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# The Effectiveness of Management Training Programs:

## A Meta-Analytic Review

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## Abstract

We conduct a meta-analysis of 44 studies and 68 different managerial skills training programs, with the aim of identifying program characteristics that can lead to more effective public policies promoting firm growth and entrepreneurship. We synthesize 431 estimates to assess the effects of these programs on firm performance. Our findings show that, on average, managerial skills development programs have positive returns on management practices, firm productivity, profits, and survival. We also examine how program and participant specifications affect program effectiveness. Our analysis suggests that, on average, business training programs focused on human resources, soft skills, marketing, and finance-accounting, especially when organized by local organizations, tend to result in better firm performance. Moreover, training of potential entrepreneurs and managers in specifically targeted sectors such as agriculture, manufacturing, or services was more likely to result in improvement compared to non-targeted programs. Finally, our results indicate that programs that involve both male and female participants are more likely to enjoy higher effects from managerial training interventions.

**JEL classifications:** J24, L25, M13

**Keywords:** Managerial skills, Firm performance, Entrepreneurship, Meta-analysis

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# 1 Introduction

High-quality management practices are essential for the success of firms, as they lead to better productivity, growth, and survival rates. However, management practices vary greatly across firms (Bloom & Van Reenen 2010). Policymakers have recognized the importance of promoting managerial skills, particularly among low-productivity firms, and have invested billions of dollars in entrepreneurship training (McKenzie et al. 2021). While there is increasing evidence on the effectiveness of human capital investment on managerial and firm performance, the existing evidence is inconclusive and constantly evolving. This paper aims to contribute to this ongoing discussion by summarizing the current state of the literature in a systematic meta-analysis of studies that measure the effectiveness of managerial training on management practices and firms' outcomes.

We systematically review the current literature on the effectiveness of managerial skills training programs on firms' outcomes. Our analysis involves coding and analyzing 431 estimates retrieved from 44 studies. Closely following the meta-analysis framework by Kluge et al. (2007) and Card et al. (2018) as well as the guidelines of Havránek et al. (2020), we synthesized the effect sizes and analyzed whether managerial training led to positive average treatment effects on four main outcomes categories: management practices, profits, productivity, and firm survival. We study treatment effect heterogeneity of different types of training programs, reporting effect sizes by the content, supplier, and duration of the intervention, as well as by the targeted population and sector.

We analyzed the effectiveness of managerial skills training programs by their characteristics. Despite much heterogeneity in their design, training programs are usually effective at improving the four outcome categories under analysis. Managers and firms that received human resources and marketing skills training improved their management practices the most. Acquisition of soft skills, including decision-making and communication skills, contributed to enhancing firm productivity. Training in marketing skills led to increased profits for firms, while training in finance and accounting skills contributed to improving firm survival rates. Local suppliers, either the government or local organizations, who have knowledge of the setting and environment achieved better outcomes than international firms. Overall, longer programs led to slightly better results, but not enough to justify their higher cost.

We look at the differential effectiveness of interventions based on the type of participants. Programs targeting future entrepreneurs led to better performance in management practices and firm survival once they own a firm. Targeting actual managers, on the other hand, had larger positive effects on firm productivity and profits. Interestingly, programs aimed exclusively at female managers or entrepreneurs were found to be effective solely at improving

firm profits. In contrast, those that trained both genders improved management practices, productivity, and firm survival. Finally, compared to training programs that did not focus on a specific sector, those that targeted the manufacturing and service industries tended to produce better results. We add a correlation matrix to confirm that improvements in management practices are positively associated with improved outcomes in productivity and firm survival.

Our work contributes to the current literature on the effect of human capital interventions on skill accumulation and firm growth. While there are a significant number of studies conducting experiments, only a handful have summarized the overall effects of human capital interventions. [McKenzie & Woodruff \(2014\)](#) found that only two out of 13 studies in developing countries reported positive effects of management training. More recent work such as ([McKenzie 2021](#)), which included more recent interventions, shows that managerial skills training positively impacts profits and sales. [Hogendoorn et al. \(2019\)](#) conducts a meta-analysis of interventions that train skills in industrialized countries, expanding on the meta-analysis of [Cho & Honorati \(2014\)](#) and [Grimm & Paffhausen \(2015\)](#) on entrepreneurship training, finding no significant effects on firm profits, firm size, and entrepreneurial earnings. Our study differs from the prior literature by encompassing all developing and developed economies instead of focusing on a specific group of countries. Furthermore, we do not restrict our pool of studies to those that target only self-employed entrepreneurs but also include those that target managers in firms (of any size). While previous studies have focused on a narrower subset of outcomes, our paper looks at the complete causal chain from managerial skill training to changes in management practices (the primary outcome that training is supposed to affect), to changes in productivity and, ultimately, firms' profits and survival.

The rest of the paper is organized as follows. [Section 2](#) describes the pool of studies with a detailed description of the search, inclusion and the coding protocol, presents an overview of the sample and investigates whether there is publication bias. [Section 3](#) shows some stylized facts about the characteristics of the training programs and the participants. [Section 4](#) describes the empirical strategy and presents the main results of the effect sizes and estimates of managerial training programs on firms' outcomes. [Section 5](#) concludes.

## 2 Sample Construction

### 2.1 Outcomes of Interest: Theoretical Underpinnings

We are interested in measuring the effect of managerial training programs on management practices,  $s$ . We use a simple profit function ( $\pi$ ) of the form  $\pi = p \times q(A, l, k, s) - wL - rK$ . As is standard in a textbook example,  $p$  is the price of the product produced by a representative firm in the economy,  $w$  and  $r$  are the prices of labor ( $l$ ) and capital ( $k$ ), the two factors of production combined by the firm using production function  $q(\cdot)$ , which also depends on firm productivity ( $A$ ) and managerial skills  $s$ . In principle, managerial skills can directly affect productivity  $A$ , and they can also affect the quantity and the type of inputs acquired by the firm.

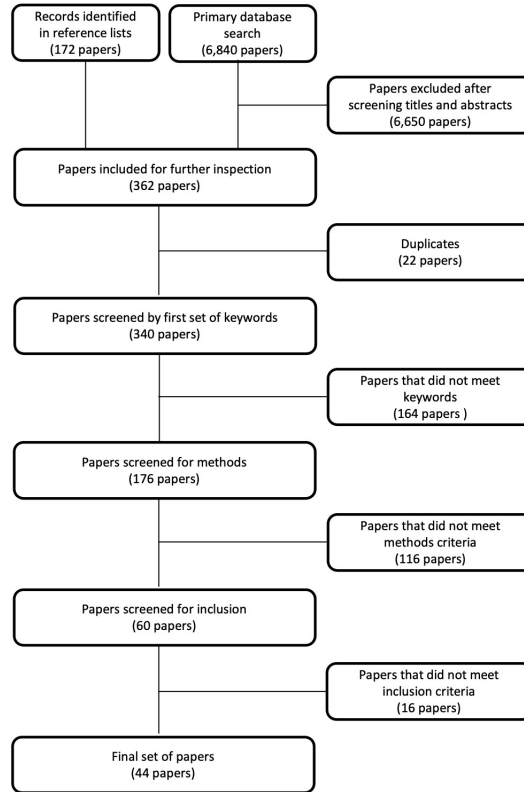
This simple setting provides a framework to define four main outcomes of interest, namely: management practices ( $s$ ), firm productivity ( $A$ ), profits ( $\pi$ ), and firm survival, the latter of which depends on the firm having a minimum level of profits ( $\pi > \bar{\pi}$ ). All of the papers included in our review report a subset of these four outcomes.

