Inception and Operationalization of Kaizen in Tanzania

Dr. Edwin P. Mhede
Dar Rapid Transit Agency (DART)

Presented at the Africa Kaizen Annual Conference 2021

24th August 2021

Outline of the Presentation

- Motivation
- The Inception Process and Landmark
- Operationalization to Manufacturing Firms
- Microeconomentric Analyses
- Conclusion and Policy Implications

The Manufacturing Sector in Tanzania

Employment Level	Number of Firms		Percentage (%)	
1 – 4	41,919	MEs = 41,919	85.1	MEs = 85.1
5 – 9	6,002	SMEs = 7,077	12.1	SMEs = 14.4
10 – 19	493		1.0	
20 – 49	412		0.8	
50 – 99	170		0.3	
100 – 499	199	LMEs = 247	0.4	SMEs = 0.5
500 +	48		0.1	
TOTAL	**49,243**		**100**	

Source: Industrial Census Report of 2013 (NBS, MIT, and CTI)

- By 2013, the Tanzania's manufacturing sector employed about 231,099 employees, and that 53.3% of the workforce was engaged in MSMEs.

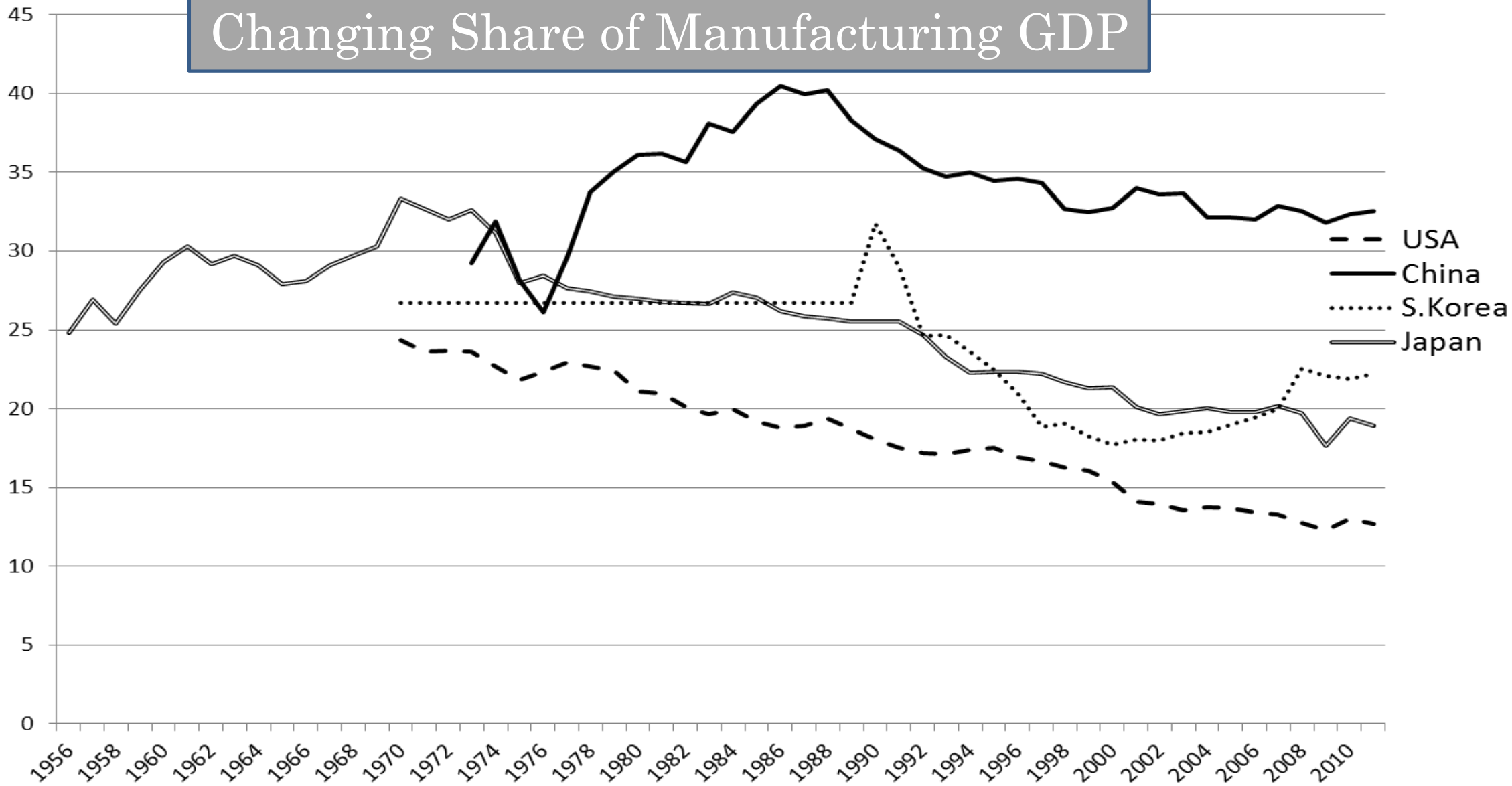
The Typical Workshops of MSMEs

The Typical Workshops of MSMEs…

The Typical Workshops of MSMEs…

A Chance for Industrialization in SSA

Changing Share of Manufacturing GDP



Motivation

- Economic growth is essential for poverty reduction and that private sector-led industrialization, through creation of decent jobs, plays an import role (WDR, 2012; Acemoglu and Robinson, 2013; Bloom et al., 2013; Otsuka and Shiraishi, 2014).

- Entrepreneur's managerial capacity is scarce in developing countries (Bruhn et al., 2010; Sonobe and Otsuka, 2014), hence, poor productivity (and un-competitiveness) is rampant there.

- Interventions to teach basic management (including Kaizen) among entrepreneurs exist (Karlan and Valdivia, 2011; Mano et al., 2012), but such interventions are yet to provide sufficient evidence for policymakers (McKenzie and Woodruff, 2014).

The Entry Point

- We found the garment cluster in Dar es Salaam, it was born in the 1990s by the training offered by UNIDO, which indicates that the training is powerful tool for industrialization.

- There were as many as 700 garment workshops, with average schooling of entrepreneurs as high as 11 years and a few enterprises were able to export their products to Europe.

- Nonetheless, enterprises were generally small with the average size of 5 workers, and moreover, the cluster was not growing.

- So, in order to stimulate growth of this cluster, we decided to design and offer the basic Kaizen management training.

The Inception Process and Landmark

- Established coordinates, such as the Academia (GRIPS), International Organization (World Bank, JICA, EoJ, UNIDO, ILO), the Government (GoT-MIT-MoH), Service Providers– mainly BDS–Public (e.g., SIDO and CBE) & Private Master Trainers–, the end users (the entrepreneurs), and Mass Media.

- Due to poor attitude of learning even basic skills, we had to knock several doors to convince the target audience that Kaizen may contribute to productivity and product quality improvement.

- After a series of such interactions, the Kaizen evangelism was accepted. So, we won the game. Key to success: **top leadership support** (from both public and private sector), willingness to **change of mindset**, **perseverance** (push until you achieve it), …

What We Did (Operationalization)

- Our Approach in this WB/GRIPS/GoT experimental intervention:-

  (a) Both classroom and onsite training components were provided for; (b) Two types of training programs: *Kaizen* (e.g., production and product quality control practices) and standard management (*non-Kaizen*); (c) Small-scale manufacturers of garments and related products in Dar es Salaam garment industrial cluster; and (d) Enterprise surveys of 114 enterprises in a span of four years.

- In this paper, we analyze the **medium-run** impact of a randomized controlled experiment of a short-term management training program on the adoption of management practices and business performance of trained enterprises in Tanzania.

The Preview of Major Findings

The Impacts of *Kaizen* management training program on:-	Medium-run (3 years after the training interventions)
The treated entrepreneur's adoption of Management practices (measured by management practices score)	+ve and significant (the same was also the case immediately, say 1 year, after the training)
Business performance, measured by the Manufacturing Value Added (MVA) and Gross Profit (expressed in real terms)	+ve and significant (it was not observed in the short-run)

The Operational (Study) Sites

- We focus on garment industrial cluster in Dar es Salaam, whose enterprise sizes are mainly small and the majority are tailor-type while some export to neighboring countries.

- Such garment enterprises are scattered in Dar es Salaam, mostly housewives who started business at their house after attending in a SIDO/UNIDO business training program in 1990s.

- Focus on industrial cluster and one industry allowed us to control various heterogeneity that would otherwise be introduced if we were to broaden our sample enterprises.

