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Ethiopia Productivity Report

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Ethiopia

Productivity Report

2020

Policy Studies Institute

National Graduate Institute for Policy Studies

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Abbreviations and Acronyms

ADLI	Agricultural Development Led Industrialization
APO	Asian Productivity Organization
CEO	Chief Executive Officer
CMT	Cut, Make and Trim
CSA	Central Statistical Agency
CPI	Consumer Price Index
DFID	Department for International Development
EDRI	Ethiopian Development Research Institute
EIC	Ethiopian Investment Commission
EKI	Ethiopian Kaizen Institute
EP	Enterprise Partners
EPU	Economic Planning Unit
ETB	Ethiopian Birr
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNI	Gross National Income
GRIPS	National Graduate Institute for Policy Studies
GTP	Growth and Transformation Plan
ICT	Information and Communication Technology
ILO	International Labour Organization
INDSTAT	Industrial Statistics Database
IPDC	Industrial Parks Development Corporation
IPR	Intellectual Property Rights
ISIC	International Standard for Industrial Classification
JICA	Japan International Cooperation Agency
LIDI	Leather Industry Development Institute
LMSMI	Large and Medium Scale Manufacturing Industries
MIDI	Metal Industry Development Institute
MSE	Micro and Small Enterprise
NEPAD	New Partnership for Africa’s Development
NPC	National Planning Commission
NPO	Nonprofit Organization
OECD	Organisation for Economic Co-operation and Development
PASDEP	Plan for Accelerated and Sustained Development to End Poverty

PDC	Planning and Development Commission
PPP	Purchasing Power Parity
PSI	Policy Studies Institute
QPC	Quality, Productivity and Competitiveness
R&D	Research and Development
SME	Small and Medium Enterprise
TFP	Total Factor Productivity
TIDI	(Ethiopian) Textile and Industry Development Institution
TVET	Technical and Vocational Education and Training
ULC	Unit Labor Cost
UNDP	United Nations Development Program
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
WDI	World Development Indicators

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Executive Summary

For the economic development of any country, productivity is an issue that must be fully understood, addressed, and pursued. This report provides, for the first time, a broad set of scientific evidence on Ethiopia's productivity, for use by policymakers as well as those interested in the Ethiopian economy and its growth history and future directions. We examine both economy-wide productivity and the productivity of the manufacturing sector with its sub-sector details. Among many productivity indicators, labor productivity and total factor productivity (TFP) are featured as the most appropriate measures for policy attention and also as the most frequently cited and compared data types across countries. The two main analytical methods used here are the decomposition of labor productivity into capital deepening and TFP and the shift-share analysis of labor productivity—explained below and in the main text.

International comparisons are performed in several topics to clarify Ethiopia's current position among developing countries attaining or about to attain global competitiveness in light manufacturing. In addition, an in-depth survey of management and labor capacities and mindsets at garment factories in Hawassa, Bole Lemi, and Mekelle are conducted to explore the causes of the mindset problem of Ethiopian workers, and how firms are coping with it. We also offer ten policy suggestions for the Ethiopian government to consider for further research and actual implementation. These are outlines of policy directions, without much detail. If the proposals are accepted, there should be a drafting of concrete action plans towards enactment of those proposals as a next step in Ethiopia's industrialization.

Our sources of domestic data are national accounts data compiled by the Planning and Development Commission (PDC), supplemented by the World Bank's World Development Indicators (WDI) and data from the International Labor Organization (ILO). For manufacturing, the annual Large and Medium Scale Manufacturing Industries (LMSMI) Survey, published by the Central Statistical Agency (CSA), covering the period 1996-2016, was extensively utilized. Before analysis, our team carefully checked and cleaned this manufacturing survey data and re-constructed it into a connected and sufficiently reliable panel dataset, the result of which should be useful to any researcher interested in the Ethiopian manufacturing sector. For USD-based international comparison, the sources are extensive industrial databases of ILO and the United Nations Industrial Development Organization (UNIDO). For researching the Ethiopian garment sector and its workers'

mindset, we conducted an original firm survey as touched above. We do not claim that our data is free of errors and inconsistencies. Information is often less than sufficient to persuasively interpret our various results. But we have analyzed as carefully as possible and are ready to admit remaining limitations and ambiguities. Given the current status of Ethiopian data, it is difficult to attain precision. Improvement of productivity-related data is one of the most urgent agenda for Ethiopia.

