be of great relevance to explore evidence-based government interventions that bring positive internal changes to firms. Along this line, our study focuses on a simple initiative—to provide managers with information about the benefits of QM practice.

STUDY DESIGN

We proceeded with our study in the following stages. In the first stage, we selected firms from the Vietnam Small and Medium Enterprise Survey 2010 (VSME) mentioned above for

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[3] Together with the program "Starting a business," the CEO training program in Hanoi is part of the plan to support the development of small businesses. The two programs are expected to train 2,300 students from businesses in the city. Source: https://fpt.com.vn/vi/tin-tuc/chi-tiet/khai-giang-chuong-trinh-dao-tao-250-giam-doc-dieu-hanh-tai-ha-noi

inclusion in the study.[4] We then conducted a baseline survey with the selected firms. In the second stage, we randomly assigned firms into three groups: TG0, TG1, and TG2. Firms in the control group TG0 neither received information, nor were part of a meeting organized by MPI officials. Firms in treatment group TG1 received the information intervention. Firms in the placebo group TG2 participated in a placebo meeting. Finally, in the third stage, to evaluate the impact of the intervention, we conducted surveys with firms in our study 12 months later and 24 months later. Further elaboration on these stages follows.

Sample selection and baseline survey

We selected our sample of firms from the 2010 VSME survey. Most relevant for our purpose, the survey asked firms in the Textile, Clothing, Leather and Footwear (TCLF) sector whether they practiced *recording quality problems by type*.[5] For simplicity, we refer to this practice as Quality Management (QM). Another important and related variable is the Quality

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[4] The VSME survey is collaboratively conducted by the Ministry of Investment Planning (MPI), and the National Economics University (NEU). The survey has a sample of 3284 SMEs, mostly in manufacturing and textile industries. These firms are randomly selected by economic regions of Vietnam. The survey consists of following modules. The first module focuses on firm's management team background, the second on firm's management practices and the third is about firm's strategic decisions such as R&D investment, while the last module is about financial reports.

[5] The use the recording of quality problems by type as a key indicator for the presence of a quality management system is in line with Bloom et al., (2013). Specifically, Bloom et al., refer to quality control as including the following: recording quality problems by type, analyzing these records daily, and formalizing procedures to address defects to prevent their recurrence.

Defective Index (QDI). In line with Bloom et al. (2013), QDI is defined as a severity-weighted average of the major types of defects. In addition, data from the survey allows us to estimate firm performance. As a validity check of the QM and QDI reported in the VSME survey, our research team conducted audits with random firms in our sample. Specifically, we observed the QM practice of these firms and counted their defects on-site. Reassuringly, we found consistency between the results from the audit study and those reported in the 2010 VSME survey.

Our selection of firms as participants in the experiment is based on the following criteria. First, managers are also the firm owners; hence, they play a key role in the firms' decisions, including management practices. Second, all firms in our sample did not adopt QM at the baseline—i.e., they did not practice recording quality problems by type at the time we conducted the baseline survey. These two criteria yielded a sample of 526 potential subject firms from the 2010 VSME survey. We invited all 526 firms, of which 328 firms agreed to participate in our study.[6]

After having selected firms, we collaborated with the Ministry of Planning and Investment (MPI) and the National Economics University (NEU) to conduct the baseline survey with the 328 participating firm in December 2010 and January 2011. The aim of the baseline survey is to update firm's characteristics collected from the 2010 VMSE survey, as well as to provide us with additional information about the characteristics of the firms, managers and employees. Table 1 presents the descriptive statistics of firms in our study from the baseline survey.

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[6] We also focused on small firms (with 5 to 20 employees), and excluded multinationals. All these firms produce fabric for the domestic market, but do not export. Geographically, we focused on firms in Hanoi and Ho Chi Minh City, to reduce the travel time for our surveyors and research assistants.

Most importantly, we elicited the manager's perception regarding the benefit of QM practice in the baseline survey. The elicitation procedure is detailed further below.

Manager's perception of QM practice

To elicit the manager perception of QM benefits, we first asked the managers about their perceived benefits of adopting QM for a typical firm in the textile industry: [7]

"Please estimate the average Quality Defective Index (QDI) of a current textile firm—which is more or less of the same size as your firm—that implements recording quality problems by type."

Next, we asked managers to estimate their own firm's QDI in a hypothetical case—i.e., in a case where they adopted QM:

"Suppose that your firm adopted recording quality problem by type this year. How much do you think your firm's QDI would be next year?"[8]

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[7] We noticed that it is not only managers' beliefs about the relationship between QC and QDI that should matter for adoption decisions, but also their beliefs about the relationship between QC and firm performance. In a pilot study, we elicited the manager perception regarding the relationship between QC and their firm financial performance. However, the data is very noisy – probably because the managers find it difficult to estimate the financial performance. Many managers told us that they had no idea how the competitors were performing in the market – which would influence their own firm's sale performance.

It is also worth recalling that "*recording quality problem by type*" refers to a QM practice.

