Impact of Entrepreneurship Training Programs: Evidence from Micro Firms in Sub-Saharan Africa

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Abstract

Entrepreneurship training programs in the developing world have become a key policy tool to enhance performance of the self-employed. However, most firms are informal and do not keep any accounts. But if financial records are not maintained, performance measures need to rely on the entrepreneurs’ memory and recall capabilities. This is potentially associated with large measurement errors. We suggest for the manufacturing sector to extend measurement indicators from standard measures such as profits to more simple and reliable indicators such as tools. We show that our entrepreneurship training program based on Kaizen as an organizational innovation causes a substantial increase in investment into tools. We further show that the trained entrepreneurs invest substantially more into electric tools. We argue that this is important because it allows for stronger productivity increases in the manufacturing process which reflects exactly the trainings’ goal. We further show that an important underlying channel is less spending on consumer or non-business related goods. This suggests that reallocation of resources from household to business is an important strategy to enhance performance. By focusing on micro firms, this paper adds to the nascent but growing literature on entrepreneurship in Africa.

JEL: M11; M53; O14; O17

Keywords: entrepreneurship training, Sub-Saharan Africa, measurement, furniture sector, tools
Impact of Entrepreneurship Training Programs:
Evidence from Micro Firms in Sub-Saharan Africa

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Abstract

Entrepreneurship training programs in the developing world have become a key part of policy to enhance human capital formation and enterprise performance. However, the measurement of their impact is challenging, as most firms do not maintain any accounts. Measurement needs to rely on recall that is potentially associated with large measurement error, thus leading to inconclusive findings in the literature regarding the impact of such trainings. We suggest to extend performance measures to tools used for manufacturing. We show that our entrepreneurship training causes a substantial increase in investment into tools, particularly into the category of electrical tools. Upgrading of manufacturing tools, we argue is important as it allows for productivity increases. We further show that resource reallocation from household to business is an important underlying channel. The paper adds to the nascent but growing literature on the value of entrepreneurship trainings in the developing world, and in particular to improved measurements in this context.

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Introduction

Micro entrepreneurs in the developing world face a number of constraints on the operation and growth of their enterprises, in particular the lack of financial and human capital. These constraints are reflected in low productivity rates: while micro firms account with 80 percent for the lion’s share of employment in the developing world, their contribution to the gross domestic product is as little as 8 percent (Mbuta, 2007). Improving the performance of micro firms could be an important contribution to growth and poverty alleviation.

The overall evidence on the impact of financial capital trainings in the developing world is mixed (Berge, Bjorvatn, and Tungodden, 2014), leading to a shift in focus towards trainings enhancing human capital formation, in particular entrepreneurship training programs which improve business skills. Management scholars and development economists have argued that such trainings may be an effective policy to achieve increases in performance (Mano et al., 2012; Bloom et al., 2013). The perhaps most well known examples include the Improve-Your-Business (IYB) and Start-Your-Business training (SYB) programs of the International Labour Organization (ILO). However, though entrepreneurship trainings are becoming increasingly popular in these economies, the evidence of their performance-enhancing effects remains limited. While positive effects have been shown in the context of corporate entrepreneurship, e.g. for textile firms in India (Bloom et al., 2013), the evidence for micro entrepreneurs is less clear (for an excellent overview, see McKenzie and Woodruff, 2008; McKenzie and Woodruff, 2013).

Two distinct, but interlinked reasons seem to be responsible for these results: First, and most important, potential measurement error. In the informal economy, most entrepreneurs do not maintain any accounts. This may reflect either a low level of math and literacy skills, or a limited understanding of basic business and management concepts. But when financial records are not maintained, performance measures need to rely on the entrepreneurs’ memory, i.e. their recall capabilities. This is, as De Mel, McKenzie, and Woodruff (2009) show, potentially associated with large measurement errors. Employing triangulation methods,
they show that the correlation between different measures of calculating profits is extremely low and ranges between 0.2 to 0.3. This holds true even for sectors like retailing which are characterized by more simple transaction tasks. Even if Personalized Digital Assistants (PDAs) are provided, measurement errors are not substantially reduced (Fafchamps et al., 2012). In an attempt to address this issue, we use insights from cognitive psychology which has identified conditions under which memory tends to be more accurate (Lindsay and Norman, 2013; Hintzman, 1976; Hintzman, Curran, and Oppy, 1992). In line with studies in this field, we suggest the ownership of tools used for manufacturing, i.e. a discrete investment indicator, as an additional outcome variable that is less prone to measurement errors. We are aware that investment into business equipment, like changes in entrepreneurial orientation, is only a channel to achieve better outcomes and not a goal in itself, but we assume that investments are only made if they affect the bottom line of businesses. More fundamentally, one of the important messages is that if we want to be able to evaluate the effect of entrepreneurship programs, we may have to rely on simple and more reliable indicators, rather than employing standard indicators of performance such as profits which might be hard to measure in a developing economy context.

Second, a further reason for the mixed results is the design of many entrepreneurship trainings which often does not allow for causal conclusions. In a recent overview of entrepreneurship training programs in emerging economies, Kiss, Danis, and Cavusgil (2012) show that the majority of studies are primarily “qualitative” or “descriptive”, or apply only “some form of regression” (57 out of 88 studies). This finding is corroborated by Martin, McNally, and Kay (2013) in the context of entrepreneurship research dealing with human capital formation and learning, showing that only 6 out of 42 studies apply a design such as random assignments that allow for causal conclusions to be drawn. We address this issue by a conducting a randomized control trial that allows us to draw causal conclusions.

Our main findings can be summarized as follows: First, we show that our entrepreneurship training causes a substantial increase in the investment into tools, measured by a binary
indicator of ownership. Second, we show that the trained entrepreneurs invest substantially more into electric tools, and not into hand-powered tool sets. We argue that this difference is important because it allows for stronger productivity increases in the manufacturing process, precisely reflecting our trainings’ content. Moreover, consistent with the channel of productivity increase, we also find that investment into electric tools reduces the weekly working hours by around 10 percent. Third, we show that an important underlying channel is less spending on consumer or non-business related goods. This suggests that reallocation of resources from household to business is an important strategy to enhance performance. The paper by focusing on microenterprises in Africa also adds to the nascent but growing literature on entrepreneurship in the developing world, and in particular to the measurement of the impact of entrepreneurship education and training programs in these environments. Given the critical role of microenterprises as the predominant source of employment, entrepreneurship trainings provide an important opportunity to contribute to poverty alleviation.

The paper is organized as follows: Section provides a literature review on the effects of entrepreneurship trainings in the developing world. We then present our research design and methodology in Section. This is followed by a presentation of our empirical findings in Section. Section offers a discussion of the main findings and the conclusions.

Entrepreneurship trainings in the developing world: A review of the literature

Entrepreneurship training: evidence and outcomes

Micro firms\(^1\) in developing economies are characterized by low performance and low productivity (Bartelsman and Doms, 2000; Foster, Haltiwanger, and Krizan, 2006). Entrepreneur-

\(^{1}\)Micro firms activities overlap with other categories of entrepreneurial work like informal entrepreneurship or self-employment (Webb et al., 2013).
ship trainings which teach more efficient management methods and techniques\(^2\) could therefore fulfill an important role in improving firms’ performance (Lima et al., 2015; Gielnik et al., 2017; Fiet, 2001). Productivity improvements could be an important avenue to help achieve growth, employment and poverty alleviation (Mead and Liedholm, 1998; Tybout, 2000).

