Spurring High-Growth Entrepreneurship through Training: Quasi-Experimental Evidence from Nigeria[1]

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Abstract
High-growth entrepreneurship entails business size expansion, improved business performance, and innovativeness of the business. However, can entrepreneur's potential to lead a high-growth business be realized through trainings, especially business related types? A large-scale survey for Nigeria on entrepreneurs is used to help provide evidence to this question. The survey contains information for over 1000 entrepreneurs and was carried out for three years, including the baseline year. Evidently, entrepreneurs who received some form of business trainings during these period experienced an expansion of the number of employees by 2 persons, an increase in innovation index by about 3 units. We also found an increase in revenue, but the importance of this increase was mixed across the matching techniques. These growths are mostly spurred by the new information gotten by the entrepreneurs, which will help in improving their business operations, innovative capacity and even labour productivity.

Keywords: Entrepreneurship; High-Growth Outcomes; Human Capital Development; Innovation; Mentoring; Nigeria
JEL codes: C0, L26, M13, O12,

1. INTRODUCTION

There are some common statistics that define small business firms in developing countries: majority of them never expand beyond only the owner (or/and) a few employees (Nichter and Goldmark, 2009; McKenzie and Woodruff, 2015). Hsieh and Olken (2014) and McKenzie (2015) set a threshold of 10 workers as the possible size that defines firms in developing countries. They lack technical knowledge, innovation and have poor access to capital, and market (see e.g. Coad and Tamvada, 2008; Shah and Saurabh, 2015). These statistics exist despite the number of extant studies recounting the importance of small business growth in developing countries. For instance, they contribute to job creation, introduce new products, and new techniques into the market, and technological innovativeness (Coad and Tamvada, 2008; Michelitsch, Saliola, and Bernt, 2011). The traditional Industrial Organization literature also suggest that new entrepreneurial ventures enhance market contestability, which is an important source of competition (Tetteh and Essegbey, 2014). Noting the challenges faced by small businesses and their importance in developing countries, an important question, therefore, is whether an internal policy directed at improving the human capital of both the owner of the small businesses and their employees (in terms of in-house trainings and other capacity development endeavors) will significantly overcome these constraints, and result in high-growth firms. To be specific, we ask two important questions: (i) what is the impact of adopting a policy directed at training employees and entrepreneurs on high-growth outcomes of small businesses? (ii) What are the channels through which adopting training policies in small businesses translate into high growth potential of small businesses?

These questions are relevant considering that entrepreneurs in developing countries are not "true entrepreneurs", especially when considering the extent of innovativeness and reform they bring into their business processes (see Santarelli and Vivarelli, 2007). In most part, new small businesses in developing countries are founded as a last resort (Beck et al, 2005), and may not be based on a firm conviction that is tied to the expertise and know-how of the entrepreneurs in the particular sector of interest. For example, there are instances where entrepreneurs in developing countries engage in more than one businesses (in different sectors) to increase their income flow. As a result, only a few of the newly established small businesses in developing countries succeeds and are able to weather the harsh business environment that confronts their operations. About a third of newly formed businesses survive beyond two years, and about 90 percent of those surviving will not grow at all and will be left with the same number of employees as when they started (Olafsen and Cook, 2016). In Nigeria, the statistics is not much different: However, the available evidence suggests that about 65 percent of small businesses fail within three years of existence due to lack of technical experience and knowledge, among others (Central Bank of Nigeria, 2003; Obi, 2013). Therefore, providing empirical evidence on some factors that can improve the capacity of the owners of small businesses to drive long-term efficiency and expansion will be relevant for policy

The research questions were investigated using comprehensive evaluation data from the National Business Plan Competition in Nigeria and organized by the Nigerian government. The data contains a baseline survey for 2011 and a subsequent three annual follow-up surveys to enable adequate tracking of the individual entrepreneurs. The main aspect of the survey that was of interest to this study include the information on the entrepreneurs' and employees' participation in business related trainings in the past year. Other important information from

the survey are those that measure our main outcome variables (business performance, innovation and size). Given that this is an ex-post evaluation following a quasi-experimental design, where participating in entrepreneurial-related trainings and programmes are based on the choice of the entrepreneur and not any specific experimental programme, propensity score matching and double difference estimator methodologies are used to net out the impact of the choice of the entrepreneurs. A control group that is drawn from a pool of other entrepreneurs who do not participate in consistent training was used to estimate the counterfactual. However, it is possible that potential spill-over effects or contamination may exist from the data since this is not a pure experiment that would have ruled out these possibilities. Thus, explaining the reason for the choice of different estimator methodologies. The result from the analysis show that entrepreneurs who participate in annual and consistent business related trainings outperform their counterparts in performance, innovation, and they are able to grow their firms – in terms of size of employee. This result is seen only three years of the entrepreneurs consistently implementation training and mentoring programs within their firms. Also, the result on the examination of the channels of impact, reveals that the main effects of participating in the trainings of the entrepreneur and the employees appear through the participant's ability to be strategic with internal organisation planning and processes, innovative capacity and funding, and improved labour productivity.

This paper contributes to two main literature. The first considers triggering factors for entrepreneurial growth and small business development, which is one of the fundamental concerns to policy makers, especially in Africa. There is a growing body of literature (see Acs and Naude, 2011; Naude, 2013) that considers promoting entrepreneurship as a tool for achieving industrialization. For instance, the UNECA 2015 industrialization report for Africa highlights the need for policies that encourage the educational system to combine both formal and informal trainings to produce entrepreneurial skills required for industrial transformation. However, apart from policies focusing on skill development, there are less empirical evidence on what other specific policies could enhance entrepreneurship growth. Naude (2011), focusing on government intervention in improving the institutional environment, pointed out that the government can get involved in entrepreneurial growth and development through creation of "right institutions" that ensure the protection of property rights and a well-functioning legal system, among others. However, this will require political will to accomplish. The political will to put up these institutional structures are mostly lacking in developing countries (see Jo-Ansie, 2007; Efobi, 2015). Funding entrepreneurial development is another option. Fafchamps et al (2014) and MckKenzie (2015), for instance, observe that granting funds to entrepreneurs increases their survival rate, performance, and aids in entrepreneurial growth. The danger in financial allocation to entrepreneurs is that some well-intentioned funding policies for entrepreneurial growth may have adverse consequences like corruption, and rent-seeking behavior on the part of the public officers who manage the disbursement of such funds. Easterly (2008) observes different cases of rent-seeking behaviors from fund pools in developing countries. This paper contributes to this ongoing debate by providing empirical evidence that there are such potentials for high growth entrepreneurship businesses only if the entrepreneurs are involved in periodic and regular skill development training.