[8] The difference between this question and the previous one is interesting, because it could be used to infer something about whether managers took the statement provided in the information treatment to be a causal one.

Description of the intervention

Having completed the baseline survey, in the next stage, we collaborated with MPI and NEU to launch the intervention in February 2011. We first randomly assigned the 328 firms into three groups: control (TG0), treatment (TG1), and placebo (TG2). [9] Managers in treatment group TG1 received information/statistics about the benefits of adopting QM, in a 40-minute meeting with an MPI official. Managers in the control group TG0 were not exposed to any information from our experiment, nor did they participate in any such meeting. The placebo group TG2 had a placebo meeting, which also lasted 40 minutes. However, managers in the placebo group did not receive information/statistics about QM benefits. [10] Table 1 describes group assignment of firms in accordance with our study design.

To conduct the intervention, officials from MPI local offices—in the same districts where the firms in our study were located—visited selected firms in our experiment. It is noteworthy that it is a common practice for government officials at the local level to have meetings with managers of firms in the geographical area. In these meetings, the officials and managers typically discuss the economic conditions, new policies and regulations. Managers can also discuss any concerns and suggestions with officials.

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[9] The assignment was stratified by firm's sales per employee and location, according to findings from the 2010 VSME survey.

[10] The placebo meetings covered topics such as economic policies and matters that are expected to have no effect on QM practice (e.g., changing the workers' shifts).

Content of the information intervention

In the treatment group TG1, managers received the "statistics/information" intervention during a meeting with MPI officials, which lasted approximately 40 min. In the meeting, MPI officials provided managers with information about the benefits of adopting QM. First, the audiences learned a few simple statistics based on the 2010 VSME survey, focusing on small textile firms. The MPI officials then presented the QDI scores of firms adopting QM —as follows:[11]

On an average, in 2010, textile firms adopting QM had QDI of 12%

To ensure the quality and consistency of the intervention, all officials and research assistants in our experiment attended a half-day training on how and what information to deliver during the meetings with managers. The trainees were provided a set of structured conversation points and themes that they would discuss with managers at the meeting; as such, we enabled consistency across all visits.

Randomization check

An important feature of our RCT design is that it randomizes firms into different groups: TG0, TG1 and TG2. To check whether the groups were properly randomized, we explored whether any difference existed between groups at the baseline. To do so, we ran regressions using the baseline's firm-specific variables—including QDI, profit level, firm age, manager tenure, and the manager's years of schooling as the dependent variables. The independent variables were binaries indicating if the firm was assigned to TG0 or TG1 group.

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[11] The QDI score of 12% refers to the actual statistics from the 2010 VSME survey. On an average, firms which adopted QM had QDI of 12%, compared to 35% for those which did not.

The reference was the placebo group TG2. If the estimated coefficient for the treatment group TG1 was not significant, there was no significant difference at the baseline – between firms in TG1 and TG2 groups.

Table 2 represents the findings. As expected, given the randomized design of our study, all key firm-level specific variables are statistically indistinguishable across treatment group TG1, control group TG0, and placebo group TG2. For example, column 1 explores whether the groups had a different QDI at the baseline. The coefficients for treatment group TG1 and control group TG0 are insignificant with a low point estimate. This result indicates that no difference exists in the QDI score between groups at the baseline. Likewise, columns 2 to 6 show that firms in TG1 and TG2 did not exhibit any significant differences in other key variables at the baseline. In addition, our test for coefficients comparison shows that the coefficients for TG1 and TG2 are insignificantly different. As such, firms in these two groups also share the same characteristics at baseline.

---Table 2 is here---

ESTIMATION STRATEGY AND RESULTS

In this section, we explore the distribution of the managers' prior perceptions of the benefits of adopting QM. We then compare these perceptions to the actual benefit estimated from the 2010 VSME survey. Finally, we evaluate the effects of the information intervention on the manager's perception of QM benefits.

Perceived Benefits of Adopting QM

First, we define the manager's perceived benefit of QM adoption—for his own firm and for a typical firm in the textile industry —as follows:

$$Perceived\ benefit = \frac{QDI\ (No\ adopting\ QM)\ -\ Perceived\ QDI\ (Adopting\ QM)}{QDI\ (No\ adopting\ QM)} \quad (1)$$

where $QDI\ (No\ adopting\ QM)$ refers to QDI score in case of not adopting QM; $Perceived\ QDI\ (Adopting\ QM)$ refers to manager's perception of QDI score in case of adopting QM.

----Table 3 is here---

Table 3 presents the statistics regarding the managers' perceived benefits of QM. Column 1 explores manager-perceived benefits of QM for their own firms, whereas column 2 presents manager's perception of QM benefits for a typical textile firm. Panels A and B report the median and standard deviation respectively. We can note a great variation in the managers' perceived benefits of QM. Panels C and D of Table 3 display the mean and standard deviation of perceived benefits, and the actual benefits as estimated from the 2010 VSME survey. It is worth noting that the standard deviation in the managers' perception of QM benefits is greater than the standard deviation estimated from the VSME survey. This suggests that manager's perception of QM benefits appears to have a larger variance than the actual benefit. Further, it is worth noting that the mean of manager-perceived QM benefits is significantly smaller than the benefits estimated from the VSME survey. These results evidence manager's misperception of QM benefits.