### 2.2 Building a Sample Set

The sample is constructed based on two key sources: a web-based search using Google Scholar (which was available in July 2022) and current review papers of [McKenzie \(2021\)](#) and [Hogendoorn et al. \(2019\)](#). In the first stage, we undertook multiple rounds of filtering by title and abstract the papers collected through these two sources. Accordingly, we developed a final pool of studies by reading the main context of the papers. Initially, we started with a total of 7,012 papers. This collection of studies contained the keywords “management training,” “business training,” or “entrepreneurship training” in their titles or abstract. While we did not limit our sample of papers by geographical location or economic level where the study took place, we restricted the study’s time frame from 2000 onward and to studies published in English. Subsequently, we excluded studies that were not in the social science realm. Using keywords such as “firms,” “business,” “workers,” and “employees,” we collected 362 studies that were in business or management fields. We then dropped duplicates (22 papers) and studies that were themselves a literature review of management training programs based on the keywords: “effects,” “impact,” “effectiveness,” “return,” and “evidence.” As a result, in this first stage, our search protocol yielded a total of 176 papers for further review in the second stage.

In the second stage, we established a set of inclusion criteria based on the content of the training programs and the methodology for estimating the effects. This process finalized a

Figure 1: Search and Inclusion Protocol



total of 44 papers. We concentrated on papers that had the main objective of instructing managers or entrepreneurs with specific skill sets to advance business management practices and ultimately improve firm performance. In this regard, we did not consider microfinance (or other types of financial aid) and role model presentation<sup>1</sup> as a skill-enhancing program. However, in cases where the training program was a combination of both financial assistance and consulting sessions or where the outcomes were not reported individually, we included the studies in the analysis. It is important to note that we incorporated papers that only had a solid control group or “natural” status quo to provide estimations on the treatment effect. We excluded papers reporting results using only propensity score matching methods or regressions. On the other hand, we included papers if the methods used were one of the following: Randomized Control Trial (RCT), Regression Discontinuity Design (RDD), Difference-in-Differences (DID), or Instrumental Variables (IV). This process is illustrated in Figure 1.

<sup>1</sup>A role model presentation is a type of training led by other managers or entrepreneurs so that participants can learn from their best practices.



## 2.3 Coding Information

With the collection of papers, we extracted information on the setting of training interventions and their outcomes. Information on the empirical setting of the intervention included the author of the paper, country name and economic status (developed/developing), geographical setting (urban/rural), methodology, target unit, firm size, target age, target gender, supplier of training, length of training, starting and ending year, contents of the program, and the publication format. We also gathered detailed information on the effects of each intervention such as outcome type, the unit of measurement, duration before reporting the outcome, estimation coefficients, standard error, and the number of observations. Data extrapolation and classification were conducted under extensive discussion between two researchers, and when judgment calls were necessary, the rule of thumb was to make decisions based on the frequency of observations.

We categorized the type of outcomes into four main groups and 12 subgroups depending on their frequency of appearance. The first category is “Management Practices” (164 effects), where we classified outcomes related to adopting a) operation practices (93), b) record-keeping skills (42), c) soft skills (23), and other measures (6). The second category is “Firm size and Productivity” (98 effects), encompassing measures relevant to a) productivity levels (18), b) the number of employees (55), c) capital stock (13), and other (12). The third category is “Profits and Revenue” (118 effects), including effects on a) profits (40), b) revenues (55), and c) other miscellaneous effects related to firm profits (23). Finally, the last category is “Firm Survival” (51 effects), where we grouped outcomes into a) firm entry (25), b) firm survival (22), and c) other (4).

The category “Management Practices” is comprised of a highly dispersed set of effect types. Outcomes in this category were mostly reported as standardized index scores, measuring the change in business knowledge, marketing practice, recordkeeping, finance skills, and other miscellaneous entrepreneurial attitudes. In developing countries, many small firms are family-owned, and business owners often do not differentiate between household and business finances, hence training in management practice is expected to have a significant impact. Given that we observed a large sample of effects regarding recordkeeping, we separated recordkeeping into an independent subgroup. All effects relevant to the entrepreneurs’ or managers’ mindsets or attitudes were classified into “soft skills.”

“Firm Size and Productivity” (for simplicity, we use “productivity”<sup>2</sup>) includes estimates that are typically factored into the productivity function. Note that wages of general em-

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<sup>2</sup>We rely on the empirical evidence from previous literature that shows firm size is positively correlated with firm productivity (Snodgrass & Tyler 1995, Van Ark & Monnikhof 1996, Van Biesebroeck 2005, Baldwin et al. 2002).

ployees are categorized in “productivity.” Even when studies did not report productivity values, we created a category “size(Labor),” which captures the change in the number of employees, and “size(Capital)” for inventories.

In “Profits and Revenue” (for simplicity, we use “Profits” in the remaining paper) papers frequently reported estimations of firm profits. The variation of units of measurement, such as real values in local currency, log values, and levels are standardized (details of standardization are discussed in Section 4). Given that many studies carried out interventions involving the training of entrepreneurs, we considered the wage of the entrepreneur or manager to be equivalent to a measurement of profits, which is categorized as “other.” A few papers also reported effects with regard to value-added, which we also grouped as “other.”

“Firm survival” measures were relatively more straightforward, including outcome measures of whether participants ever started a new business or whether the participating firms kept their business open after multiple follow-up surveys. A handful of papers also presented outcomes tracking information on the number of plants or sales locations, which we categorized as “other.”

Due to the heterogeneity in outcomes, we excluded those outcomes that were only scarcely reported, that is, product unit price, inventory spending, number of visiting customers, hours worked, bank credit access, number of loans, and business costs. Also, when studies reported multiple measurement units of the same outcome, for instance, the monthly and yearly profits, we included the most comprehensive measurement (i.e., yearly rather than monthly profits). In cases where follow-up surveys were conducted more than two times, we included the first and the last. Regarding outcomes on business practices, some papers reported an aggregated index score of the business practices that they measured, along with the individual score of each business practice; in this case, we coded the aggregated index score.

## 2.4 Sample Overview

We identify some distinctive characteristics based on the empirical settings of the training interventions. In Table 1, we find that a substantial proportion of the interventions took place in developing countries. This finding does not come as a surprise considering how the issue of firm productivity is frequently addressed within the development economics literature. While we did not solely limit our study to RCT designs, it was the prevailing methodology of the studies we included, comprising approximately 98 percent of the total. The size was evenly distributed between studies that had less than 500 participants and those that had 500 to 5,000 participants. An important discussion that arises in the management training literature

Table 1: Research Design Descriptive Statistics

	Number of effects	Total (%)	Management practices (%)	Productivity (%)	Profits (%)	Firm survival (%)
<i>Panel A: Publication status</i>						
Published paper	332	77.03	34.94	23.49	29.52	12.05
Not published paper	99	22.97	48.48	20.20	20.20	11.11
<i>Panel B: Sample size</i>						
Small sample size	192	44.55	41.15	19.79	32.81	6.25
Medium sample size	205	47.56	39.51	22.44	21.46	16.59
Large sample size	34	7.89	11.76	41.18	32.35	14.71
<i>Panel C: Income level of countries</i>						
Developed country	75	17.40	18.67	36.00	26.67	18.67
Developing country	356	82.60	42.13	19.94	27.53	10.39
<i>Panel D: Evaluation design</i>						
RCT design	424	98.38	38.44	22.64	27.36	11.56
Not RCT design	7	1.62	14.29	28.57	28.57	28.57
<i>Panel E: Follow-up duration</i>						
Short follow-up	222	51.51	40.09	21.62	28.83	9.46
Medium follow-up	87	20.19	42.53	19.54	22.99	14.94
Long follow-up	122	28.30	31.15	27.05	27.87	13.93

**Notes:** Published paper is an indicator variable for published studies. Sample size is a categorical variable with three categories: Small sample (less than 500 participants), medium sample (between 500 and 5,000 participants), and large sample (more than 5,000 participants). RCT design is an indicator variable for randomized experiments. The timing of the follow-up survey is a variable with three categories: short (less than one year), medium (more than one year), and long (more than two years).

is the timing of the follow-up survey. Depending on the type of outcomes that the study measures, the period when the evaluation took place could either supplement or reduce the significance of the results. For instance, improvements in adapting new business practices, such as soft skills, would take more time to appear than would new bookkeeping skills. Therefore, many studies have conducted multiple follow-up surveys, typically evaluating first-stage results less than a year after the intervention has ended and then providing additional evaluation results after two years of the training intervention. [Anderson & McKenzie \(2022\)](#) observe the outcomes in two periods, the first being two to four months after the intervention and the second being about two years after the interventions first started. They found that the effects persisted or even improved over time, for example, in the case of business practices, where it can take time to observe the actual change. [Giorcelli \(2019\)](#) is another good example of a study that observed the impact for some time, in this case for 20 years. Their study reports that firms where managers participated in the program had higher survival rates, better productivity, and higher sales, which persisted for 15 years. Lastly, the majority of the studies were published papers. In the process of compiling the sample, we encountered multiple versions of working papers, for which we included only the published and final versions of papers, and hence we have a high share (77 percent) of published papers.