* * * * * * * * * *

The ten key findings of the analysis are presented in outline form below.

1. Reasonably high productivity growth but low absolute productivity level

From 2000 to 2016, Ethiopia's economy-wide labor productivity grew at an annual average of 4.9%, which was reasonably high though not outstanding (section 3.2). However, the absolute level of Ethiopia's labor productivity is still low even by the standard of latecomer countries. International comparison indicates that productivity in Ethiopia is much lower than that of other industrializing countries such as Myanmar, Vietnam, Cambodia, and Tanzania whose productivity for the same period is between 1.7 and 3.4 times that of Ethiopia. The results are similar or even worse for the manufacturing sector (section 4.2). Manufacturing labor productivity in Ethiopia, measured in real Birr, has grown an average of 4.6% per year over the last two decades. Measured in the USD-based labor productivity data published by UNIDO, Ethiopia's labor productivity in overall manufacturing and selected sub-sectors has remained low and stagnant, and in some sub-sectors has even declined. As a result, the gap between Ethiopia and the other countries in our sample (China, Malaysia, Indonesia, Kenya, Sri Lanka, and Vietnam) has widened dramatically. In 2000, Ethiopia's manufacturing labor productivity was roughly equal to that of China, but in 2015 it was only 13%. Ethiopia must accelerate productivity growth if it is to catch up with the high performers in the developing world. Its current moderate productivity growth is not sufficient to achieve this goal (sections 3.3 and 4.4).

2. Heavy investment as a main driver of labor productivity

Labor productivity growth can be separated into two components by means of the growth accounting method: capital deepening (heavy investment) and TFP growth (overall efficiency). Capital deepening increases labor productivity by giving each worker access to more machines and structures to work with, even without acquisition of additional skills or technology. Meanwhile, TFP growth is regarded as efficiency improvement in the true sense.

Our data reveals that in recent years the increase in Ethiopia's labor productivity was mainly the result of capital deepening rather than TFP improvement. True efficiency is not achieved even through large investments in public infrastructure and private physical assets sustain labor productivity growth. Aggressive investments are also likely to cause fiscal and balance-of-payments problems and real estate and land bubbles. This is alarming for Ethiopia, as it is a sign of over-investment and inefficient resource use (section 3.4).

3. Limited labor mobility from low- to high-productivity activities

From another angle, part of Ethiopia's less than exemplary productivity performance can be attributed to a lack of internal labor movement from low-productivity to high-productivity sectors. This can be confirmed by means of shift-share analysis, which shows that Ethiopia's labor productivity growth is largely the result of the "within effect," i.e., efficiency improvement within individual sectors (section 3.4). That outcome is welcome, but the relative contribution of within effect declined over time. In a country at an early stage of development like Ethiopia, labor productivity in every sector must be stimulated. Moreover, productivity can—and should—be additionally much enhanced by the "shift effect," in which labor is allowed to move freely from traditional sectors plagued by labor surplus to globally competitive modern sectors with increasing labor demand. The shift effect did increase productivity in Ethiopia, but the effect was not as extensive as that commonly observed in high-performing Asian economies. Ethiopia's labor mobility is limited, partly because the modern industrial sector is still young and hence does not absorb so much labor, and partly because significant ethnic and cultural barriers exist between rural and urban areas and among regional states. Latecomer industrializing nations are expected to experience dynamic internal labor migration, and the "within effect" and the "shift effect" should be large and mutually enhancing, as witnessed in Japan in the 1960s and Taiwan and Korea in the 1970s-80s. This has not yet been observed in Ethiopia.