Factors affecting manager's perception of QM benefit

Given that managers seem to misperceive the benefits of QM, it would be interesting to explore factors responsible therefor. We refer the manager's misperception of QM benefit as the difference in absolute terms — between the manager's perception of QDI and the QDI observed from the 2010 VSME survey, conditional on QM adoption. Specifically, we define:

$$Misperception = \left| Observed\ QDI(\ Adopting\ QM) - Perceived\ QDI\ (\ Adopting\ QM) \right| \qquad (2)$$

where *Observed QDI*($Adopting\ QM$) refers to average QDI score of firms adopting QM – estimated from the 2010 VSME survey. *Perceived QDI* ($Adopting\ QM$) refers to manager's perception of QDI score in case of adopting QM.

Table 4 presents the determinants of manager misperception. It is worth noting that managers with limited training in management have lower levels of misperception $(\beta = -4.57,\ p < 0.06)$. Likewise, managers with higher levels of education perceive the benefits of QM better $(\beta = -8.28,\ p < 0.008)$. Given the correlation between cognition and education, the negative link between education and manager's misperception of management practices found in this paper is in line with the Helfat and Peteraf (2015) study on the role of managers' cognition in managers' strategic choices. Interestingly, firms operating in major cities perceived the benefits of QM better. This could be attributed to the fact that information is usually more accessible in the cities than in rural areas. Other demographic and firm-specific variables do not show any significant effect on manager misperception of QM benefits.

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Evaluating impact of information intervention

To access the impact of the intervention, MPI officials and our research assistants collected information on manager perception of QM benefits, their management practices and profit level - one and two years after the experiment. As such, we can examine whether the information interventions induced managers to adopt QM practice leading to improvement in product quality and financial performance.

It should be noted that we recruited our own surveyors to collect information about QM and QDI, rather than depend on the manager's self-reporting. This was to avoid the Hawthorne effects—i.e., "they told me about quality management, so now I say I have low defect rates to please them." These surveyors were not aware of our current project. In addition, they were recruited independently and had no connection with the MPI. The main job of surveyors was to directly watch production and count defects among firms in our study. To do so, our surveyors randomly visited firms one day per month to observe and collect information. In addition, we asked the surveyors to report major changes in the production process during the timeframe of our experiment. Thus, we could identify whether the government information triggered something like a "Pygmalion effect" or self-fulfilling prophecy (e.g., Eden, 1993). For example, the intervention informs firms that they will improve by adopting QM, so the firms may begin to act in certain ways.

Model specification

In line with the feature of the experiments, to estimate the impact of the information intervention, we implemented the following econometric model specifications:[12]

$$Y_i = \alpha + \gamma \, Information_i + \phi Control_i + \delta X_i + \eta Y_{BL} + \varepsilon_i$$

where Y_i is an outcome variable for firm i. Specifically, Y_i can be one of the following: adoption level of QM, QDI score or profit level per employee.[13] $Information_i$ is a binary variable equal to 1, if manager i receives the information treatment. The reference variable is an indicator variable for firms in the "Placebo" group. [14] We also include a binary variable $Control_i$ to represent firms in the "Control" group. Our coefficient of interest is γ, which gives an estimate of the comparison on the outcome variables Y_i - between the treatment (TG1) and placebo (TG2) groups.

X_i refers to a vector of firm-specific variables including firm age, number of employees, manager age, manager education, and manager tenure at the current firm. [15] Y_{BL} is the value of outcome variable Y_i at baseline - i.e., before the experiment. We include Y_{BL} to improve the explanatory power of the dependent variable, and the precision of the coefficient

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[12] Given that some of our DVs are measured in difference scores, we also considered the suggestion of Edwards (2001) by running polynomial regressions. The findings are consistent with what we report here.

[13] We also use other variables to proxy for firm performance. The findings are almost the same as are reported here. They are presented in Appendix 1.

[14] We use the Placebo group (TG2) rather than the Control group (TG0) as the reference category in the model to give a more robust estimation of the treatment effect. This is because the only difference between TG2 and TG1 is whether information about QM benefits is provided to managers. On the other hand, the difference between TG1 and TG0 could not only be due to information intervention but also due to having a meeting with MPI official.

[15] We include covariates at the baseline is to improve precision i.e., to reduce standard errors (Athey and Imbens, 2017). See Augsburg et al., (2015) for an example of using baseline covariates for impact evaluations.

estimates.