The second body of literature that this study contributes considers skill development of individuals through training. Some authors find that workshops and training, as well as other

entrepreneurial education, are relevant for fostering entrepreneurial activities (Klinger and Schundeln, 2011; Testa and Franscheri, 2015). Some of the studies that directly relates to our inquiry include Klinger and Schundeln (2011) who used quasi-experimental design to examine whether entrepreneurial activity can be taught. The authors find that receiving business training can significantly increase the probability of starting a business or expanding an already existing business. Mano et al (2012) also examined similar issue using a randomized experiment in Ghana. They find that basic-level management training improves business practices and performance. Elert, Andersson, and Wennberg (2015) find a positive entrepreneurial income and firm survival from participating in entrepreneurship education and training in high school. In yet another study, Fafchamps and Woodruff (2014) runs an experiment of a small business plan competition in Ghana, where winners are selected to receive individual training. Nonetheless, the authors find no significant impact of such training on firm growth. The contributions of these studies are noteworthy and directly explain how entrepreneurship education affects businesses. However, this present study hopes to add to this literature by considering entrepreneurship education for business owners (entrepreneurs), and also considering a long-term monitoring of those entrepreneurs who consistently participate in such trainings for a consecutive number of periods – three years. Hopefully, this study can provide insight as to the impact of training on entrepreneurs who consistently engage in such trainings over a long period of time. For instance, some of the other studies (e.g. Klinger and Schundeln, 2011) based their result on participating in a three-week training. While Elert, Andersson, and Wennberg (2015) focused on high-school participants, despite that they considered a long-term entrepreneurial training. Also, this study considers a broad outcome from such trainings such as firm performance, innovation and job creation through growth in a number of firm employee. The result in this paper show that consistent participation in business training programmes by business owners enhance the performance, innovation and job creation of the firm.

The rest of the paper is structured as follows. The second section describes the methodology used, which contains the analytical framework, description of the survey data and method of analysis. The third section discusses the empirical findings, while the fourth section contains the discussion of the results.

2.   THE ANALYTICAL FRAMEWORK

One of the key underlying assumptions of this study is that the participation and consistency of training of entrepreneurs in business related field and leadership would lead to a rise in performance, innovation, and size of the firm, which will in turn trigger high-growth entrepreneurship. This causal model assumes that a positive relationship between the firm's productivity and cash income will be achieved through three main channels – (i) directly through improved firm processes and productivity (ii) innovation and innovative abilities, and (iii) indirectly through efficient leadership. Some of these channels have been identified by a number of studies (see Mason, Robinson and Bondibene, 2012; Naude, 2013 – summarised in Figure 1) as possible linkage through which trainings and improved entrepreneurial education of owners and employees of a firm affect the firm's output. In addition, it is reasonable to expect that a higher level of firm operation (as a result of innovation) would increase the demand for the firm outputs (in terms of goods and services), which in-turn will have an impact on the real income paid to the firm's employees and the income of those not directly working

in the firm, but have a backward or forward linkage with the firm. The overall impact of these linkage is the development of the economy where the entrepreneur's business operation exists.

The linkages in Figure 1 presented in this paper is a broad framework on training, innovation and economic development. The framework is based on the following assumptions: (1) innovation within the firm has an overall impact on economic development; (2) human capital development of the entrepreneur, through training, can spur firm innovation. The debate about the role of firm innovation on development is very old, and with similar conclusions – that a pool of innovative firms can increase the speed of development (Fagerberg, Srholec and Verspagen, 2009; Audretsch and Sanders, 2011; Szirmai, Naude and Goedhuys, 2011; Oluwatobi et al., 2014). Nonetheless, another strand of literature has rather stressed the notion that human capital development of the entrepreneur (in the form of training) play a major role in innovativeness of the firm (see for example, Shindina, Lysenko and Orlova, 2015; Riel, Tichkiewitch and Paris, 2015). According to these literature, entrepreneurs are expected to reach a higher level of self-efficacy, passion and business creation as a result of getting involved in long-term training, which will have an impact on their business operations (see Figure 1). In Figure 1, the development of the intrinsic characteristics of the entrepreneurs are captioned as leadership development. This is apart from the other impact of such training on the entrepreneur such as improved firm processes and innovative ability. It is an established fact that business related training directed at the entrepreneur is effective but what is lacking is a theoretical understanding of the evidenced based estimation of training leading to improving the innovative ability of entrepreneurial business.

Figure 1:   Analytical Framework: Training and Entrepreneurship Development
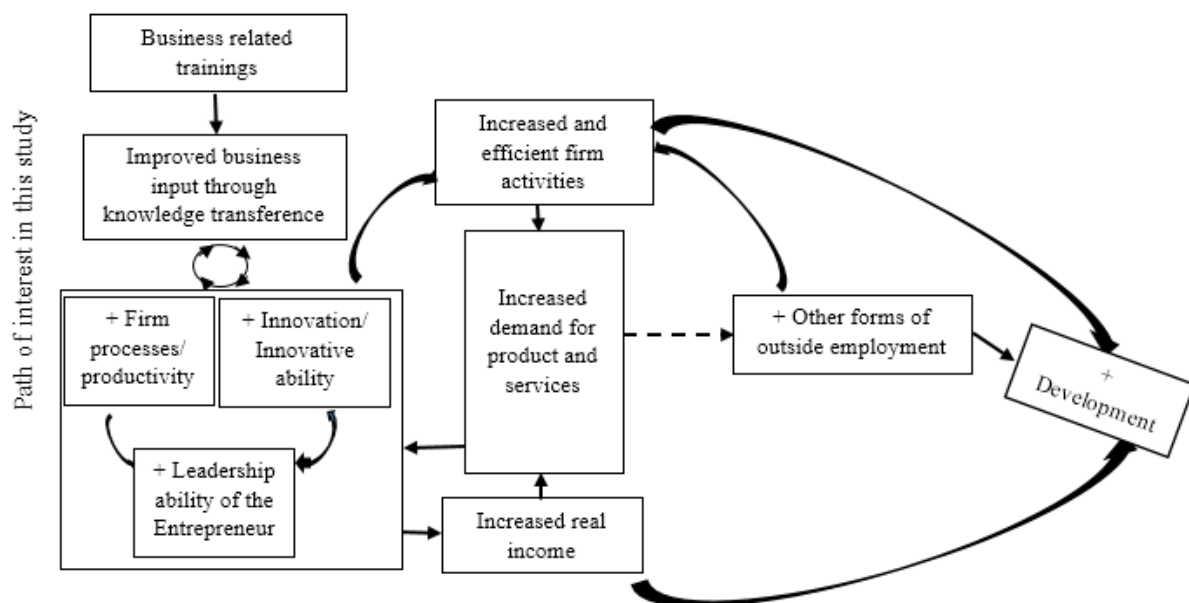
Source: Adapted from Gielnik et al (2017)

As earlier stated, this study provides evidence based research on how entrepreneurship training can bring about high-growth businesses. The national business plan competition in Nigeria, from which the survey was collected, targets individual entrepreneurs who represent their varying businesses. From the survey, we categorise the individual entrepreneurs into two groups, where those who have participated in business related trainings for a period of three years (across the survey period) are included in the treatment group. The control group was set as those entrepreneurs that have not been involved in such trainings for the period of interest.

