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Entrepreneurship Trainings and Human Capital Endowment: When Learning from External Sources Does (Not) Increase Performance

Abstract: Bottom-of-the-pyramid (BoP) entrepreneurs have few resources to draw on besides their human capital. We analyze the effects of a training program teaching lean management to BoP entrepreneurs in Zambia by comparing its performance effects across individuals with high and low levels of specific human capital. We find that participation in the entrepreneurship training program positively affects management practices related to lean management as well as cost reduction for all training participants. The program, however, has no uniform effect on profits. The effect is positive only for entrepreneurs equipped with specific human capital. Moreover, we observe that this effect is in particular strong for entrepreneurs with vocational education compared to work experience. This suggests that the value of entrepreneurship training programs is contingent on human-capital endowment and calls into question existing notions of what it means to offer such programs.

Keywords: randomized experiment; learning; management training; necessity entrepreneurs; emerging markets

1 Introduction

Bottom-of-the-pyramid (BoP) entrepreneurs have few resources to draw on besides their human capital. Under these challenging conditions, the importance of

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founders' human capital comes to the fore. Thus, learning from external sources such as from buyers, suppliers, or consultants is important for improving performance (Almeida, Dokko, and Rosenkopf 2003). Against this background, a dramatic increase in training programs for BoP entrepreneurs has taken place (Cho and Honorati 2014; McKenzie 2020). According to World Bank estimates, at least four to five million entrepreneurs in emerging economies have been trained, and at least USD 1 billion spent (McKenzie 2020). India's National Institute for Entrepreneurship and Small Business Development alone has provided training programs to more than 1 million individuals (NIESBUD 2020). Entrepreneurship trainings hold the potential to significantly contribute to poverty alleviation, creating more substantial and sustainable sources of income.

However, we have little knowledge of whether, or under what circumstances, learning from such external sources helps to increase performance. The findings are mixed. While some studies show that learning from training improves performance (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015; Suzuki, Vu, and Sonobe 2014), others do not identify substantial effects – in particular not on profits (Bruhn, Karlan, and Schoar 2018; Fiet 2001; Gielnik et al. 2017; Lima et al. 2015; Mano et al. 2012; Quinn and Woodruff 2019). More importantly, we have little knowledge of how different human-capital endowments may matter. Given the substantial investment in entrepreneurship training, we believe it is now time to understand the contingencies underlying the different performance effects better.

In this paper, we assess the impact of a training program for BoP entrepreneurs in an emerging-economy context on subsequent firm-level outcomes and analyze who benefits most from the training. We argue that entrepreneurs have varying levels of predisposition toward changing management practices and performance, as they are equipped with different human-capital endowments. Per existing theories of learning, the effects of entrepreneurship training programs conditional on entrepreneurial human capital are ambiguous and can go in opposing directions. On the one side, entrepreneurs with lower human capital may have distinct advantages in gaining from learning (Miller and LeBreton Miller 2020) as they are, compared to managers of larger and established firms, less constrained by cognitive path dependence, and more flexible (Zhao et al. 2021). Such training may also work as a substitute for what those concerned have missed in their prior entrepreneurial journey, so that they benefit more at the margins (Anderson, Chandy, and Zia 2018). On the other side, entrepreneurs with higher human-capital endowments before the participation in the program may be better able to acquire, assimilate, and utilize external knowledge (Cohen and Levinthal 1990) and to achieve higher performance (Marvel and Lumpkin 2007) as the level of absorptive capacity is strongly affected by prior knowledge (Cassar 2014).

Our empirical setting is a tried-and-tested *Kaizen* training program for necessity entrepreneurs in Zambia. The components of our entrepreneurship training program are consistent with training programs in emerging economies that have been shown to increase a firm's performance, and to contribute to higher profits (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015; Mano et al. 2012; Suzuki, Vu, and Sonobe 2014). These lean-management programs focus on profit gains through cost reduction, and encourage entrepreneurs to seek new ideas for improving existing procedures (Aoki 2020). We measure the impact of the program under the contingency of varied specific human-capital endowments, reflecting that necessity entrepreneurs have few resources to draw on besides their human capital (Gruber, Dencker, and Nikiforou 2023).

We find that learning from the entrepreneurship training causally and substantially affects performance, contingent on human-capital endowments. In particular, we show that participating in the program is linked with the likelihood that participants adapt new management practices and reduce their costs. Participation in the training program increases the likelihood of adopting lean-management practices to a rate of 71 %. This increase is related to a drastic reduction of costs of 36 %, using the last month's cost estimates, compared to the control group. Most importantly, we find that the impact of the program is not uniform across participants. The impact of the training on profits is significantly more pronounced for entrepreneurs equipped with specific human capital, compared to participants with lower levels hereof. The participants equipped with specific human capital have a 16 % higher likelihood of achieving higher profits. Finally, when we disaggregate specific human capital endowments, we find that participants with a higher level of vocational training benefit more from the training than those with a higher level of industry work-experience (45 vs. 20 %). We implement robustness checks to show that our results are not driven by statistical artefact.

We offer three main contributions to the scholarship in this paper. First, we go beyond estimating the average effect of an entrepreneurship training program on performance to examine contingencies. Doing so, we reply to McKenzie's suggestion to ask "what types of training work best for which types of firms?" (2020: 32), (rather than asking "does training work?"). Second, we find that specific human-capital endowments need to be considered a multidimensional construct, and that qualitative differences of specific human capital need to be considered when training effects are measured. This is important because prior studies mostly have focused on prior startup experience (Eesley and Roberts 2012; Toft-Kehler, Wennberg, and Kim 2014). We show that it is in particular vocational training, meaning the education of entrepreneurs, which allows for higher profits – with important implications for infrastructure policies. Third, we explore multiple outcomes, including management practices, costs, and profits. To the best of our knowledge, none of the prior studies on

entrepreneurship trainings in emerging markets have analyzed the effect on the venture's costs (see for overviews, Cho and Honorati 2014; McKenzie 2020). This allows us to identify the gap between the content that is provided and trained (i.e. changing management practices and costs) and its translation into profit.

Taken together, our results suggest that entrepreneurship training programs can have large economic impacts if appropriate ventures are selected. At the same time, our findings call for greater self-reflection within the entrepreneurship training domains in ways that can, perhaps, more adequately think about the fraught relationship between learning from external sources, trainings, and alleviating poverty measures.

2 Entrepreneurship Trainings and Hypotheses Development

2.1 Entrepreneurship Trainings for Ventures at the Bottom of the Pyramid and Lean-Management Trainings

There is a burgeoning growth of entrepreneurship training programs, and a substantial investment of private and public resources in them. This is driven, on the one side, by an increasing disappointment with infrastructure policies (Quinn and Woodruff 2019), which have often not achieved desired outcomes, and by an increasing interest in engineering changes to affect "what entrepreneurs can do themselves" (Hampel-Milagrosa, Loewe, and Reeg 2015). On the other side, we know that business practices affect a firm's performance (Bloom et al. 2013). Still, many entrepreneurs in emerging economies have not acquired any basic management knowledge, indicating large room for potential improvement. Therefore, it is imperative that policymakers and researchers alike aim at improving business-related capabilities by providing entrepreneurship training programs (Bruhn and Zia 2011; Calderon, Cunha, and De Giorgi 2020; Drexler, Fischer, and Schoar 2014; Field, Jayachandran, and Pande 2010; Giné and Mansuri 2014; Quinn and Woodruff 2019).