Impact of the intervention on the managers' perception regarding the benefit of QM practice

In this section, we examine whether managers in the treatment group (TG1) updated their perceptions of QM benefits. Table 5 presents the main findings. The dependent variable is the manager's misperception of QM benefits defined in equation 2 —i.e., the difference in absolute terms between the manager perception of the QM benefit and the actual benefits. Columns 1 and 2 focus on factors affecting the manager's misperception 12 months after the intervention. Column 1 shows that relative to the placebo group, providing information significantly reduced the managers' misperception of QM benefit for their own firms $(\beta = -0.28, p < 0.008)$. Likewise, column 2 shows a significant improvement in the manager perception of QM benefits for a typical firm in the textile industry. Interestingly, we notice from columns 3 and 4 that the effect of the intervention on manager's perception persists, though less significant, even after 2 years of the experiment $(\beta = -0.19, p < 0.1)$.

---Table 5 is here---

Impact of the intervention on adoption of QM practice

This section explores whether managers in the treatment group TG1, having updated their perceptions of QM benefits, changed their QM practice. In addition, we examine the effect of the intervention on QDI scores. Table 6 presents the main findings. Column 1 in Panel A presents the effect of the intervention on the likelihood of adopting QM one year after the experiment. Compared to managers in the placebo group TG2, those in treatment group TG1 are 22% more likely to adopt QM —i.e., the information intervention increased

QM adoption by 22%. [16] This effect is both statistically and economically significant. It's interesting to note that the effect of our information intervention on QM adoption is somewhat lower than that in Bloom et al. (2013). [17]. A stronger effect in Bloom et al., (2013) could be attributed to a more intensive and expensive intervention — i.e., management consultants. Finally, column 2 in panel A presents the effect of the information intervention on QDI scores. As with QM adoption, the information intervention improved QDI, though the effect was significant at only the 10% level.

We next explore whether the information intervention sustains its impacts. Panel B in table 6 shows the effect of the information intervention two years after the experiment. We can notice that the intervention still has a significant impact on improving QM adoption and QDI scores. Compared with firms in the placebo group (TG2), those in the treatment group (TG1) were more likely to adopt QM and experience improvement in QDI scores $(\beta = 0.15, p < 0.02)$—even after 2 years of the intervention.

---Table 6 is here---

Impact of the intervention on firm performance

We have shown in previous sections that information intervention encourages firms to adopt QM practice, which in turn plays a role in improving the product quality as measured by an

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[16] As a robustness check, we run a simple difference regression that does not control for baseline level. This regression gives very similar coefficients, but less precise estimation.

[17] For example, in our study, firms in the treatment group increase QM adoption by of 28% after one year. Bloom et al. (2013) found a 38% increase in quality-aligned management practices.

improvement in QDI score. This section explores whether the intervention improves firm financial performance, as measured by profit level.[18] As in previous sections, we investigate both the short-term effect i.e., one year after the experiment—and the long-run effect i.e., two years thereafter.

Table 7 presents the main findings. Column 1 shows that on an average, relative to those in the placebo group (TG2), firms in the treatment group (TG1) experienced a greater increase in profit ($\beta = 5245, p < 0.008$) one year after the experiment. In addition, the positive effect of the information intervention on firm performance was sustained even after two years ($\beta = 2568, p < 0.07$). These effects are both economically and statistically significant.

---Table 7 is here---

Heterogeneous treatment effect

Given the great variance in manager perception of QM benefits an interesting question is whether the effect of the information intervention would vary according to the managers' prior perception. We expect that managers whose prior perception of QM benefit fell below the actual benefit derived from the VSME survey, would respond more to the intervention. Along this line, we are interested in the interactive term between the "information" intervention and the managers' prior perception of QM benefit. Please refer to Appendix 2 for an elaboration of our model specification.

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[18] We also use other variables as proxy for firm performance including total sales, ROCI, and market shares. The findings are almost the same as those we reported here. They are available upon request.

Table 6 shows that providing information significantly increased QM adoption by managers who initially underestimated the benefits of QM ($\beta = 0.24$, $p < 0.01$).[19] Regarding firm performance, we examine whether firms with lower prior perception of QM benefit gained more from the intervention. Table 7 presents the main results. We observe a positive and significant coefficient of the interactive term between TG1 and manager's prior perception. This finding suggests that managers who underestimated the benefits of QM enjoyed greater improvement in profit.

A validity check on the impact of the information intervention

This section explores an important question: whether the information intervention did in fact influence manager perception of QM benefits, and whether it actually influenced a manager's actual behavior in adopting QM. For example, a manager may change his belief about QM benefits simply due to a meeting with an official—even if the meeting has nothing to do with information about QM benefits. To address this concern, we have incorporated the reference variable TG2— i.e., the placebo group in which we organized a "placebo" official-manager meeting. The "placebo" official-manager meetings were conducted in a manner identical to those in treatment group TG1—except that no information about the benefits of QM was provided. Hence, the coefficient of TG1 – by comparing firms in TG1 and TG2 groups - represents the effects of the information intervention itself.