It is important to note that the groups of entrepreneurs who were surveyed by the national business plan competition were earlier selected randomly across the different states of Nigeria. Hence, the likelihood of spill-over and contamination is already limited.

The matching technique is appropriate for netting out the effect of participating in long-term training by the entrepreneur and the employees. There are some pre-conditions required for the matching technique to provide low-biased and reliable evidence based conclusion. They include: the data for both the treatment and control groups are collected using similar instruments; both groups have similar baseline characteristics so that similar outcome can be expected of the two groups without the intervention; finally, the propensity score function include similar explanatory variables for both groups (see Heckman, Ichimura, and Todd, 1997; Glazerman, Levy, and Myers, 2003; Cook, Shadish, and Wong, 2008; Wanjala and Muradian, 2013). Such pre-conditions are satisfied based on the approach of this study, and further checks will be performed in subsequent sections. Therefore, attributing the impact of participating in consistent training by the entrepreneur can be seen as the change in the outcome of interest, supposing this is measured as the difference in outcome of participating entrepreneur ($T_i=1$) and non-participating entrepreneur ($T_i=0$), assuming the treatment status (T). Therefore, the counterfactual is represented by the control group.

Computing the change in the outcome of interest mathematically is depicted as $Y_i^{T=1}$ for the outcome of the business of participating entrepreneur and $Y_i^{T=0}$ for the counterfactual. The change in the outcome that is attributed to participating in the training program is computed as:

$$\Delta Y = Y_i^{T=1} - Y_i^{T=0}$$

The average treatment effect therefore will be:

$$ATE = E\ (\Delta Y \mid T = 1) = E\ (Y_i^{T=1} \mid T = 1) - E\ (Y_i^{T=0} \mid T = 0)$$

When evaluating the impact of adopting policies that enhance human capital of both the entrepreneur and the small-business workers on high-growth outcomes, it is crucial to take into account the endogeneity that surrounds the relationship. Policies that affect the human capital composition of both the entrepreneurs and the employees are not randomly decided across firms. Each firms decide whether to adopt or not, and such decision may result in issues of self-selection bias. Hence, the heterogeneity of the firms, in terms of the entrepreneurs' characteristics and the small business characteristics, both the observed and unobserved factors affects that affects the relationship. Hence adopting policies that enhance the human capital capacity within the firm is potentially endogenous. Therefore, failure to account for this issue may bias the result and produce inconsistent estimates of the impact of adopting such policy on high-growth potential of the small business.

3. METHODOLOGY
(a) Estimation Strategy
To address the potential selection bias, we first rely on the Propensity Score Matching (PSM) to identify comparable treatment and control groups (see Rosenbaum and Rubin, 1983). The PSM generates propensity scores (PS), which it uses to match both groups based on their respective (PSs). P(D_i), which represents entrepreneurs' probability of adopting human capital development policies in their businesses. The *Logit* model is used to estimate the propensity scores, where the option to implement human capital development policies are binary across firms and regressed against the entrepreneur's characteristics and the small business characteristics. In order to derive the most efficient impact, the entrepreneurs/their businesses

in the treatment and control group that overlap in their propensity scores (common support area) are matched based on different matching algorithms[2]. Two conditions should be satisfied before validating the efficiency of the matching process. They include (i) all important characteristics that explain the decision of the entrepreneur for human capital development (both for self and the employees) can be accounted for; (ii) the entrepreneurs in the treatment and control groups are similar in these characteristics (see Heckman et al., 1997; Dehejia and Wahaba, 1999).

The first condition may not be fully satisfied because the decision to implement such policies that enhance human capital development of both the entrepreneur and the employees are not based on only observable characteristics. Therefore, it is recommended that the *PSM* estimation be complemented with other quasi-experimental approach like the Double Difference or the regression discontinuity Methods (see Gertler *et al*, 2011). Hence, the Double Difference technique will also be applied as suggested.

As earlier indicated, both the entrepreneurs' characteristics and the small business characteristics were included in the *logit* model, and as likely observable characteristics that may determine the decision of the entrepreneur to implement in human capital development policy within the business. For the entrepreneur characteristics[i], we include the confidence level, gender, number of business owned by the entrepreneur, and the quality of the entrepreneurs' involvement in the business. While for the small business characteristics, we include the size, credit facility, internal organisation of the company, and market penetration. To ensure comparability of entrepreneurs and their businesses across the two groups, we match the units that are within the common support region (based on their propensity scores). Further tests were also performed to check the efficiency of the matching process – that there are sufficient balances across the distribution of variables in both the treatment and control groups.

Since the PSM requires sufficient prediction of the decision to implement human capital policy within the firm (by the entrepreneur) and may not entirely solve the self-selection bias[3], we will complement our analysis with the Double Difference estimation technique. The Double Difference (*DD*) estimates the impact of the policy implementation when controlling for the difference between the treatment and control groups. This estimation approach adjusts for other time-varying factors that may affect the outcome variables. It also eliminates further biases that arises over time. Essentially, applying the *DD* approach controls for unobserved heterogeneities that may affect the outcome variables - apart from implementing the policy for human capital development, Gertler *et al* (2011) emphasise that the *DD* should be included in PSM estimates for robustness.