On the most general level, entrepreneurship trainings aim at triggering attentional change from more outdated modes of attention to new opportunities to induce strategic changes and to improve firms’ performance (Cho and Hambrick, 2006; O’Connor, 2013). Especially in persistently constrained environments like in the developing world (Bloom and Van Reenen, 2010; see also Sonobe, Suzuki, and Otsuka, 2011), entrepreneurship trainings which enhance the control of the entrepreneur, because strategic changes can be induced more independently from external constraints – like productivity improvements – may play a pivotal role in identifying room for improving firm performance. Hanna, Mullainathan, and Schwartzstein (2012) show, for instance, in the context of rural farmers that shifting entrepreneurial attention to alternative input dimensions may have large effects on performance.

However, the evidence of the effects of entrepreneurship training programs on management outcomes is rather mixed, even if they apply a rigor research design. De Mel, McKenzie, and Woodruff (2014) find no significant impact of a program combining training and grants in the long run; the gains only hold true in the short run. Moreover, they do not find evidence of the training program on profits even in the short run. Drexler, Fischer, and Schoar (2014) find that the effect of a basic training on during what they refer to as “bad months” is very small, and only leads to significant increase in sales during “bad weeks”. These findings are corroborated in a study by Valdivia (2015). Berge, Bjorvatn, and Tungodden (2014) show that human capital intervention did not improve the sales of female entrepreneurs, but

\(^2\)O’Connor (2013) distinguishes between four types of entrepreneurship education: Trainings that focus on the entrepreneur herself (i.e. on entrepreneurial traits), on the entrepreneurial process (i.e. new venture creation), on entrepreneurial cognition (i.e. on decision making to engage in entrepreneurial activity) and on entrepreneurial methods (i.e. teaching portfolio of techniques to practice entrepreneurship). Our training belongs to the category of entrepreneurial methods and teaches basic management methods, i.e. basic production skills (see also Ladzani and Van Vuuren, 2002).
only of males. They also show that financial capital intervention has no significant effect on business outcomes for both genders.

Other studies, however, show that trainings can have substantial effects on businesses and their performance. A closely related study is Mano et al. (2012), who implement a basic training program for metalwork entrepreneurs in Ghana for a duration of three weeks. Their training focuses on imparting basic business skills, which have a strong link to \emph{kaizen} techniques, as opposed to management programs that require higher human capital and more systematic firm structures.\footnote{Also refer to Pascha, Storz, and Taube (2011) and Ramachandran and Storz (2018).} The authors find that the training increases the business skills of entrepreneurs substantially, though they do not analyze impacts on profits or sales. Furthermore, their results suggest the managerial training induced an increase in entrepreneurs’ investment into machinery. Sonobe, Suzuki, and Otsuka (2011) also implement a training program drawing its principles from the field of \emph{kaizen}. They show that classroom trainings in an industrial cluster in Vietnam significantly improves management practices. Analyzing the mechanisms, they find that the quality of instructors, in terms of teaching experience, is an important moderator for increasing sales and revenues. Bjorvatn and Tungodden (2010) investigate the effect of entrepreneurship training in Tanzania on small-scale firm’s participation and performance. They analyze determinants of participation and find that entrepreneurs who are more educated, skilled (in terms of math), and experienced (in terms of age) have higher attendance. Thus, they too find that training increases entrepreneurial business skills. Calderon, Cunha, and De Giorgi (2013) implement a business training program for women in Mexico. The authors find that those who received the treatment earn higher profits, have larger revenues, serve a greater number of clients, are more likely to use formal accounting techniques, and more likely to be registered with the government.

Summing up, it is not fully clear whether and to which degree entrepreneurship trainings affect changes in firm performance. One important underlying reason is that, with the exception of those works measuring changes in business skills, most studies rely on standard
measurement indicators such as profits, revenues and costs. The absence of documentation for these indicators, however, makes the measurement of effects highly imprecise. This means that the weak effect of training programs may be caused by measurement error, and not due to the training not having a meaningful impact. We address this issue in the next section. Additionally, a number of trainings do not apply a rigor design (see for an overview Martin, McNally, and Kay, 2013; Kiss, Danis, and Cavusgil, 2012); an issue, which we also address.

**Evaluating entrepreneurship trainings: improvements in measurement**

The measurement of outcomes is challenging in an environment where entrepreneurs do not keep financial records, and where measurement basically relies on recall. One of the seminal studies trying to understand measurement errors in business outcomes is De Mel, McKenzie, and Woodruff (2009). They collect estimates of profits using two methods: the first measure calculates profits as the difference between reported revenue and expenses. The second measure calculates profits by directly asking for them. In a perfect world, the correlation between the two estimates would be one. However, the authors show that the Pearson correlation is very low, i.e. in the range of 0.04 to 0.29. They explore how measurement can be improved through detailed questions allowing for consistency checks, examining recall errors and underreporting (e.g. asking for units and their sub-units). Based on their results they conclude that “that simply asking profits provides a more accurate measure of firm profits than detailed questions on revenues and expenses” (De Mel, McKenzie, and Woodruff, 2009, 19).

Fafchamps et al. (2012) report that the use of PDAs helps to reduce the coefficient of variation and increases the autocorrelation of observations, but they also conclude that “the consistency checks have very minimal effect on the means, standard deviations, and

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4McKenzie and Woodruff (2008) provide an excellent overview of measurement issues in the informal economy where the business outcomes of micro enterprises have been shown to be notoriously difficult to measure and often inconsistently reported.
autocorrelations of sales and profits for the full dataset. As such, it appears that the use of PDAs or other electronic data collection methods for measuring firm profits and sales is unlikely to be justified on the basis of better measurement alone” (Fafchamps et al., 2012, 52). This is an important conclusion, as management processes in the retail sector in which the PDA experiment has been carried out tend to be less complex than in the manufacturing sector. In the manufacturing sector, costs emerge not only during the processes of purchasing and storing but also during the production process. This means that the measurement of outcomes in the manufacturing industry should be even more prone to measurement errors.

Hence, the question of how to improve the measurement of performance has remained largely unresolved in the literature. Its solution remains challenging, given the low levels of business skills, and, more fundamentally, the lack of numeracy, literacy and abstract problem solving skills (Musonda and Kaba, 2011). The measurement is even more demanding in the settings where companies usually are considered to be the property of the entrepreneurs’ extended family, linked to the normative pressures of sharing earnings with their relatives’ social network (Webb et al., 2013; Valdivia, 2015).

However, if management scholars and development economists contend that entrepreneurship trainings may be an important answer to improving firm performance, obviously more reliable outcomes to measure the impact of training is needed. Based on insights from cognitive psychology, we suggest easier-to-memorize measures and focus on investment into new manufacturing tools as an additional performance indicator.