It is worth mentioning that we also included in the model the "pure control" group, TG0. Managers in this group did not come into contact with any announcement from our experiment or attend any meeting organized by the experiment. The coefficient of TG0

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[19] A concern in interpreting these results as Bayesian updating is that "under-estimating" might be correlated to other factors impacting QDI scores.

indicates whether any difference exists between managers in "placebo" group TG2 and control group TG1. If yes, then the effectiveness of the information intervention is questionable. This is because such difference indicates that simply having a meeting with an official would change the manager's perception and behavior - even if the meeting had nothing to do with information about QM benefits. From tables 5, 6, and 7, we can notice that the coefficients for TG0 are insignificant in all model specifications. In other words, firms in placebo group TG2 did not experience significant change in QM practice, product quality, and firm performance - compared to those in control group TG0. These results suggest that a mere meeting with an official does not have a significant impact on the manager's adoption of QM practice, QDI scores, and firm performance.

The causal effect of QM practice on firm performance

In this section, we explore a challenging question regarding the causal relationship between QM and firm performance. It is difficult to identify whether QM improves firm performance or whether firms with better performance have more resources to invest in QM practices. To our knowledge, Bloom et al. (2013) is the only study that addresses the causal link between management practices and firm performance using an experiment. In the context of our study, given the random assignment of firms to different groups, we can estimate a regression of firm performance on QM adoption using an instrumental variable approach. Specifically, considering that firms are randomly assigned to TG0, TG1, and TG2 groups, we use *information intervention*—i.e., the binary variable indicating whether a firm is assigned to the treatment group (TG1)—as the instrumental variable for QM practice. [20]

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[20] The random assignment allows the instrument to meet the exclusion restriction.

Table 8 presents the results from the second stage of the 2SLS model. [21] The main finding is that adoption of QM causes a significant increase in firm profits ($\beta = 4688$, $p < 0.006$).

-----Table 8 is here---

Does the information spill over to other firms?

Given the benefits of information provision —as evidenced by improvement in profits among firms in the treatment group—we would like to know the degree of spillover of the information to other firms. To address this in a follow up survey (run from June 2013 to October 2013), we focused on each of the 128 firms in control group TG0 and a sample of 6 small firms in the same districts as those in treatment group TG1. We asked whether they had known anything about the project run by the Ministry of Planning and Investment. In line with Bloom et al. (2013), we found a negligible level of spillover—only 5% reported hearing any details of the intervention and consequently implemented QM practice. As such, managers in the experiment seemed not to share information regarding benefit of QM practice with outsiders and competitors.

Attrition rate

After one year of the experiment, there were 276 firms remaining in the study sample, implying an attrition rate of 16%. After 24 months post-intervention, there were 247 firms remaining in the study sample (11% attrition rate). Together, 81 firms dropped out of the initial sample (n= 328) 24 months after the intervention (n= 247). Our attrition pattern was comparable to other small business RCT studies (e.g., McKenzie and Woodruff, 2012). In addition, the attrition rates were roughly equal across the three groups TG0, TG1, and TG2.

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[21] The results of the first stage are the same as those reported in model 1 of Table 6. The F statistics on the excluded instrument is ($F = 16.88$, $p < 0.001$).

CONCLUSIONS

The question of why firms do not adopt some basic management practices despite their benefits is a matter of great relevance to academics and policymakers. This study explores the role of government intervention in promoting firms' internal change in the adoption of QM practice.[22] Doing so we complement the fascinating literature on management practices - which focuses on two related questions: 1. why do firms not adopt certain basic practices and 2. what can be the approaches to improve firms' management practices. Regarding the first question, a potential explanation for poor management practices (e.g., Bloom et al., 2013 and related findings) that has been explored is (lack of) competition. However, lack of knowledge/information is arguably of more direct policy relevance, and easier to scale up. As for the second question, extant studies (e.g., Anderson et al., 2017, and Bruhn et al., 2017) have noted the role of training and consultancy in improving management practices. These approaches, however, can be costly and, from a policy perspective, not easily scalable for reaching many firms. Expanding prior studies, we take a step back and show that a cost-effective intervention, i.e., providing information on the benefits of sound business practices, can induce firms to improve management practices leading to better performance.

Managerial Implications

From a policy perspective, our study matters to managers and policymakers because it

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[22] van Knippenberg et al., (2015) highlights an insight into management research in the information age, where information is so abundant that it creates opportunities and challenges to managers at the same time. Specifically, information on the one hand can assist managers to make right decisions – on the other hand, too much information makes it difficult for managers to focus on what matters most. In this study, we explore a related but somewhat different question: what kind of information should the managers pay attention to? Further, could the governments play the role of being efficient knowledge provider (Hass et al., 2015) by providing firms with the most relevant information? To examine these questions, we focus the analysis on management practices.

shows that government can promote change in a firm's management practices. At a broader level, information provision can be a cost-effective instrument to encourage managers to adopt sound management practices and improve product quality. This aspect is of great value to firms in emerging economies, where information is rather limited and where it is costly to use alternative methods, such as hiring managerial consultants and/or training to improve management practices.