Findings from research on training programs for BoP entrepreneurs are, however, mixed (see for overviews, Cho and Honorati 2014; McKenzie and Woodruff 2014). Some studies on trainings in Vietnam and sub-Saharan Africa show that participation in training improves a venture's performance, also in the medium-run, both in terms of new practices and profits (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015; Suzuki, Vu, and Sonobe 2014). Others find weak or no

effects along outcomes like productivity, investments, or profits (Alibhai et al. 2019; Anderson and Mckenzie 2020; Fiet 2001; Gielnik et al. 2017; Lima et al. 2015).

One potential explanation is that most previous studies are on classroom-based trainings. The latter typically take place with a trainer teaching 15–40 participants over a period between 3 and 12 days, and participants are taught management knowledge such as accounting, marketing, human resources, and operation management (McKenzie 2020). Well-known programs include the SIYB program of the International Labour Organization or Freedom from Hunger's courses for microfinance clients. While teaching in a classroom setting may have advantages in minimizing selection concerns, entrepreneurs participate in these settings for reasons other than to improve their management knowledge and performance – namely in seeking loans. Second, while management knowledge is indeed scarce in BoP environments, these programs tend to neglect production-related knowledge, meaning all operational knowledge related to production processes. We know, however, from the management literature on strategic change that entrepreneurial identity is strongly linked to the product (Zuzul and Tripsas 2019). Hence, different from general business training programs, we suggest that trainings that are more closely linked to the entrepreneurial identity make strategic changes easier. Third, important for effective learning is "doing through experience," or allowing room for experimentation (Aldrich and Yang 2014), as well as applied knowledge that offers practical examples and guidance on how the new knowledge can be adapted to the context (Corredoira and McDermott 2020). Such elements lower the learning costs of entrepreneurs and tend to be linked to higher performance outcomes (Sutter, Kistruck, and Morris 2014). Lowering learning costs is in particular important for necessity entrepreneurship with a low human-capital predisposition. Finally, few programs have focused on cost reduction. However, within a BoP context of highly fragmented markets being a barrier to higher sales (Anderson, Chandy, and Zia 2018), programs aiming at increased profits through cost reduction correspond better to the entrepreneurial environment (Mano et al. 2012).

Furthermore, the examined population in prior studies may not capture entrepreneurs who are likely to pursue strategies of productivity increases through cost reduction. Most trainings have been carried out in service and retailing (e.g. Calderon, Cunha, and De Giorgi 2020), and only few programs have trained populations in manufacturing where a much richer knowledge on process improvements has been developed (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015; Mano et al. 2012; Suzuki, Vu, and Sonobe 2014). This implies a higher likelihood of performance gains from lean management, in comparison to service or retail industries. Our lean-management program teaches a tried-and-tested *Kaizen* curriculum to individuals in the manufacturing sector. We suggest that programs

that teach individuals in the manufacturing sector with large and obvious room for improvement are an appropriate research setting for studying the effects of entrepreneurship programs on cost reduction and performance.

Another important feature is that prior programs have been less frequently known to be successful role models. We know from learning theory that role models are beneficial for learning (Healey, Bleda, and Querbes 2021). Japan's postwar success has been substantially built on applying *Kaizen* in the manufacturing industries, and has been established in many emerging economies, including South East Asia, as a proven concept to stimulate performance (Kikuchi and Suzuki 2018).

Taken together, if the design of an entrepreneurship training program is based on lean management – meaning experience-based training like a *Kaizen* program, one aiming at productivity increases through cost reduction – entrepreneurs will learn the new management practices and reduce their costs. We thus hypothesize:

Hypothesis 1a: BoP entrepreneurs participating in a lean-management training will achieve improved management practices.

H1b: BoP entrepreneurs participating in a lean-management training will achieve stronger firm performance in terms of lower costs.

2.2 Contingencies: Specific Human-Capital Endowment

In addition to differences in the sample structure and the program, we suggest that the mixed results of prior research may be partially attributed to the heterogeneity of participants. The impact of these training programs is unlikely to have uniform effects across entrepreneurs because they differ in regard to the human capital which they bring with them to the program. These individual-level prior resources may affect in particular those outcomes that are in need of an additional entrepreneurial input. If the program, like in our case, teaches lean-management practices to reduce costs, it can indeed be expected that the training helps to change cost-related business practices and to reduce costs, but not necessarily profits.

However, we posit that the effect of the program on other performance outcomes that are not directly taught likely varies between individuals with different human-capital endowments. Entrepreneurs with higher levels of the latter before participation in the program may be better able to acquire, assimilate, and utilize external knowledge (Cohen and Levinthal 1990; Marvel, Davis, and Sproul 2016) as the level of absorptive capacity is strongly affected by prior knowledge in related fields (Lichtenthaler and Lichtenthaler 2009). This holds true in particular for

entrepreneurs at the bottom of the pyramid who have very few resources besides their human capital (Gruber, Dencker, and Nikiforou 2023). Entrepreneurs with higher levels of human capital might be more capable to carry out a diagnosis of which information provided by the course matches to the venture's strategy and how to translate the new knowledge into higher profits (Boothby, Dufour, and Tang 2010). Such experience, for example, helps to understand how to adapt a firm's internal processes (Toft-Kehler, Wennberg, and Kim 2014).

Further, certain human-capital endowments – meaning those specific to particular industries – gives entrepreneurs relevant, ready-to-use practical skills and deep knowledge in their domain (Gruber, Dencker, and Nikiforou 2023), which may help them to develop strategies on how to translate novel management practices or reduced costs in pursuit of higher profits. Such specific human capital – for example work experience in a given industry or the entrepreneur having been trained in a particular vocation – allows broader search spaces within an industry, helps to better position products, and serves to implement more fine-grained differentiation strategies that altogether help to increase a firm's profits (Argote, Lee, and Park 2021; Cassar 2014). More industry experience is also associated with more sector-specific knowledge and networks, and helps entrepreneurs to develop market-specific knowledge (Urbig et al. 2013). For example, more industry experience in manufacturing has been shown to be beneficial for improving production processes (McGee, Dowling, and Megginson 1995). Thus, entrepreneurs who have accumulated many years of experience in an industry tend to be better equipped to deal with new information (Kaufmann and Roesch 2012) and to develop more accurate mental models of new opportunities (Eesley and Roberts 2012).

Taken together, an entrepreneurs' capacity to translate cost reductions into profits crucially depends on prior experience in related fields, such as with regard to industry conditions. Given this evidence, we may expect that entrepreneurs equipped with specific human capital benefit relatively more from an entrepreneurship training at the margins. We thus posit:

H2: BoP entrepreneurs participating in lean-management training will benefit in terms of profits if they are endowed with specific human capital.

3 Methods

Measuring training effects is challenging, as results may be confounded by various empirical issues such as self-selection bias (e.g. more cost-conscious entrepreneurs enroll for the training) or reverse causality (e.g. better performance is a requirement

to be able to participate in the training). To address these challenges and test our hypotheses, we chose a randomized controlled trial design when carrying out the entrepreneurship training program.