To understand why memorization of tools tends to be more accurate than reporting profits, it is important to know how people memorize and what improves recall. We suggest tools to be a more reliable outcome variable for mainly three reasons: First, making mistakes and forgetting initial information increases as a function of the number of calculations stages between the initial presentation and subsequent utilization of information (Hitch, 1978). Obviously, costs, revenues and profits are more complex to calculate than counting tools. In the case of the former, entrepreneurs need to calculate over a variety of product classes, and
over longer and different periods of time. In contrast, there are no major calculation stages in the case of tools, especially if entrepreneurs possess only a few tools and if these tools do not change. Tools in our setting are few, and even more relevant, visible and located in the entrepreneurs’ immediate environment so they are simple to count. The discrete and lumpy nature of tools should, therefore, imply that tools are less subject to measurement errors, especially at the extensive margin.5

Second, it has been shown that memory improves when connections with other information can be made. Goldstein (2014) provides rich evidence to show that the more connections people are able to make, the better the quality of the information retrieved, when people try to remember it. Linked to this, memory is improved if the person who needs to memorize is able to create a link to herself. This so-called self-reference effect means that memory is more accurate if the information is encoded with reference to the person who is asked to retrieve the information (Goldstein, 2014). Measures of investment into tools should meet this criterion rather than measures of profit: In the case of tools, entrepreneurs can connect the tool to existing knowledge on how to produce manufactured goods, and can relate the tool to themselves in their identity of being carpenters. Also, connections should be easier to make because the same tools are used on a daily basis.

Third and finally, Draschkow, Wolfe, and Vo (2014) have shown that “memory performance was markedly better for searched objects than for objects they had explicitly tried to memorize, even though participants in the search condition were not explicitly asked to memorize objects”. Put differently, tools that need to be looked for are easier to recall correctly than data which are asked to be retrieved from the memory. This is exactly what we can be observed in an entrepreneur’s daily work routine where it is common to look for tools during the manufacturing process.

Independent from the issue of recall is another potential source of measurement error,  

5This is in line with Dupas and Robinson (2013, 169) who note in the context of Kenya that “many respondents did not keep good records of their sales during the day, in part because they did not have time to record each small retail transaction that they had. In contrast, the data on business investments (mostly wholesale purchases) is relatively reliable, albeit somewhat noisy.”
i.e. strategic misreporting. In this regard, the use of tools have the additional advantage to reduce strategic underreporting. As argued by Alby, Auriol, and Nguimkeu (2011), family members within the African context often have claims over business resources. In such an environment, reporting on profits is sensitive (Alby, Auriol, and Nguimkeu, 2011) and might give incentives for strategic misreporting. However, there is no reason to assume why entrepreneurs would not tell the truth – as long as it is correctly memorized – in the case of tools.

We, therefore, argue that measuring the business investment into manufacturing tools may be prone to fewer recall errors. Tools should be a more reliable outcome indicator in environments when accounts are not kept and memory is based on recalling, and therefore provide an important complementary indicator. We use investment into tools as our major outcome variable, along with the standard indicators on profits. We also employ a number of other indicators (like working hours) as outcome measures, which are closely linked to the use of tools.

**Design of entrepreneurship training programs in developing economies**

In a systematic analysis of eighty-eight journal articles published over the last two decades overview, Kiss, Danis, and Cavusgil (2012) reveals that entrepreneurship research in emerging economies (which they call IEEE research) is a vibrant and rapidly growing stream of research. However, they also show that the field is methodologically diverse: The majority of studies does not apply a rigorous design (57 out of 88 studies). This finding is supported by Martin, McNally, and Kay (2013) in their overview on entrepreneurship research dealing with human capital formation and learning. Hence, we do not know whether the weak effects of entrepreneurship training programs are indeed caused by low impacts of the training, or whether the result is due to a design that doesn’t allow for estimating the effects of the program.

In order tackle this issue, development economists make use of randomized experiments,
in particular in the context of entrepreneurship trainings. In a recent review paper, McKenzie and Woodruff (2013) identify 16 studies that use randomized experiments in development economics to uncover causal effects of business training.6 Our paper adds to this growing body of studies and investigates human capital formation through the medium of entrepreneurship training for small-scale entrepreneurs. To the best of our knowledge, we carry out the first randomized experiment on entrepreneurship trainings in the context of Zambia. To study the effects of our treatment in more detail, we additionally use a novel hybrid approach by combining our randomized control treatment with observations in the field. This allows not only a better understanding of the underlying mechanisms of behavioral change, but also to gain a better understanding of our quantitative findings.

Next, most entrepreneurship trainings - with the exceptions of Mano et al. (2012), Sonobe, Suzuki, and Otsuka (2011) and Higuchi, Nam, and Sonobe (2015) who carry out trainings designed for the metal and garment-related sectors (see for a review McKenzie and Woodruff, 2008) - apply a general design which does not take into account sector-specific constraints and learning opportunities. Trainings are also often classroom based, lacking one-on-one follow-ups (see McKenzie and Woodruff, 2008) which would help to verify the implementation of the knowledge learnt in the classroom, to correct any mistakes or misunderstandings, and to create a trust-based relationship with the instructor in order to facilitate changes in behavior (Drexler, Fischer, and Schoar, 2014). Our training addresses these issues by a design containing strong sector-specific elements and intense follow-up visits.

**Research design and method**

**The setting: the furniture sector in Zambia**

The focus of our study is micro enterprises in the Zambian furniture sector. The furniture sector in Zambia is one of the important manufacturing sectors in Zambia, comprising around

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6 Refer to Table 1 of McKenzie and Woodruff (2008) for a list of the studies.
9 percent of the total employment of Zambian manufacturing firms (World Bank, 2012). Typical products include chairs, sofas, kitchen furniture and furniture for bedrooms and living rooms, as well as cabinets for televisions and other goods for domestic premises.

The reason for focusing on the furniture sector is guided by (1) the representativeness of this sector; (2) the scope for improvement; (3) the existence of market demand; and (4) the emphasis on a non-capital injection based approach to improving firm performance. These are explained in greater detail below.

Furniture production is a good representation of other sectors under the category of "low technology" manufacturing. Majority of these firms are informal micro firms that account for 95 percent of all firms and for 88 percent of non-farm employment but only for five percent of the total GDP (Conway and Shah, 2010). This case holds true for the furniture sector, where roughly 90 percent of all firms are either micro or small-scale enterprise (Ministry of Commerce, Trade and Industry and Central Statistics Office, 2014). Two, Zambian micro entrepreneurs experience challenges in accessing the capital market. The sector of low technology manufacturing gives opportunities for micro entrepreneurs to enter the market with minimum capital requirements. This serves as the second reason for focusing on the Zambian furniture sector, as we are interested in exploring programs that might improve firm performance without the direct injection of capital. Third, the manufacturing industry in Zambia is heavily concentrated on food and beverage, accounting for 29 percent of the total employment in the industry. However, the most profitable small-scale manufacturing industries are furniture products, non-metallic minerals products, fabricated metal products and textiles (Ministry of Commerce, Trade and Industry and Central Statistics Office, 2014). Thus, it is critical for Zambia to diversify and to encourage non-food low technology manufacturing firms like furniture microenterprises. Moreover, as Zambia faces a construction boom, the demand for furniture and related products is expected to remain high in the coming years. Ergo, Zambian furniture sector has a good potential to emerge as a prosperous manufacturing sector and hence our focus on the same.
In terms of the features of this sector, one of the key obstacles facing furniture producing firms is its low level of productivity. Though furniture sector and fabricated metal sector are similar in terms of employment rates, there is a stark difference between their productive capacities. Fabricated metal sector provides 25 percent of the total manufacturing value added share while the furniture sector only contributes 10 percent. Furthermore, furniture sector experienced a 15 percent decrease in labor productivity based from the change in value added output per wage investment during the period of 2006 to 2010 (Ministry of Commerce, Trade and Industry and Central Statistics Office, 2014).