Figure 1: Location of Sample Enterprises

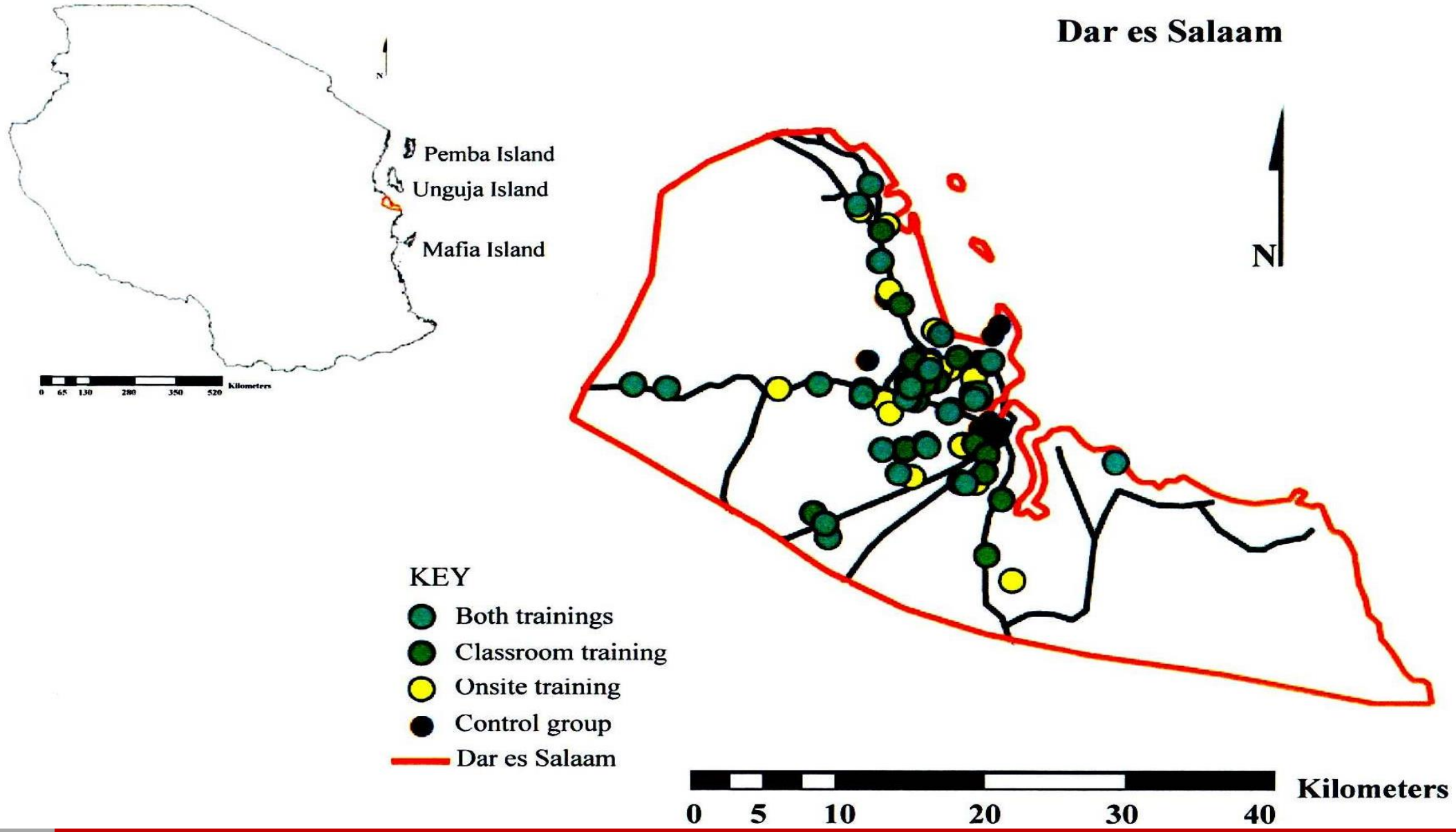
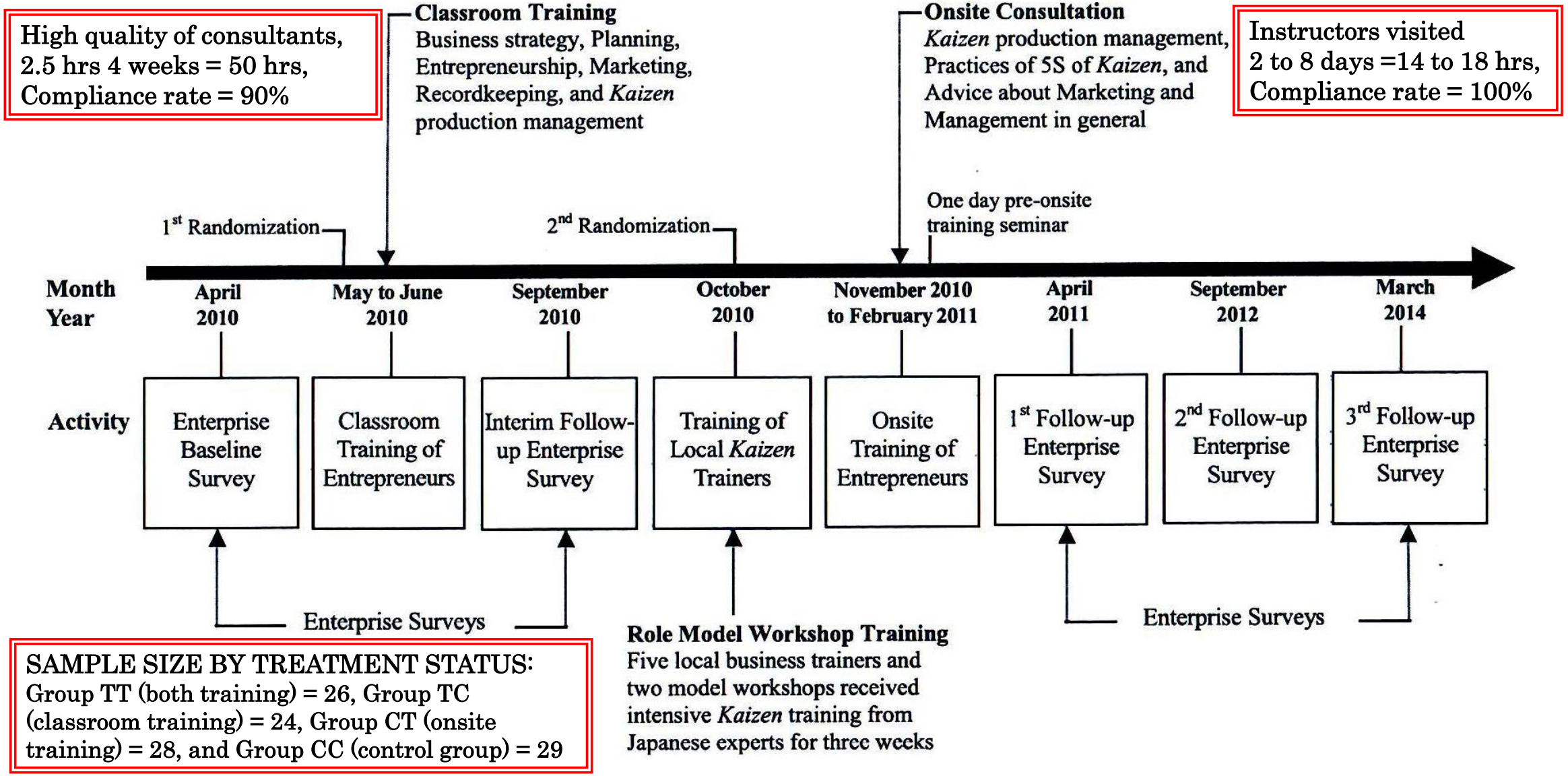


Figure 2. Program Implementation Timeline



Kaizen: for Production Management

- ***Kaizen*** (which means change for the better) a Japanese business philosophy and scientific approach of improvement of working practices, product quality, and productivity by reducing wasted work and materials with the continuous and collaborative effort of the firm manager and workers (Imai, 2012).

- ***Kaizen*** consists of:-
  - ❑ Introductory part: **5S** (**Sort**, **Set**, **Shine**, **Standardize**, and **Sustain**);
  - ❑ Techniques for spotting inefficiencies, finding root causes, making hypotheses, carrying out experiments, finding solutions, implementing and evaluating the solutions; and
  - ❑ Advanced techniques for scaling up the implantation of solution and improving these techniques.