## 2.5 Publication Bias

A relevant concern in meta-analysis literature is that the estimated impacts of the included interventions contain a systematic positive bias. Publication bias can come in two ways: i) authors only write up studies with positive effects or ii) they choose specifications with positive and significant effects (Card et al. 2018).

We present a formal test, following Card et al. (2018), a regression between the estimated program effect and the publication status of the studies based on intervention design characteristics. For our dependent variable, we include a dummy variable with a value of 1 for all the significant and positive effects and 0 for the rest (we include significant and negative effects as 0 because we have few effects in that category.) Two percent of total effects are negative and significant, 62 percent are not significant, and 36 percent are positive and significant. Our independent variables are: a dummy for published studies (studies published in journals have a value of 1 and working papers or others have a value of 0), the square root of sample size, and a dummy for RCT designs.

The estimated results for this specification are presented in Table 2. For Panel A, we only include the publication dummy, and for Panel B, we also include sample size and RCT design variables. We find no significant association between publishing a study and finding positive and significant effects for any of our specifications. As shown in Table 2, we do not find any signs of publication bias in any of the studies included.

Table 2: Publication Bias Regressions

Variables	Management practices (1)	Productivity (2)	Profits (3)	Firm survival (4)
<i>Panel A: Publication bias without controls</i>				
Published study	-0.071 (0.086)	-0.031 (0.115)	-0.086 (0.111)	-0.205 (0.168)
Constant	0.563*** (0.072)	0.300*** (0.104)	0.300*** (0.103)	0.455*** (0.153)
<i>Panel B: Publication bias with controls</i>				
Published study	-0.106 (0.079)	0.057 (0.113)	-0.043 (0.112)	-0.193 (0.169)
Square root of sample	-0.012*** (0.003)	0.002*** (0.000)	0.001*** (0.000)	0.001 (0.003)
RCT design	-0.537*** (0.047)	-0.275 (0.365)	-0.299 (0.365)	-0.201 (0.327)
Constant	1.437*** (0.125)	0.422 (0.379)	0.525 (0.380)	0.579* (0.312)
Observations	164	98	118	51

**Notes:** OLS estimates with a significant and positive effects dummy as dependent variable. Published study dummy is an indicator variable for published studies. Square root of sample size refers to the total number of participants in each program. RCT design dummy is an indicator variable for randomized experiments. Robust standard errors in parentheses. \*\*\* ; \*\* ; \* significant at the 1%, 5%, and 10% level, respectively.

### 3 Descriptive Analysis

#### 3.1 What Does Management Training Involve?

To better understand the scope of the current literature, we present the distribution of management training interventions based on our classification of program characteristics. Assuming that the design of each training intervention may differ depending on the target participant or sector, we group the subjects addressed in training programs based on the frequency of the topics covered in the programs. We identified six common topics: planning-management, finance-accounting, human resources, marketing, soft skills, and production-operations.

In Table 3 Panel A, we observe that 86 percent of the literature in our sample contains “planning-management” material, which we identify as necessary skills to start a new entrepreneurial venture or to manage an already established entrepreneurship. We find recurring examples such as providing guidance for starting and operating a new business, developing and writing a business plan, selecting products and pricing, obtaining finance,

Table 3: Intervention Characteristics Descriptive Statistics

	Number of effects	Total (%)	Management skills (%)	Productivity (%)	Profits (%)	Firm survival (%)
<i>Panel A: Intervention components</i>						
Planning-Management	372	86.31	38.71	21.77	27.69	11.83
Finance-Accounting	282	65.43	38.30	20.21	31.91	9.57
Human resources	66	15.31	28.79	27.27	30.30	13.64
Marketing	254	58.93	38.58	19.69	31.50	10.24
Soft skills	90	20.88	38.89	22.22	25.56	13.33
Production-Operations	164	38.05	42.68	23.78	21.95	11.59
<i>Panel B: Supplier of the program</i>						
Government	50	11.60	14.00	30.00	32.00	24.00
Local	181	42.00	41.44	19.34	27.07	12.15
International	200	46.40	41.00	24.00	26.50	8.50
<i>Panel C: Duration of intervention</i>						
Short duration	103	23.90	41.75	15.53	33.98	8.74
Medium duration	227	52.67	43.17	21.59	24.23	11.01
Long duration	101	23.43	22.77	32.67	27.72	16.83
<i>Panel D: Target population</i>						
Entrepreneurs	196	45.48	40.82	19.39	27.04	12.76
Firms	23	5.34	47.83	39.13	13.04	0.00
Managers	138	32.02	44.93	23.91	28.99	2.17
New entrepreneurs	74	17.16	14.86	24.32	29.73	31.08
<i>Panel E: Target gender</i>						
Female	154	35.73	41.56	20.78	24.03	13.64
Male-Female	277	64.27	36.10	23.83	29.24	10.83
<i>Panel F: Target sector</i>						
Agriculture	15	3.48	46.67	13.33	33.33	6.67
Manufacture	126	29.23	42.86	23.81	30.16	3.17
Multiple (specified)	117	27.15	41.88	24.79	24.79	8.55
Multiple (unspecified)	103	23.90	20.39	23.30	28.16	28.16
Services	70	16.24	47.14	18.57	24.29	10.00

**Notes:** We do not have mutually exclusive intervention components because most programs have multiple components, and hence they do not add up to 100% in the percentage columns. Short duration indicates the program lasted less than a month, medium duration refers to one to six months, and long duration is more than six months. Multiple (specified) indicates programs that targeted more than one industry sector and are listed in the papers. Multiple (unspecified) indicates either programs that targeted more than one industry sector but were not listed in the paper or programs that target potential entrepreneurs who do not yet have an industry sector.

managing a web-based business, managing growth, developing business concepts, evaluating progress on business goals, separating business and personal expenses, and working capital management.

The category of “finance-accounting” accounts for 65 percent of our sample of studies. We categorized studies as finance-accounting if the training courses contained skills to improve the accounting or bookkeeping of businesses and the understanding of financial management. This includes lessons on: guides for accounting, record keeping (e.g., Bruhn et al. 2018), stock control, costing (e.g., De Mel et al. 2014), cash accounting, calculating profits, debt management (e.g., Drexler et al. 2014), bookkeeping, pricing (e.g., McKenzie & Puerto 2021), and financial management (e.g., Anderson & McKenzie 2022). In addition, a significant number of the sample studies focus on establishing marketing strategies; 59 percent show that the training courses included materials related to sales, advertising (e.g., Bruhn et al.

2018), and general marketing practices (e.g., [Bloom et al. 2013](#)).

Another strand of programs provided training on “production-operations” (38 percent) to teach participants how to improve their production process and business operations. A well-known Japanese management training strategy, the “KAIZEN Practice,” also belongs to this category. Similar to KAIZEN practices, this category includes general courses offering guidance on general operations (e.g., [Anderson & McKenzie 2022](#)), factory operations, quality control (e.g., [Bloom et al. 2013](#)), technology usage (e.g., [Fairlie et al. 2015](#)), production management/quality management (e.g., [Mano et al. 2012](#)), organizational structure (e.g., [Bruhn et al. 2018](#)), and productivity improvements (e.g., [Valdivia 2015](#)).

A share of 21 percent of the interventions provided training on obtaining specific mindsets for managers or entrepreneurs, which we categorized as “soft skills.” Some examples of training in this category are teaching the delegation of duties (e.g., [Georgiadis & Pitelis 2016](#)), achieving personal development (e.g., [Valdivia 2015](#)), enhancing networking skills (e.g., [McKenzie & Puerto 2021](#)), and improving communication skills (e.g., [Assenova 2020](#)). Lastly, training in “human resources”-related skills, such as employment management (e.g., [Karlán et al. 2015](#)), customer relations (e.g., [Michaelides & Benus 2012](#)), and general human resources management (e.g., [Bloom et al. 2013](#)) account for 15 percent of the total sample.