Their low productivity becomes more apparent when compared to furniture producers in other developing economies. Comparing the Zambian furniture sector to Vietnam, for instance, the cost of producing a wooden chair in Zambia is around $30, whereas in Vietnam the cost is only around $18 (Dinh, 2013). In terms of labor productivity, the average number of chairs produced per worker per day, again in the formal sector, is 0.2-0.6, whereas it averages 2 in Vietnam. The sector also suffers from the use of outdated technology: Equipment in Zambia is, on an average, 28 years old, compared to 7-13 years in Vietnam. Furniture micro entrepreneurs are still mainly based on manual labor. These differences are relevant for both the formal, as well as the informal sector. Hence, it is imperative for the furniture producing to increase their productivity levels if they are to act as an engine of growth for the Zambian economy.

The low levels of productivity characterizing the Zambian furniture sector imply there is a large room for improvement. Thus, the combination of large room for improvement and growing demand due to the construction boom, make it a sector that could be potentially poised for growth in the future. Finally, the Zambian furniture sector is a representative for most Sub-Saharan African production sites: Firms are informal, have little access to finance and possess low levels of business skills. Thus, the findings of this study also provide a lens to understand firms operating in similar conditions across the continent.
**Training program and the intervention**

The training program was designed as a randomized field experiment and took place between October 2015 and the middle of January 2016. Our study site is Lusaka, the capital of Zambia. The participants of the present study are located in four of Lusaka’s markets. Production within markets is typical for entrepreneurs in the developing world, as they usually locate in markets to compensate for resource constraints.\(^7\) The selected four markets, i.e. Buyantanshi, Chifundo, Mutonyo and Mwasauka, are representative for furniture production sites in Zambia: they are informal, have little access to financing, possess low levels of business skills, and lack formal qualifications. They are located in low-income areas and primarily cater to low-income consumers. Working and production areas are located within a square in the market which is not visible from the street. Once a product is produced, it is usually placed on the streets outside the market and displayed to individuals crossing the streets surrounding the market. Customers are either individuals who notice displayed products and purchase them or prior customers who pre-order the furniture products or recommend them to friends and acquaintances.

We created a listing of all furniture producers in the four markets in December 2014, containing 136 firms. We conducted a baseline survey in April 2015 and obtained data on 121 firms. We could not obtain data on the remaining 15 firms. Table 1 provides a description of the key characteristics of the micro entrepreneurs in our sample.

![Insert Table 1 about here](Table 1)

The average entrepreneur is a single proprietor (81%) and is operating his business for 14 years. There are no female entrepreneurs in the sample which is typical for the furniture industry in the developing world (UNECA, 1988). The vast majority of companies are unregistered and belongs to the informal economy (94%). Very few entrepreneurs maintain

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\(^7\)Webb et al. (2013) identify a number of strategies to overcome resource constraints: to cluster into markets, to exchange tools, and to reallocate resources.
any kind of business records (5%). Only few entrepreneurs have received any business training (10%), somewhat more a carpenter training (25%). Access to finance is very limited with only 6 percent of firms report borrowing from any source. Working hours are long; entrepreneurs typically work 51 hours in a week. Entrepreneurs possess in average six hand tools that usually cover the main and most important ones for the production process (typically, sander, clamper, plane, hammer, drills or saws). Electric tools, however, are rare; a typical carpenter possesses only one electrical tool. This means that the production process is not only concerned with quality issues, but is also extremely labor intensive, a factor underlying the reported long working hours, which again is typical for micro firms in the developing world (Webb et al., 2013). Within the group of electrical tools, electric drills are the most common and owned by 50 percent of the entrepreneurs; less common are electric sanders (21%) and other electric tools (31%). Such electrical tools - for example, battery-operated drills - improve the speed of the production process, reduce waste and improve the product’s quality, but do not require any further education or special training.

The training program was implemented between October 2015 and January 2016 and consisted out of two modules, i.e. two classroom sessions (module I) and three onsite trainings (module II). The two classroom sessions of the module I have been carried out in October 2015, each of them taking place between 9h – 15h. They have been followed by three on-site training sessions (module II), carried out between the beginning of November 2015 and the end of January 2016. During these three trainings, entrepreneurs have been instructed at the firm’s production site, following up the content of the two classroom sessions.

Both classroom sessions introduced basic management methods to improve productivity throughout the production process. The onsite-sessions gave advice on how these methods can be applied to the individual firm. More specifically, the first classroom session introduced a number of strategies to improve productivity, focusing on potential productivity gains over the whole production process, including the step of the purchase. This session aimed to shift the entrepreneurial attention to the link between productivity and competitiveness and
to encourage the participants to identify opportunities for productivity improvements. In the second classroom session, the main products of the participants, as well as tools and equipment necessary to produce them, were identified. This involved understanding how simple but new and improved techniques could help reduce purchase and production costs. Examples included the reduction of wasted timber that would reduce procurement costs, the diminution of miscuts that would reduce production costs, and the use of electric tools which would ensure better cutting and precision and hereby again less waste and higher customer satisfaction. Organized into smaller groups, entrepreneurs then identified concrete channels of productivity gains.

During the three one-on-one follow-up sessions, entrepreneurs have been supported in implementing the lessons learnt in the classroom sessions. Session 1 of the follow-up focused on potential productivity improvements in the step of purchase, and sessions 2 and 3 on improvements in the step of production.

Our training program, for both modules I and II, has been developed in three stages: The first stage involved intensive exchange with experienced trainers in the European small-scale manufacturing sector which helped to get a better understanding of the concrete production process and possible productivity gains in the furniture sector. The second stage was the development of the classroom modules. These were based on the Improve-Your-Business (IYB) and Start-Your-Business training (SYB) program developed by the ILO, and additionally on principles of lean management (kaizen) with its focus on productivity gains across the whole manufacturing process. Following the advice of our local instructors, we adapted, in a third stage, the classroom sessions to the carpenters’ specific needs; for example, we included in both classroom sessions group discussions on how the production process of a specific wood product may be optimized (see Table 2). In the very end, we provided entrepreneurs with a management training that identified purchase and production as the two main steps, highlighting potential avenues for productivity gains, as well as strategies linked to it. Thus, as compared to previous trainings which focus on financial literacy (Drexler, Fis-
cher, and Schoar, 2014; Field, Jayachandran, and Pande, 2010), on accounting, marketing or investment analysis (Berge, Bjorvatn, and Tungodden, 2014; Bruhn and Zia, 2013; Calderon, Cunha, and De Giorgi, 2013), our training program focuses on potential productivity gains during the whole manufacturing process, similar to Mano et al. (2012) and Sonobe, Suzuki, and Otsuka (2011).

The instructors were two Zambian consultants with extensive experience in small firm business trainings in the manufacturing sector. This is important as it has been shown that teaching experience is an important moderator for performance changes (Sonobe, Suzuki, and Otsuka, 2011). One trainer was also experienced in training carpenters. Both trainers were familiar with lean management practices. Both spoke the local language, Nyanja, in order to enhance communication and common problem solving on the ground.

In line with studies in the field of micro firm trainings, a follow-up survey serves as the main source of data to evaluate the outcomes of the training program. The survey was carried out at the end of April 2016, that is about four months after the training sessions were completed.