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[2] The Nearest Neighbour Match (NNM), the Kernel Match (KM) and the Radius Match (RM) are the three selected algorithm for this study. The NNM algorithm compares the outcome of entrepreneurs in treatment group with the closest and most similar entrepreneurs in the control group, based on the propensity score. The KM algorithm produces more efficient results and it is more suitable for dealing with large, asymmetrically distributed dataset. Hence, entrepreneurs in the treatment group are matched with those in the control group based on weights that are inversely proportional to the distance between them and those in the control group. The RM is such that the distance between the propensity scores of the entrepreneurs in the treatment group and the control are within a specified radius. Hence, their propensity scores are similar and are within the same radius:

[3] It is important to also note that the bias that may likely linger around our PSM estimation will not be caused by the sample distribution, especially at the first-order. This is considering that the experimental sample is widely scattered over a country of 170 million people, and the sample is not heavily concentrated in a single industry. As a result, the entrepreneurs and their businesses are unlikely to be competing with themselves for the same customers.

(b) Outcome Variables
The main outcome variables for this study are high-growth entrepreneur outcomes. This is measured based on three indicators that can be traced directly to the high-growth performance of the entrepreneur's business. They include: firm performance, innovation, and the job creation capacity of the business through growth in number of firm employees. Firm performance is computed as the profit of the firm. This measure is computed in the Local Currency Unit. The innovation variable is computed as an index from a weighted response to the following questions: (i) whether the small business has introduced a new product, (ii) improved an existing product or service, (iii) introduced new business process, (iv) implemented new design or packaging, (v) introduced new marketing channel, (vi) new method of pricing, new approach to advertising, (vii) new database and supply chain, (viii) new way of organising work, and (ix) new quality control standards, (x) engaged in outsourcing, (xi) licensed a new technology, (xii) obtained a new quality accreditation. Each of these indicators are weighted (1/12), such that the extent of innovation ranges from 0 (low innovation) to 1 (high innovation). The last outcome variable is the job creation capacity of the business, which is measured as the number of new jobs that the firm created in the current year compared to the previous year.

We considered these three outcome variables as our measure of high-growth firms considering the following: first, it considers different dimensions of firms that portrays its ability for a growing concern. Second, the ability of an entrepreneur to be profitable in business and able to grow and hire workers is a fundamental indicator of sustainable business development and industrialisation (see Schoar, 2010). Third, some of these measures are favoured in recent empirical literature (such as Mason, Robinson and Bondibene, 2012; McKenzie, 2015).

(c) Description of Survey Data and Descriptive Statistics
The data for this study is from the Nigeria Youth Entrepreneurship Survey, which is part of the *Youth Enterprise with Innovation in Nigeria* (*YouWiN!*) Impact Evaluation survey (2011-2015). The *YouWin!* impact evaluation program is a collaborative intervention that was launched in 2011 in collaboration with five organisations (the Ministry of Finance, the Ministry of Communication Technology, and the Ministry of Youth Development, with support from DFID and the World Bank). The program contains a four-day training course on preparation of a business plan to applicants of the program, after which a few of the applicants were randomly selected (based on random selection of winning proposals) for funding[4]. Since the program is focused on impact of funding on small businesses, and the trainings that the applicants were exposed to are short-termed (four-day and an additional two-day), we pay attention to the self-reported training of the entrepreneurs on behalf of their firms (apart from the *YouWin!* training).

The survey was conducted in three rounds, apart from the baseline (in 2011), when the program was initiated. The survey contains both individual, household and extensive firm level data. For the firm level data, additional and very detailed firm-level information about the inputs and outputs, human resource, and other additional information that can aid the capture of the main variables in this study. The Nigeria Youth Entrepreneurship Survey follows about 3000 entrepreneurs and their businesses (3, 139 entrepreneurs to be precise) over the period (2011 to 2015). From the survey, we focused on only entrepreneurs who own an operational business. This further reduces the sample to 1,601 that is distributed into two groups of entrepreneurs,

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[4] see McKenzie, 2015 for more elaboration with regards to the program

depending on their implementation of in-house policy to train their employees and the entrepreneurs having a personal mentor across the period of the survey, respectively. Therefore, the entrepreneurs who have consistently implemented policies that trains their workers and who have a personal mentor that coaches them across the period of the survey were included in the treatment group. While those who were not consistent with the in-house training program within their businesses and who do not have a personal mentor were included in the control group. From the sample, only 133 entrepreneurs consistently implemented in-house training program for employees and who had a personal mentor that coached them in business related issues, while 1,468 were in the control group.

This sample distribution is sufficient to identify an appropriate match that will be used to implement the propensity score matching algorithms. Hence, based on this data and the classification, we evaluate the impact of internal policy directed at improving the human capital of both the owner of the small businesses and their employees on high-growth outcomes of small businesses.

Descriptive Statistics
The descriptive statistics of the heterogeneous characteristics across the small businesses and the entrepreneurs, are reported in Table 1. Most of the entrepreneurs in the survey are male, representing over 80 percent for both the entire sample and the two groups of the sample (treated and comparison). The entrepreneurs own only one business on the average. When comparing the entrepreneurs in the treatment and comparison group, there is a significant difference in the number of businesses owned by the entrepreneurs across the two groups. Likewise, the number of hours invested into the business and the confidence level of the entrepreneurs significantly differ across the two groups. The entrepreneurs in the treatment group put in more hour in the running of their business and they are more confident than their counterpart in the comparison group. These differences are likely to explain the dissimilarities in the adoption of the human capital development policies in the businesses of the entrepreneurs. For instance, it is expected that spending more hours on the businesses and having a higher confidence level should spur interest in adopting policies that can further enhance the efficiency of those working in the businesses.

With regards to the entrepreneurs' business characteristics, Table 1 reveals that although the businesses of the entrepreneurs in the treatment group had more customers than the comparison group, the difference is not significant. This is also applicable to the number of hours that the entrepreneur spent earning fund (apart from the primary business) and working for other businesses. However, significant difference was observed across the groups of the sample firms for their ownership status, access to credit, corruption problem that confront the business, and the size of the business (measured as total assets). About 65 percent of the entrepreneurs in the treatment group operate a sole-trader type of business, unlike the comparison group, where only 47 percent operated a sole-trader business. 29 percent had access to credit (for the treatment group) and 17 percent for the comparison group. Also, more of the entrepreneurs' businesses in the treatment group had corruption issues that confront them, compared to their comparison group. Of course, corruption is a cost on the business and it shows the extent to which entrepreneur firms do business with government officials, who may demand for bribe. Finally, the average size of the businesses in the treatment group are about three-fold larger than their comparison counterpart, and this difference is significant at 1 percent.