### 3.2 Delivery of Training

In Panel B, we show the distribution of the three main suppliers that provided training sessions: local governments, local firms, and international firms. The most common supplier type of training interventions is international consulting firms and international organizations (e.g., World Bank, USAID), together representing 46 percent of the total number of programs in our sample. We did not consider providing financial assistance as a supplier but only when the firm or organization was the main instructor. A representing example of training organized by international firms is a program evaluated by [Bloom et al. \(2013\)](#) that was delivered by a large international consulting firm with funds provided by Stanford University and the World Bank; this program was implemented in large textile firms in India, where the firms received an extensive management training program. Another example can be found in ([McKenzie & Puerto 2021](#)), where the study evaluates the impact of the International Labour Organization’s (ILO) Gender and Entrepreneurship Together (GET) program, which was designed to improve Kenyan women’s entrepreneurial skills and knowledge.

Locally-based nonprofit organizations, researchers, and consultants—in other words, “local suppliers”—were the second most common suppliers, with a share of 42 percent of total outcomes. In this category, we also include studies that invited international firms to train

local consultants with the appropriate knowledge of skill sets and assist them in translating the information into the local context. Examples of locally-based nonprofits include a Chilean nonprofit organization (Fundación Simón de Cirene), which developed a micro-entrepreneurs program focused on financial and managerial training (Lafortune et al. 2018). Similarly Dominican training experts developed a financial education training program in collaboration with ADOPEM, a savings and credit bank based in the Dominican Republic (Drexler et al. 2014). Furthermore, in Tunisia, tertiary education institutions developed an “Entrepreneurship track program” to improve the entrepreneurship culture among university students. The training was delivered by university professors (Alaref et al. 2020).

Lastly, we have a handful of training interventions in our sample that are part of government programs organized by ministries or different branches of the government, a share of 11 percent. For example, in the United States, the US Department of Labor designed and implemented Project GATE (Growing America Through Entrepreneurship) to provide free entrepreneurship courses (Fairlie et al. 2015, Michaelides & Benus 2012). In the United Kingdom, the Department for Business Innovation and Skills (BIS) developed programs to improve the skills and knowledge of managers (Georgiadis & Pitelis 2016). In the developing country context, we have cases of training operated in Mexico and Chile. In Mexico, the Ministry of Labor of the Mexican State of Puebla developed the Institute for the Competitiveness and Productivity of Puebla with the purpose of growing micro, small and medium-sized enterprises (Bruhn et al. 2018). In Chile, the Chilean government launched the Micro Entrepreneurship Support Program (MESP) with intensive formal training for micro-entrepreneurs (Martínez et al. 2018).

Furthermore, in Panel C, we classify the duration of the training programs in our sample into three distinctive periods: short, medium, and long. Short-term training refers to a program duration of less than a month, medium-term refers to a duration of one-to-six months, and long-term programs are those that last more than six months. The majority of our sample, 52.67 percent, implemented a medium-term training program.

### **3.3 Who Participates in Management Training?**

In Panels D, E, and F, we present the distribution of the literature based on the objectives of each program. We break down into targeted population, targeted gender of the participants, and targeted sector of the participants. According to Panel D, the majority of participants in training programs are managers and entrepreneurs. Within our category of “entrepreneurs,” we separated them into “new entrepreneurs” and “entrepreneurs,” where new entrepreneurs are defined as potential entrepreneurs who have not yet started a firm but are willing to;



entrepreneurs are the typical business owners already active in the market, assuming that the objectives of training programs would be different. On the one hand, as [Martínez et al. \(2018\)](#) shows in an experiment inviting applicants of the “Micro-entrepreneurship Support Program” in Chile, training interventions for potential entrepreneurs aim to teach skills that are beneficial prior to opening a business, such as setting business goals, identifying main products, and learning the legislative framework. On the other hand, skills training for entrepreneurs already in the market tends to be more related to scaling up their businesses and improving business operation practices. For instance, [Valdivia \(2015\)](#) performed an RCT with female micro-entrepreneurs providing training sessions in sales strategies, process innovation, and social skills.

The large share of training interventions invited managers of small, medium, and large firms for coaching sessions which accounted for 32 percent of the total number of outcomes. The experiment conducted by [Dammert & Nansamba \(2019\)](#) is an example of training small and medium enterprise (SME) owners in Africa on recordkeeping, customer services, interpersonal communication, and management skills. Among the sample of studies we collected, we find only one case [Iacovone et al. \(2022\)](#) where firms themselves were the targeted population of the intervention. In their study, a sample of 159 firms from the auto parts manufacturing sector in Colombia was randomly selected to participate in three training groups.

In Panel F, we next examine the type of training participants by industry sector. Unlike the classification of managers and entrepreneurs, there is a wide range of business sectors. One possible reason is that many of the interventions focused on potential entrepreneurs and recruited participants by region and not by industry, which could result in a diverse mix of business sectors participating in the same training program. Only a small share of the literature targets firms in the agriculture sector. For instance, [Bakhtiar et al. \(2021\)](#) carried out an experiment involving female microenterprise owners in the Women in Agribusiness Leaders Network (WALN). The intervention included training sessions on business skills, financial planning, and marketing as well as building networks within the agriculture sector.

Our sample of studies has the highest share, 29 percent, in the manufacturing sector. For instance, in an interesting study that ex post analyzes a training that took place in the 1950s, [Giorcelli \(2019\)](#) uses survey data from a productivity program under the Marshall Plan, inviting managers from Italian manufacturing firms to US plant sites to learn business operation practices. The training focused on factory operations, production planning, and modern management practices.

In a handful of other papers in our sample, especially those regarding microenterprises, the samples were randomized at a specific town or city, which entailed a mixture of participants from a variety of sectors. For example, in the experiment by [McKenzie & Puerto](#)

(2021), four counties were selected as the targeted markets, whereby a combination of fruits, vegetables, and grains sellers, along with service provider shops, were included. Note that for studies that provided training to potential entrepreneurs, such as De Mel et al. (2014), we could not assign them to a specific sector, hence we sorted them as “multiple unspecified.”

## 4 Impact of Management Training Interventions

### 4.1 Methodology

The vast majority of studies included in our sample used experimental methods<sup>3</sup>, and few used quasi-experimental methods, estimating the intention-to-treat effects or the average treatment effects of managerial training programs on firm level outcomes. The effect sizes were either computed using  $\hat{\beta}$ , the parameter from a regression, or a simple difference in means of the outcome of treated and control units. Because studies reported different outcomes in different measurement units, we harmonized effect sizes by category.

In the case of firm profits and survival we encountered two cases. First, a group of studies reported effects on log change in profits or percentage change in firm survival. In those cases, we defined “effect size” as  $\hat{\beta}$ . A second group of studies, reported effects on profit levels or percentage point changes in survival. In those cases, we used  $\hat{\beta}/y_{cpost}$  (if a study did not report the post-control group mean then we used mean values from baseline).

In the case of productivity levels and management practices, we used the Standardized Mean Difference (SMD) to harmonize effects reported in studies which relied on different measurement units. Following (Kluve et al. 2017), the SMD  $d$  can be calculated from the ratio of the regression coefficient  $\hat{\beta}$  and the standard deviation of the outcome  $\hat{\sigma}$

$$d = \frac{\hat{\beta}}{\hat{\sigma}} \quad (1)$$

We approximated  $\hat{\sigma}$  as  $S_p$  using the standard error of the coefficient  $\hat{\beta}$  as follows:

$$S_p = SE * \sqrt{\frac{n_c * n_t}{n_c + n_t}} \quad (2)$$

The variance of  $d$  ( $V_d$ ) depends on the SMD ( $d$ ) itself, the t-statistic  $t$ , and the degrees of freedom of the regression coefficient, which is, in general,  $v = n - k$ . In this case, we stated  $k = 2$  because it is the minimum number of coefficients estimated.  $d$  and  $V_d$  are not sensitive to the value of  $k$  in our sensitivity analysis.