3.1 Randomized Controlled Trial Design

Our setting offers a number of advantages allowing us to understand the causal effect of training on performance while taking into account the specific human-capital endowment of entrepreneurs as an important contingency. First, evidence that learning from an entrepreneurship training program in which prior resources are a necessity for participation is not easily available. In cross-sectional studies, endogeneity such as reverse causality may confound the results. Are entrepreneurs with higher profits, for example, more inclined to participate and to learn in trainings? In a review on management research, Hill et al. (2021) therefore call for higher standards of methodological rigor here. With our setting, we reply to their call. We choose random assignment to treatment and control groups. We taught entrepreneurs how to lower their expenses, and thereby how to increase the profit margin on each item sold. For example, entrepreneurs learnt a number of lean-management practices, such as how to improve the storage of material to reduce expenses, and applied the well-known set of "5S" practices (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015).[1] Our random assignment to treatment and control groups is based on a sample of 121 entrepreneurs operating in local markets in Zambia.

Second, self-selection and survey attrition are important concerns. In our study, we hardly face selection concerns or survey attrition, important technical issues of previous randomized experiments (McKenzie 2020). Selection concerns would imply that the participants of the program are more likely to have a preference for, and are more capable of improving, their own practices and performance, compared to the population average in these markets. This concern applies less to our setting, where almost all entrepreneurs to whom the training was offered participated: meaning 136 entrepreneurs were considered, and we achieved complete data collection from 121 of them. From our field observations, the characteristics of the entrepreneurs who participated in the training program are similar to those of other entrepreneurs in the wood-processing sector in these markets. Also, attrition is negligible. During our training program only 12 ventures dropped out, and of these only two from the

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1 A lean-management practice based on the principles of, in Japanese, "5S": *seiri*, *seiton*, *seisō*, *seiketsu*, and *shitsuke*, best translated as "sort," "set in order," "shine," "standardize," and "sustain." These principles describe how to organize a workspace to achieve efficiency and effectiveness.

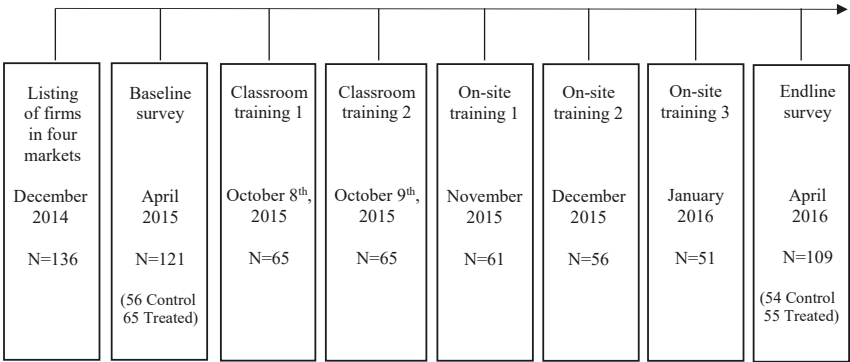| Listing of firms in four markets	Baseline survey	Classroom training 1	Classroom training 2	On-site training 1	On-site training 2	On-site training 3	Endline survey
December 2014	April 2015	October 8th, 2015	October 9th, 2015	November 2015	December 2015	January 2016	April 2016
N=136	N=121	N=65	N=65	N=61	N=56	N=51	N=109
	(56 Control 65 Treated)						(54 Control 55 Treated)

Figure 1: Research design and sample data. Notes: n is the number of entrepreneurs at the time of the survey and the intervention. The endline survey was conducted exactly one year later after the baseline survey to ensure that we collect data on the outcomes at the same time of the year as the baseline. The rationale being that any seasonal trends would be (partially) accounted for by conducting the baseline and endline at the same time of the year. The endline survey was carried out with 109 firms; on the remaining 12 firms, we were unable to obtain any data.

control group (see Figure 1 below). The low attrition in the control group is important because systematic opting out of entrepreneurs from the control group could overestimate the true treatment effect. The data collected at baseline shows that the average reported profit for ventures in the treated group that is no longer present in the data was ZMW 1870 (around USD 102), whereas for the firms still contactable the comparable figure is ZMW 1783 (around USD 98). This means that entrepreneurs with higher profits disappeared from our sample. This suggests, at least based on this parameter, that attrition – if anything – leads to a downward bias in our results.

Third, we have data on specific human-capital endowments, immediate outcomes such as management practices, and information on costs and profits for all participants for the whole time of the intervention. This allows us to measure the trainings' direct effects (management practices and costs) and indirect effects (profits) alike. This distinction is important, as any entrepreneurship training in emerging markets only improves income and alleviates poverty if, in the very end, profits are increased.

3.2 Program-Participant Selection

We collected data from the Zambian manufacturing industry. We selected the wood-processing sector, which is representative in terms of enterprise structure as it provides significant room for improvement in terms of performance. Further, as a

manufacturing one, the wood-processing sector allows for potentially faster growth because of easier-to-realize productivity increases, as well as for exports. These facets make the sector an ideal setting for achieving greater understanding of how the performance of entrepreneurial firms can be improved.

Our study site is Lusaka, the capital of Zambia. The participants of the study are located in four of Lusaka's markets. With these four, we have covered the major wood-processing markets.[2] Production within markets is typical for BoP entrepreneurs in the developing world, as they usually locate themselves therein to compensate for resource limitations (London et al. 2014). While there are a limited number of clusters (i.e. four markets), we demonstrate that our findings are robust through a bootstrapping approach (see 5.4).

3.3 Program Content: Lean-Management Training

The program offers lean-management training to entrepreneurs. Its primary components are based on tried-and-tested *Kaizen* training programs (Higuchi, Mhede, and Sonobe 2019; Higuchi, Nam, and Sonobe 2015; Suzuki, Vu, and Sonobe 2014), teaching standardized procedures to reach efficient performance by examining workflows and bottlenecks. The underlying idea is simple: by providing distinct tools for lean management (e.g. 5S) practices, entrepreneurs can raise their profits by reducing their costs. These management practices are applied to the full production process of the wood company: ordering, procurement, production, and delivery/service. Along this process, the trainer developed together with entrepreneurs product-specific strategies to save costs (Table 1).

Participants received formal education through classroom sessions that introduced basic lean-management practices on how to save costs throughout the

Table 1: Lean management training program: a generic process view of wood production.

	Product A	Product B	Product C
Step 1: Order			
Step 2: Procurement			
Step 3: Production			
Step 4: Delivery and service			

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2 There are two other markets featuring wood-processing endeavors, but they are not specialized: Buseko is a wholesale market while in Kalinga-kalinga producers do not have fixed locations and operate in the street.

production process. Participants then explored, within three on-site trainings, opportunities to improve their business processes and to reduce "waste," as it is called with the 5S practices. That is, how to reduce costs and enhance productivity.