4. Fear of premature de-industrialization as rural labor migrates to services

Another general pattern observed in rapidly industrializing economies is a steady decline of agriculture as a percentage of national employment and output, concurrent with a strong emergence of modern industry—especially manufacturing—as the principal creator of jobs and value added, absorbing a large amount of the labor migrating from family farms. In Ethiopia, there are few signs of such dynamic structural transformation despite the very fast GDP growth recorded over the last one-and-half decades, and despite the government's sustained effort in the form of Agricultural Development Led Industrialization (ADLI)

strategy and manufacturing sector promotion. Data shows that, in 2016, real value added per person was highest in services (33,100 Birr measured in 2011 real Birr, the same for below) followed by industry (27,900 Birr), and lowest in agriculture (8,400 Birr) although there has been an upward trend in each of those sectors (section 3.2). Furthermore, between 2000 and 2017, the share of agriculture in total employment fell from 86% to 68%, while that of industry rose from 3.5% to 10% and that of services rose from 11% to 22% (World Bank data derived from ILO). Much of the increase in the Ethiopian industrial labor pool must be construction workers rather than factory operators. Further detailed evidence on inter-sectoral labor migration was unavailable, but the above information suggests that the majority of Ethiopian rural labor migrants are moving to services and construction and only moderately to manufacturing (section 3.4). The services sector is an amalgam of high-tech and low-tech activities, from Ethiopian Airlines and software engineering to local shops, restaurants, and road transport. Data revealing the share of rural migrants absorbed by each service sub-sector were not available, but the main labor absorbers are likely to be the low-tech type.

In rapidly industrializing economies, the share of manufacturing in GDP and employment typically rises to 30-50% before falling back when the nation achieves high income. This has been observed in advanced economies in Europe and America and more recently in East Asia's high-performers: Japan, Korea, and Taiwan. However, many developing countries today are experiencing shrinkage of manufacturing even before they arrive at upper middle income, let alone high income. This *premature de-industrialization* phenomenon can be regarded as a primary symptom of middle income trap (section 3.4). Ethiopia, still at low income, may fall into this trap if structural transformation is not strongly supported by improvements in quality and productivity. Some argue that there is nothing wrong with economic development driven by services, but for a latecomer country with a large rural labor surplus like Ethiopia, robust growth of manufacturing is crucial for meaningful job creation and income generation in the decades to come. This is more urgent when the large share of current labor migration is moving to low-tech services rather than high-value professional services.

5. Diverse performance within manufacturing

The report finds heterogeneity in productivity performance across manufacturing sub-sectors. Motor vehicles, basic metals, fabricated metal, and food & beverages have relatively high labor productivity, while lower labor productivity was found for the garment, wood, textiles, furniture, and leather & footwear sectors (section 4.3). However, these results should

be interpreted with caution because they also reflect factors other than efficiency. One obvious factor is difference in the capital-labor ratio. Capital-intensive sub-sectors such as steel and cement may show high labor productivity because they hire fewer workers, usually engineers or similar, who work with a large amount of sophisticated machines—although this fact alone does not mean that those workers are efficient by each industry's standard. In contrast, labor-intensive operations, such as garment and footwear production that require less machines and more workers, naturally show low labor productivity, although there is a need for an accurate measure of their efficiency by benchmarking competitor firms and countries. Another difficulty is the aggregation problem. Production in each sub-sector is a mixture of traditional and modern techniques and of large-scale production and family-based proprietorship, hence average performance is difficult to interpret. If we turn to TFP, seemingly capital-intensive industries such as machinery & equipment, fabricated metal, publishing & printing, and motor vehicles perform poorly despite their relatively good labor productivity rating. This partially corrects our tentative conclusion, derived from labor productivity data, that those sub-sectors are more efficient than labor-intensive ones.

