

Infrastructure and Cluster Development: A Case Study of Handloom Weavers in Ethiopia

ESSP-II Discussion Paper No. 1 (October, 2009)

Gezahegn Ayele, Jordan Chamberlin, Lisa Moorman, Kassu Wamisho, Xiaobo Zhang

This paper evaluates the impacts of access to infrastructure on development of handloom weaving clusters in Ethiopia based on a survey collected in both urban and rural areas. Geographical clustering enables entrepreneurs with limited capital to enter the business through shared workspaces and greater specialization of labor. In towns with electricity access, producers work longer hours by sharing workspaces with electric lights at lower rental cost, resulting in higher labor productivity.

Introduction

Rural nonfarm development plays a key role in generating employment in many developing countries. Based on a primary survey of both urban and rural handloom weaver clusters in Ethiopia, one of the country's most important rural nonfarm sectors, this paper examines the mechanism and performance of clustering. In the absence of financial institutions, clustered producers set up interconnected trade credit linkages to ease working capital constraints. Moreover, geographical clustering enables entrepreneurs with limited capital to enter the business through shared workspaces and greater specialization of labor. Although firms adopting the clustering model of production are able to operate profitably in harsh environments, an improvement in infrastructure could further enhance their performance.

Based on a 2008 survey of 486 producers and 154 traders, in both rural and urban environments, the study maps out the linkages among producers in handloom weaving clusters. There are four main areas in which the clustering method has helped Ethiopian handloom weavers to perform better: reductions in transaction costs through better market linkages; technological spillovers; lower cost of entry; and ease of trade credit through repeated interactions. In addition to the collective efficiencies of clusters, in this paper we also examine cluster performance, particularly with respect to access to infrastructure. We find that access to electricity matters to firm performance.

Producer Characteristics

Three production types exist among handloom weavers in this context: household, rented workspace, and workshop (Table 1). Household producers typically operate from their homes, while rented workspace producers are individual producers who have chosen to share space with other individual producers, in a cost-saving effort.

Types of products vary widely by geographic location, and are typically related to local season and cultural traditions. The average starting capital for these producers was less than the 2008 Ethiopian GDP per capita of US\$328. The source for this capital was largely from producers' own savings and friends and family. Trade credit, a form of reducing transactions costs through offering deferred payment to a buyer or seller, is prevalent as well, with 21.1 percent of producers giving trade credit, while 40.7 percent of producers reported receiving trade credit. This contributes to the reduced starting capital requirement.

Table 1: Handloom Producer Characteristics

	Addis Ababa	Rural Electrified	Rural Not Electrified
Types of producer enterprise			
Household	55.9%	49.7%	78.1%
Rented workspace	38.0%	49.7%	21.9%
Workshop	6.2%	0.7%	0.0%
Value of starting capital (in Ethiopian birr)	194.29	95.23	114.86
Value of starting capital (in U.S. dollars)	21.68	10.63	12.82

Source: Producer surveys (2008).

Having shown that cluster-based handloom production can exist even in poor areas, next we examine under what conditions a cluster performs better. In other words, does the government have effective instruments at hand, such as infrastructure investment, to nurture cluster development? The basic hypothesis proposed by this paper is that infrastructure improvements facilitate cluster productivity. Average productivity varies between urban and rural clusters, and between electrified and non-electrified clusters within rural clusters, according to the specific environment available. The econometric analysis of the survey data indicates that labor productivity in clusters with access to electricity is indeed higher than in those that do not have access to electricity.

Productivity Analysis

To address the question of differing productivity between clusters with access to infrastructure and those without in a more rigorous way, we first perform a set of statistical tests (pair-wise *t*-tests) between the rural and urban clusters, and then between rural clusters with and without access to electricity. **Producers in clusters with access to electricity work longer hours than their non-electrified counterparts.** Workers in non-electrified rural villages on average worked only 7.2 hours per day, whereas their counterparts in other electrified (but rural) villages worked 10.7 hours per day (Table 9). A comparison of rural and urban clusters yielded a similar result, with those clusters located in Addis Ababa, who all have access to electricity, working 10.3 hours per day and those in the rural areas as a whole working 9.0 hours per day.