From the descriptive statistics, it is apparent that entrepreneurs in the treatment group are better off than their counterpart in most of the observed characteristics. However, comparing the
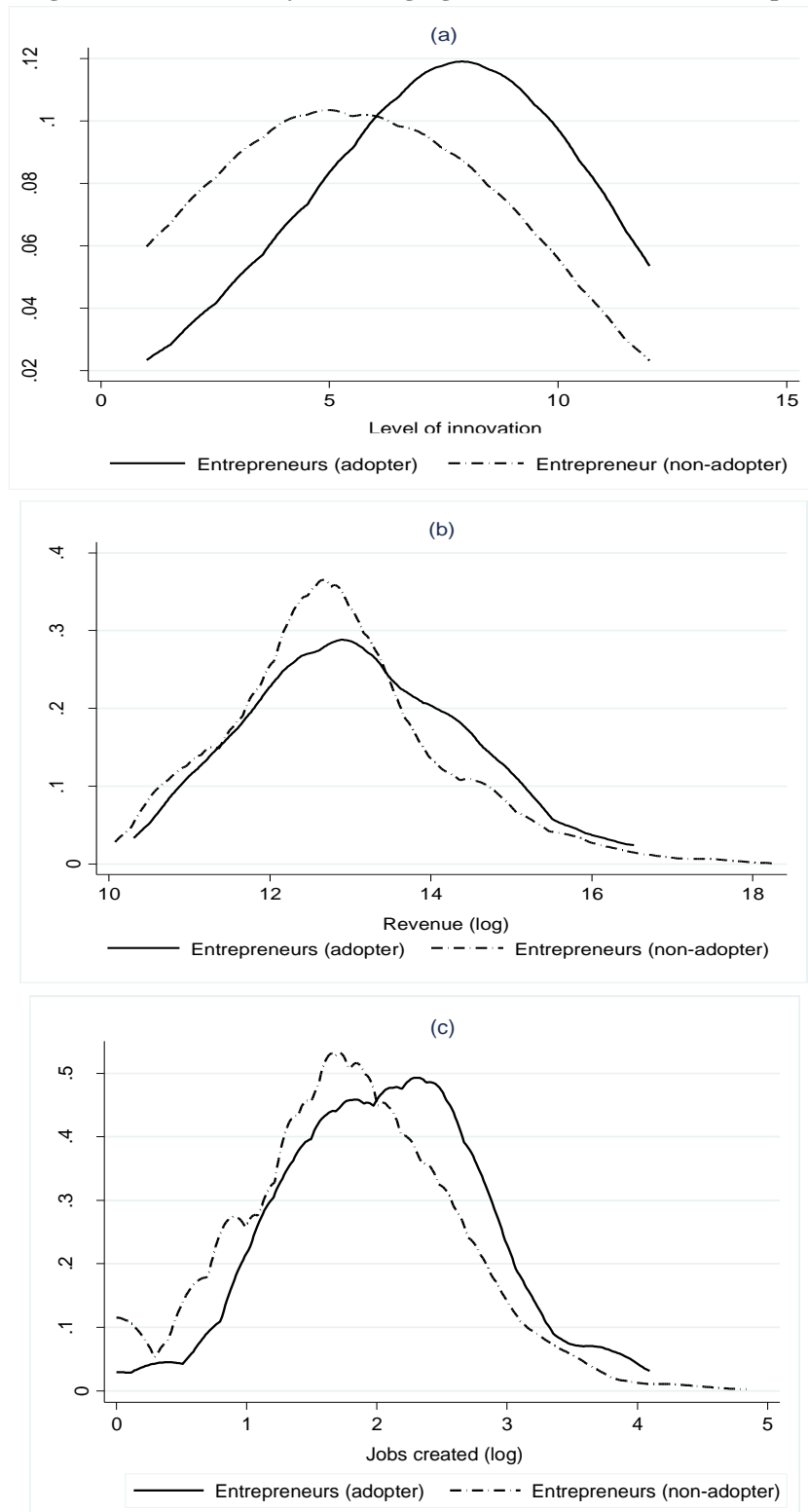
mean differences between the two groups of entrepreneurs may not account for the effect of entrepreneur and firm specific characteristics, and other observed and unobserved factors. If not taken into account, these factors may confound the impact of adopting human capital development policies by firm on high-growth outcomes with the influence of other characteristics. Hence, the need to consider endogenous treatment effect model that accounts for the selection bias that may arise from the fact that the two groups of entrepreneurs (adopter and non-adopter of human capital development policies) may be systematically different.

Table 1: Descriptive Statistics

Variable	Total		Treat		Comparison		t/x^2
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
Entrepreneurs Characteristics							
Gender (1=male, 2= female)	0.85	0.36	0.89	0.32	0.84	0.37	-1.41
Businesses owned (#)	1.29	0.62	1.38	0.67	1.28	0.62	-1.87*
Hours put into business (#)	44.26	22.63	48.95	26.05	43.83	22.25	-2.50**
Confidence level (1=low; 4=high)	1.99	1.57	3.24	0.31	1.93	1.59	-9.49***
Business Characteristics							
Ownership status	0.48	0.50	0.65	0.48	0.47	0.49	-3.94***
Customers of business (# of customers)	90.65	315.72	102.32	235.72	89.95	320.03	-0.23
Access to credit (1=yes if access to credit and 2= no)	0.18	0.39	0.29	0.46	0.17	0.38	-3.55***
Corruption (1=yes if business is confronted with corrupt demands – e.g. bribe)	0.10	0.29	0.16	0.37	0.09	0.29	-2.46**
Total asset of the firm ('000, 000)	6.44	1.65	16.60	27.30	5.88	15.50	-7.37***
Hrs. spent earning money elsewhere	14.77	17.34	11.79	14.08	15.04	17.58	1.50
Hrs. spent working in other businesses	12.24	15.84	10.68	12.98	12.37	16.07	0.83
Outcome Variables							
Innovation (0, low and 12, high)	4.663	3.385	7.278	2.689	4.426	3.342	-9.563***
Total monthly sales (value in LCU, '000, 000)	0.904	2.335	1.265	2.446	0.870	2.323	-1.872*
Job creation (# of new employment)	7.863	9.035	10.323	9.498	7.640	8.963	-3.290***

Using the kernel density plot, we present the outcome variables across the two groups of entrepreneurs. It is important to restate that the outcome variables of interest are the innovation levels of the firm, the performance (in terms of revenue) and the job creation capacity of the firm (measured as the number of new employment in the current year). These outcome variables were included to capture the extent of high-growth potential of the entrepreneur's business across groups. The kernel density plots in Figure 1 reveals that in all the plots (a-c), the density plot of the entrepreneurs, who adopt the human capital development policies in their businesses – i.e. instil training programmes for workers and have a mentor, overlaps with the density of the non-adopter entrepreneur. A right-bias of the innovation, revenue and job creation capacity of the adopter entrepreneur relative to the non-adopter, means that they have a higher mean across these outcome indices and that they tend to have better high-growth businesses. The graph also supports the earlier observation in the descriptive statistics from Table 1 that entrepreneurs who adopt human development policies in their businesses tend to have better outcomes than the non-adopter counterpart. This assertion will subsequently be confirmed in the econometric result section of the paper.