We complemented our data with various databases and business and industry reports. Together with own visits to the field as well as information from external key informants, these complementary data sources helped us to contextualize our survey data (see Table 2).

Insert Table 2 here

**Selection and randomization**

Our sample consists of 121 entrepreneurs: 42 entrepreneurs from the Buyantanshi market, 46 from Chifundo, 10 from Mutonyo and 23 from Mwasauka market. We randomized treatment across markets. The two markets of Buyantanshi and Mwasuaka (total of 65 furniture producers) were assigned to receive the business training program, whereas the markets of Chifundo and Mutonyo (total of 56 furniture producers) were assigned to the control group. Those who received the business training are our treatment group. The main reason for
randomizing across rather than within markets was driven by the fact that offering training
to some furniture producers and not others might create “bad blood” and undesirable com-
petition among them. Randomization across markets also helped to ensure that there would
be no spillover across treated and control units. In order to check whether the randomization
across markets enables us to create a balanced sample, Table 3 compares the entrepreneurs
assigned to control and treatment on a range of characteristics.

Insert Table 3 here

The comparison of covariates - age, profit, years of operation, registration status, hours
worked, site of production, place of sale, previous experience, carpenter training etc. -
shows that the baseline characteristics of firms are similar for a wide range of characteristics,
indicating that our mode of randomization created balanced groups.

Measuring the impact of the entrepreneurship training

Our sample of self-employed furniture producers poses exactly the same set of issues which we
described above in the literature review on measurement (Section 2.2). We follow previous
studies in the field De Mel, McKenzie, and Woodruff (2009) to gauge the extent of potential
measurement error and measure profits with two different methods: We asked respondents
to directly report profits earned in a normal month, and next asked for total revenue and
expenses\(^8\) in a normal month so that profits could be estimated by us. Table 4 shows
the profit estimate arising from these two methods as well as the Pearson and Spearman
correlation between them.

Insert Table 4 here

Table 4 shows that the correlation between the two measures is positive and is in the range
of 0.20-0.26. Moreover, the coefficient of variation is the lowest for reported profit. Our data
\(^8\)Expenses include: purchase of inventories, purchase of timber, purchase of electricity, water, gas and
fuel, interests paid, wages and salaries for employees, rent for machinery and equipment, rent for land and
buildings, telephone and cellphone charges, maintenance and general repairs, and travelling expenses.
suggest what De Mel, McKenzie, and Woodruff (2009) recommend, that is, directly asking respondents for profits levels might be the best way to elicit the profitability of a business. Thus, we use reported profits as one of the outcome measures. However, another lesson that emerges from this exercise is that there is a lot of measurement error: Our within subject correlation for profits is between the range of 0.2 to 0.3. While this result is exactly in line with a number of other studies, including De Mel et al. (2009) who reported a range of 0.2 to 0.3 as well, it is still very low and shows that the respondents are not consistent. Obviously, measuring profits when relying on recall is challenging.

We, therefore, decided to complement the profit measure with an outcome measure that is easier to recall. Given the trainings’ focus on productivity increases on the one hand and the important role of business equipment investment on the other, we measure performance changes with the ownership of tools. We do so for various categories and are especially interested in whether an entrepreneur invests into electric tools. To shed some light on the underlying channel, we also explore whether the treated firms shift attention by reducing purchases of household consumables. Following our instructors’ advice, we also included “working time” to indicate behavioral changes as they reported that working time is often not used efficiently. Additionally, we use qualitative evidence, in particular meetings with the local instructors, training documents they provided, and own field observations (see Table 2).

**Estimation**

The design of the experiment is based on a randomized control trial. Table 3 (see above) shows that the treated and control firms are balanced on a range of important characteristics. Thus, our primary focus is on intention to treat (ITT) estimates of the entrepreneurship program. More, specifically we estimate:

\[ Y_i = \alpha + \beta T_i + X_i + \epsilon_i, \]  

(1)
where, $Y_i$ refers to the outcome of interest of firm $i$; $T_i$ is a dummy taking the value 1, if the firm was assigned to receive the entrepreneurship training program; $X_i$ is a vector of controls and $\epsilon_i$, by assumption, independent and identically distributed.

**Results**

**Treatment effects on performance indicators: profits and tools**

In this section, we estimate the average treatment effects of our entrepreneurship training. The first column looks at the effect of the treatment on directly stated profit of the respondent. We come later back to profits as an outcome indicator, but start by exploring the impact of the training on the investment into tools.

Columns (2), (3) and (4) of Table 5 explore changes in investment into tools. There are a broad range of tools that might improve productivity. Most important, however, is the category of electrical tools because these do not only increase production speed, which means an increase in productivity by reducing working time, but also allow for more precise cutting and treatment techniques which again help to reduce production costs (or, as it is called in the *kaizen* terminology, “waste”), and hereby also improves productivity. For instance, electric sanders reduce the polishing time of wood, and also provide better accuracy and superior quality of surface finishing. Similarly, an electric drill enables greater precision and reduces production time, especially when working with hard substances as it is the case with Mukwa, the main type of timber worked with in the markets under observation. We collect information on the ownership of electric sanders, electric drills and other electric tools both at baseline and four months after the end of the intervention. We construct a dummy variable which takes the value one in case the entrepreneur reports owning the tool and zero otherwise. Column (2) shows that entrepreneurs who were part of the business training are 18 percentage points more likely to report owning an electric sander after the intervention. Though the coefficient on the treatment dummy for ownership of electric drills
is marginally insignificant, columns (3) and (4) of the table show that treatment also increases the possibility of reporting ownership of an electric drill or other electric tools by 13 and 19 percentage points, respectively.9

In contrast, we do not observe any effects on profits (column (1) of Table 5). The coefficient is small and insignificant (p-value = 0.58) suggesting that the training did not have an impact.10 We interpret the systematic difference for the outcome variables investment into tools and profits as reflecting differences in entrepreneurial recalling capabilities. While we cannot rule out that also measurement errors for the outcome of tools exist, memory studies suggest that recall capabilities are substantially enhanced when recall is linked to fewer calculative steps, to more connections, and when they are searched for (Goldstein, 2014). This holds true for tools, but not for profits which contain more calculate steps, have less self-referencing effects, and are not searched for. Furthermore, self-reported data on tool ownership are less likely to raise the concern of strategic misreporting.

Insert Table 5 here

To further corroborate the consistency in the measurement of tools as an outcome indicator, we explore whether individuals who report purchasing electric tools in 2016, controlling for prior ownership levels in 2015, report an increase in the expenditure associated with electricity.11 Columns (1) and (2) of Table 6 show that individuals who report having purchased electric tools in 2016 indeed report higher expenditures on electricity, both in the last and a normal month, though the coefficient is significant only for the former. Given that the electricity expenditure in the baseline was around 60 Kwachas a month, the reported increase amounts to about a 50 percent increase. While this increase supports the robustness of our result, it is important to notice that this increase is not substantial in terms of the entrepreneurial income; it corresponds to about 3% of the reported profits. We

9We collect information on both hand powered and electric tools. The treatment shows no effect on ownership of other categories of tools. The results are available from the authors.
10Observe that the point estimate compared to the baseline shows a positive effect of 131 Kwachas.
11It is important to note that recalling electricity expenditures is subject to the same measurement problems as recalling profits and thus these results should be considered as suggestive.
therefore conclude that our entrepreneurship training program caused an attentional shift of the trained micro entrepreneurs towards productivity improvements.