The 5S of KAIZEN for Improvement

PRODUCTIVITY,

EFFICIENCY, AND

PRODUCT QUALITY

ENHANCEMENT

Kaizen Management Practices

	B	1ST	2ND	3RD
	(1)	(2)	(3)	(4)
Panel A: *Kaizen* Management Practices Scores (max = 15)				
The enterprise/entrepreneur:				
1. Assigns any workers to inspect the quality of the products before sales	10	5	3	2
2. Keeps records of quality defects	22	46	70	40
3. Records customers' complaints about the products sold	45	57	70	48
4. Instructs the worker the way of preventing the defect	9	2	4	8
5. Has a designated place for all tools	34	53	71	35
6. Has labels in the storage of tools so that workers can easily find them	3	11	23	19
7. Has a designated place for raw material storage	76	91	89	87
8. Separately stores raw materials from the scrap	75	93	94	83
9. Has no scrap cloths around the floor	13	62	61	56
10. Daily removes scraps and cleans the floor of the workplace	83	94	95	96
11. Does machine maintenance at least once a week	29	25	59	25
12. Regularly holds a meeting in which all the production workers participate	28	48	64	53
13. Has a designated area for all the production activities within the workshop	29	38	52	22
14. Has a flowchart indicating the sequence of activities in the production process	8	11	39	6
15. Completely knows the sequence and duration of each of the production activities	82	94	85	72
Average Rate of Adoption	**36**	**49**	**59**	**44**

Non-*Kaizen* Management Practices

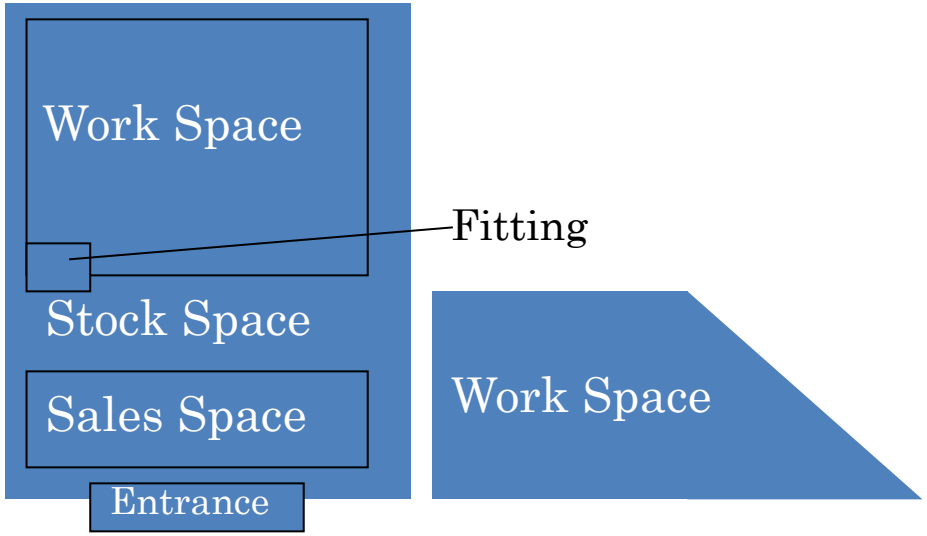
	B	1ST	2ND	3RD
	(1)	(2)	(3)	(4)
Panel B: non-*Kaizen* Management Practices Scores (max = 12)				
The enterprise/entrepreneur:				
(1) Had any expenditure for advertisement in the last 3 months†	10	37	63	15
(2) Has any signboards in front of the workshop	39	57	75	60
(3) Distributes complimentary cards or calendar	27	43	80	57
(4) Issues invoices or receipts with workshop's name or phone number	36	59	77	62
(5) Preserves business documents (e.g., receipts or invoices) when making a purchase	48	81	96	92
(6) Separates business and household expenses	62	84	96	82
(7) Keeps record of sales	84	92	97	93
(8) Keeps record of material purchase	70	88	97	93
(9) Can clearly describe the characteristics of their customers	42	67	93	85
(10) Can clearly describe the strength of own firm compared with his(her) competitor(s)	24	62	88	93
(11) Has clear sales target or profit target in this year	45	73	96	67
(12) Has clear plan for growth of the enterprise in five years from now	28	62	90	92
Average Rate of Adoption	**43**	**67**	**87**	**74**