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<sup>3</sup>No study in our sample relied on a clustered randomized controlled trial.

$$V_d = \frac{d^2}{v-2} \left( \frac{v}{t^2} + v * c^2(v) - v + 2 \right) \quad (3)$$

where  $\frac{1}{c(v)} = \sqrt{\frac{v}{2} \frac{\gamma(\frac{v}{2}-0.5)}{\gamma(\frac{v}{2})}}$  and  $\Gamma()$  is the gamma function. When the study has a large  $n$ ,  $c(v)=1$ . When the paper reported the t-stat, we used the formula  $\frac{\hat{\beta}}{SE} = t$ . In order to summarize specified outcomes, we selected the most aggregated effect to code. For example, if there are effects for male, female, and the pooled sample, we only coded the pooled sample. We also found a wide range of different outcomes measuring management quality, given that business performance is typically measured differently by researchers. Therefore, we reviewed, case by case, only after we listed the outcomes related to management quality, to identify commonly reported outcomes and grouped them into similar categories.

Using the synthesized average effect sizes across studies, we used an OLS regression model to understand how effect sizes may differ under different specifications. OLS regressions, with effect size as the dependent variable, are weighted by  $\frac{1}{SE}$  with estimated standard errors of effect sizes. To supplement this model, we also provide the marginal effects of the logit regression model with a dummy with value 1 for positive and significant effects and 0 for the remaining.<sup>4</sup> In Tables 5 and 6, we include information about intervention components, the supplier of the program, duration of the intervention, target population, target gender, and target sector. We estimated the regressions, including dummy variables, for all of the different relevant characteristics mentioned and research design and studies controls, such as a dummy for published papers, square root of sample size, a dummy for country income level, and the timing of the follow-up survey. Standard errors are estimated with the inclusion of clusters by evaluations because all the different treatment effects, by evaluation, are correlated with each other.

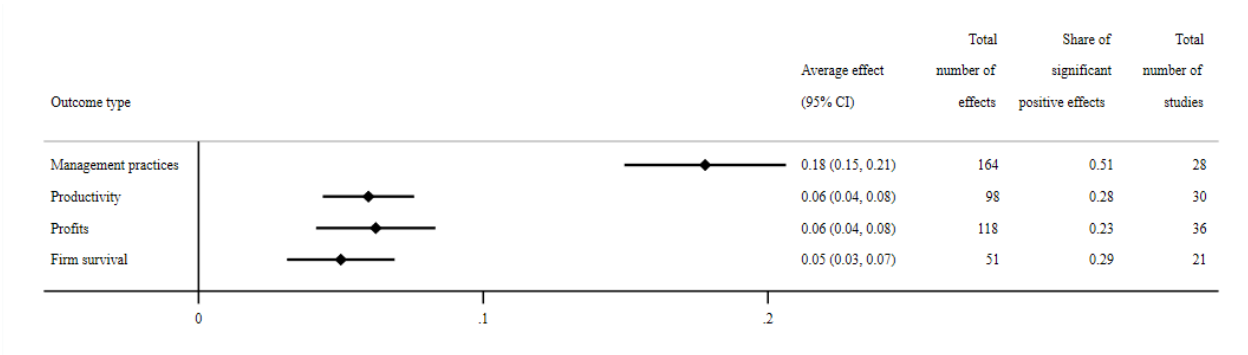
## 4.2 Average Effect Sizes

Figure 2 summarizes our main results of average effect sizes by the four outcome types; we include the share of significant and positive effects in proportion to the sample size of the respective outcome type. Our sample is relatively evenly distributed among different outcomes, yet we do have a concentration of the number of effects on management practices and profits. The average effect size is the highest for management practices. Given that the measurement unit for management practices had high variance, we compute the SMD mentioned in Section 4 above. Hence, a 0.18 SMD can be interpreted as the mean difference between the control and the treatment group. The second-largest number of effects, profits,

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<sup>4</sup>We include significant and negative effects as 0 because two percent of total effects appear in that category.

Figure 2: Average Effect Size by Outcome Type



**Notes:** Plotted dots represent the aggregated average effect size along with its confidence interval.

report a similar magnitude of effect sizes as McKenzie (2021), where they discover a 6-10 percent increase in profits and sales<sup>5</sup>. Following that is productivity, where we include effects on number of employees and capital stock<sup>6</sup> While we have the smallest number of observations for firm survival outcomes, firm survival has a higher share of significant and positive effects (29 percent) relative to other outcomes such as productivity measures or profits.

In Table 4, we present the distribution of the four categories of outcomes by the program characteristics. First, it shows that, of the 164 effects grouped as management practices, 87.8 percent resulted from planning and management training courses, and about half of the effects were positive and significant. Management practice outcomes were least likely to be evaluated through human resources skills interventions, yet more than 70 percent of management practice outcomes were reported to be significant and positive. We also identify that the majority of the effects were evaluated from interventions that were: (i) locally-led, (ii) medium-term duration, (iii) those that targeted entrepreneurs, (iv) from participants that were both genders, and (v) in the manufacturing sector.

This trend is similar across all four categories of outcomes. More than 80 percent of the effect sizes in productivity, profits, and firm survival resulted from planning and management training sessions, followed by finance and accounting training, marketing, production and operations, soft skills, and human resources content. At the same time, we have fewer studies in general that report significant and positive results for these outcomes compared to management practices.

<sup>5</sup>Note that we also consider revenue increase in this category. The pairwise correlation between effect sizes on profits and revenue is 0.3.

<sup>6</sup>The pairwise correlation between the effect sizes on productivity and the number of employees is 0.51, while that between the number of employees and capital is 0.9.

Table 4: Distribution of Effect Sizes by Program Type and Participant Group

Category	Management practices		Productivity		Profits		Firm survival	
	(%) of Effects	Share of Sig & Pos	(%) of Effects	Share of Sig & Pos	(%) of Effects	Share of Sig & Pos	(%) of Effects	Share of Sig & Pos
<i>Panel A: Program components</i>								
Planning-Management	87.80	0.49	82.65	0.26	87.29	0.25	86.27	0.32
Finance-Accounting	65.85	0.65	58.16	0.18	76.27	0.16	52.94	0.37
Human resources	11.59	0.74	18.37	0.22	16.95	0.10	17.65	0.33
Marketing	59.76	0.65	51.02	0.22	67.80	0.20	50.98	0.38
Soft skills	21.34	0.40	20.41	0.35	19.49	0.35	23.53	0.25
Production-Operations	42.68	0.33	39.80	0.18	30.51	0.22	37.25	0.37
<i>Panel B: Supplier of the program</i>								
Government	4.27	0.57	15.31	0.33	13.56	0.19	23.53	0.17
Local	45.73	0.63	35.71	0.20	41.53	0.16	43.14	0.36
International	50.00	0.40	48.98	0.31	44.92	0.30	33.33	0.29
<i>Panel C: Program duration</i>								
Short	26.22	0.60	16.33	0.31	29.66	0.23	17.65	0.67
Medium	59.76	0.46	50.00	0.20	46.61	0.29	49.02	0.20
Long	14.02	0.57	33.67	0.36	23.73	0.11	33.33	0.24
<i>Panel D: Target population</i>								
Entrepreneurs	48.78	0.38	38.78	0.08	44.92	0.13	49.02	0.20
Firms	6.71	0.91	9.18	0.56	2.54	0.00		
Managers	37.80	0.63	33.67	0.42	33.90	0.25	5.88	0.67
New entrepreneurs	6.71	0.45	18.37	0.28	18.64	0.45	45.10	0.35
<i>Panel E: Target gender</i>								
Female	39.02	0.22	32.65	0.13	31.36	0.27	41.18	0.14
Male-Female	60.98	0.70	67.35	0.35	68.64	0.21	58.82	0.40
<i>Panel F: Target sector</i>								
Agriculture	4.27	0.86	2.04	0.00	4.24	0.20	1.96	1.00
Manufacture	32.93	0.70	30.61	0.50	32.20	0.16	7.84	0.75
Multiple (specified)	29.88	0.37	29.59	0.10	24.58	0.14	19.61	0.10
Multiple (unspecified)	12.80	0.43	24.49	0.25	24.58	0.41	56.86	0.31
Services	20.12	0.39	13.27	0.23	14.41	0.24	13.73	0.14
Number of effects	164		98		118		51	
Number of interventions	48		50		58		28	
Number of studies	28		30		36		21	

**Notes:** “(%) of Effects” is the percentage of the total effects by each outcome category. “Share of Sig & Pos” is the proportion of significant and positive effects per category and outcome. For program components, a majority of the programs had multiple components, and hence they are not mutually exclusive. Short duration indicates the program lasted less than a month, medium duration refers to one-to-six months, and long duration is more than six months. Multiple (specified) indicates programs that targeted more than one industry sector and are listed in the papers. Multiple (unspecified) indicates programs that either targeted more than one industry sector but are not listed in the paper or programs that target potential entrepreneurs who do not yet have an industry sector.