Figure 1: Kernel Density Plots (High-growth outcomes across Groups)

(a)

Level of innovation

——— Entrepreneurs (adopter) — ∙ — ∙ — Entrepreneur (non-adopter)

(b)

Revenue (log)

——— Entrepreneurs (adopter) — ∙ — ∙ — Entrepreneurs (non-adopter)

(c)

Jobs created (log)

——— Entrepreneurs (adopter) — ∙ — ∙ — Entrepreneurs (non-adopter)

4.   ECONOMETRIC RESULT

We begin the econometric analysis by presenting the *probit* model and balancing tests that was used to derive the propensity scores. Table 2 shows that gender, access to credit, exposure to institutional crisis (like corruption), size of the firm and number of hours that the entrepreneur put in other businesses apart from his current business are significantly associated with

participating in the implementation of human capital development policies in their businesses. The correlation with size of the firm and number of hours that the entrepreneur put in other businesses apart from his current business are expected as entrepreneurs with larger business size but with insufficient time input in their current business rely more often on training their workforce to reduce the cost of monitoring. The significant coefficient for the gender variable may be linked to the fact that more males are likely to engage in developing their workers, especially when considering the male gender's desire to gain competitive advantage and in a patriarchal society (like Nigeria). Yet more entrepreneurs with access to credit tend to be more aligned with training their workers and themselves. But with increased exposure to corruption, entrepreneurs tend reduce their implementation of policies that train themselves and their employees. This probably may be because of the huge cost on their businesses that arises with corruption. The main intention for estimating the model in Table 2, therefore, is to ensure the balancing of the differences in observable characteristics between the two groups of entrepreneurs.

Table 2: Logistic Regression

Dependent variable: Implementation of HCD policies	Coeff,	Robust Std. Err
Gender (1=male, 2= female)	-0.844*	0.445
Businesses owned (#)	-0.277	0.468
Hours put into business (#)	0.671	0.556
Confidence level (1=low; 4=high)	-1.093	1.099
Ownership status	-0.484	0.632
Customers of business (# of customers)	-0.008	0.001
Access to credit (1=yes if access to credit and 2= no)	-1.307**	0.659
Corruption (1=yes if business is confronted with corrupt demands – e.g. bribe)	-1.693**	0.677
Total asset of the firm (log)*	0.473**	0.241
Hrs. spent working in other businesses (log)*	0.273*	0.142
Constant	-1.935	3.213
Pseudo R^2		0.200
		86.66
Wald Chi2		(0.000)

Note: HCD imply human capital development. The value in parenthesis is the probability value of the wald test. The superscript *, **, and *** imply significant levels at 10, 5 and 1 percent, respectively.

The results of the balancing quality checks are reported in Figure 2 and Table 3. Figure 2 shows the histograms of the predicted propensity scores of treated and control groups. For the models, the entrepreneurs in the treated group had equivalent matches from those in the control group. The histogram is fairly similar, which suggest that there is overlap and similarity between the two groups of entrepreneur to justify the use of PSM. The comparison of the differences between the two groups in terms of the overall covariance distribution (mean and median absolute bias) and the model fit (pseudo R2 and LR-test) before and after the matching are presented in Table 3. The results for the NNM, KM and RM in Table 3 suggest that the pre-matching differences in the characteristics of the entrepreneurs (across the two groups) are significantly reduced after the matching. For instance, the mean absolute biases are significantly reduced for the three matching algorithm and the p-values of the LR test are no longer significant for post-matching. Thus, an equivalent match can be gotten for comparison.

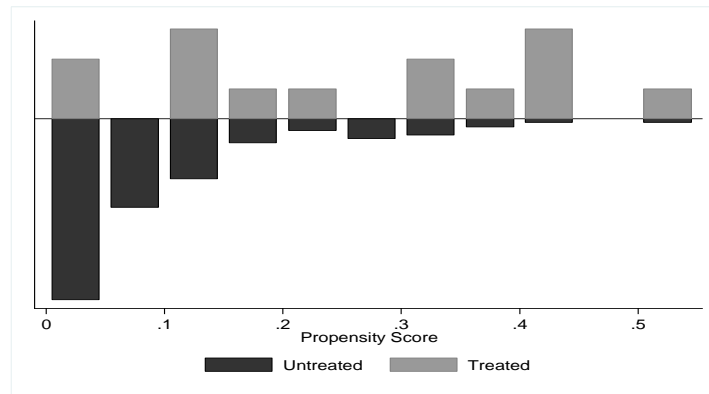**Figure 2: Propensity Score Distribution**

Table 3: Matching Quality

Matching Algorithms	Outcome	Sample	Total Sample Pseud	LR chi2	p>Chi2	Mean	Median Bias
	Innovation	Unmatched	0.196	16.82	0.078	30.8	26.5
		Matched	0.090	3.480	0.968	16.7	16.5
5 Nearest Neighbour Matching (NNM)	Revenue	Unmatched	0.189	16.28	0.061	31.7	29.0
		Matched	0.107	4.01	0.856	18.6	17.1
	Job creation	Unmatched	0.194	16.35	0.038	35.7	37.5
		Matched	0.043	1.66	0.990	14.2	11.2
	Innovation	Unmatched	0.196	14.73	0.099	29.5	25.5
		Matched	0.107	3.65	0.933	18.0	11.2
Kernel Matching (KM)	Revenue	Unmatched	0.177	14.73	0.099	29.5	25.5
		Matched	0.094	3.65	0.933	18.0	11.2
	Job creation	Unmatched	0.194	16.35	0.038	35.7	37.5
		Matched	0.053	3.61	0.891	17.9	14.7
	Innovation	Unmatched	0.196	16.82	0.078	30.8	26.5
		Matched	0.083	3.21	0.976	16.1	17.9
	Revenue	Unmatched	0.177	14.73	0.099	29.5	25.5
		Matched	0.067	2.59	0.978	14.9	16.3
	Job creation	Unmatched	0.194	16.35	0.038	35.7	37.5
		Matched	0.086	3.34	0.911	16.7	12.2

High-growth Differences: Matching and Regressions

Table 4 presents the matching estimates of the effects of implementing human capital development practices on high-growth outcome of entrepreneurs in Nigeria. The Ordinary Least Square (OLS) estimation technique with the three matching algorithms (NNM, KM and RM) were estimated for sensitivity checks. The Rosenbaum bounds estimation in Table 5 provides test for further sensitivity of the PSM result.