The onsite trainings, taught by experienced *Kaizen* consultants, were supposed to enhance learning by providing practical examples and guidance on how new knowledge can be adapted to the venture (Corredoira and McDermott 2020). For instance, participants experimented with the 5S practices to reduce the amount of poorly stored timber. The consultants also put effort into creating bilateral interactions aiming at solving "the 'why'" (Sutter, Kistruck, and Morris 2014) and to assist entrepreneurs in applying their classroom learning to their environment. The consultants were familiar with entrepreneurship trainings and spoke the local language, Nyanja, to enhance communication and problem-solving on the ground. The detailed training content is provided in the Online Appendix (OA2 and OA3).

4 Data and Empirical Strategy

4.1 Data

We use data from entrepreneurs in four Lusaka markets working in the wood-processing sector. In total, we have listed 136 entrepreneurs, which corresponds to the full population of wood-processing firms in these four markets. As is common in randomized controlled trials, we carried out a baseline survey prior to the intervention, conducted the training, and then implemented the endline survey. Hence, the baseline data is from a survey carried out before the training began while the endline survey data was obtained after the training had been completed. We have complete data for 121 firms in the baseline survey (with 56 entrepreneurs being in the control, 65 in the treated group).

The analysis of the performance effects of our training builds on the baseline and endline surveys. The baseline survey was used to analyze the contingency of specific human-capital endowments. Our research design and the survey data points are presented in Figure 1.

A common concern when using surveys is respondents may tend to answer in a manner that will be viewed favorably by the enumerators. This could result in overreporting good behavior, and in underreporting undesirable behavior. While we cannot exclude this concern, we undertake two strategies to minimize their impact: First, following the standard procedures for conducting a survey, the personal information of respondents was made confidential and responses were anonymous. Second, observations in the field, both by our trainers and our own selves, indicated that entrepreneurs had a strong interest in getting access to

financial funds through the mediation of our trainer. If at all, the ventures in our sample should underestimate the effect of the training on performance. Indeed, there are indications that the treated firms strategically underreported profits with the expectation of obtaining financial aid due to the program. However, this would only imply we are downwardly biasing our estimates.[3] Further, we triangulated the survey data with various databases as well as business and industry reports. Together with own visits in the field as well as information from key informants, these data sources helped to contextualize the survey data (Table 2).

4.2 Empirical Strategy

To implement the training program, we selected four markets in Lusaka to avoid any spillover effects. Given that the selection is based on four markets, we face another selection concern in that concurrent events such as market initiatives might have taken place in one market but not in the other, or that self-selection of entrepreneurs has taken place; for example, more savvy individuals might have self-selected in certain markets. Thus, it may be difficult to discern whether our training program affects subsequent performance, or whether the participants would have enhanced their processes and performance even in the absence of our *Kaizen* training. This creates concerns whether the control and the treated group are fully randomized or reflect distinct properties of the markets in question.

    We take a number of steps to address this empirical challenge. In a first one, we identified typical and mutually similar markets in Lusaka based on in total two meetings with the local Kaizen Institute, three with local consultants, three with the Zambia Chamber of Small and Medium Business Associations (ZCSMBA), and two with the Technical Training Authority (TEVETA). From these talks, the four markets Buyantanshi, Chifundo, Mutonyo, and Mwasuaka emerged as appropriate sites. In a second step, we carried out own visits in the field with seven full days of market observation. These included 12 semi-structured interviews with entrepreneurs in all four markets (Table 2). In a third step, we choose the name of two markets from a bowl to assign to treatment. The two markets of Buyantanshi and Mwasuaka (65 ventures) were assigned to receive the management training, whereas the markets

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3 See the kernel density graphs for profits for the treated and control in the pre-intervention and post-intervention periods (Figure OA1). The graph shows a larger right tail for the control group than for the treated group in the post-intervention period, though the tail was present also for the control group in the pre-intervention period. This means that the control group reports higher profits and that the treated group madedid fewer reports of high profits in the post-intervention period compared to the pre-intervention period. This supports our assumption that the treated group has an incentive to under-report their profits.

Table 2: Data sources.

Source of data	Type of data	Use in analysis
Kaizen and industry experts	Two meetings with local Kaizen Institute; development of suited training program taking into consideration the market situation of the wood processing sector in Zambia, in particular constraints and market development; in total 15 interviews. Training program was developed with two consultants hereof.	Identification of markets; development of management training and survey questions, including alternative outcome variables
Local consultants	Three meetings with local consultants; 10 Skype conferences during the pre-intervention with local consultants. Additionally, three documents (consisting of 20, 6 & 57 pages) documenting and evaluating the two modules of the program (consisting of two classrooms and three onsite sessions).	Identification of markets; other meetings: content and design of the training
Chamber of commerce and industries, training institutes, financial institutes	Three meetings with the Zambia Chamber of Small and Medium Business Associations (ZCSMBA), two meetings with Technical Education Vocational and Entrepreneurship Training (TEVETA) in Zambia	Identification of markets
Own visits to the field	Listing of firms in the four markets; two days market observations; semi-structured interviews with 12 entrepreneurs; in total seven days of observation; baseline survey	Qualitative evidence on changes in entrepreneurial behavior; Interpretation of results
External key informants	Background on entrepreneurial training programs in Sub-Saharan Africa and Zambia; information on *Kaizen* training institutes and wood processing technologies in Zambia; in total seven interviewees	Development of management training and survey questions, including alternative outcome variables, in particular use of tools; Interpretation of results
Business and industry reports	Zambia Manufacturing Sector Profile; Economics of Scale; Furniture Production in Lafia; Micro and Small Cluster Based Furniture; Manufacturing in Tanzania; Small Scale Furniture Markets in Indonesia; Study of Wood Sector	Background information on industry conditions in the wood processing industry; entrepreneurship training programs of international organizations in developing economies; information on market conditions in Zambia
Databases	World Bank Enterprise Survey; Central Statistical Office, Zambia	Information on enterprise structure and firm characteristics in Zambia

of Chifundo and Mutonyo (56 ventures) were assigned to the control group. Our sample thus consists of 121 ventures: of these, 42 from Buyantanshi, 46 from Chifundo, 10 from Mutonyo, and 23 from Mwasauka. Those who received the training are our treatment group.

Fourth and finally, to check whether the randomization across markets indeed worked and enables us to create a balanced sample, we compared the ventures assigned to control and treatment on a range of 34 baseline characteristics that might affect the effectiveness of the training program – such as profit, size, prior resources and capabilities, or ownership of electrical tools. They are balanced on all key characteristics, as well as on other ones such as prior business training, legal status, credit history, as well as the reported key constraints on business (see Table 3 below). Two variables are not balanced, but these differences are more or less expected with such a large set of business characteristics.[4] In this sense, our randomization strategy based on the four markets has successfully generated a balance for the 121 ventures in our sample.

In the Appendix (OA1), we provide a pairwise correlation table for our key variables of interests.

4.3 Measures

4.3.1 Dependent Variables

Management Practices. Learning from external sources takes place in interrelated stages (Honig 2001; Sirén and Kohtamäki 2016; Wang and Chugh 2014), where knowledge implementation (Sirén and Kohtamäki 2016) is linked to the most immediate effect of applying new processes and practices (Aldrich and Yang 2014; Edmondson, Bohmer, and Pisano 2001). We examine the lean-management practices using a measure similar to Higuchi, Nam, and Sonobe (2015) and Higuchi, Mhede, and Sonobe (2019) called, as noted, 5S. More precisely, we measure when entrepreneurs report to: (i) sort the production area at least once a week; (ii) never miss tools during production due to mishandling; (iii) never have spoiled timber due to poor storage; (iv) sort and store timber; and (v) use visual aids while selling products.