Classroom and Onsite Training Sessions

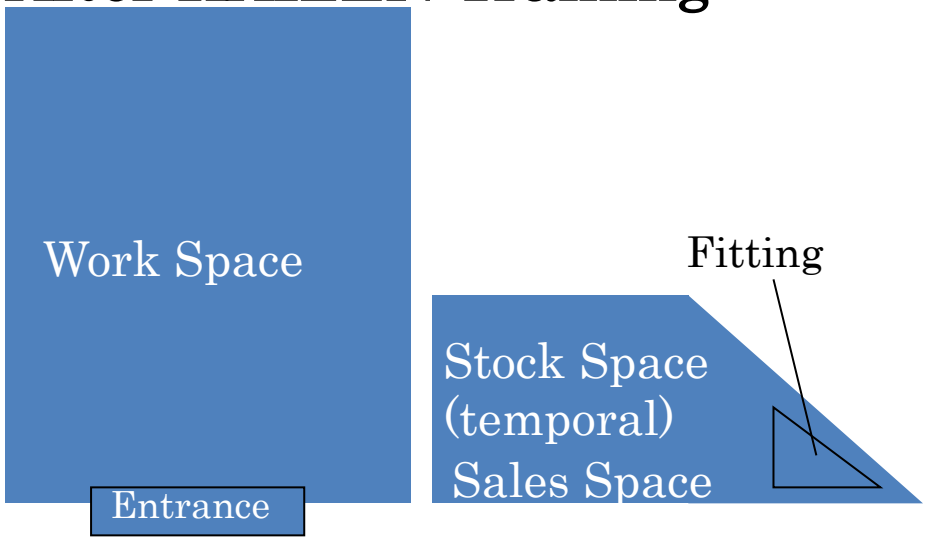
Classroom training in progress

Onsite training in progress

Before KAIZEN Training



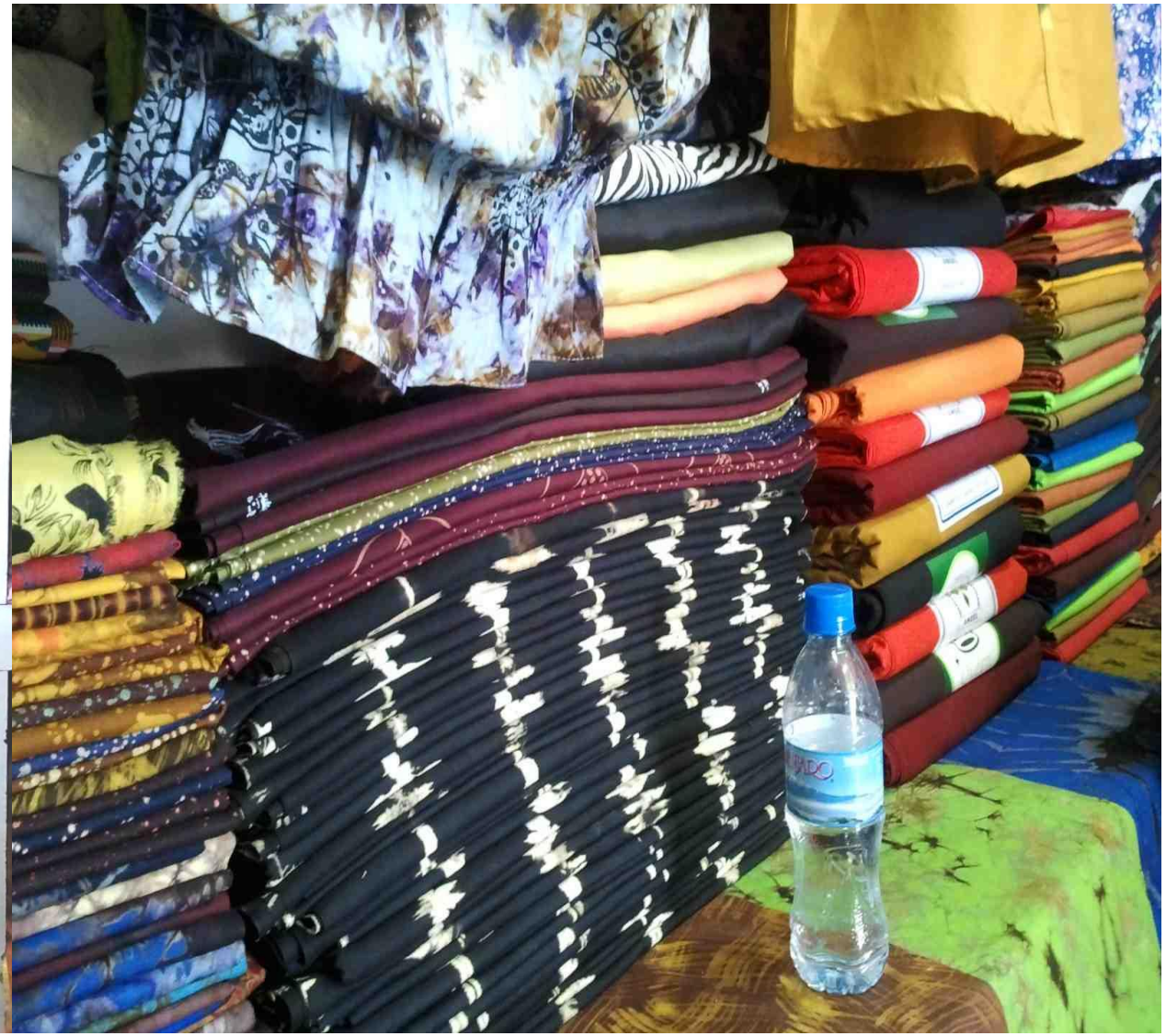
After KAIZEN Training



How they could minimize loss?

BEFORE

AFTER



Some Success Stories such as

Cherie Blair, the founder of CBFW and the wife of the former UK Prime Minister Tony Blair, observed how Rose Makoyola, a participant in the GRIPS/World Bank training program, benefited from Kaizen (1 July 2013)

Garment industry in Dar es Salaam

The same room before the training

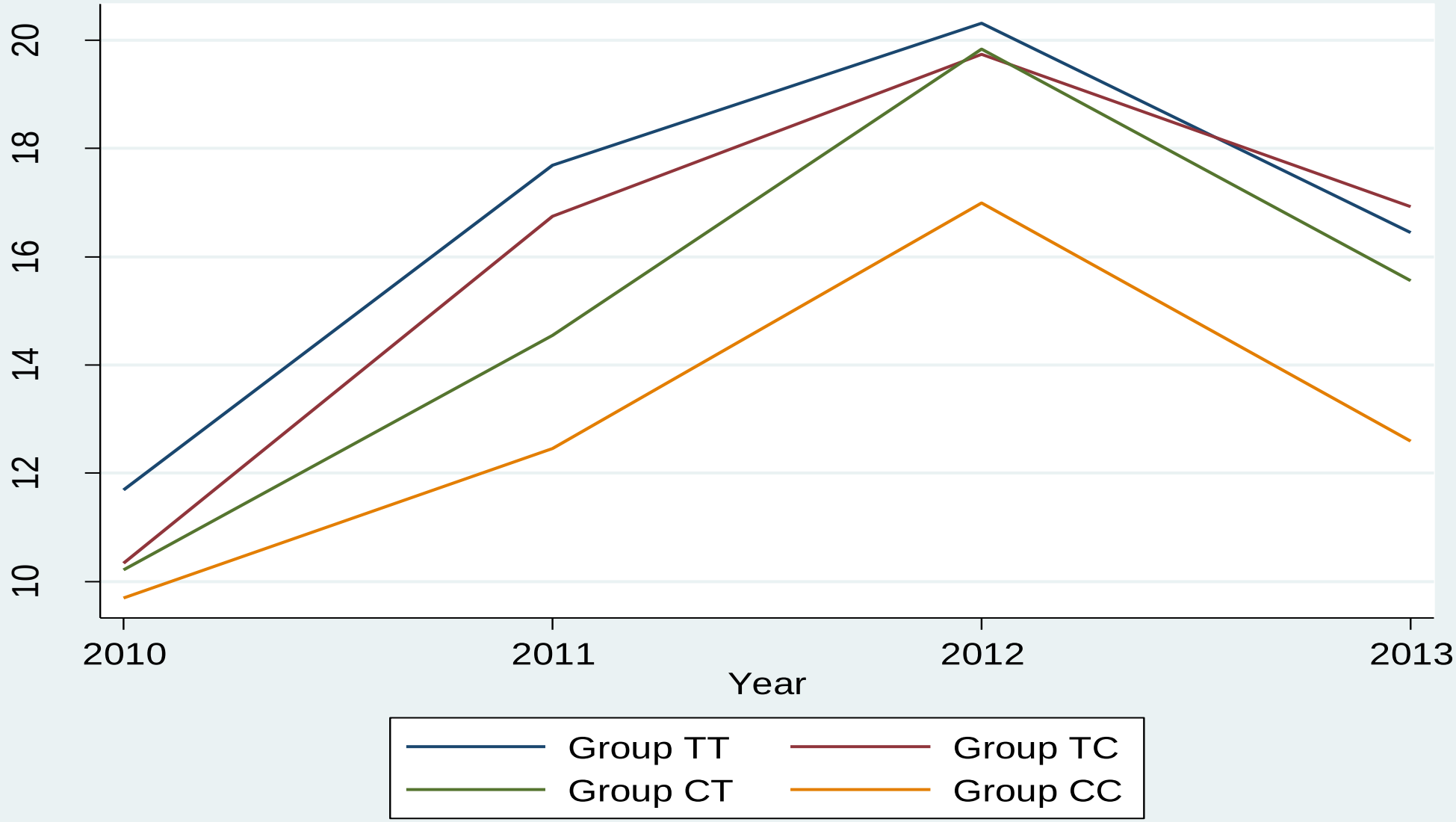
After the Training … Happy Faces!

Table 1: Basic Characteristics of Entrepreneurs

	Treatment Status				Test of Equality of Means		
	Group TT	Group TC	Group CT	Group CC	(1) – (4)	(2) – (4)	(3) – (4)
	Mean [Std.] (1)	Mean [Std.] (2)	Mean [Std.] (3)	Mean [Std.] (4)	MD (*t*-value) (5)	MD (*t*-value) (6)	MD (*t*-value) (7)
Panel A: Individual Characteristics							
Age (as of baseline survey)	44.5	44.9	45.2	44.8	-0.30	0.01	0.40
	[9.06]	[7.52]	[9.49]	[7.53]	(-0.11)	(0.03)	(0.08)
Sex of entrepreneur	0.92	0.83	0.86	0.76	0.16*	0.07	0.10
(Female=1)	[0.29]	[0.31]	[0.32]	[0.46]	(1.83)	(1.28)	(1.58)
Education of entrepreneur	11.3	10.3	10.6	10.7	0.60	-0.40	-0.10
(years of schooling)	[2.62]	[2.12]	[2.66]	[2.85]	(0.77)	(-0.58)	(-0.13)
Parent's experience in the	0.35	0.29	0.39	0.45	-0.10	-0.16	-0.06
same business (Yes=1)	[0.49]	[0.46]	[0.50]	[0.51]	(-0.97)	(-1.59)	(-0.59)
Any prior business training	0.73	0.67	0.61	0.55	0.15	0.09	0.03
experience (Yes=1)	[0.45]	[0.48]	[0.50]	[0.51]	(1.56)	(0.85)	(0.29)
Years of operation	11.9	11.8	12.0	10.5	1.30	1.20	1.40
(as of baseline survey)	[5.45]	[4.85]	[6.34]	[6.10]	(0.56)	(0.54)	(0.58)
Former employee in the	0.15	0.25	0.25	0.17	-0.04	0.06	0.06
textile industry (Yes=1)	[0.37]	[0.44]	[0.44]	[0.38]	(-0.51)	(0.63)	(0.68)
Chagga (Yes=1)	0.15	0.25	0.32	0.31	-0.16	-0.06	0.01
	[0.37]	[0.44]	[0.48]	[0.47]	(-1.62)	(-0.41)	(0.31)
Number of entrepreneurs	26	24	28	29			