Insert Table 6 here

Changes in entrepreneurial behavior

In this section, we analyze how the intervention affects the entrepreneurial behavior. Overall, we observe that the training had an impact on the reallocation of resources, on the time and style of working and, depending on the source of our data, on cooperative behavior.

When entrepreneurs invest into tools, they need financial sources to be able to do so. As the access to the financial market is severely restricted, reallocation has been shown to be an important road underlying strategic changes in the developing world (Webb et al., 2013). Indeed, in Table 7 we observe that treated entrepreneurs are more likely to shift expenses from consumer or non-business related goods to business purchases. Column (1) and (2) show that the treated entrepreneurs are 19 and 11 percentage points less likely to report having purchased clothes for their kids or parents, though the coefficient only in column (2) is statistically significant. Hence, the reallocation of resources from household to business seems to be one important underlying channel. It is important to note that we assume that our findings do not show a link between ownership of tools and profit changes. While we cannot exclude this possibility, we assume that reallocation is the dominant strategy to achieve productivity increases.

Another important behavioural shift linked to productivity observe that entrepreneurs who invest into electrical tools work substantially less. Column (4) of Table 7 shows that training had a statistically significant effect on working hours. Trained entrepreneurs report working five fewer hours in a week, or in other words, reduce the amount of time worked by about 10 percent. While these data are, like data on profit or revenues, not documented, this result is strongly supported by evidence from the field. During our field observations, the majority of trained entrepreneurs reported changes in how they work on deliveries. More
specifically, they reported that they started to work on customer orders as soon as they have been received to ensure timely delivery, and that they had reduced the time spent on idle talk such as politics and football, different from how they behaved before the training. This allowed them to use their working time more efficiently. Given that entrepreneurs report working over 50 hours a week, this reduction can be considered to be further beneficial in terms of improving health.\textsuperscript{12}

We also test for changes in levels of cooperation as an important behavioral channel potentially improving productivity. Our training incorporated various suggestions on cooperative strategies. More specifically, we elicit whether entrepreneurs cooperate in the following activities: (i) cooperation in borrowing and lending machinery; (ii) cooperation in training workers; (iii) cooperation in product development; (iv) cooperation in marketing; (v) cooperation in procurement of raw materials except timber; and (vi) cooperation in procurement of timber. We assign 1’s for the activities in which the firms answer in the affirmative and then take the mean for the six categories and create a standardized index. Given our trainings’ focus on productivity increases, we would expect to observe more cooperative purchasing behavior to reduce costs and to achieve higher productivity. The results of the exercise are shown in column (5) of Table 7; the coefficient is small, positive and insignificant. The mean value of the index suggests that cooperation remains limited for treated entrepreneurs; the average value on the index is 0.35, as compared to a maximum possible value of 1.

However, the experience of our local instructors as well as our own observations in the field (see Table 2 for data sources) tell a different story. Participants interviewed during the on-site sessions reported that they had started cooperative activities. Repeatedly, the trained entrepreneurs referred to concepts having been taught in the first teaching module, the classroom sessions. For instance, they were conscious of the increase in costs inherent in buying paints and other raw materials if bought in small quantities. The trained entrepreneurs reported that they intend to procure raw materials on a cooperative basis to

\textsuperscript{12}Notes of the interviews from the field are available from the authors.
benefit from economies of scale, and that they deliberately look for opportunities to share transport costs with entrepreneurs from the same market. In one of the two treated markets, the market of Mwasauka, entrepreneurs already established a procurement information notice board so that individual entrepreneurs could post weekly material procurement activities on a voluntary basis. Further, changes in the mode of material transportation could be observed. Usually, micro entrepreneurs operating in these markets rent trucks to transport material. In order to save procurement costs, entrepreneurs in the treated markets started to use bicycle trailers called “Vingolo” when they bought timber in another market, the Buseko market.\textsuperscript{13} Other entrepreneurs reported new suppliers located in geographically closer locations, so that transportation costs could be reduced. Linking these qualitative findings to our quantitative ones, we assume that treated entrepreneurs started to change their behavior, but that this change potentially takes more time than the period that could be covered by our endline survey. Compared to other indicators that are based on individual behavioral changes, this result is intuitive as changing collective behavior would typically require more time than changing individual behavior.

Insert Table 7 here

Conclusions and Discussion

In line with Berge, Bjorvatn, and Tungodden (2014), who show that human capital interventions tend to be more effective than financial interventions, we provided an entrepreneurship training enhancing human capital by teaching channels to productivity improvements during the whole manufacturing process. Our study shows that entrepreneurship trainings emphasizing industry specificity and including follow-up visits as a component can have positive effects on business outcomes of poor micro entrepreneurs. Our data suggests that an important underlying channel is the reallocation of resources by shifting expenses from household

\textsuperscript{13}The Buseko market is the main source of timber supply for carpenters in Lusaka.
to business expenses, which is in line with the work of Webb et al. (2013). We use a randomized control trial in order to be able to identify causal effects which has arguably been an important gap in research on the effects of entrepreneurship trainings (Kiss, Danis, and Cavusgil, 2012; Martin, McNally, and Kay, 2013).

While most trainings focus on business skills in terms of marketing, bookkeeping or investment analysis, our focus on production skills has, to the best of our knowledge, only been applied by Mano et al. (2012) and Sonobe, Suzuki, and Otsuka (2011). These studies have been inspired by the Japanese post-war success in manufacturing to which production management techniques like *kaizen* or lean management made a substantial contribution. As it was in particular, production management, which helped Japanese firms in the 60s to catch up, entrepreneurship trainings with a focus on production management techniques may be a particularly fruitful path also for the developing world. Indeed, the recent establishment of a number of *Kaizen* Institutes in Sub-Saharan Africa illustrates that African policy leaders and managers consider *kaizen* to be a key policy initiative that can contribute to increased firm performance (Ramachandran and Storz, 2018).

Looking at the set of outcome measures, our data show that the effect of the entrepreneurship program varies depending on the choice of the outcome variable - “visible” ownership of production tools versus “invisible” data on profits. As financial records are seldom kept in the developing world, measurement errors are a long-standing concern when outcomes are measured with standard accounting data like profits, savings or revenues, also in the context of field experiments (De Mel, McKenzie, and Woodruff, 2009). There are two sources of error: “Honest mistakes” due to insufficient memory, and “misreporting” due to strategic considerations. In order to reduce the former, we suggest to not exclusively rely on standard business indicators like profits, saving and revenues, but to additionally make use of insights from cognitive psychology on how people memorize. Studies in cognitive psychology have shown that memory or recall is better (1) the less the number of calculation stages, (2) the more connections between existing knowledge and the information to be retrieved.
exist, and (3) for objects which are searched for than for objects which have been explicitly
tried to memorize. Hence, using tools which are in the developing world usually few in
numbers, which can be connected to daily work and are related to one’s own profession of
being a carpenter should lead to more precise memorizing and recalling. Additionally, tools
are simply visible and can be counted, given that they are "lying around" in the workshop.
We therefore suggest to extend performance measures, and to measure also the ownership
of tools or other types of physical equipment. We suggest that this indicator may be an
important complementary indicator especially for studies in the manufacturing and agricul-
ture sectors where productivity may be substantially enhanced via investment into physical
equipment. This indicator has, especially in the case of micro firms, the additional advantage
that enumerators can simply crosscheck and verify the reported outcome when conducting
interviews.