Costs. The training teaches entrepreneurs how to reduce costs during wood-processing procedures. In emerging economies, eliciting the true value of costs is challenging, as entrepreneurs usually do not keep business accounts. To alleviate this issue and to ensure that costs are uniformly measured across all ventures, each

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4 Note that randomization in this setting does not imply full balance. We add a controls for education and access to electricity as a problem respectively, as these two variables are not balanced.

Table 3: Balance tests between ventures assigned to treatment and control.

	Full sample			Control firms		Treated firms		Diff	*p*-Value
	Obs.	Mean	SD	Obs.	Mean	Obs.	Mean		
Panel A: General baseline characteristics									
(1) Age	119	39.10	10.04	54	37.87	65	40.12	−2.25	0.22[‡]
(2) Total profit	119	1942.10	1431.47	54	2117.59	65	1796.31	321.28	0.22[‡]
(3) Total profit (revenue – expense)	117	1560.94	3335.526	55	1978.87	62	1190.19	788.68	0.20[‡]
(4) Total value of assets	121	15,846.59	25,258.09	56	16,583.3	65	15,211.8	−1371.43	0.77[‡]
(5) Years of education	120	9.03	3.08	55	9.8	65	8.38	1.42	0.01[‡]
(6) Years since business was registered	7	11.86	6.91	2	13.5	5	11.2	2.3	0.73[‡]
(7) Hours worked in a normal week	120	51.31	12.03	55	51.85	65	50.86	0.98	0.66[‡]
(8) No. non-family employees	121	1.00	1.14	56	1.04	65	0.97	0.07	0.75[‡]
(9) No. family employees	121	0.45	0.87	56	0.54	65	0.38	0.15	0.35[‡]
(10) Own any electric tool	121	0.53	0.50	56	0.45	65	0.5	−0.1	0.29[‡]
(11) Whether held previous job	120	0.53	0.50	55	0.51	65	0.43	0.08	0.46[†]
(12) Legal status	119	0.94	0.23	55	0.96	64	0.92	0.04	0.45[†]
(13) Purchase in-puts at Buseko	120	2.00	0.12	55	1.98	65	2.02	−0.03	0.70[†]
(14) Advertising in the last six months	120	0.10	0.30	55	0.15	65	0.06	0.08	0.14[†]
(15) Cooperate to buy other inputs with firms	119	0.28	0.45	54	0.22	65	0.25	−0.02	0.83[†]
(16) Subcontract to other firms	119	0.71	0.46	54	0.76	65	0.66	0.10	0.31[†]
(17) Previous financial literacy training	119	0.10	0.30	55	0.13	64	0.08	−0.05	0.54[†]
(18) Producing at business premise	120	0.89	0.31	55	0.87	65	0.91	−0.03	0.54[†]
(19) Selling at business premise	118	0.89	0.31	54	0.87	64	0.91	−004	0.54[†]

Table 3: (continued)

	Full sample			Control firms		Treated firms		Diff	*p*-Value
	Obs.	Mean	SD	Obs.	Mean	Obs.	Mean		
(20) Borrowed money successfully	120	0.07	0.25	55	0.07	65	0.61	0.01	0.86[†]
(21) Visited competitors for learning	120	0.22	0.41	55	0.25	65	0.18	0.07	0.36[†]
(22) Importance of individuals as customers	120	2.99	0.09	55	3.00	65	2.98	0.02	0.36[‡]
(23) Importance of wholesalers as customers	108	1.17	0.40	55	1.11	53	1.23	−0.12	0.13[‡]
(24) Access to electricity as a problem	120	1.48	0.71	55	1.24	65	1.68	−0.44	0.00[‡]
(25) Lack of area for display as a problem	120	2.09	0.83	55	2.07	65	2.11	−0.03	0.82[‡]
(26) Lack of storage space as a problem	119	1.89	0.82	55	1.96	64	1.83	0.14	0.37[‡]
(27) Sources of finance as constraint	120	2.4	0.71	55	2.31	65	2.48	−0.17	0.20[‡]
(28) Many identical producers as a constraint	119	2.39	0.78	55	2.47	65	2.66	−0.19	0.15[‡]
(29) Lack of regular buyers as a constraint	120	2.58	0.71	54	2.37	65	2.40	−0.03	0.84[‡]
(30) Lack of product range as a constraint	120	1.68	0.73	55	1.6	65	0.09	−0.15	0.25[‡]
(31) Reasons for becoming carpenter	120	1.85	0.82	55	1.85	65	1.85	0.01	0.92[‡]

Panel B: Contingencies: specific human capital

(32) Specific human capital	116	0.15	0.17	54	0.11	62	0.17	−0.07	0.32[†]

Table 3: (continued)

	Full sample			**Control firms**		**Treated firms**		**Diff**	**p-Value**
	Obs.	Mean	SD	Obs.	Mean	Obs.	Mean		
(33) Work experience in the industry	116	0.51	0.50	54	0.46	62	0.55	−0.08	0.36[†]
(34) Vocational training	120	0.25	0.43	55	0.22	65	0.28	−0.06	0.46[†]

Notes: The table compares the treated and control entrepreneurs on 34 characteristics collected in the pre-intervention period for the final sample. Variables (22)–(31) follows 1–3 Likert scale. The continuous variables are compared using a *t*-test, denoted by ‡, the ordinal variables are compared using Fischer exact test, denoted by †, and the categorical variables using Kwallis Test, denoted by ⫯.

entrepreneur received a list of expenses to take into account when reporting costs (see OA4). Based on this list, we measure costs with several outcome variables: namely the total costs of a normal and of the last month, and of the top-selling items. We rely in particular on the measure of the last month and of top-selling items as they need the lowest calculation efforts by the entrepreneur.

Profits. As entrepreneurs usually do not use business accounts, also measuring profits is a challenge. We follow previous studies that find that directly reported profits are the most reliable measure here (De Mel, McKenzie, and Woodruff 2009), as compared to calculating profits by reported revenue and costs. Table 4 below shows that the correlation between the two measures is positive and in the range of 0.20–0.26, with the coefficient of variation being the lowest for directly reported profits. Hence, our data suggest the validity of what De Mel, McKenzie, and Woodruff (2009) recommend: that is, directly asking respondents for profits might be the best way to elicit this information. Since profits tend to be highly skewed, we use the logged value of the endline directly reported profits as our main measure.

Contingency: **Specific Human Capital**. We measure the contingency of *specific human capital* with the most common constructs here: work experience and education (Marvel, Davis, and Sproul 2016). We identify these with questions from the baseline survey.

Table 4: Business profits: within-subject correlation between different methods of profit calculation.

	Directly reported profit	**Calculated profit**
Directly reported profit	1.00; [1.00] (Pearson; Spearman)	
Calculated profit	0.20; [0.26] (Pearson; Spearman)	1.00; [1.00] (Pearson; Spearman)

Notes: The average reported profit is 1942.10 Kwachas (around 106 USD) with a standard deviation of 1431.47 (around 78 USD). The average profit using the revenue minus expense methodology is 1560.94 Kwachas (around 86 USD) with a standard deviation of 3335.53 (around 180 USD). The standard deviation is shown in parenthesis and the Spearman rank correlation shown in the square brackets.