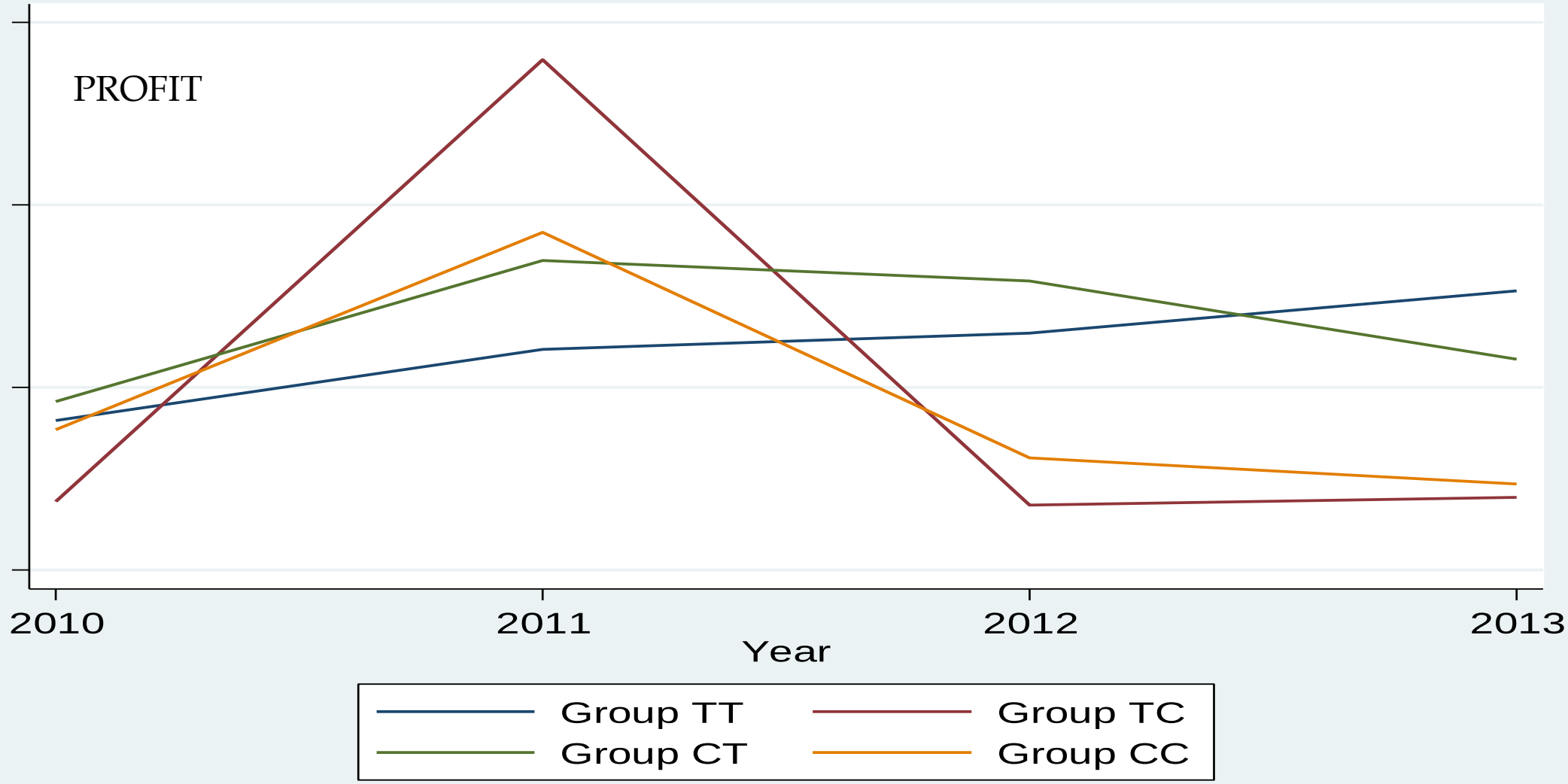
Notes: Numbers in square brackets in columns (1) - (4) are standard deviations. Columns (5) to (7) display *t*-values of test of the equality of means (i.e., *t*-test of null hypothesis that mean values are the same in the two groups). The asterisks ***, **, and * indicate the statistical significance level at 1 percent, 5 percent, and 10 percent, respectively.

Table 2: Management Practices Scores



Notes: Numbers in square brackets in columns (1) - (4) are standard deviations. Columns (5) to (7) display *t*-values of test of the equality of means (i.e., *t*-test of null hypothesis that mean values are the same in the two groups). The asterisks ***, **, and * indicate the statistical significance level at 1 percent, 5 percent, and 10 percent, respectively.

Table 3: Manufacturing Value Added and Profit



Reliability of Outcome Measures

- Before implementing analysis, impact evaluation studies should check the reliability of the outcome measures by examining how the management practices scores and business performance are correlated with the variables capturing the characteristics of entrepreneurs (Bloom and van Reenen, 2007).

- We did that by conducting *ex-ante* regressions involving:
  - y_i = *f*(*Kaizen* practices scores, X_i);
  - y_i = *f*(non-*Kaizen* practices scores, X_i); and
  - y_i = *f*(*Kaizen* practices scores, non-*Kaizen* practices scores, X_i).

- Generally, we found that, indeed, such management practices are correlated with our measures of business performance suggesting the reliability of our measures of outcome variables.

Table 4: ex-ante Correlates of *Kaizen* and non-*Kaizen* Practices Scores and Business Performance (VA and Profit)

	VALUE ADDED						PROFIT					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Kaizen Practices Scores	1,387.3***	69.052			699.6	-144.336	973.3***	49.056			537.4	-130.764
	(3.605)	(0.462)			(1.428)	(-0.767)	(3.041)	(0.337)			(1.192)	(-0.673)
non-*Kaizen* Practices Scores			1,636.4***	324.039**	1,203.2***	405.790*			1,095.6***	251.812*	762.8*	328.131
			(6.085)	(2.058)	(3.099)	(1.903)			(4.261)	(1.768)	(1.945)	(1.624)
Sex of entrepreneur (Female=1)	4,199.7	3,416.19**	2,232.3	2,894.19**	2,479.5	2,847.04*	3,107.9	3,517.44**	1,827.4	3,084.15**	2,017.3	3,044.89**
	(1.494)	(2.265)	(0.736)	(2.025)	(0.869)	(1.972)	(1.230)	(2.573)	(0.696)	(2.365)	(0.813)	(2.316)
Entrepreneur's years of schooling	694.6	-175.880	383.5	-251.292	408.5	-260.139	639.1*	-137.454	438.5	-200.801	457.7	-209.001
	(1.613)	(-1.129)	(0.892)	(-1.506)	(0.971)	(-1.521)	(1.730)	(-0.992)	(1.199)	(-1.355)	(1.270)	(-1.364)
Any prior training experience (Yes=1)	422.8	-961.999	-639.6	-1,171.006	-406.4	-1,222.21	10.1	-1,030.99	-694.7	-1,202.06	-515.6	-1,248.45
	(0.151)	(-1.030)	(-0.237)	(-1.235)	(-0.147)	(-1.262)	(0.004)	(-1.085)	(-0.270)	(-1.254)	(-0.194)	(-1.281)
Years of business Operation	387.3**	-23.815	317.2*	-38.529	319.2*	-41.014	258.0*	-43.371	213.3	-57.563	214.8	-59.436
	(2.125)	(-0.299)	(1.695)	(-0.468)	(1.807)	(-0.485)	(1.697)	(-0.583)	(1.358)	(-0.737)	(1.439)	(-0.744)
Value added/Profit in the past (Y_P)		1.440***		1.411***		1.419***		0.806***		0.794***		0.799***
		(11.603)		(10.772)		(11.317)		(8.860)		(8.566)		(8.920)
Constant	24,791.6	-9,828.0	21,421.6	-10,937.9	20,229.6	-10,880.1	39,190.5	-2,218.7	37,213.7	-3,117.5	36,298.2	-3,117.3
	(0.676)	(-0.468)	(0.511)	(-0.520)	(0.521)	(-0.516)	(1.130)	(-0.126)	(0.953)	(-0.178)	(0.993)	(-0.178)
R-squared	0.240	0.891	0.265	0.895	0.280	0.895	0.185	0.854	0.196	0.858	0.208	0.858
Number of enterprises	107	107	107	107	107	107	107	107	107	107	107	107

Notes: The dependent variable in columns (1) to (6) and columns (7) to (12) is the value added (i.e., sales revenue minus material costs, subcontracting costs, utility costs, and transportation costs) and the profit (i.e., sales revenue minus material costs, subcontracting costs, utility costs, transportation costs, and labor costs), respectively. The value added and profit are in USD and are adjusted by using the World Bank GDP Deflator. Numbers in parentheses are robust *t*-statistics. The asterisks ***, **, and * indicate the statistical significance level at 1 percent, 5 percent, and 10 percent, respectively.