6. The risk of losing wage-productivity balance

The wage-labor productivity nexus refers to a balance between the level and the growth of wages and of labor productivity. In neoclassical economic theory, equilibrium under perfect competition ensures that real wage is determined by and equal to the value of the marginal productivity of labor. In the real world, this does not happen due to such technical problems as imperfect competition, non-constant returns to scale, externalities, and information asymmetry as well as underdevelopment of the market economy and political pressure and lobbying. When the wage-labor productivity balance is disturbed, sound development is undermined. Competitiveness is lost if wages rise faster than labor productivity, and living standards are suppressed if workers do not receive compensation proportional to the value they create. Global firms are mainly interested in Ethiopia's wages and labor productivity measured in USD or Euro, while workers are sensitive to their wages deflated by domestic consumer prices (i.e., how many consumer goods they can buy). The matter becomes more complicated when the exchange rate deviates from the equilibrium level (purchasing power parity), generating different results when measured in ETB and USD.

Ethiopia's manufacturing labor productivity and wages are both lower than those of China, Kenya, Vietnam, Indonesia, Malaysia and Sri Lanka (section 4.5). Some FDI garment firms complain that Ethiopian wages are low but labor productivity is even lower. To attract high-

quality manufacturing FDI, low wage advantage alone is not sufficient; labor productivity must rise far above the current level. Furthermore, political demands often push up wages (including the minimum wage) without attaining equivalent labor productivity growth. This can damage national competitiveness as has been observed in Indonesia, Vietnam, and Cambodia. As Ethiopia prepares to institute a minimum wage system, this mistake should be avoided at all cost. Minimum wage settings must be based on economic data and scientific reasoning, not on whose voice is loudest. Data is currently insufficient for pursuit of this very important issue. There is a need for more comprehensive data and more thorough analyses.

7. Ethiopian workers are trainable in terms of technical skills, but attitude and discipline are wanting

An in-depth survey of firms in the apparel industry was conducted to identify possible causes of Ethiopia's low labor productivity (section 5.2). Eighteen firms from Hawassa, Bole Lemi, and Mekelle, all but one fully foreign owned, were surveyed. Average number of workers per firm in the sample was 1,614. The operation ratio of the firms relative to capacity was generally low in the range of 30% to 40%. Through preliminary interviews and study, three major factors affecting labor productivity in light manufacturing were identified: (i) labor mindset and quality; (ii) management style and strategy (item 9 below); and (iii) policy and external factors (item 10 below). Among these, the lack of proper labor mindset and insufficient quality are great concerns for Ethiopia. The possibility of enhancing labor motivation and productivity by means of financial and non-financial incentives and good working conditions was also examined.

Most garment workers are engaged in sewing (75% in our sample firms), which requires only basic numerical and reading skills. Approximately 60% of the workers have high school diplomas or better. Almost all firms agree that Ethiopian workers are sufficiently schooled and are quick learners of technical skills. There is, however, a strong need for the development of soft skills, including industrial work discipline and motivation (section 5.3). Poor work attitude manifests in forms including high attrition, absenteeism, lack of sense of urgency for work, and low motivation to work overtime. In interviews workers reported extreme dissatisfaction with very low wages and poor working conditions. The average monthly salary and non-wage benefits for sewing operators are about USD 30 and below USD 20, respectively. Workers do not regard the garment job as permanent but only transitory. The low wage and non-wage compensation as well as poor working conditions create the vicious circle of low work motivation, high attrition, and low productivity. The

issue of housing and dormitories is especially critical for factory garment workers who are predominantly young women. Failure to provide free or cheap accommodation with decent quality near workplaces negatively affects workers' enthusiasm and productivity. Refusal by workers to do overtime is not only due to low compensation but also security problems young females encounter in traveling to their residence at night.