To construct this measure of specific human capital, we use a question on *work experience* (an indicator taking the value of 1 when entrepreneurs have higher than the median number of years in operating the business in the sector) and a question on *vocational education* (whether the entrepreneur received prior technical training in woodwork). We aggregate these values into a single indicator to elicit *specific human capital*: entrepreneurs with both vocational education and work experience above the median are assigned a value of 1, otherwise 0.

As we carried out a randomized controlled trial, and as our groups are balanced, we do not need to add control variables except on access to electricity and years of education (see footnote).

4.4 Estimating Equation

The design of the experiment is based on a randomized controlled trial. Table 3 above shows that the treated and control firms are balanced on key characteristics. Thus, our primary focus is on intention to treat (ITT) estimates of the training program. The main estimating equation we use to examine the impact of the entrepreneurship training and performance outcomes is as follows:

$$Y_i = \alpha + \beta T_i \times \text{Specific Human Capital}_i + X_i + \varepsilon_i, \tag{1}$$

Y_i refers to the outcomes of interest such as management practices, costs, and profits in the post-intervention period of venture i; T_i is a dummy taking value of 1 if the venture was assigned to receive the training program; Specific Human Capital$_i$ is a dummy equal to 1 if the venture has prior work experience in the industry (*work experience*) and prior *vocational training*; X_i is a vector of controls containing years of education and access to electricity as a problem; and ε_i, is by design, independent and identically distributed. To account for the possibility that the standard errors of the entrepreneur within the same market do not satisfy the assumption of being independent, we estimate treatment effects using ordinary least squares (OLS) and implement a clustered bootstrap with 1500 repetitions with replacement to obtain the most conservative estimates.

5 Results

5.1 Descriptive Statistics

Descriptive statistics are reported in Table 3. Entrepreneurs exhibit characteristics typical for emerging markets; for instance, on average ventures have no employees,

are operated by a single male business owner, and have limited access to finance (ILO 2018; United Nations. Economic Commission for Africa 2011–10). Further, they are characterized by strong external and internal resource constraints (Ansari, Munir, and Gregg 2012; Chatterjee 2016). Only 53 % own electric tools and only 7 % have successfully secured external financial support. At the same time, similar to previous studies, we see within-sample heterogeneity. We further observe that half of the entrepreneurs have work experience in the wood-processing industry, and one-quarter of them have attained vocational training. Specifically, there is significant heterogeneity: we observe variation in industry-related work experience (3.08 years standard deviation) and in vocational training (0.43 years standard deviation). We make use of these different characteristics when analyzing how entrepreneurs' specific human-capital endowments moderate the training's effect on profits.[5]

5.2 Program Participation, Management Practices, and Cost Reduction

Results from the main estimating equation are presented in Table 5 below. The dependent variable in columns (1) to (4) is the standardized value of 5S practices. Column (1) does not control for any covariates, column (2) accounts for years of education, column (3) accounts for access to electricity as a problem, and column

Table 5: Impact of program participation on management practices.

	Management practices			
	(1)	**(2)**	**(3)**	**(4)**
Program participation	0.59**	0.61**	0.68**	0.71**
	(0.16)	(0.18)	(0.19)	(0.12)
	[0.04]	[0.01]	[0.01]	[0.01]
Years of education	No	Yes	No	Yes
Access to electricity a problem	No	No	Yes	Yes
Standard error	Clustered OLS	Clustered OLS	Clustered OLS	Clustered OLS
Observations	109	109	109	109
R-squared	0.12	0.12	0.13	0.14

Note: Management practices are measured with 5S practices. All specifications are estimated using ordinary least squares regressions with standard errors clustered at the level of the market. P-values are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

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5 As a number of indicators are based on the Likert scale (e.g. storage space or regular buyers as constraints), the figures cannot be directly derived from Table 3. Available on request from the authors.

(4) for both. All four columns show clustered OLS standard errors and account for years of education and access to electricity as a problem. Consistent with H1a, we find that entrepreneurs have improved their knowledge on management practices, and that the new knowledge has been encoded in new processes and practices. The magnitudes of the estimated coefficients are large. Entrepreneurs who have participated in the training program show a 59–71 %-point improvement in 5S practices, which implies that relative to the control group there is a significant improvement of the production process for the program participants. This suggests that an important goal of the program, namely to improve the production process, has indeed been realized.

H1b predicts that entrepreneurs will achieve stronger firm performance in terms of lower costs. Results on costs are presented in Table 6 below. The dependent variable in columns (1)–(3) shows the absolute changes in costs (in kwacha, the local currency), and in columns (4)–(6) reveals the standardized values. Columns (1) and (4) show the costs of the last month, columns (2) and (5) of the normal month, and columns (3) and (6) of producing the top-selling items. Consistent with H1b, we find that participating in the program led to its most immediate goal being realized: reduced costs. Participants in the program increase the likelihood of having reduced their total costs by about ZMW 1246 (USD 55) for the last month, and by ZMW 7100 Kwacha (USD 313) for their top-selling items. This corresponds to a decrease of 36 or 99 % points respectively, compared to those entrepreneurs who have not participated in the training. This is substantial. There are even five ventures belonging to the control group who increased the total production costs of their top-selling items in the post-intervention period (see Table 9). Taken together, the *Kaizen* training has

Table 6: Impact of program participation on cost.

	Cost in Kwachas			Cost (standardized)		
	Last month (1)	**Normal month (2)**	**Top selling items (3)**	**Last month (4)**	**Normal month (5)**	**Top selling items (6)**
Program participation	−1246.31* (603.06) [0.09]	−1004.87 (679.48) [0.20]	−7109.66** (1927.29) [0.014]	−0.36* (0.17) [0.09]	−0.23 (0.156) [0.199]	−0.99** (0.27) [0.01]
Years of education	Yes	Yes	Yes	Yes	Yes	Yes
Access to electricity a problem	Yes	Yes	Yes	Yes	Yes	Yes
Standard error	Clustered OLS	Clustered OLS	Clustered OLS	Clustered OLS	Clustered OLS	Clustered OLS
Observations	109	109	107	109	109	107
R-squared	0.10	0.08	0.22	0.10	0.08	0.22

Notes: Columns (1)–(6) are estimated using a clustered OLS where the standard errors are clustered at the market level. p-Values are shown in square brackets. Standard errors are shown in parentheses and p-values are shown in square bracket. $*p < 0.10$; $**p < 0.05$; $***p < 0.01$.

achieved its most immediate goal: to help participants improve their business practices and reduce their costs.

5.3 Contingency: Role of Specific Human Capital

Thus far, our examination has not considered the program's heterogeneous effects based on participants' specific human-capital endowments. In particular, we analyze by whom the ultimate goal of the program – higher profits – was realized. Entrepreneurs vary greatly in their resources. In our baseline sample, there is strong variation in specific human-capital endowments (Table 3). We use this heterogeneity to measure the availability of resources prior to participation in the program, and to test H2 – that is, whether entrepreneurs who are endowed with a higher level of specific human capital realize higher profits when offered the opportunity to learn from the entrepreneurship training.