### 4.3 What Works? And for Whom?

In this section, we go beyond answering “Does training work?” as in [McKenzie \(2021\)](#)

Table 5: What Works in Management Training?

	Management practices		Productivity		Profits		Firm survival	
	OLS (1)	Logit (2)	OLS (3)	Logit (4)	OLS (5)	Logit (6)	OLS (7)	Logit (8)
<i>Panel A: Program components</i>								
Planning-Management	-0.02 (0.07)	-0.07 (0.14)	-0.06* (0.04)	-0.18 (0.18)	-0.02 (0.06)	0.18 (0.16)	0.06 (0.06)	0.10 (0.22)
Finance-Accounting	-0.04 (0.04)	0.16 (0.18)	-0.03 (0.04)	-0.48*** (0.18)	-0.11* (0.06)	-0.43*** (0.15)	0.06** (0.02)	0.11 (0.24)
Human Resources	0.13 (0.10)	0.21 (0.19)	0.01 (0.03)	0.05 (0.22)	-0.05* (0.03)	-0.05 (0.12)	0.00 (0.04)	-0.09 (0.19)
Marketing	0.11* (0.06)	0.20 (0.18)	-0.01 (0.04)	0.23 (0.20)	0.04 (0.06)	0.20 (0.16)	0.00 (0.03)	0.05 (0.23)
Soft skills	-0.01 (0.04)	0.19 (0.15)	0.02 (0.03)	0.07 (0.15)	-0.01 (0.03)	0.08 (0.12)	0.00 (0.04)	-0.16 (0.16)
Production-Operation	-0.13*** (0.04)	-0.40*** (0.13)	-0.05* (0.02)	0.05 (0.14)	-0.03 (0.03)	0.03 (0.08)	-0.03 (0.04)	0.10 (0.15)
Constant	0.43*** (0.09)	- -	0.16** (0.07)	- -	0.13 (0.08)	- -	0.07 (0.08)	- -
<i>Panel B: Supplier of the program (Omitted = International supplier)</i>								
Government	0.12 (0.11)	0.37 (0.43)	0.00 (0.06)	-0.02 (0.19)	-0.13*** (0.04)	-0.28* (0.16)	0.08** (0.03)	-0.26 (0.29)
Local	0.08 (0.08)	0.21 (0.13)	0.03 (0.02)	-0.14 (0.17)	-0.02 (0.04)	-0.19* (0.10)	0.08 (0.06)	0.01 (0.19)
Constant	0.20 (0.18)	- -	0.02 (0.04)	- -	0.12** (0.05)	- -	-0.04 (0.07)	- -
<i>Panel C: Program duration (Omitted = Medium duration)</i>								
Short	0.05 (0.07)	0.17 (0.11)	-0.02 (0.03)	0.01 (0.16)	-0.05 (0.03)	-0.22* (0.12)	0.03 (0.03)	0.41* (0.21)
Long	0.10 (0.07)	0.28* (0.16)	-0.04 (0.03)	0.06 (0.17)	-0.09 (0.06)	-0.29** (0.13)	0.05 (0.07)	0.07 (0.29)
Constant	0.35*** (0.11)	- -	0.07 (0.05)	- -	0.11 (0.08)	- -	0.05 (0.08)	- -
Publication dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Square root sample	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing of follow-up survey	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	164	164	98	81	118	118	51	51

**Notes:** Dependent variables are effect size for OLS and a significant and positive effects dummy for logits. Logit columns present the marginal effects. We do not have an omitted category for intervention components because a majority of the programs had multiple components, and hence they are not mutually exclusive. Short duration indicates the program lasted less than a month, medium duration refers to one to six months, and long duration is more than six months. Publication dummy is an indicator variable for published studies. Square root of sample size refers to the total number of participants in each program. Country income level is a dummy variable for developed or developing country. Timing of follow-up survey is a categorical variable that is either short duration (less than a year), medium duration (more than one year), and long duration (more than two years). Clustered standard errors in parentheses for OLS estimates and robust standard errors in parentheses for logit estimates. \*\*\* ; \*\* ; \* significant at the 1%, 5%, and 10% level, respectively.

and examine the specifications of the training programs and the targeted population to analyze which distinctive characteristics increased the likelihood of showing higher returns on firm performance. In Tables 5 and 6, we present our estimation results of both the OLS and logit model with regard to the contents of the interventions and the type of participants. Appendix Tables A1 and A2 present robustness checks with random-effects meta-regressions and excluding outliers. Every category of the program components and the type of participants were factored in as dummy variables, including a baseline estimate in all categories. In cases where the categories are mutually exclusive, in other words, if the characteristics of the program can be classified as a single non-overlapping category, we selected omitted variables based on the category with the highest number of observations. We also included controls relevant to the research design; publication dummy variables, whether the paper was published or not, the square root of the sample size, the country income level, and the timing of the follow-up survey. Note that the coefficients are in relative terms to the baseline or omitted variables.

Panel A disentangles the effect sizes estimates by intervention components. We observe that the ranking of effective interventions is similar in the OLS and logit models. Interventions with human resources and marketing components induced higher effects for management practices (over a 0.5 mean difference between the treatment and the control group), while interventions on training soft skills have a higher impact on productivity. When we look at increases in log changes of profit measurements, we can imply that interventions with marketing contents had the largest impact, increasing 0.17 log points of firms' profits. For firm survival and business creation, finance-accounting and planning-management components generated higher returns, leading to a 13 percent increase in firm survival rates. It is important to note that interventions involve a combination of multiple components. For example, Bloom et al. (2013) conducted a combination of human resources, marketing, and production-operations program; McKenzie & Puerto (2021) shows a combination of planning-management, accounting-finance, marketing, and soft skills. Considering that many interventions for entrepreneurs (both potential and existing entrepreneurs) emphasized how to structure a business plan prior to opening a new business or how to manage products or finance their budget, it is not surprising that the courses had a positive impact on firm survival.

In Panel B, we explore whether the suppliers of each program show differential effectiveness. While international firms represent the largest share of suppliers of the interventions, we do not find a distinctive effect from international firms and organizations. Rather, we observe that government-led training programs have the most positive impact on management practices, and local suppliers have the most positive impact on productivity. When

we only factor in the positive and significant effects, we observe that international suppliers seem more effective at improving firm profits and government programs improve firm survival. For example, [Giordelli \(2019\)](#) presents a study on Italian managers traveling to the United States to obtain hands-on training, which led to higher sales over the years. Also, [Anderson et al. \(2021\)](#) evaluated an intervention managed by international professionals in Uganda. Coming from more than 60 different countries, international volunteers trained entrepreneurs, which led to a 50 percent increase in monthly sales and a 35 percent increase in profits.

In the next panel, we show that on average, managerial training interventions that lasted for more than a month are more likely to have a positive impact on firm performances. Longer programs were more effective at improving management practices and firm survival while programs that lasted six months were enough to raise firm productivity and profits. For instance, [Assenova \(2020\)](#) evaluated a six-month incubator for entrepreneurs in South Africa and found higher levels of profits 12 months later.