8. Foreign methods in improving workers

Foreign factory managers bring different attitudes, work cultures and experiences from home countries. This may improve enterprise management in Ethiopia but it may also raise tension with local workers (section 5.4). On the positive side, labor management methods proven to be effective abroad may also improve Ethiopian workers. Each country and even each firm has a different corporate philosophy. Regarding labor mindset and productivity, there are such various approaches as (i) top-down order and punishment, (ii) creation of corporate family oneness, (iii) mindset reform through instruction and persuasion, and (iv) mindset reform through monetary rewards and incentives. All of these approaches are at least considered, and sometimes tried, partially or fully, by FDI garment factories we interviewed in Hawassa, Bole Lemi, and Mekelle. The results range significantly from firms that are satisfied with the progress Ethiopian workers have made to firms which continue to complain about the quality of workers. Another important method of facilitating communication and trust is to mobilize Ethiopian line supervisors as an interface between foreign management and Ethiopian labor. Such middle managers are typically picked and trained from among best line workers, and are already producing good results at a number of interviewed FDI garment factories.

On the negative side, some foreign managers impose their home methods without due respect to local customs and conditions. Some even shout at or insult female workers which are taboo in the local culture. Meanwhile, Ethiopian managers unexposed to global business practices also have weaknesses in the sense of purpose and responsibility, the lack of consistency in learning, poor time management and the lack of global mindset. Both foreign and domestic managers must learn and improve. It should be highly useful if systematic research is conducted on the impact of imported labor management on the transformation of Ethiopian mindset, and what pitfalls to be avoided. Ethiopia should create its own way of improving worker quality by learning different foreign methods and adopting them to Ethiopian cases with selectivity and proper adjustments.

9. Locational differences in worker type

In any rapidly industrializing economy, industrial parks in the suburbs of a principal city tend to suffer from labor shortage and footloose workers. This is partly because big cities offer many other job opportunities to those with low skills, including restaurant and café staff, shop keepers, house maids, construction workers, shuttle traders, and informal vendors, some of which are far more lucrative than sewing operators. Another reason is that most workers are migrants from rural villages with the main objective of earning cash to bring back home, and this makes them very sensitive to wages and other financial conditions. Meanwhile, factories located in rural areas have less problems in recruiting and retaining workers, who usually commute from their own home nearby and are happy to earn extra income without leaving the village—at least until local industrial labor demand rises so much to outstrip local labor supply. Factory wages are naturally higher in urban areas than rural areas due to higher urban prices and living costs. This dual geographical pattern is clearly visible in Asia, where some FDI firms even relocate from the capital city to rural areas in the same country in search of more workers with relatively low wages and less job hopping. The same phenomena are also detected in Ethiopia, as Bole Lemi is challenged with highly selective and fast-moving workers while Mekelle presently faces less problems of that kind. The situation in Hawassa is in between the two poles (section 5.3).

10. Impediments of productivity improvement outside factories

Our re-constructed manufacturing database shows that, from 1996 to 2016, Ethiopia's manufacturing labor productivity on average rose 4.6% annually. However, this growth was highly volatile year-to-year due to factors beyond the control of individual firms. Meanwhile, manufacturing TFP remained stagnant over the sample period except temporary spikes in 1999 and 2015, with an average annual growth of 2.5%. Ethiopian manufacturing entrepreneurs encounter many external impediments. Some are caused by inappropriate policy actions and others are generated by international political and economic situations, for which factory managers and workers bear no responsibility. Problems include shortage of foreign currency, unstable power supply, slow and expensive logistics, bureaucratic customs clearance, unavailability of materials, supplies and spare parts, and a horde of labor law-based headaches concerning the minimum wage (or lack thereof to date), and workers' overtime limits, leaves, and income tax. Interviewees in our firm survey all stressed that these were very serious business barriers which lowered productivity at their firms as well as for the whole nation (section 5.5). Each problem must be solved with appropriate policy resolve and measures. The government is currently working hard on the World Bank's Ease of Doing

Business ranking, which is desirable, but this ranking deals mainly with the speed and cost of administrative procedures. Other impediments cited above must also be tackled.