Table 7 below reports the results. Column (1) shows the baseline estimation of the impact of program participation on profit while column (2) shows the heterogeneous impact of endowment with specific human capital. Consistent with H2, results indicate that entrepreneurs equipped with specific forms of human capital outperform those with lower levels thereof and achieve higher profits. The findings (column (2)) indicate that entrepreneurs who have undergone the training and possess an elevated level of specific human capital experience an approximate 16 % increase in their likelihood of achieving higher profits. This calculation is derived by

Table 7: Impact of program participation on profit by specific human capital.

	Log(profit)	
	(1)	**(2)**
Program participation	0.228	0.070
	(0.154)	(0.170)
	[0.236]	[0.680]
Specific human capital		−0.669***
		(0.068)
		[0.000]
Program participation × specific		0.829***
human capital		(0.221)
		[0.000]
Years of education	Yes	Yes
Access to electricity a problem	Yes	Yes
Standard error	Clustered bootstrap	Clustered bootstrap
Observations	90	87
R-squared	0.044	0.075

Notes: *p*-Values are shown in square brackets. Standard errors are shown in parentheses and p-value are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

summing the coefficient of specific human capital (−0.669) with the interaction term involving program participation and specific human capital (0.829). Another finding stands out. Having participated in the program on its own is not correlated with higher profits. Indeed, whether the program is beneficial seems to depend on the level of industry-specific human capital.

5.4 Robustness and Extensions

5.4.1 Robustness

Management Practices. We ran extensions with variants of the dependent variables and specifications. We find that participating in the program leads to a significant increase in the likelihood that participants have changed other management practices of theirs. We find a reduction of overtime by almost 6 h, which corresponds to more than a 10 % decrease compared to the baseline of a 51 h working week. We also find a change in investment practices for electric sanders and other tools, equipment, and machinery. Lastly, we also find a more open attitude toward cost-saving technologies, which is in line with the lean-management training's focus on reducing costs. In sum, this all suggests participants have indeed learnt from the external source that is the entrepreneurship training program, therewith moving them away from less efficient practices (Table 8).

Table 8: Impact of program participation on alternate management practices.

	Overtime working practices	Ownership of electric sander	Investment on tools	Attitudes towards cost-saving technologies
	(1)	(2)	(3)	(4)
Program participation	−5.91**	0.335*	0.236**	0.21**
	(2.24)	(0.187)	(0.096)	(0.041)
	[0.08]	[0.07]	[0.01]	[0.02]
Years of education	Yes	Yes	Yes	Yes
Access to electricity a problem	Yes	Yes	Yes	Yes
Standard error	Clustered OLS	Clustered OLS	Clustered OLS	Clustered OLS
Observations	94	94	109	108
R-squared	0.081	0.081	0.321	0.048

Notes: The dependent variables are as follows: Column (1) reports overtime working hours reported in post-intervention period; Columns (2) captures investment into electric sander; Column (3) depicts investment into any other tools except for electric sanders; and Columns (4) exhibits a dummy that takes the value 1 wherein ventures show preference on access to technology that reduces the cost of production by 100 Kwachas and takes the value 0 when the ventures have preference to an increase in the sale price of an equivalent amount or considers an increase in the sale price or access to technology as equivalent. All columns are estimated using ordinary least squares regressions with standard errors clustered at the level of the market. Standard errors are shown in parentheses and p-values are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Given that bias may remain if the adoption of management practices is correlated within markets, we also apply the clustering of standard errors for robustness. As the number of clusters falls below the rule of thumb cutoff point for a sufficient number of clusters, we employ clustered bootstrap (Cameron, Gelbach, and Miller 2008; Cameron and Trivedi 2009) and implement 1500 repetitions with replacement to correct for standard errors. We implement additional specifications and correct for within-cluster error correlation using a clustered-bootstrap strategy. The results for all management practices are robust to these models (Table 9).

Costs. We investigate whether the results we observe in terms of costs are driven by only a handful of entrepreneurs with higher costs. Should they indeed be driven by this group, the impact of program participation should show a significantly lower estimate and, possibly, become statistically insignificant. To test this, we restricted the sample to exclude the outliers with highest costs belonging to the control group. Results remain consistent (available from the authors on request).

Next, we conducted robustness checks to investigate whether correcting for standard errors using a clustered-bootstrap approach reveals consistent results in terms of the other outcomes. Table 10 below depicts how the impact of program participation on cost reduction remains robust to different standard-error specifications.

Table 9: Impact of program participation on management practices under different estimation strategies.

	Management practices	Overtime working practices	Ownership of electric sander	Investment on tools	Attitudes towards cost-saving technologies
	(1)	(2)	(3)	(4)	(5)
Program participation	0.71***	−5.91**	0.242	0.207**	0.21**
	(0.21)	(2.82)	(0.154)	(0.081)	(0.079)
	[0.00]	[0.04]	[0.12]	[0.01]	[0.01]
Years of education	Yes	Yes	Yes	Yes	Yes
Access to electricity a problem	Yes	Yes	Yes	Yes	Yes
Dummy for owned any electric tool in pre-intervention	No	No	Yes	Yes	No
Standard error	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap
Observations	94	94	94	109	108
R-squared	0.081	0.081	0.081	0.321	0.048

Notes: Standard errors are shown in parentheses and p-value are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

Table 10: Impact of program participation on cost under different estimation strategies.

	Cost in Kwachas				Cost (standardized)			
	Last month	Normal month	Top selling items		Last month	Normal month	Top selling items	
			Full sample	Restricted sample			Full sample	Restricted sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Program participation	−1246.31*	−1000.87	−7109.66***	−3345.68*	−0.36*	−0.23	−0.99***	−0.46*
	−738.827	(855.83)	(2737.52)	(2024.60)	(0.21)	(0.20)	(0.38)	(0.28)
	[0.092]	[0.240]	[0.009]	[0.09]	[0.09]	[0.24]	[0.01]	[0.09]
Years of education	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Access to electricity a problem	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard error	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap
Observations	109	109	107	102	109	109	107	102
R-squared	0.10	0.08	0.22	0.17	0.10	0.08	0.22	0.17

Notes: Standard errors are shown in parentheses and p-value are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

5.4.2 Extensions

Finally, we analyzed more in-depth the moderating variable of specific human capital. To start with, industry-specific work experience may be highly correlated with participants' age. It could be that older people learn less fast in trainings compared to younger people, which might drive our results.[6] However, we found no moderation effect of age on the relationship between training and outcomes. When entering both into the equation, work experience remains significant (results available on request).

Next, we disaggregated specific human capital into work experience and vocational training. Columns (2) and (3) in Table 11 below separate specific human capital into work experience in the industry and vocational training, respectively.

Table 11: Impact of program participation on profit by work experience and vocational training.