Table 6 shows the effects estimates by different participant groups. In Panel A, where the omitted category is entrepreneurs, targeting managers seem to benefit in terms of productivity and profit levels, while targeting new entrepreneurs had better outcomes in management practices and firm survival. Even though we notice that targeting firms yielded highly significant results, note that we only had one training intervention where firms were the unit of observation, hence making it difficult to consider this as representing effect size. When we run the logit model, we find that targeting managers were more effective for firm survival outcomes as opposed to targeting new entrepreneurs. One example is [Chioda et al. \(2021\)](#), where an experimental intervention on skills training was designed for Ugandan secondary school students, which brought higher returns in business creation and self-employment rates after three years. We also find that interventions for managers are more effective for profits and productivity outcomes. For instance, [Buvinić et al. \(2020\)](#) evaluated financial and business literacy training for female managers of farm businesses, and they found a higher level of monthly profits. [Bloom et al. \(2013\)](#) found higher productivity in firms two years after implementing an intervention that improved management practices in large Indian textile firms.

We do not find many studies that evaluate the effect of training interventions on female managers or entrepreneurs, and even though the effects of females were positive in increasing firm profits, in general, they were—surprisingly—smaller than interventions in which both genders participated. Female training intervention effects may be difficult to separate from the combined effect of microfinance programs or cash transfer interventions, in turn lowering the statistical power of training effects. In our sample as well, apart from [McKenzie & Puerto](#)



Table 6: Where to Target Managerial Training?

	Management practices		Productivity		Profits		Firm survival	
	OLS (1)	Logit (2)	OLS (3)	Logit (4)	OLS (5)	Logit (6)	OLS (7)	Logit (8)
<i>Panel A: Target population (Omitted = Entrepreneurs)</i>								
New entrepreneurs	0.13 (0.09)	0.15 (0.21)	0.03 (0.04)	0.21 (0.22)	-0.00 (0.04)	0.35** (0.14)	0.03 (0.08)	0.23 (0.19)
Firms	0.37*** (0.12)	0.39 (0.32)	0.09 (0.06)	0.40* (0.22)	-0.00 (0.03)	- -	- -	- -
Managers	0.09 (0.06)	0.15 (0.12)	0.05 (0.06)	0.22 (0.20)	0.04 (0.04)	0.19* (0.10)	-0.06 (0.05)	0.53** (0.27)
Constant	0.15 (0.12)	- -	-0.03 (0.06)	- -	0.01 (0.06)	- -	0.08 (0.14)	- -
<i>Panel B: Target gender (Omitted = Male-Female interventions)</i>								
Female	-0.20*** (0.05)	-0.56*** (0.15)	-0.06*** (0.02)	-0.39* (0.21)	0.02 (0.03)	0.06 (0.11)	-0.10** (0.05)	-0.48*** (0.17)
Constant	0.24*** (0.09)	- -	0.03 (0.04)	- -	0.01 (0.05)	- -	0.06* (0.03)	- -
<i>Panel C: Target sector (Omitted = Manufacture)</i>								
Agriculture	0.05 (0.08)	0.61 (0.37)	-0.07** (0.03)	- -	0.04 (0.10)	0.04 (0.18)	0.16*** (0.04)	0.31 (0.20)
Multiple (Specified)	-0.09* (0.04)	-0.03 (0.15)	-0.01 (0.03)	0.02 (0.23)	-0.02 (0.04)	0.03 (0.14)	-0.14*** (0.04)	-0.14 (0.34)
Multiple (Unspecified)	-0.09 (0.06)	-0.11 (0.22)	-0.01 (0.04)	-0.10 (0.16)	0.01 (0.05)	0.30** (0.14)	0.07** (0.03)	-0.24 (0.15)
Services	-0.17*** (0.06)	-0.29* (0.17)	-0.02 (0.05)	-0.14 (0.17)	0.06 (0.04)	0.13 (0.13)	0.09** (0.03)	-0.49** (0.22)
Constant	0.45*** (0.08)	- -	0.05 (0.03)	- -	-0.01 (0.07)	- -	0.07 (0.05)	- -
Publication dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Square root sample	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing of follow-up survey	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	164	164	98	81	118	118	51	51

**Notes:** Dependent variables are effect size for OLS and a significant and positive effects dummy for logits. Logit columns present the marginal effects. Multiple (specified) indicates programs that targeted more than one industry sector and are listed in the papers. Multiple (unspecified) indicates programs that either targeted more than one industry sector but are not listed in the paper or programs that target potential entrepreneurs who do not yet have an industry sector. Publication dummy is an indicator variable for published studies. Square root of sample size refers to the total number of participants in each program. Country income level is a dummy variable for developed or developing country. Timing of follow-up survey is a categorical variable that is either short duration (less than a year), medium duration (more than one year), and long duration (more than two years). Clustered standard errors in parentheses for OLS estimates and robust standard errors in parentheses for logit estimates. \*\*\* ; \*\* ; \* significant at the 1%, 5%, and 10% level, respectively.

(2021), female training programs were part of a microfinance program. De Mel et al. (2014) suggests that female interventions work better when combined with cash transfer programs.

In Panel C, we present the results by targeting sectors. Setting manufacturing sector as the omitted variable, we find that firms in the manufacturing and services sectors are more likely to enjoy growth in firm performance. Our sample only includes two evaluations where the agriculture sector is the main target of the training program. While the two studies on agriculture report positive and significant results, we focus on the remaining sectors for general interpretation. Targeting manufacturing firms was more efficient in improving management practices and firm productivity, while firms in the service sector were proficient in increasing the level of profits and the likelihood of firm survival. The results are consistent with what we find in Panel A because "multiple unspecified sector" refers to new entrepreneurs or entrepreneurs who do not have a specific sector yet.

#### 4.4 Effectiveness Correlations

In principle, managerial interventions that translate into better management practices should, if those practices are effective, produce better firm-level outcomes. Table 7 presents a simple pairwise correlation between the effect sizes across different firm outcomes studied in the sample of papers included in this meta-analysis (Panel A). In addition, we present the pairwise correlation between indicator variables that is equal to one if the measured effect size is positive and significant (Panel B).

We find that, in general, interventions that improved management practices have a positive and significant correlation with productivity and firm survival outcomes. The correlation between management practices and firm profits is weaker (and even negative in Panel B). However, interventions that raised productivity tend to also be the ones that led to higher profits and a higher probability of firm survival.

Table 7: Pairwise Correlation Matrix between Outcomes

Outcome	Management practices	Productivity	Profits	Firm survival
<i>Panel A: All effect sizes</i>				
Management practices	1.000			
Productivity	0.364*	1.000		
Profits	0.040	0.043	1.000	
Firm survival	0.148*	0.261*	0.086	1.000
<i>Panel B: Significant and positive effect sizes</i>				
Management practices	1.000			
Productivity	0.207*	1.000		
Profits	-0.210*	0.115*	1.000	
Firm survival	0.346*	0.283*	0.225*	1.000

**Notes:** Pairwise correlation coefficients based on the aggregate effect sizes of each outcome category. Panel A is based on all effect sizes. Panel B is based on an indicator variable for significant and positive effect sizes. \* significant at the 5% level.

## 5 Conclusion

Despite the debate on the effectiveness of management skills training, our study contributes to the strand of literature that suggests a positive impact. The aggregated effect sizes suggest that management training programs improve management practices, productivity, profits, and firm survival. With respect to improving management practices, we find that training in human resource skills that is led by government institutions over longer time periods is the most effective intervention. For productivity, training in soft skills led by local organizations for one to six months resulted in the most positive outcomes. In the case of increasing profits, programs on marketing led by an international firm or organization with a medium length duration presented the most positive results. Finally, we show that for firm survival, interventions in finance-accounting led by local or government organizations that took place for more than six months yielded better results.

We find that managerial programs for new entrepreneurs tend to have larger effect sizes on management practices and firm survival, whereas targeting managers is associated with positive effects on productivity and increased profits. Targeting the agriculture sector improved management practices and firm survival, and targeting manufacturing tends to enhance productivity the most. Also, targeting the service sector seems to have the greatest influence on firm profits. We found that interventions targeting only female participants were less effective than those with a gender mix of participants (even though those female-targeted programs were still highly effective).