Our study also provides insights into the diffusion of advanced practices from foreign multinationals (MNEs) to affiliates in the home country. While such knowledge-sharing plays an active role in the growth of SMEs in emerging economies, it is equally important to encourage SMEs to adopt those practices. We propose a mechanism to facilitate such adoption is that the government can provide MNEs with information about SMEs' perception of management practices. MNEs, in turn, can provide government information about the benefits of advanced practices, especially those that have been adopted by SMEs in a closely related environment. Our mechanism can be incorporated into initiatives, such as the Business Bridge, to promote advanced management practices in emerging markets.

Implications for Research

Our study focuses on a relatively simple government intervention to promote changes within companies—i.e., providing information on the benefits of QM. It would be interesting to examine whether an alternative information intervention that relies on big picture and grand, qualitative data would yield similar outcomes. In addition, would an information intervention introduced by "government" officials (i.e., an authority figure) vs. non-government or private personnel vs. no-personal-contact/mail delivery yield similar outcomes? Future studies could also explore mechanisms underlying the effect of information provision. Does information provision have a positive effect because it

improves the manager's perception? Or do other mechanisms such as social comparison exert the same effect? For example, if managers are informed that firms on an average achieve a QDI of 12% from QM practice, each individual firm may see that information as a social reference point, with corresponding motivational consequences. More broadly, the social comparison nudge is an interesting topic in RCT not only in OM, but also in other disciplines.[23] Researchers have explored the role of information provision in various areas such as education, finance, and management; however, distinguishing the value of information from the social comparison effect is under-addressed and worth exploring further.

Methodologically, our study appears to be the first to conduct an RCT to explore the effect of a governmental information intervention on the adoption of management practices. Using an RCT can help researchers overcome challenges to identify cause-and-effect relationships of important managerial phenomena. For example, to investigate the effect of good management practices on firm performance, Bloom et al. (2013) implemented an RCT by randomizing plans into different groups and conducting a "managerial consultancy" intervention. Likewise, conducting an RCT allows us to estimate a causal effect of QM practice on firm performance. Finally, implementing RCTs with a large number of firms as the unit of analysis is a promising direction to address important managerial questions (Anderson et al., 2014).

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[23] We are thankful to a Department Editor for this excellent insight.

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Table 1: Random assignment of firms by group and summary statistics at baseline survey

Control group	TG0: 128 firms
Treatment group	TG1: 128 firms
Placebo meeting group	TG2: 72 firms

	All		TG0		TG1		TG2	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Panel A: Firm Variables								
QDI score (%)	35.67	11.84	34.47	12.26	36.84	15.47	35.76	11.77
Number of employees	5.51	2.03	4.46	2.26	5.84	2.14	5.48	2.32
Years of employee schooling	8.16	1.15	9.12	1.18	8.08	1.22	8.11	1.27
Profit (USD)	515,500	68,200	515,314	66,884	515776	69,672	515,219	69
Firm's age (years)	9.56	2.56	9.65	2.84	10.84	2.76	8.86	1.88
Number of firms	328		128		128		72	
Panel B: Manager Variables								
Manager Age	42.48	9.46	40.22	8.86	43.58	7.76	42.84	6.68
Female Manager (%)	0.07	0.06	0.08	0.05	0.06	0.04	0.07	0.05
Tenure at current firm (years)	6.6	2.11	7.2	2.24	6.26	2.47	6.48	2.28
Manager years of schooling (years)	15.88	5.47	16.22	4.48	15.26	4.48	15.76	2.76
Number of managers	328		128		128		72	

Table 2: Randomization check of our design

	QDI Score	Manager's year of schooling	Manager's tenure at current firm	Firm's Profits (USD)	Number of employees	Firm's age
			Dependent variables			
	(1)	(2)	(3)	(4)	(5)	(6)
TG1 = Information	0.06	1.15	1.184	557.45	1.17	1.25
	(0.11)	(2.65)	(1.06)	(647.76)	(1.11)	(1.76)
TG0 = control	0.02	0.687	1.51	-95.55	1.22	1.16
	(0.17)	(0.77)	(0.84)	(110.58)	(1.09)	(1.84)
Constant	0.67	0.74	1.76	684.46	2.84	2.46
	(1.12)	(0.06)	(1.02)	(526.05)	(2.06)	(2.14)
Observations	328	328	328	328	328	328
F-stat (joint significance)	1.08	1.25	1.76	2.16	2.26	1.57

Notes: This table aims to check whether the randomization of our study design is properly implemented – i.e., whether significant differences exist between groups at the baseline. To do so, we present OLS results from regressing the baseline firm's characteristics on different treatment group binary variables TG1 and TG0 using TG2 as a reference variable.

Reference category: Placebo group TG2
Robust standard errors in parentheses.