	Log(profit)		
	(1)	(2)	(3)
Program participation	0.228	0.107	0.116
	(0.154)	(0.277)	(0.158)
	[0.236]	[0.698]	[0.464]
Work experience		−0.017	
		(0.054)	
		[0.742]	
Program participation × work experience		0.203**	
		(0.083)	
		[0.015]	
Vocational training			−0.388***
			(0.059)
			[0.000]
Program participation × vocational training			0.455**
			(0.203)
			[0.025]
Years of education	Yes	Yes	Yes
Access to electricity a problem	Yes	Yes	Yes
Standard error	Clustered bootstrap	Clustered bootstrap	Clustered bootstrap
Observations	90	87	90
R-squared	0.044	0.040	0.065

Notes: Standard errors are shown in parentheses and p-value are shown in square bracket. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

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6 We would like to thank one of the anonymous referees for this important comment.

The findings show that both dimensions are significant but that vocational training matters more. Column (3) suggests that entrepreneurs who have a higher level of vocational training increase their profits by 45.5 %, compared to entrepreneurs with higher work experience in the industry, who increase profits only by 20.3 %.

6 Discussion and Conclusion

Within the last few years, entrepreneurship training programs within emerging economies have exploded. In this paper, we assessed the impact of one such program in an emerging-economy context, Zambia, on subsequent firm-level outcomes and analyzed who benefits most from the training. We used a novel dataset derived from a randomized controlled trial of 121 entrepreneurs. Our empirical setting allowed us to compare the effects for trained and untrained entrepreneurs. We find evidence that entrepreneurship trainings contribute to immediately intended outcomes; in our case, to improved lean-management practices and help with cost reduction. However, the ultimate goal of an entrepreneurship training program is to increase firm-level profits. We find that the value of the entrepreneurship training program is contingent on whether entrepreneurs are equipped with specific human capital. This suggests that entrepreneurs who have richer resources before participating in the program benefit more from it, presumably because they have a higher level of absorptive capacity. We therefore note that the new knowledge of the training program has been effectively implemented as it has been put into "organizing" and "encoded" in new practices and routines (Aldrich and Yang 2014), but that an entrepreneur's prior resources, in particular her specific human capital, are an important boundary condition to fully benefiting from her learning.[7]

We make a number of contributions to the scholarship herewith. First, most papers focus on estimating the average effects of training programs (for an overview, see Mckenzie and Woodruff 2014). However, they do not reveal the differential impacts of the training program on individual entrepreneurs, despite examining heterogeneity being essential for researchers, program design, and entrepreneurs themselves alike. We show that heterogeneity indeed matters: entrepreneurs with specific human capital benefit substantially more from the offered training. If such

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[7] The strength of our study is in our research design. Our study is a randomized control trial, and therefore able to isolate and causally determine the role of one important factor affecting firm-level performance: namely entrepreneurial training. This implies, as discussed earlier, that we do not need to control for additional variables because the treatment groups are balanced on key characteristics. This, in turn, exhibits lower R^2. Further, since we look at only one aspect on what affects a venture's performance, the level of our R^2 is already powerful.

programs are likely to deliver unequal benefits to participants, designers will get better value for money if they address the training to such a subset of entrepreneurs (McKenzie 2020). An important subsequent societal challenge is then to answer the question of how best to deal with the rising inequalities resulting out of such training, and how to address related fairness concerns.

Second, we use multiple outcomes. McKenzie (2020) notes that important as regard translating better practices into higher profits may be external binding constraints. Indeed, such constraints must be addressed as the training program itself cannot alleviate them. Our findings indicate that trainings are complementary to the provision of a public infrastructure for technical training that reduces such binding constraints.

Third, in our additional analysis we broke down specific human capital into two dimensions: (a) work experience, or the expertise an entrepreneur has developed in the industry; (b) vocational training, meaning the expertise an entrepreneur has developed through industry-specific trainings. Entrepreneurs with vocational training benefit substantially more from the offered program than those with work experience do. This finding indicates relative advantages for entrepreneurs with distinct educational attainments. Our results thus have important implications for program design. Given the dramatic increase in entrepreneurship training, it is important to know for whom and under which conditions they have the strongest impact. If vocational training indeed matters most, then programs should be designed in such a way that they are combined with technical education programs. Our results also have implications for prospective applicants to entrepreneurship training programs, as they should help them better decide whether it is worth it for them to invest their time herein based on surrounding conditions.

Fourth and finally, our findings have implications for both program design and for entrepreneurship policy. It is widely recognized that entrepreneurship trainings in emerging economies are drastically increasing, complementing or even substituting infrastructural policies (Quinn and Woodruff 2019). This literature claims that such trainings are beneficial to firms as they improve the owners' human capital (Bloom et al. 2013; Drexler, Fischer, and Schoar 2014). Nevertheless, previous studies do not find that trainings are indeed universally beneficial, but that the impact hereof tends to be mixed (McKenzie and Woodruff 2014; Quinn and Woodruff 2019). Taken together, although the possibility of no – or even negative – effects to entrepreneurial trainings are well-known, the focus has been mostly on potentially positive aspects such as leveraging business owners' human capital. We build on this idea by arguing that the "bright side" of training only applies for select groups of entrepreneurs, indicating that learning requires a minimum level of resources and capabilities in order to be beneficial (Levitt and March 1988).

On the one side, this insight provides an answer on the more efficient allocation of resources. On the other, if the goal of entrepreneurship training is to alleviate poverty and contribute to job creation, it is unclear whether such programs are optimal, as only those who have higher prior levels of entrepreneurial experience end up gaining in terms of profits. In turn, not only the performance gap between trained and untrained participants but also within the group of trained entrepreneurs is becoming larger as time goes on, meaning between those who are equipped with specific human capital and those who are not. Only for the former does the training have value in terms of increased profits, the ultimate goal of entrepreneurial training. This finding calls for complementary infrastructural support for entrepreneurs with lower levels of specific human capital. It also contributes to recent research on economic inequality and entrepreneurship (Bruton, Sutter, and Lenz 2021) by indicating a new potential source of inequality: the training of entrepreneurs.

The paper is, of course, not without its limitations. But these shortcomings offer new research opportunities going forward. To begin with, we measured the impact of the training program after one year, though ideally we would have liked to also understand whether these effects persist in the long run. Further, due to budget and logistical constraints our sample was restricted to 121 firms. Though our balance tests suggest that randomization was effective in creating two comparable set of firms even with this sample size, a larger one would give us greater statistical power to detect the effects of the treatment more precisely, as well to reduce potential noise in the data. Furthermore, the external-learning source we provided focuses on what entrepreneurs can "do themselves" (i.e. supply side). It would be interesting to see whether performance, and hence growth, could be enhanced if entrepreneurship training is coupled with treatments such as the provision of marketing technologies. As trainings solve the supply-side constraints, entrepreneurs may benefit more from programs that help alleviate demand-side ones at the same time. Further, research has shown that entrepreneurship training is more effective when it focuses on personal initiative and related psychological characteristics (Campos et al. 2017; Frese and Gielnik 2023). Future research needs to investigate which types of training content might be more effective at increasing profits, for example by combining lean-management training with entrepreneurial psychological characteristics. Finally, we use work experience and education as constructs for specific human capital. While these measures are the most common constructs, they only measure investments not human-capital outcomes (Marvel, Davis, and Sproul 2016). Future research could test, therefore, for the robustness of our results with human-capital outcome measures such as knowledge, skills, or capabilities.

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