Another reason for measurement error is are strategic misreporting, in particular due
to either tax or family considerations. In the context of the developing world, we think
that strategic mistakes due to tax reasons (De Mel, McKenzie, and Woodruff, 2009) have
been overstated, given that most firms are unregistered, informal and hence do not pay
taxes. However, an underestimated and important factor for misreporting is linked to the
culturally embedded conception of the firm which is conceived to be the property of the
entrepreneurs’ extended family, linked to normative pressures of sharing earnings with the
family (Webb et al., 2013; Valdivia, 2015). This means a disincentive to report savings and
profits as they would be expected to be shared with the entrepreneurs’ extended family. This
fact may also explain why the introduction of business accounts in the developing world has
been shown to be quite challenging (Clarke, 2011). Obligations toward the family have been
shown to be an important external constraint (see Berge, Bjorvatn, and Tungodden 2014 for
female entrepreneurs). Measuring investment into tools as the outcome of interest also helps
address this constraint: It is much more advantageous for micro entrepreneurs to invest into
equipment which cannot be easily disinvested than to keep savings. Besides our argument
on cognitive mechanisms of recall, we assume this to be a further important argument why, within the developing context, investments into tools can be used as a more reliable outcome measure.

Related to the notion of improving measurement, we think more attention should be devoted to how data from randomized control trials can be complemented with qualitative data from the field to better understand the observed results. Admittedly, also our focus is on quantitative indicators, but we attempted to include semi-structured interviews, observations in the field and document analyses to be able to draw a richer picture of the sector under study. In particular for the emergence of new cooperation patterns we have shown that our quantitative data might have underestimated the real effects. In this vein, a promising avenue seems to integrate ethnographical methods. Blattman et al. (2016), for example, complement their exercise with intensive qualitative work which include deep participant observation. These observations are then compared to the survey data to determine the both the direction of the bias, as well as the magnitude.\footnote{Also, Deininger et al. (2012) administer a survey method that draws on the large-scale implementation of diaries by respondents. These diaries are to be filled by a household member who is assisted by a qualified local person, at the time of harvest, which are then compared to Uganda’s 2005/06 National Household Survey (UNHS).}

An important policy implication from our research is to put stronger effort in measuring the impact of entrepreneurship training programs, and to take the industry as an important frame of reference into account.

**Acknowledgement**

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References


<table>
<thead>
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<th>Variable</th>
<th>Mean</th>
<th>Variable</th>
<th>Mean</th>
</tr>
</thead>
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<tr>
<td>Age of respondent</td>
<td>39.10</td>
<td>Hours worked normal week on business</td>
<td>51.31</td>
</tr>
<tr>
<td></td>
<td>(10.04)</td>
<td>(12.03)</td>
<td></td>
</tr>
<tr>
<td>Previous work experience</td>
<td>0.46</td>
<td>Borrowed money for business</td>
<td>0.06</td>
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<tr>
<td></td>
<td>(0.25)</td>
<td></td>
<td>(0.50)</td>
</tr>
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<td>Carpenter training</td>
<td>0.25</td>
<td>Does the shop have a clear visible sign outside</td>
<td>0.10</td>
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<tr>
<td></td>
<td>(0.43)</td>
<td></td>
<td>(0.303)</td>
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<td>Management/Business skill training</td>
<td>0.10</td>
<td>Proportion who own sanders in 2015</td>
<td>0.21</td>
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<tr>
<td></td>
<td>(0.30)</td>
<td></td>
<td>(0.40)</td>
</tr>
<tr>
<td>Single proprietor</td>
<td>0.81</td>
<td>Proportion who own sanders in 2016</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>(0.38)</td>
<td></td>
<td>(0.48)</td>
</tr>
<tr>
<td>Unregistered</td>
<td>0.94</td>
<td>Proportion who own electric drills in 2015</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td></td>
<td>(0.50)</td>
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<tr>
<td>Maintains any accounts</td>
<td>0.05</td>
<td>Proportion who own electric drills in 2016</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td></td>
<td>(0.49)</td>
</tr>
<tr>
<td>Years since business was started</td>
<td>14.82</td>
<td>Proportion who own other electric tools in 2015</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>(8.47)</td>
<td></td>
<td>(0.46)</td>
</tr>
<tr>
<td>Produce goods on business premises</td>
<td>0.89</td>
<td>Proportion who own other electric tools in 2016</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>(0.312)</td>
<td></td>
<td>(0.49)</td>
</tr>
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The standard deviations are shown in the parenthesis.
<table>
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<tr>
<th>Source of data</th>
<th>Type of data</th>
<th>Use in analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry experts and consultants, including local wood training institutes, Chamber of Commerce and Industries and financial institutes</td>
<td>Development of suited training program taking into consideration the market situation of the furniture sector in Zambia, in particular constraints and market development; in total 5 interviewees (in total about 15 interviews). Training program was developed with two consultants hereof.</td>
<td>Development of management training and survey questions, including alternative outcome variables</td>
</tr>
<tr>
<td>Local instructors</td>
<td>Local meetings and 10 Skype conferences during March 2015. Additionally 3 documents (consisting of 20, 6 &amp; 57 pages) documenting and evaluating the two modules of the program (consisting of two classroom and three onsite sessions).</td>
<td>Content and design of the training</td>
</tr>
<tr>
<td>External key informants</td>
<td>Background on entrepreneurial training programs in Sub-Saharan Africa and Zambia; information on Kaizen training institutes and wood processing technologies in Zambia; in total 7 interviewees</td>
<td>Development of management training and survey questions, including alternative outcome variables, in particular use of tools; Interpretation of results</td>
</tr>
<tr>
<td>Business and Industry reports</td>
<td>Zambia Manufacturing Sector Profile; Economics of Scale; Furniture Production in Lafia; Micro and Small Cluster Based Furniture; Manufacturing in Tanzania; Small Scale Furniture Makers in Indonesia; Study of Wood Sector</td>
<td>Background information on industry conditions in the furniture industry; entrepreneurship training programs of international organizations in developing economies; information on market conditions Zambia</td>
</tr>
<tr>
<td>Databases</td>
<td>World Bank Enterprise Survey; Central Statistical Office, Zambia</td>
<td>Information on enterprise structure and firm characteristics in Zambia</td>
</tr>
<tr>
<td>Own visits to the field</td>
<td>Listing of firms in the four markets; two days market observations; baseline survey; after intervention semi-structured interviews with 10-12 treated entrepreneurs; in total 7 days of observation three meetings with the Business chambers and Technical Education Vocational and Entrepreneurship Training (TEVETA) in Zambia</td>
<td>Qualitative evidence on changes in entrepreneurial behavior; Interpretation of results</td>
</tr>
</tbody>
</table>
Table 3: Balance tests between firms assigned to control and treatment