Table 5: *ex-ante* Correlates of Management Practices Scores, Business Performance (VA and Profit), and Attrition

	VALUE ADDED		PROFIT		ATTRITION
	(1)	(2)	(3)	(4)	(5)
Management Practices Scores	945.066***	124.121	647.245***	94.068	
	(5.519)	(1.518)	(4.339)	(1.230)	
Sex of entrepreneur (Female=1)	2,767.904	3,161.935**	2,146.397	3,305.269**	-0.081
	(0.969)	(2.152)	(0.837)	(2.464)	(-0.980)
Entrepreneur's years of schooling	452.935	-211.304	477.612	-167.129	0.003
	(1.078)	(-1.328)	(1.340)	(-1.188)	(0.459)
Any prior training experience (Yes=1)	-242.716	-1,043.040	-442.288	-1,097.880	-0.041
	(-0.090)	(-1.114)	(-0.173)	(-1.154)	(-0.909)
Years of business operation	328.933*	-30.239	219.207	-50.000	0.004
	(1.924)	(-0.380)	(1.503)	(-0.665)	(0.696)
Value added/Profit in the past (Y_P)		1.419***		0.797***	
		(10.861)		(8.528)	
Group TT					0.081
					(1.025)
Group TC					-0.091
					(-1.605)
Group CT					-0.034
					(-0.494)
Constant	20,594.038	-10,470.093	36,461.407	-2,703.426	
	(0.547)	(-0.499)	(1.019)	(-0.154)	
R-squared	0.278	0.893	0.207	0.856	0.100
Mean					0.056
Standard Deviation					0.231
Number of enterprises	107	107	107	107	107

In column (5), the dummy dependent variable, ATTRITION, takes 1 if an enterprise did not operate by the time of our third follow-up survey, otherwise 0. Group TT, Group TC, and Group CT refers to the beneficiaries of classroom and onsite training components (completely-treated entrepreneurs), classroom training component only (partially-treated entrepreneurs), and onsite training component only (partially-treated entrepreneurs), respectively.

Econometric Specification

- We specify the basic econometric equation (1) as follow:

$$y_i = \tau_0 + \tau_B B_i + \tau_E E_i + X_i\tau + \tau_P Y_{Pi} + \varepsilon_i, \qquad (1)$$

y_i = management scores, value-added, and profit of enterprise i.
B_i = 1 for participant in both programs, 0 otherwise.
E_i = 1 for participant in either program, 0 otherwise.
X_i = vector of variables capturing the entrepreneurs' characteristics.
Y_{pi} = is the outcome variable in the past (McKenzie, 2012).
while τ_0, and ε_i is a constant and error term, τ_B, τ_E, τ, and τ_P is the coefficient of B_i, E_i, and Y_{pi}, respectively.

- We estimate equation (1) using the baseline and third follow-up survey data conducted in April 2010 and March 2014, respectively, because we focus on evaluating the medium-run impact of the training program.

- We use two strategies to estimate equation (1): the intention-to-treat (ITT) and the treatment-on-the-treated (TOT). To estimate TOT, we instrument the actual participation status with the random invitation status, following the lead of Imbens and Angrist (1994).

Table 6: Training Impact on Adoption of Management Practices

	Management Practices Scores		*Kaizen* Practices Scores		non-*Kaizen* Practices Scores	
	ITT	TOT	ITT	TOT	ITT	TOT
	(1)	(2)	(3)	(4)	(5)	(6)
Both training dummy *B* (Yes=1)	2.707*	2.702*	1.347	1.395	1.382*	1.322*
	(1.971)	(1.877)	(1.646)	(1.621)	(1.923)	(1.787)
Either training dummy *E* (Yes=1)	3.059**	3.070**	1.186*	1.191*	1.938***	1.937***
	(2.466)	(2.447)	(1.712)	(1.719)	(2.982)	(2.979)
Sex of entrepreneur (Female=1)	1.299	1.184	0.302	0.260	0.829	0.753
	(1.149)	(1.060)	(0.374)	(0.330)	(1.415)	(1.303)
Education of entrepreneur (years of schooling)	0.478***	0.473***	0.171	0.166*	0.269***	0.272***
	(2.709)	(2.810)	(1.653)	(1.682)	(3.038)	(3.191)
Any prior training experience (Yes=1)	0.257	0.273	-0.049	-0.049	0.138	0.158
	(0.257)	(0.289)	(-0.082)	(-0.088)	(0.257)	(0.308)
Kaizen/non-*Kaizen*/Overall Scores in the past (Y_P)	0.223	0.200	0.114	0.102	0.426**	0.393**
	(1.635)	(1.377)	(0.938)	(0.831)	(2.582)	(2.308)
Constant	-1.404	-1.181	0.733	0.892	-3.308	-3.289
	(-0.110)	(-0.096)	(0.077)	(0.099)	(-0.587)	(-0.610)
First-stage *F*-statistics		377.52		431.24		322.06
R-squared	0.279	0.258	0.124	0.109	0.406	0.384
Number of enterprises	107	107	107	107	107	107

Due to limited space, other covariates are not shown here. The asterisks ***, **, and * indicate the statistical significance level at 1 percent, 5 percent, and 10 percent, respectively.

Table 7: Training Impact on the Business Performance

	Value Added		Profit	
	ITT	TOT	ITT	TOT
	(1)	(2)	(3)	(4)
Both training dummy *B* (Yes=1)	2,710.689*	3,107.364**	2,062.191	2,380.133*
	(1.941)	(2.094)	(1.590)	(1.758)
Either training dummy *E* (Yes=1)	-102.960	-187.997	78.330	47.448
	(-0.108)	(-0.206)	(0.081)	(0.051)
Sex of entrepreneur (Female=1)	2,932.219**	3,057.560**	3,126.412**	3,204.334***
	(2.158)	(2.333)	(2.449)	(2.634)
Education of entrepreneur (years of schooling)	-213.031	-234.391	-166.598	-175.113
	(-1.415)	(-1.613)	(-1.242)	(-1.393)
Any prior training experience (Yes=1)	-1,122.129	-1,107.621	-1,162.193	-1,146.417
	(-1.141)	(-1.194)	(-1.169)	(-1.228)
Value added/Profit in the past (Y_P)	1.431***	1.439***	0.804***	0.801***
	(12.303)	(12.941)	(9.283)	(9.777)
Constant	-12,970.279	-11,666.018	-4,972.649	-3,838.887
	(-0.689)	(-0.667)	(-0.298)	(-0.253)
First-stage *F*-statistics		436.13		328.07
R-squared	0.899	0.896	0.860	0.861
Number of enterprises	107	107	107	107

Due to limited space, other covariates are not shown here. The asterisks ***, **, and * indicate the statistical significance level at 1 percent, 5 percent, and 10 percent, respectively.

Knowledge Spillovers?

- During the fieldwork, we observed entrepreneurs had instances of communication via their social and business networks.
- We collected data related to entrepreneurs' communication and social network (e.g., information like the number of entrepreneurs you known in person, number of entrepreneurs having had conversation about our *Kaizen* training program, workshop visits, and instances of imitation).
- Although we do not use such data in the main analysis of impact evaluation due to endogeneity problem (and that we do not have suitable IV), we have analyzed such data to explore the correlation between entrepreneurs' communication and our outcome variables.

Table 8a: Entrepreneurs' Communication and Social Network

	Group TT	Group TC	Group CT	Group CC	Total
	Mean [Std.] (1)	Mean [Std.] (2)	Mean [Std.] (3)	Mean [Std.] (4)	Mean [Std.] (5)
Panel A: Baseline Survey					
Number of sample entrepreneurs you know in person	35.3 [19.5]	39.3 [12.7]	27.2 [21.6]	20.9 [13.7]	29.5 [19.0]
Number of entrepreneurs in the Group	26	24	28	29	107
Panel B: Interim Follow-up Survey (Sept. 2010)					
Number of sample entrepreneurs you know in person	38.6 [20.4]	39.1 [15.7]	30.4 [20.5]	18.6 [12.1]	29.0 [18.7]
Number of sample entrepreneurs you have talked to about *Kaizen*	21.2 [14.2]	22.2 [11.2]	10.2 [11.9]	5.2 [6.1]	14.2 [13.4]
Number of entrepreneurs in the Group	26	24	28	29	107
Panel C: First Follow-up Survey (Apr. 2011)					
Number of sample entrepreneurs you know in person	45.6 [17.2]	45.3 [15.7]	37.1 [21.8]	23.0 [15.2]	34.8 [20.2]
Number of sample entrepreneurs you have talked to about *Kaizen*	29.5 [16.5]	29.5 [15.5]	16.9 [19.1]	9.7 [12.8]	19.4 [17.9]
Number of sample entrepreneurs whose conversation with you about *Kaizen* has led to a change in your business	27.7 [17.3]	27.8 [15.9]	16.7 [19.3]	9.3 [12.3]	18.5 [17.8]
Number of sample enterprises you have visited	16.3 [12.8]	15.6 [12.5]	12.6 [15.1]	7.3 [9.7]	12.0 [12.8]
Number of sample enterprises from which you have copied something	15.3 [13.1]	15.3 [12.4]	12.6 [15.0]	7.3 [9.7]	11.8 [12.7]
Number of entrepreneurs in the Group	26	24	28	29	107

Notes: In this Table, irrespective of the treatment status, an entrepreneur reports the number of sample entrepreneurs s/he interacts with. Group TT, Group TC, Group CT, and Group CC denotes the entrepreneurs who received both the classroom and onsite training components, the classroom training only, the onsite training only, and the control group, respectively. The numbers in square brackets are standard deviations.