Table 3: Perceived and actual QDI score contingent on adopting QM

	For own firm	For a typical firm in textile industry
	(1)	(2)
Panel A: Median perceived benefits of adopting QM		
	0.10	0.11
Panel B: Standard deviation of perceived benefits of adopting QM		
	0.11	0.16
Panel C: Mean and standard deviation of perceived yearly QDI		
Adopting QM	0.22	0.20
	(0.22)	(0.35)
Non-Adopting QM	0.18	0.18
	(0.16)	(0.27)
Panel D: Mean and standard deviation of observed yearly QDI – for the sample of firms in TCLF sector from the 2010 SME Survey		
Non-Adopting QM	0.35	
	(0.112)	
Adopting QM	0.23	
	(0.065)	
Panel E: Mean and standard deviation of observed yearly QDI – for the *textile firms* from the 2010 SME Survey		
Non-Adopting QM	0.32	
	(0.116)	
Adopting QM	0.12	
	(0.076)	

Notes: Perceived benefit from QM is defined in equation (1) in the main text as follows:

$$Perceived\ benefit = \frac{QDI\ (No\ adopting\ QM)\ -\ Perceived\ QDI\ (Adopting\ QM)}{QDI\ (No\ adopting\ QM)}$$

Panel D refers to the actual statistics derived for the whole sample of firms in the Textile, Clothing, Leather and Footwear (TCLF) sector – from 2010 VSME survey.

Panel E focuses on *textile firms* from the 2010 VSME survey. On an average, textile firms which adopted QM had QDI of 12%. We provided this statistics to managers in the *information intervention* group TG1.

Table 4: Determinants of the misperception about the benefits of adopting QM

	Coefficient	Std. Error	p-value
Panel A: Firm Variables			
QDI score (baseline)	2.48	(1.57)	0.26
Number of employees	-1.26	(1.12)	0.17
Years of employee schooling	-2.24	(1.28)	0.14
Firm's age	-2.56	(1.35)	0.11
Whether firm is located in major city	-4.28$^+$	(2.56)	0.08
Panel B: Manager Variables			
Manager Age	5.57	(3.34)	0.12
Female Manager	0.07	(0.12)	0.46
Manager tenure at the current firm	-2.68	(1.47)	0.17
Years of manager schooling	-8.28**	(3.84)	0.008
Participated in management training	-4.57$^+$	(2.26)	0.06
No of observations	328		
Adjusted R squared	0.24		

Notes: The dependent variable is the manager's misperception of QM benefit defined in equation (2) in the main text as follows:

$$Misperception = \left| Observed\ QDI(\ Adopting\ QM) - Perceived\ QDI\ (\ Adopting\ QM) \right|$$

—i.e., the difference in absolute terms between the manager's perception and actual QDI score conditional on adopting QM practice.

Robust standard errors in parentheses.

+p < 0.10, *p < 0.05, **p < 0.01.

Table 5: Information intervention reduces the manager's misperception of QM benefit

	12 months after the experiment		24 months after the experiment	
	Self (1)	Average (2)	Self (3)	Average (4)
Panel A				
Information intervention TG1	-0.28** (0.12)	-0.24** (0.10)	-0.19* (0.09)	-0.17 (0.11)
Panel B				
Control TG0	-0.12 (0.08)	-0.15 (0.11)	-0.16 (0.12)	0.12 (0.14)
Constant	0.76 (0.56)	0.65 (0.57)	0.66 (0.46)	0.75 (0.76)
Number of Observations	276	276	247	247
F-stat	2.26	2.47	1.65	1.12

Notes: The dependent variable is the misperception of QM benefit defined in equation (2) in the main text as follows:

$$Misperception = \left| Observed\ QDI(\text{Adopting QM}) - Perceived\ QDI\ (\text{Adopting QM}) \right|$$

Reference category: Placebo group **TG2**. All regressions include firm-specific characteristics.

In all regressions, we control for the baseline level of the dependent variables, as well as firm-specifics including firm's age, manager's age, manager's education, and manager's tenure at the current firm.

A negative coefficient of the "*information intervention*" indicates that mangers in the treatment group perceive the QDI score more correctly than those in control and placebo groups.

Robust standard errors in parentheses.

$+p < 0.10$, $*p < 0.05$, $**p < 0.01$.

Table 6: Impact of information provision on QM adoption and QDI score — one and two years after the intervention

	QM adoption	QDI	QM adoption improvement	QDI improvement
	(1)	(2)	(3)	(4)
Panel A (one year after the information intervention—276 observations)				
Information intervention (TG1)	0.22*	0.15*	0.28**	0.16*
	(0.10)	(0.07)	(0.12)	(0.07)
Control (TG0)	0.15	0.11	0.11	0.06
	(0.12)	(0.10)	(0.09)	(0.08)
Underestimated	0.06	0.11	0.08	0.10
	(0.12)	(0.07)	(0.11)	(0.08)
TG1 * Underestimated	0.24**	0.17*	0.34**	0.11+
	(0.08)	(0.06)	(0.12)	(0.04)
Adjusted R squared	0.16	0.22	0.26	0.28
Panel B (two years after the information intervention—257 observations)				
Information intervention (TG1)	0.15+	0.11+	0.24*	0.17+
	(0.06)	(0.05)	(0.11)	(0.08)
Control (TG0)	0.12	0.15	0.11	0.02
	(0.16)	(0.12)	(0.08)	(0.07)
Underestimated	0.07	0.10	0.10	0.05
	(0.05)	(0.07)	(0.06)	(0.04)
TG1 * Underestimated	0.17+	0.14+	0.29+	0.08+
	(0.07)	(0.07)	(0.14)	(0.03)
Adjusted R squared	0.25	0.18	0.25	0.27

Notes: QM (QDI) improvement is defined as the difference between current and previous level.