The OLS results show significant increase in the extent of entrepreneur's innovation, revenue and job creation as a result of implementing human capital development policies in their firms. The OLS estimates are within the same range as the different PSM algorithms: for the NNM matching algorithm, the innovation outcome of entrepreneurs that implement human capital development actions in their businesses ranges between 3 to 4 point increases compared to those that do not implement these policies. These result are consistent across different matching algorithms. For the job creation outcome, we found a significant increase in the number of jobs created by entrepreneurs who adopt training and mentorship in their businesses compared to those who do not. The increase was about 2 new jobs created. For the revenue outcome, we do not find a significant increase in the revenue size for the adopter entrepreneur. Although the result was positive – suggesting a positive impact – we cannot rely on the result considering that it was not significant at either 1, 5 or 10 percent levels of significance.

Table 4: Estimated Average Treatment Effect

	OLS	NNM	KM	RM
Innovation	2.852***	2.957***	3.779***	3.292***
	(0.000)	(0.008)	(0.000)	(0.000)
Revenue	341519.7*	231357.1	222967.7	53968.5
	(0.094)	(0.557)	(0.859)	(0.959)
Job creation	1.953***	2.300*	2.294**	2.397*
	(0.000)	(0.070)	(0.032)	(0.086)

Note: Probability values are in parenthesis. The superscripts *, ** and *** imply significant levels at 10, 5 and 1 percent respectively.

The Rosenbaum bounds test in Table 5 provides the probability values from the Wilcoxon's signed rank test which present the highest critical values that the average treatment effect on the treated remains significantly different from zero. From the Table, we see the probability value is quite close to the estimated values in Table 4. The estimates in Table 5 indicates that the results in Table 4 are valid assuming there is no hidden bias due to unobserved confounder. Thus, even the presence of unobserved differences in the covariates would not change our inference. This is especially for the innovation and job creation model. However, for the revenue model, we need to exert some level of caution considering that the model is highly sensitive to unobserved differences.

Table 5: Rosenbaum Bounds Test

Outcomes	Gamma (Γ)	U.Bound P-Value	L.Bound P-Value	U.Hodges-Lehmann	L.Hodges-Lehmann
	1	0.001	0.001	3.417	3.417
	1.25	0.002	0.000	3.223	3.587
	1.5	0.004	0.000	3.106	3.691
Innovation	1.75	0.008	0.000	3.048	3.835
	2	0.012	0.000	2.976	3.913
	2.25	0.017	0.000	2.861	3.918
	2.5	0.022	0.000	2.776	4.047
	2.75	0.028	0.000	2.678	4.082
	1	0.976	0.976	774793	774793
	1.25	0.991	0.948	839197	711542
	1.5	0.996	0.911	874043	653457
	1.75	0.999	0.869	896764	576930
Monthly Sales	2	0.999	0.824	957966	477997
	2.25	1.000	0.779	989886	273002
	2.5	1.000	0.734	1100000	171521
	2.75	1.000	0.690	1200000	140552
	1	0.070	0.070	2.025	2.025
	1.25	0.013	0.032	1.309	2.240
	1.5	0.020	0.015	0.934	2.383
	1.75	0.027	0.007	0.701	2.668
Job Creation	2	0.034	0.003	0.486	2.883
	2.25	0.041	0.001	0.241	3.094
	2.5	0.047	0.001	0.033	3.202
	2.75	0.053	0.000	-0.054	3.480

We further present the double difference (DD) result in Table 6. As earlier stated, the DD estimate adjusts for other time-varying factors that may affect the outcome variables and also eliminates further biases that arises over time. The result from the DD technique corroborates that of the PSM. As expected, the significance of the revenue effect from the training could not be verified using the DD estimation, which further agrees with the result in Table 4. However, the innovation and job creation outcome remained positive and significant. The size of the

impact was at the same range with Table 4 for the outcome variable - job creation, but for the innovation variable, the DD result shows a slightly higher increase compared to the result in Table 4. Hence we can conclude that participation in regular training and mentorship programmes by an entrepreneur and in the entrepreneur business will result in a significant improvement in the level of innovation and job-creation capacity.

Table 6: Double Difference Estimations

	Multivariate Linear Regression		
	Coefficient	Standard error	Prob. Value
Estimated impact on innovation	5.002***	0.270	(0.000)
Estimated impact on revenue	170000	420000	(0.682)
Estimated impact on innovation	2.390***	0.794	(0.003)

Note: the superscripts *** imply significant levels at 1 percent.

Our findings agree with most previous studies that, that find training and other human capital development activity to have significantly positive impact on outcomes after controlling for reverse causality, omitted variable bias, and selectivity, even though these studies range from entrepreneurs across different sectors. For instance, Duy *et al* (2014) find that the impact of investment in human capital on performance of the small and medium enterprises (SMEs) in Vietnam results in a significant positive impact on short-term performance, but not revenue and profit of the SMEs. Monge-González and Rodríguez-Álvarez (2013) emphasised the impact of training on innovation of small businesses in Costa Rica. More so, fast growing entrepreneur businesses are such that they seek to meet their skill requirements through substantial training of their employees as well as searching other human capital development activities (see Mason, Robinson and Bondibene, 2012). In the context of Nigeria, McKenzie (2015) used the same data as our and no significant impacts of a short training programmes on some high-growth outcomes of entrepreneurs (like starting a business, or employment). Although our findings contradict those of McKenzie (2015), we emphasised on longer application of employee training activities and even mentorship program for the entrepreneur, which may account for the difference in result.