Panel A: Interval Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Firms</th>
<th>Control Firms</th>
<th>Treated Firms</th>
<th>Treated Firms</th>
<th>Diff</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Observations</td>
<td>Mean</td>
<td>Observations</td>
<td>Observations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of respondent</td>
<td>54.00</td>
<td>37.87</td>
<td>65.00</td>
<td>40.12</td>
<td>-2.25</td>
<td>0.22</td>
</tr>
<tr>
<td>Total Profit Stated by Respondent</td>
<td>54.00</td>
<td>2117.59</td>
<td>65.00</td>
<td>1796.31</td>
<td>321.28</td>
<td>0.22</td>
</tr>
<tr>
<td>Total Profit (Revenue - Expense)</td>
<td>55.00</td>
<td>1978.87</td>
<td>62.00</td>
<td>1190.19</td>
<td>788.68</td>
<td>0.20</td>
</tr>
<tr>
<td>Total profit (Top selling items)</td>
<td>55.00</td>
<td>4561.47</td>
<td>65.00</td>
<td>4538.16</td>
<td>23.32</td>
<td>0.98</td>
</tr>
<tr>
<td>Years of Education - Entrepreneur</td>
<td>55.00</td>
<td>9.80</td>
<td>65.00</td>
<td>8.38</td>
<td>1.42</td>
<td>0.01</td>
</tr>
<tr>
<td>Years since Business was registered</td>
<td>2.00</td>
<td>13.50</td>
<td>5.00</td>
<td>11.20</td>
<td>2.30</td>
<td>0.73</td>
</tr>
<tr>
<td>Years since Business was started</td>
<td>54.00</td>
<td>14.20</td>
<td>62.00</td>
<td>15.37</td>
<td>-1.17</td>
<td>0.46</td>
</tr>
<tr>
<td>Hours worked normal week on Business</td>
<td>55.00</td>
<td>51.85</td>
<td>65.00</td>
<td>50.86</td>
<td>0.98</td>
<td>0.66</td>
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Panel B: Categorical and Ordinal Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fisher Exact</th>
<th>Variable</th>
<th>Kwallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whether held previous job</td>
<td>0.46</td>
<td>Importance of wholesalers as customers (1-3 scale)</td>
<td>0.24</td>
</tr>
<tr>
<td>Received training to become Carpenter</td>
<td>0.52</td>
<td>Importance of individuals as customers (1-3 scale)</td>
<td>0.88</td>
</tr>
<tr>
<td>Received Business training</td>
<td>0.54</td>
<td>Access to electricity as constraint (1-3 scale)</td>
<td>0.13</td>
</tr>
<tr>
<td>Legal Status</td>
<td>0.45</td>
<td>Place to display finished products as constraint (1-3 scale)</td>
<td>0.89</td>
</tr>
<tr>
<td>Produce on business premises</td>
<td>0.57</td>
<td>Storage space as constraint (1-3 scale)</td>
<td>0.52</td>
</tr>
<tr>
<td>Sell on business premises</td>
<td>0.57</td>
<td>Sources of finance as constraint (1-3 scale)</td>
<td>0.44</td>
</tr>
<tr>
<td>Whether taken any loans</td>
<td>0.55</td>
<td>Too many identical producers as a constraint (1-3 scale)</td>
<td>0.89</td>
</tr>
<tr>
<td>Where purchase inputs</td>
<td>0.71</td>
<td>Lack of regular assured buyers as a constraint (1-3 scale)</td>
<td>0.25</td>
</tr>
<tr>
<td>Visit other businesses to learn</td>
<td>0.38</td>
<td>Insufficient product range as a constraint (1-3 scale)</td>
<td>0.42</td>
</tr>
<tr>
<td>Whether done any advertising in last 6 months</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperate with other firms to buy inventories</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other than timber</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperate with other firms to buy timber</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcontract to other firms</td>
<td>0.31</td>
<td></td>
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</table>
Table 4: Within subject correlation between two methods of profit calculation

<table>
<thead>
<tr>
<th></th>
<th>STATED PROFIT</th>
<th>REVENUE MINUS EXPENSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[1942.10]; (1431.47)</td>
<td>[1560.94]; (3335.53)</td>
</tr>
<tr>
<td>Stated Profit</td>
<td>1.00; [1.00]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Pearson; Spearman)</td>
<td></td>
</tr>
<tr>
<td>Revenue minus Expense</td>
<td>0.20; [0.26]</td>
<td>1.00; [1.00]</td>
</tr>
<tr>
<td></td>
<td>(Pearson; Spearman)</td>
<td>(Pearson; Spearman)</td>
</tr>
</tbody>
</table>

Note: The standard deviation is shown in parenthesis and the Spearman rank correlation is shown in the square parenthesis.
Table 5: Impact of business training on profits and investment into business equipment

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stated Profit</td>
<td>Purchase of Electric Sanders</td>
<td>Purchase of Electric Drills</td>
<td>Purchase of Other Electric Tools</td>
</tr>
<tr>
<td>Treated Dummy</td>
<td>-190</td>
<td>0.18**</td>
<td>0.13</td>
<td>0.19**</td>
</tr>
<tr>
<td></td>
<td>(347)</td>
<td>(0.082)</td>
<td>(0.084)</td>
<td>(0.086)</td>
</tr>
<tr>
<td></td>
<td>[-879 - 500]</td>
<td>[0.015 - 0.34]</td>
<td>[-0.040 - 0.30]</td>
<td>[0.020 - 0.36]</td>
</tr>
<tr>
<td>Dummy for Owned Electric Sanders in 2015</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dummy for Owned Electric Drills in 2015</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dummy for Owned Other Tools in 2015</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>90</td>
<td>109</td>
<td>109</td>
<td>109</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.003</td>
<td>0.176</td>
<td>0.273</td>
<td>0.157</td>
</tr>
</tbody>
</table>

*p < 0.10; **p < 0.05; ***p < 0.01. Robust SE’s in parenthesis and 95 percent confidence intervals are shown in the square brackets.
Table 6: Change in Electricity Expenses

<table>
<thead>
<tr>
<th>Dummy for owns Electric Tools in 2016</th>
<th>35.3*</th>
<th>31.7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(20.5)</td>
<td>(19.9)</td>
</tr>
<tr>
<td></td>
<td>[-5.58 - 76.2]</td>
<td>[-8.07 - 71.4]</td>
</tr>
<tr>
<td>Dummy for Owned Electric Tools in 2015</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.038</td>
<td>0.035</td>
</tr>
</tbody>
</table>

*p < 0.10; **p < 0.05; ***p < 0.01. Robust SE’s in parenthesis and 95 percent confidence intervals are shown in the square brackets.
Table 7: Changes in entrepreneurial behavior

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase of Clothes for Kids</td>
<td>-0.19*</td>
<td>-0.11</td>
<td>-0.98</td>
<td>-6.68***</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>(0.097)</td>
<td>(0.083)</td>
<td>(2.21)</td>
<td>(2.45)</td>
<td>(0.21)</td>
</tr>
<tr>
<td></td>
<td>[-0.38 - 0.00028]</td>
<td>[-0.27 - 0.057]</td>
<td>[-5.37 - 3.40]</td>
<td>[-11.6 - -1.82]</td>
<td>[-0.39 - 0.46]</td>
</tr>
<tr>
<td>Purchase of Clothes for Parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours Worked 2015 Normal week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours Worked 2016 Normal week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Index of Cooperative Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated Dummy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>96</td>
<td>107</td>
<td>120</td>
<td>94</td>
<td>89</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.040</td>
<td>0.016</td>
<td>0.002</td>
<td>0.075</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*p < 0.10; **p < 0.05; ***p < 0.01. Robust SE’s in parenthesis and 95 percent confidence intervals are shown in the square brackets.