"Underestimated" denotes the sub-sample of managers, whose prior perception of QM benefit
 fell below the actual QM benefit.
Reference category: Placebo group **TG2**

In all regressions, we control for the baseline level of the dependent variables, as well as
Firm-specifics including firm's age, manager's age, manager's education, and manager's
tenure at the current firm.

 Robust standard errors in parentheses.
+p < 0.10, *p < 0.05, **p < 0.01.

Table 7: Impact of the intervention on firm's profits—one and two years after

	Profits

Panel A (one year after the information intervention—276 observations)

Information intervention (TG1)	5245**
	(1884)
Control (TG0)	1677
	(784)
Underestimated	558
	(428)
TG1 * Underestimated	6288**
	(2876)
Adjusted R squared	0.26

Panel B (two years after the information intervention—257 observations)

Information intervention (TG1)	3568^{+}
	(1684)
Control (TG0)	655
	(476)
Underestimated	558
	(356)
TG1 * Underestimated	4266*
	(1884)
Adjusted R squared	0.22

Notes: "Underestimated" denotes the sub-sample of managers whose prior perception of QM benefit fell below the actual QM benefit.
Reference category: placebo group **TG2**.

In all regressions, we control for the baseline level of the dependent variables, as well as Firm-specifics including firm's age, manager's age, manager's education, and manager's tenure at the current firm.

Robust standard errors in parentheses.
+$p < 0.10$, *$p < 0.05$, **$p < 0.01$.

Table 8: QM adoption improves firm's profits

	Coefficient	Std.Err	p-value
Panel A (one year after the information intervention—276 observations)			
Adoption of QM	4688 **	(1784)	0.006
Control for baseline's profit	Yes		
Control for manager's specifics	Yes		
Control for firm's specifics	Yes		
Adjusted R squared	0.42		
Panel B (two years after the information intervention—257 observations)			
Adoption of QM	3256*	(1576)	0.01
Control for baseline's profit	Yes		
Control for manager's specifics	Yes		
Control for firm's specifics	Yes		
Adjusted R squared	0.36		

Notes: This table presents results from the second stage of the 2SLS model. We use treatment i.e., whether the firm is assigned to the treatment group TG1 as the instrumental variable (IV) for QM adoption.
We control for the baseline level of firm's profit, as well as firm-specifics including firm's age, manager's age, manager's education, and manager's tenure at the current firm.

Robust standard errors in parentheses.
+$p < 0.10$, *$p < 0.05$, **$p < 0.01$.

Appendix 1

Other measures of firm performance

	Sales	Productivity	Market share
Panel A (one year after the information intervention—276 observations)			
Information intervention (TG1)	11125*	0.402*	1.26+
	(4688)	(0.19)	(0.12)
Control (TG0)	-1014	0.24	0.46
	(776)	(0.18)	(0.29)
Adjusted R squared	0.28	0.22	0.25
Panel B (two years after the information intervention—257 observations)			
Information intervention (TG1)	9822+	0.358*	1.12+
	(4228)	(0.156)	(0.48)
Control (TG0)	4511	0.159	0.62
	(2880)	(0.11)	(0.45)
Adjusted R squared	0.28	0.24	0.22

Notes:

Reference category: placebo group **TG2**.
In all regressions, we control for the baseline level of the dependent variables, as well as Firm-specifics including firm's age, manager's age, manager's education, and manager's tenure at the current firm.
Robust standard errors in parentheses.
$+p < 0.10$, $*p < 0.05$, $**p < 0.01$.

APPENDIX 2

Heterogeneous treatment effect of the intervention

We expect that information intervention will have a stronger effect on managers whose initial/prior perception about the benefits of QM fell below the estimated average benefits of adopting QM (we refer to this as "underestimate"). Along this line, we investigate the treatment effects of the manager's prior perception. The model specification is as follows:

$$(Posttest - \Pr etest)_i = \alpha + \gamma \, Information_i + \delta X_i + \eta Y_{BL}$$
$$+ \; \lambda \; Under_i + \chi Information_i * Under_i + \varepsilon_i$$

where $Under_i$ is a binary variable indicating whether the manager's prior perception of the QM benefit is lower than the statistics about the benefits of QM provided. We are interested in the coefficients of the interaction terms χ. A positive χ would imply stronger treatment effects of the information intervention on those who underestimated the QM benefits. [24]

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[24] It is also interesting to explore the effect of how far below the manager's perception, rather than just using a binary variable. The results are highly consistent with what we report in the main text.