Table 8b: Entrepreneurs' Communication and Social Network

	Group TT	Group TC	Group CT	Group CC	Total
	Mean [Std.] (1)	Mean [Std.] (2)	Mean [Std.] (3)	Mean [Std.] (4)	Mean [Std.] (5)
Panel D: Second Follow-up Survey (Sept. 2012)					
Number of sample entrepreneurs you know in person	46.1 [17.0]	46.2 [15.6]	38.0 [20.9]	24.8 [13.8]	35.9 [19.3]
Number of sample entrepreneurs you have talked to about *Kaizen*	28.1 [17.3]	29.5 [15.5]	15.6 [17.0]	9.9 [12.5]	20.5 [18.3]
Number of sample entrepreneurs whose conversation with you about *Kaizen* has led to a change in your business	25.7 [17.6]	26.9 [16.3]	16.2 [18.3]	8.2 [12.1]	18.9 [16.7]
Number of sample enterprises you have visited	14.4 [13.2]	13.9 [12.3]	10.7 [13.7]	6.8 [9.5]	11.5 [12.1]
Number of sample enterprises from which you have copied something	12.9 [11.1]	13.2 [11.3]	10.5 [14.6]	5.3 [8.1]	9.7 [11.6]
Number of entrepreneurs in the Group	26	24	28	29	107
Panel E: Third Follow-up Survey (Mar. 2014)					
Number of sample entrepreneurs you know in person	52.7 [17.4]	50.2 [13.7]	45.2 [19.3]	26.1 [22.7]	40.3 [20.6]
Number of sample entrepreneurs you have talked to about *Kaizen*	30.8 [21.4]	27.0 [20.4]	15.6 [15.4]	5.3 [11.0]	18.6 [19.4]
Number of sample entrepreneurs whose conversation with you about *Kaizen* has led to a change in your business	25.6 [22.5]	22.7 [19.8]	11.1 [14.0]	4.7 [9.9]	15.1 [18.4]
Number of sample enterprises you have visited	12.6 [12.5]	12.1 [13.0]	8.4 [8.1]	6.3 [7.2]	9.7 [10.6]
Number of sample entrepreneurs who have visited your enterprise	9.7 [14.0]	8.6 [10.5]	5.2 [6.0]	4.7 [7.6]	6.9 [10.1]
Number of sample entrepreneurs who have visited and copied something from your enterprise	8.7 [14.0]	6.4 [9.6]	3.9 [4.5]	3.9 [6.6]	5.7 [9.5]
Number of entrepreneurs in the Group	26	24	28	29	107

Notes: In this Table, irrespective of the treatment status, an entrepreneur reports the number of sample entrepreneurs s/he interacts with. Group TT, Group TC, Group CT, and Group CC denotes the entrepreneurs who received both the classroom and onsite training components, the classroom training only, the onsite training only, and the control group, respectively. The numbers in square brackets are standard deviations.

Econometric Specification

- We include the variables capturing entrepreneur's communication and social network in eq. (3.1) to form eq. (A.1) as follow:

$$y_i = \alpha_0 + \alpha_B B_i + \alpha_E E_i + \alpha_{BZ} B_i Z_i + \lambda(1 - B_i - E_i) Z_i + X_i \beta + \alpha_P Y_{Pi} + \varepsilon'_i, \quad \text{(A.1)}$$

- Where Z_i = entrepreneur's communication variables, which can be:-
  - ❑ "**TALKED TO**" (i.e., number of invited/participants with whom s/he talked to about the *Kaizen* training),
  - ❑ "**VISITED**" (i.e., number of invited/participants with whom s/he have visited their workshop), and
  - ❑ "**KNOWN**" (i.e., number of invited/participants whom s/he knew in person).

- After regressing equation (A.1), we find suggestive evidence that entrepreneur's communication is correlated with adoption of certain management practices (*Kaizen* and *non-Kaizen* practices).

Table 9a: Communication and Management Practices

	TALKED		VISITED		KNOWN	
	ITT (1)	TOT (2)	ITT (3)	TOT (4)	ITT (5)	TOT (6)
Both training dummy *B* (Yes=1)	2.449*	2.326	3.230**	3.680**	1.977	1.372
	(1.776)	(1.290)	(2.301)	(2.338)	(0.807)	(0.296)
Either training dummy *E* (Yes=1)	3.400***	3.603***	3.583***	3.760***	2.534	2.940
	(3.300)	(3.152)	(3.066)	(2.847)	(1.458)	(1.273)
Both training (Yes=1) x Communication *Z*	0.034	0.041	0.028	0.005	0.036	0.049
	(0.981)	(0.981)	(0.379)	(0.067)	(0.908)	(0.659)
Either training (Yes=1) x Communication *Z*	0.022	0.017	0.044	0.045	0.037	0.029
	(0.925)	(0.684)	(0.905)	(1.034)	(1.173)	(0.701)
Control (Yes = 1) x communication (1 - *B* - *E*)*Z*	0.125***	0.126***	0.147*	0.160**	0.038	0.038
	(3.432)	(3.526)	(1.729)	(1.970)	(1.345)	(1.366)
Sex of entrepreneur (Female=1)	1.977*	1.801*	1.921*	1.811*	1.853*	1.713*
	(1.857)	(1.723)	(1.783)	(1.694)	(1.738)	(1.648)
Education of entrepreneur (years of schooling)	0.264*	0.264*	0.293**	0.289**	0.278**	0.275**
	(1.905)	(1.953)	(2.264)	(2.370)	(2.019)	(2.010)
Any prior training experience (Yes=1)	0.064	0.089	0.217	0.199	0.071	0.097
	(0.085)	(0.125)	(0.309)	(0.298)	(0.094)	(0.133)
Overall Management Practices Scores in the past (Y_P)	0.110	0.077	0.130	0.093	0.097	0.074
	(1.235)	(0.709)	(1.440)	(0.835)	(1.027)	(0.644)
Constant	1.552	1.148	4.468	5.135	2.766	2.320
	(0.131)	(0.100)	(0.373)	(0.457)	(0.218)	(0.190)
First-stage *F* statistics		176.71		217.02		234.43
R-squared	0.407	0.365	0.391	0.357	0.391	0.355
Number of enterprises	107	107	107	107	107	107

Notes: The dependent variable in columns (1) to (6) is the overall management practices scores (i.e., the sum of the *Kaizen* and non-*Kaizen* management practices scores). For the intention-to-treat (ITT) effects, the reported estimates are the coefficients of dummy variable taking 1 if the enterprise was assigned Group TT (both training programs) or Group TC/CT (either training program). For the treatment effects on the treated (TOT), the reported estimates are the coefficients of the dummy variable taking 1 if the enterprise complied with the assigned treatment. To estimate the TOT, we use the instrumental variable approach by instrumenting the actual participation status with the random invitation status. The variables "TALKED", "VISITED", and "KNOWN" capture the communication networks, *Z*, as defined by the number of entrepreneurs with whom s/he talked to about the training program, the number of entrepreneurs with whom (s)he visited their workshop, and the number of entrepreneurs whom the entrepreneur knew in person (or just by name), respectively. The robust *t*-statistics and *z*-statistics for the ITT and TOT are in parentheses, respectively. The asterisks ***, **, and * indicate the statistical significance at 1 percent, 5 percent, and 10 percent, respectively.