The literature on management skills training shows that there is not a “one-size-fits-

all” program that improves firms’ performance in all outcome categories. While we find a significant and positive association between improvements in management practices and productivity and firm survival, we do not find that improvements in management practices to be translated to profits. Lastly, we can infer from the results that, in cases of outcomes related to management practices and firm survival, training that lasts only one month is too short result in improvements.

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## 6 Appendix

Table A1: Robustness Checks, Table 5

	Management practices		Productivity		Profits		Firm survival	
	Outliers (1)	Meta-Reg (2)	Outliers (3)	Meta-Reg (4)	Outliers (5)	Meta-Reg (6)	Outliers (7)	Meta-Reg (8)
<i>Panel A: Program components</i>								
Planning-Management	-0.03 (0.06)	-0.03 (0.05)	-0.04 (0.03)	-0.06 (0.04)	-0.03 (0.06)	0.01 (0.06)	0.06 (0.06)	0.04 (0.05)
Finance-Accounting	-0.04 (0.04)	-0.03 (0.06)	-0.04 (0.03)	-0.03 (0.04)	-0.11* (0.06)	-0.09 (0.06)	0.05*** (0.02)	0.05 (0.04)
Human Resources	0.11 (0.09)	0.12** (0.06)	0.00 (0.03)	0.01 (0.03)	-0.05* (0.03)	-0.05 (0.04)	-0.00 (0.03)	0.01 (0.06)
Marketing	0.10* (0.06)	0.12* (0.06)	0.01 (0.04)	-0.01 (0.04)	0.03 (0.06)	0.01 (0.06)	0.01 (0.03)	0.02 (0.04)
Soft skills	-0.02 (0.04)	0.01 (0.04)	-0.00 (0.03)	0.01 (0.03)	-0.02 (0.03)	0.01 (0.04)	0.01 (0.04)	0.01 (0.05)
Production-Operation	-0.13*** (0.04)	-0.11*** (0.03)	-0.04* (0.02)	-0.04* (0.03)	-0.02 (0.03)	-0.03 (0.03)	-0.02 (0.04)	-0.04 (0.04)
Constant	0.43*** (0.09)	0.45*** (0.08)	0.12** (0.05)	0.14** (0.06)	0.11 (0.08)	0.15* (0.08)	0.07 (0.08)	0.14* (0.08)
<i>Panel B: Supplier of the program (Omitted = International supplier)</i>								
Government	0.12 (0.11)	0.14 (0.09)	-0.01 (0.05)	0.00 (0.04)	-0.13*** (0.04)	-0.13** (0.05)	0.08*** (0.03)	0.09 (0.07)
Local	0.07 (0.08)	0.07* (0.04)	0.02 (0.02)	0.02 (0.04)	-0.03 (0.03)	-0.04 (0.04)	0.06 (0.06)	0.07 (0.05)
Constant	0.21 (0.18)	0.24** (0.11)	0.01 (0.04)	0.02 (0.06)	0.12** (0.05)	0.16** (0.07)	-0.02 (0.07)	0.02 (0.10)
<i>Panel C: Program duration (Omitted = Medium duration)</i>								
Short	0.05 (0.06)	0.05 (0.04)	-0.00 (0.04)	-0.01 (0.04)	-0.03 (0.03)	-0.03 (0.04)	0.02 (0.03)	0.04 (0.05)
Long	0.09 (0.06)	0.08* (0.05)	-0.04 (0.03)	-0.04 (0.03)	-0.10* (0.05)	-0.11** (0.05)	0.05 (0.07)	0.04 (0.05)
Constant	0.34*** (0.10)	0.39*** (0.07)	0.06 (0.05)	0.07 (0.05)	0.10 (0.07)	0.15** (0.06)	0.05 (0.08)	0.13* (0.08)
Publication dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Square root sample	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing of follow-up survey	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	160	164	96	98	114	118	49	51

**Notes:** Dependent variable is effect size for both estimations. For “outliers” estimations, we dropped top and bottom 1% effect sizes, and “Meta-Reg” columns are random-effects meta-regression. Short duration indicates less than a month, medium duration refers to one to six months, and long duration is more than six months. Publication dummy is an indicator variable for published studies. Square root of sample size refers to the total number of participants in each program. Country income level is a dummy variable for developed or developing country. Timing of follow-up survey is a categorical variable that is either short duration (less than one year), medium duration (more than one year), and long duration (more than two years). Robust standard errors in parentheses. \*\*\* ; \*\* ; \* significant at the 1%, 5%, and 10% level, respectively.

Table A2: Robustness Checks, Table 6

	Management practices		Productivity		Profits		Firm survival	
	Outliers (1)	Meta-Reg (2)	Outliers (3)	Meta-Reg (4)	Outliers (5)	Meta-Reg (6)	Outliers (7)	Meta-Reg (8)
<i>Panel A: Target population (Omitted = Entrepreneurs)</i>								
New entrepreneurs	0.12 (0.09)	0.11* (0.06)	0.04 (0.04)	0.03 (0.04)	0.00 (0.04)	0.02 (0.05)	0.00 (0.08)	0.01 (0.06)
Firms	0.32** (0.12)	0.33*** (0.08)	0.10* (0.06)	0.09* (0.05)	0.01 (0.03)	-0.02 (0.09)	- (-)	- (-)
Managers	0.09 (0.06)	0.08* (0.04)	0.08 (0.05)	0.05 (0.04)	0.06* (0.03)	0.01 (0.04)	-0.08* (0.05)	-0.07 (0.06)
Constant	0.15 (0.12)	0.20** (0.09)	-0.06 (0.06)	-0.03 (0.06)	-0.01 (0.05)	0.06 (0.07)	0.13 (0.14)	0.16 (0.12)
<i>Panel B: Target gender (Omitted = Male-Female interventions)</i>								
Female	-0.18*** (0.05)	-0.20*** (0.04)	-0.07*** (0.02)	-0.06** (0.03)	0.00 (0.03)	0.05 (0.03)	-0.08 (0.05)	-0.07 (0.05)
Constant	0.24*** (0.09)	0.26*** (0.07)	0.02 (0.04)	0.03 (0.04)	0.00 (0.05)	0.04 (0.05)	0.07* (0.03)	0.14** (0.06)
<i>Panel C: Target sector (Omitted = Manufacture)</i>								
Agriculture	0.06 (0.08)	0.05 (0.07)	-0.08*** (0.03)	-0.07 (0.08)	-0.01 (0.08)	0.02 (0.09)	0.15** (0.05)	0.17** (0.06)
Multiple (Specified)	-0.07 (0.04)	-0.08* (0.04)	-0.01 (0.03)	-0.01 (0.04)	-0.02 (0.05)	-0.01 (0.05)	-0.11** (0.05)	-0.16* (0.08)
Multiple (Unspecified)	-0.07 (0.06)	-0.08* (0.05)	-0.02 (0.04)	-0.01 (0.03)	0.00 (0.04)	0.06 (0.05)	0.07** (0.03)	0.06 (0.04)
Services	-0.16*** (0.06)	-0.17*** (0.05)	-0.03 (0.05)	-0.03 (0.04)	0.04 (0.04)	0.06 (0.04)	0.09** (0.03)	0.08 (0.06)
Constant	0.44*** (0.08)	0.49*** (0.07)	0.04 (0.03)	0.05 (0.05)	-0.01 (0.06)	0.01 (0.07)	0.07 (0.05)	0.11 (0.08)
Publication dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Square root sample	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country income level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing of follow-up survey	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	160	164	96	98	114	118	49	51

**Notes:** Dependent variable is effect size for both estimations. For “outliers” estimations, we dropped top and bottom 1% effect sizes, and “Meta-Reg” columns are random-effects meta-regression. Publication dummy is an indicator variable for published studies. Square root of sample size refers to the total number of participants in each program. Country income level is a dummy variable for developed or developing country. Timing of follow-up survey is a categorical variable that is either short duration (less than one year), medium duration (more than one year), and long duration (more than two years). Robust standard errors in parentheses. \*\*\* ; \*\* ; \* significant at the 1%, 5%, and 10% level, respectively.