Channels of Impact
Apart from observing the average impact of implementing the training and mentorship program by entrepreneurs and for high-growth outcome, we go further to examine the impacts on intermediate channels to help understand the mechanisms through which these high-growth outcomes are attained. We consider some channels following McKenzie (2015) and based on a simple production function where firm outcome is a function of productivity *(A)*, capital stock *(K),* stock of business skill *(E)* and labour *(L)* – i.e.

$$Y = f(A, K, E, L)$$

Specifically, we consider the following channels: capital productivity, labour productivity, and business market access (as a measure of improved business skills). For instance, it is expected that improved training of the employees of the entrepreneur's business and mentoring of the entrepreneur will affect innovation and job creation through increasing the stock of skills in the small business and enhancing their level of productivity. More so, training and mentoring may cause the employees and the entrepreneurs in the small business to invest in in-house product development as a result of their improved skills. Investing in product development could also be perceived as enhanced capacity of the firm to carry out innovative research to expand their business operations, which can lead to improved business growth potentials. These skills could be relevant for job creation outcome if used to obtain better market access and enhance

competitive advantage within the market. As a further addition, we include the business process[5] of the firm as a measure of business skill considering that this channel may be an important intermediary between training and mentoring and the high-growth outcomes of the firm

The regression results across these channels of interest are recorded in Table 7. The Table presents how applying the Human Capital Development (HCD) policies (such as consistent training and mentoring program) by the entrepreneur affects the determinants of productivity (capital and labour) and innovative actions (like funding research and development) as well as improved business processes. We can see from the Table that the training and mentoring program in the entrepreneur's business significantly reduce capital productivity. This adverse effect is unlikely to reflect high-growth outcome. We infer from the results that the negative impact may be because the training program was not geared towards improving financial operation or the capital structure of the entrepreneur's business. For labour productivity *(L productivity)*, funding innovation research (*Innovative research*) and improved business processes (*Business processes)* we see from Table 7 a large significant increase in these measures, which is consistent with the fact that implementing training and mentoring program significantly improves these intermediaries within the firm. Thus, implementing these policies within the firm appears to improve the channels of labour productivity, stir up research and development activities and even improve the business operations. This result is expected considering that the programs are channelled towards enhancing the human capacity of the entrepreneur's business operation. Therefore, it is expected that such program will translate in labour productivity, better research engagement (proxy by research funding) and even the operational processes of the business.

Table 7: Channels of Impact

	Multivariate Regression			
Unconditional impact	K productivity	L productivity	Innovative research	Business processes
Implementing HCD policy by Entrepreneur	-0.843*** (0.000)	12.911*** (0.000)	12.296*** (0.000)	6.820*** (0.000)

Note: the superscripts *** imply significant levels at 1 percent. The capital and labour productivity are measured as the total revenue of the firm divided by the capital and labour input. Innovative research is the sum spent by entrepreneur's firm in researching and developing new products and processes during the year. Business process is discussed in the footnote. The summary statistics of the four channels are not presented for focus: however, they are available upon request.

Conclusions

Training programs within firms is seen as an important catalyst for business growth and development. Likewise, implementing human capital development (HCD) policies within the entrepreneur's firms – such as programs to sustain continuous training of the entrepreneur's employees and the entrepreneur – is believed to be important for high-growth entrepreneurship. Nonetheless, there is generally a lack of strong evidence to explain this relationship, especially with large dataset that monitors the consistency of implementing the HCD policy for over three years. Moreover, the pathways through which the implementation of the HCD program affects high-growth outcome is not also clear. In this study, we clarified these two lines of enquiries

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[5] The business process was measured by a sum of the affirmative action of the entrepreneur's firm with regards to drastic and competitive approach to competitors (such as monitoring pricing and products of competitors); customer relation (such as knowing the product desire of customers, product evaluation, promotion for customer retention and customer follow-up); supplier relation; advertisement and evaluating the impact of such advertisement; material management; and general business evaluation. This variable is a discrete variable that range from 0 to 25, with higher number signifying better business processes and vice versa for lower numbers.

using a unique dataset from the Nigeria Youth Entrepreneurship Survey, which is part of the *Youth Enterprise with Innovation in Nigeria* (*YouWiN!*) Impact Evaluation survey (2011-2015). We address the problem of causation in a quasi-experimental manner by using both the matching technique and the double-difference estimator. We conduct some sensitivity checks using the Rosenbaum bounds test.

We find that that entrepreneurs who participate in annual and consistent business related trainings outperform their counterparts since they become more innovative, and they are able to grow their firms in terms of size of employee. This result is observed for entrepreneurs who consistently participated in three years of implementation training and mentoring programs within their firms. Also, the result on the examination of the channels of impact, reveals that the main effects of participating in the trainings of the entrepreneur and the employees appear through the participant's ability to be strategic with internal organisation planning and processes, innovative capacity and funding, and improved labour productivity. We also find that the training and mentoring program in the entrepreneur's business significantly reduce capital productivity. This adverse effect is likely to be because the training program was not geared towards improving financial operation or the capital structure of the entrepreneur's business.

One important caveat that should be observed when interpreting our results is that we used a survey data that includes self-reported information of participation status of the entrepreneur in internal training and mentoring programs. Information pertaining to the content of such programs were not clearly stated in the survey. However, some evidence suggests that the trainings that are implemented by the entrepreneurs are usually geared towards improving the human capital of the employees and other business operations (apart from finance and capital structure skills). This means that it be difficult to ascribe the positive effects to the aspect of the training programs related to financial and capital structure alone. While we acknowledge that our conclusions may hold to some extent, we are flexible on the causal linkages and hold the view that data on a well-structured experimental studies may provide more concrete findings. For future studies, it will be important to prepare the instrument of data collection in such a form that there will be more information on the content of programs being evaluated. This will be important to have a very clear understanding of the estimated impact. On the basis of these findings, this paper recommends that in order to maximize the positive impact of training and mentorship, entrepreneurs should participate in well-targeted and long term rather short term entrepreneurship and mentorship programmes.

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[i] For the entrepreneur characteristics the confidence level, gender, number of business owned by the entrepreneur, and the quality of the entrepreneurs' involvement in the business were included. The confidence level of the entrepreneur to run the business is computed as 1 (low confidence) to 4(high confidence). This variable is based on the response to the following questions – confidence to come up with a new business product/service, accurately estimate the cost of the business, accurately estimate the customer demand for a new product, sell a product/service to a customer in a first meeting, identify new business who can help the business grow, inspire, motivate and encourage employees, find suppliers to sell material at best price, persuade bank to lend to the business, and correctly value a business if the entrepreneur was to buy the business from the open market. The quality of the entrepreneur's engagement in the business is another unpopular variable, which is measured as the number of hours that the entrepreneur personally spend in working in the business in a week. The gender and the number of business that is owned by the entrepreneur follows usual measurement. These variables were included

as a heterogeneous factor because they are in line with logical expectation that the confident level of the entrepreneur, involvement in the business, and the number of businesses owned will significantly determine the extent to which they seek for better performance and efficiency of their work-force, and as well as themselves (see Goffee and Jones, 2013; Birkinshaw and Cohen, 2013).