Table 10a: Communication and Business Performance

	Talked				Visited				Known			
	Value Added		Profit		Value Added		Profit		Value Added		Profit	
	ITT	TOT	ITT	TOT	ITT	TOT	ITT	TOT	ITT	TOT	ITT	TOT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Both training dummy *B*	1,885.2	3,853.9	1,293.5	1,534.2	2,315.9	3,874.9**	1,785.1	2,083.2	-2,017.9	5,354.2	-2,816.7	-1,133.1
(Yes=1)	(1.003)	(1.571)	(0.710)	(0.780)	(1.398)	(2.016)	(1.078)	(1.193)	(-0.648)	(0.916)	(-0.988)	(-0.314)
Either training dummy *E*	-1,432.2	-2,094.4*	-1,416.8	-1,424.3	-1,347.9	-2,156.9*	-1,854.7	-1,846.2	-3,244.7*	-6,287.3**	-3,258.8*	-4,097.4**
(Yes=1)	(-1.196)	(-1.720)	(-1.113)	(-1.140)	(-1.182)	(-1.800)	(-1.563)	(-1.615)	(-1.931)	(-2.429)	(-1.981)	(-2.074)
Both training (Yes=1)	30.726	-21.626	22.684	22.911	2.995	-100.729	-42.809	-48.918	72.502	-63.442	69.652	40.466
x Communication *Z*	(0.554)	(-0.370)	(0.453)	(0.470)	(0.044)	(-1.425)	(-0.787)	(-0.776)	(1.060)	(-0.614)	(1.143)	(0.645)
Either training (Yes=1)	62.835**	88.511***	64.056**	62.571**	76.248	128.724**	97.761*	91.012*	47.761	110.921**	46.346	62.487
x Communication *Z*	(2.232)	(2.728)	(2.066)	(2.234)	(1.445)	(2.249)	(1.857)	(1.901)	(1.486)	(2.040)	(1.479)	(1.620)
Control (Yes = 1) x	-12.742	-7.178	-38.375	-36.511	-51.055	-59.271	-114.395	-114.468	-40.704	-38.599	-50.772	-50.482
communication (1 - *B* - *E*)*Z*	(-0.280)	(-0.174)	(-0.832)	(-0.864)	(-0.317)	(-0.401)	(-0.726)	(-0.792)	(-0.906)	(-0.900)	(-1.161)	(-1.238)
Sex of entrepreneur	2,942**	3,282***	3,132**	3,279***	3,294**	3,848***	3,660***	3,869***	2,922**	3,369***	3,136***	3,414***
(Female=1)	(2.282)	(2.636)	(2.584)	(2.860)	(2.470)	(2.979)	(2.827)	(3.138)	(2.356)	(2.755)	(2.651)	(3.021)
Education of entrepreneur	-244.925	-292.608*	-184.343	-190.324	-284.79*	-304.45**	-240.209*	-238.71*	-203.907	-264.517	-142.825	-154.358
(years of schooling)	(-1.648)	(-1.900)	(-1.378)	(-1.532)	(-1.842)	(-2.030)	(-1.721)	(-1.841)	(-1.226)	(-1.441)	(-0.948)	(-1.071)
Any prior training	-1,285.2	-1,365.7	-1,299.1	-1,261.6	-1,043.0	-1,047.8	-1,016.1	-1,072.2	-1,106.6	-1,285.4	-1,104.7	-1,107.3
experience (Yes=1)	(-1.270)	(-1.421)	(-1.246)	(-1.305)	(-1.050)	(-1.144)	(-1.002)	(-1.156)	(-1.085)	(-1.282)	(-1.076)	(-1.153)
Value added/Profit in	1.410***	1.417***	0.795***	0.793***	1.426***	1.412***	0.807***	0.802***	1.426***	1.463***	0.807***	0.812***
the past (Y_P)	(11.950)	(12.910)	(9.129)	(9.860)	(12.485)	(13.251)	(9.498)	(10.095)	(13.049)	(14.506)	(9.917)	(11.160)
Constant	-13,919.0	-7,950.3	-5,417.9	-4,164.4	-12,183.8	-7,191.4	-4,055.5	-1,912.7	-19,507.9	-12,357.1	-11,992.8	-9,666.6
	(-0.743)	(-0.481)	(-0.307)	(-0.270)	(-0.644)	(-0.434)	(-0.238)	(-0.128)	(-1.071)	(-0.710)	(-0.705)	(-0.640)
First-stage *F* statistics		204.23		211.86		215.98		201.58		204.29		218.27
R-squared	0.900	0.897	0.864	0.865	0.898	0.897	0.864	0.865	0.901	0.890	0.866	0.866
Number of enterprises	107	107	107	107	107	107	107	107	107	107	107	107

Notes: The dependent variable in columns (1), (2), (5), (6), (9), and (10) is the value added (i.e., sales revenue minus material costs, subcontracting costs, utility costs, and transportation costs). The dependent variable in columns (3), (4), (7), (8), (11), and (12) is the profit (i.e., sales revenue minus material costs, subcontracting costs, utility costs, transportation costs, and labor costs). The value added and profit are in USD and are adjusted by using the World Bank GDP Deflator. The baseline value added and profit (i.e., values in the past) are those of the mean values of 2008 and 2010. For the intention-to-treat (ITT) effects, the reported estimates are the coefficients of the dummy variable taking 1 if the enterprise was assigned Group TT (both training programs) or Group TC/CT (either training programs). For the treatment effects on the treated (TOT), the reported estimates are the coefficients of the dummy variable taking 1 if the enterprise complied with the assigned treatment. To estimate the TOT, we use the instrumental variable approach by instrumenting the actual participation status with the random invitation status. The variables "Talked", "Visited", and "Known" capture the communication networks, *Z*, as defined by the number of entrepreneurs with whom s/he talked to about the training program, the number of entrepreneurs with whom (s)he visited their workshop, and the number of entrepreneurs whom the entrepreneur knew in person (or just by name), respectively. The robust *t*-statistics and *z*-statistics for the ITT and TOT are in parentheses, respectively. The asterisks ***, **, and * indicate the statistical significance at 1 percent, 5 percent, and 10 percent, respectively.

Conclusions and Policy Implications

- The training program, which featured basic *Kaizen* approach to productivity improvement, had a positive and statistically significant impact on the adoption of management practices and business performance in the medium run (i.e., 3 years after the interventions).

- Admittedly, the findings in this paper are likely to be understating the training impacts due to potential existence of knowledge spillovers.

- ***Policy***: Industrial Policy that promotes and support the entrepreneur's learning of firm-level production and business management practices, including *Kaizen* approach to productivity improvement, is essential for building a competitive industrial sector in Tanzania (also SSA).

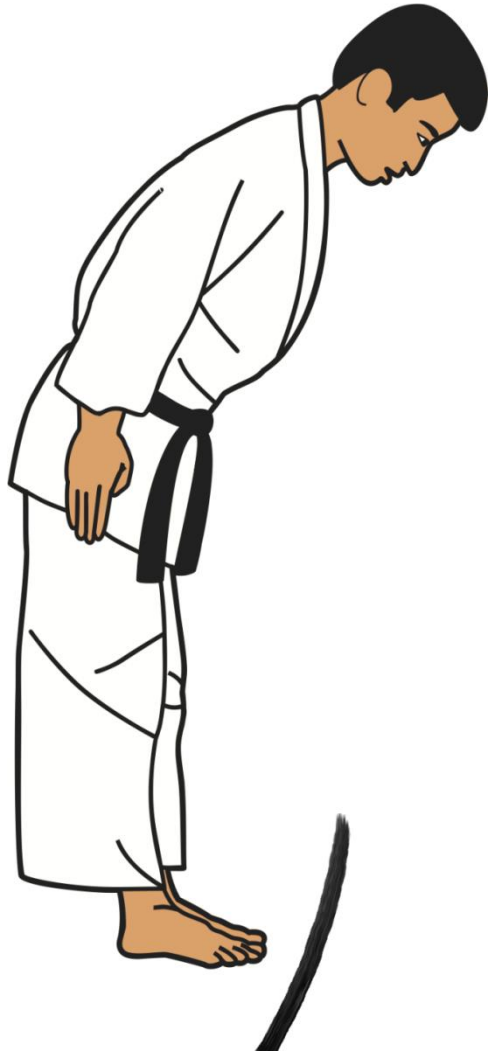
- ***Research***: It is worth collecting data over a longer span after the interventions is vital.

Is Management Training Enough?

- It is necessary but not a panacea (that is, not a sufficient condition for industrialization in SSA), other critical determinants (such as technology, affordable credit, and infrastructure (industrial clusters) are to be logically made available.

- Then why do we emphasize the firm-level management training, including Kaizen practices? Because of the under-evaluation of the importance of management and that the practical results of management training can be used to screen promising and non-promising entrepreneurs.

- Re-emphasis: **Lead role of Government** is key, and **top leadership** in the Government and Private Sector for **institutionalization** of Kaizen is necessary to widely disseminate Kaizen.



THANK YOU FOR YOUR AUDIENCE