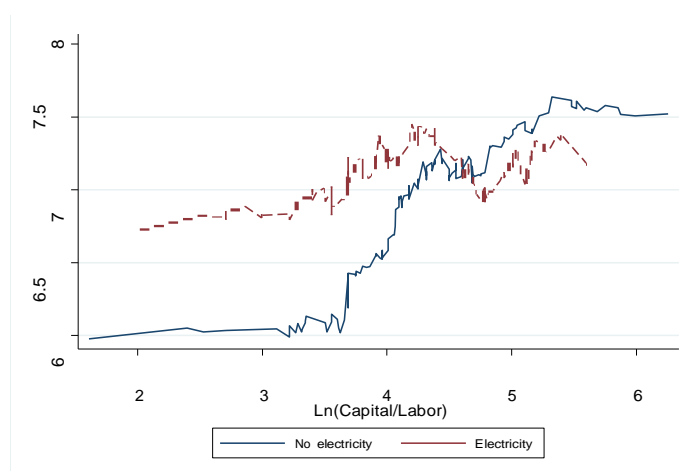
Table 2: Productivity Measures

	Addis Ababa	Rural Electrified	Rural Not Electrified
Hours worked per day (average)	10.3	10.73	7.21
Average number of workers per enterprise	1.83	1.31	1.67
Average annual revenue per worker (in Ethiopian birr/worker)	14,859	8,460	6,021
Average annual value-added per worker (in Ethiopian birr/worker)	4,427	2,543	1,796

Source: Producer surveys (2008).

Notes: Value-added = revenue - fixed and variable capital costs + wage + taxes. 1 U.S. dollar = 8.96 Ethiopian birr. "Electrified" versus "Not Electrified" refers to small towns or villages located in the SNNPR.

Based on these initial results, electrified clusters seem to be more productive than their nonelectrified counterparts. However, the simple *t*-test comparisons may omit some important factors, such as capital, which could contribute to the observed differences between electrified and nonelectrified towns. Through multivariate regression analysis, we control for age of enterprise, producer type, and access to electricity, as the proxy for infrastructure. The results of the regression analysis indicate a varied impact of infrastructure on productivity. We also control for the size of enterprise, by running a locally weighted polynomial regression that allows for more variability in estimation, of labor productivity on capital.

Figure 1: Rural Value-Added/Labor on Fixed Assets/Labor

Note: Data is for Handlooms in Chencha, SNNPR

Source: Ayele et al. (2009)

This research note is intended to promote discussion; it has not been formally peer reviewed but has been reviewed by at least one internal and/or external reviewer.

The Ethiopia Strategy Support Program of the International Food Policy Research Institute (IFPRI) works closely with the government of Ethiopia, and other development partners to provide information relevant for the design and implementation of Ethiopia's agricultural and rural development strategies. For more information, see <http://www.ifpri.org/book-757/ourwork/program/ethiopia-strategy-support-program> or <http://www.edri.org.et/>.

Copyright © 2010, International Food Policy Research Institute. All rights reserved. This material may be reproduced for personal and not-for-profit use without permission from but with acknowledgement to IFPRI. For other use, contact ifpri-copyright@cgiar.org.

IFPRI HEADQUARTERS INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW • Washington, DC 20006-1002 USA
Tel: +1-202-862-5600 • Skype: IFPRIhomeoffice
Fax: +1-202-467-4439 • E-mail: ifpri@cgiar.org

IFPRI-ADDIS ABABA

P.O. Box 5689 • Addis Ababa, Ethiopia
Tel: +251-11-646-2921
Fax: +251-11-646-2318
E-mail: ifpri-addis@cgiar.org

Contact: Paul Dorosh, Senior Research Fellow and Program Leader
Email: p.dorosh@cgiar.org

ETHIOPIAN DEVELOPMENT RESEARCH INSTITUTE

Blue Building • Addis Ababa Stadium
P.O. Box 2479 • Addis Ababa, Ethiopia
Tel: +251-11- 506066 / 525315 / 525316
Fax: +251-11- 505588
Email: info@edri-et.org

Contact:
Nahume Yadene
Email: exe-director@edri.org.et

Figure 1 plots labor productivity (value added/labor input) and capital intensity (capital/labor input) for electrified versus not electrified communities. For enterprises with a low ratio of capital to labor, (typically enterprises with little financial resources), labor productivity is significantly higher for enterprises with access to electricity than for enterprises without electricity.

To highlight the relationship of electricity to productivity, within the different groups, we stratify the survey sample into thirds according to the ratio of fixed assets to workers. The results are consistent with the visual patterns revealed in Figure 1, particularly for the bottom third of the sample (the least capital-intensive enterprises). For this sub-sample, enterprises with access to electricity are 60 percent more productive than their counterparts in nonelectrified communities. Moreover, access to shared workspace provides an additional 67 percent productivity increase over household production.

Conclusions and Policy Implications

Our study shows that cluster activities can survive even in harsh environments with no formal institutions and limited infrastructure. Further, clustered activities like handloom weaving can serve as gateways to entrepreneurship and industrial development. Despite the high degree of adaptability inherent in the organizational structure of clusters, improvements in infrastructure can further boost labor productivity. Within the African context, the promotion of less-capital-intensive production systems can be extremely useful when capital markets are less developed and most entrepreneurs have limited financial resources. The clustering production structure provides a way for potential entrepreneurs to participate in nonfarm activities, particularly in the rural sector. Further research is needed to examine the origins and evolution of clusters as well as ways to facilitate their growth.