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At the end of the report, we offer ten suggestions for policy directions. For setting up a policy framework for nationwide productivity improvement, we propose the following: (i) establish a policy organization and an operational organization; (ii) improve data collection and publication; and (iii) set medium-term targets. For concrete policy areas in which substantive action is required, we propose the following: (iv) adjust investment policy for proper pace and more private projects; (v) speed up structural transformation; (vi) maintain wage competitiveness; (vii) deepen and broaden Kaizen into a national productivity movement; (viii) construct an effective enterprise support system, especially for small and medium enterprises (SMEs); (ix) simultaneously pursue productivity and ethical standards; and (x) transform the mindset of workers and management.

It is hoped that this report contributes to the formulation of Ethiopia's of productivity policy by making basic data and useful analyses accessible to all.

1. Introduction

Ethiopia has designed and implemented several national development plans and strategies since the early 2000s, including A Plan for Accelerated and Sustained Development to End Poverty (PASDEP) during 2005/06-2009/10; the First Growth and Transformation Plan (GTP I) covering the period 2010/11-2014/15; and the current Second Growth and Transformation Plan (GTP II) (2015/16-2019/20). During those plan periods, the Ethiopian economy generally performed well, achieving fast economic growth, improving the per capita income and living standard of citizens, and reducing the poverty level. Ethiopian growth was not only continuous and broad-based but also much higher than the regional average. For instance, during the PASDEP and GTP I periods, the Ethiopian economy grew an average of 10.1% per year. In the first three years of the GTP II period, the economy grew an average of 8.8% per year. Growth was accompanied by a substantial improvement in access to health and education facilities. Regarding the economic structure of the GDP, agriculture used to have the lion's share, followed by services and industry. More recently, however, the service sector has become the dominant sector, despite the country's great ambition towards industrialization. A report by the National Bank of Ethiopia in 2017/18 showed that the GDP shares of agriculture, service and industry were 34.9%, 39.2%, and 27.0% respectively.

Despite Ethiopia's high economic growth, its productivity remains well below the average of developing countries. That high growth has largely been driven by substantial public investment in physical infrastructure and the strong performance of the service sector, which absorbed a modest migration of labor from the agricultural sector (World Bank, 2016). Among its African peers, Ethiopia stands out for its very rapid development of infrastructure, but its overall economic efficiency has not improved at the same rate. This is alarming because productivity improvement is an important contributor to sustainable economic growth and hence a crucial indicator for policymakers (Conway, 2016).

Realizing this, Ethiopia made pursuit of productivity its key policy direction under GTP II, with the enhancement of productivity of agriculture and manufacturing one of the major focus areas. However, concrete policy measures to enhance productivity remain unclear. In order to concretize productivity policies, a comprehensive and detailed study of productivity is needed. This report is intended to contribute to that research direction. The objectives of this report are to examine the evolution of productivity in Ethiopia, with particular emphasis on the manufacturing sector; and to qualitatively analyze the effect of worker mindset and

management mindset on labor productivity in Ethiopia's emerging garment sector.

Our analysis focuses on two main elements: economy-wide productivity and manufacturing sector productivity. The macro-level part of the analysis focuses on the determinants of labor productivity using national account and shift-share analysis. The manufacturing part examines the evolution of productivity of the manufacturing sector using various productivity metrics, both descriptive and statistical, that provide insights into the constraints on structural transformation. Analyzing productivity at the macro-level affords a view of the state of the manufacturing sector in the context of the overall economy, as the manufacturing sector is closely linked with both the agricultural and service sectors. The focus on the manufacturing sector is in line with the government's policy of prioritizing that sector. The report offers basic but crucial information and a deeper understanding of the concept of productivity and the Ethiopian approach to it. These should help Ethiopian policymakers to formulate an appropriate productivity strategy.

The main data sources for the economy-wide productivity analysis are official data from the Planning and Development Commission (PDC) and the World Bank's World Development Indicators (WDI). The main data source for the manufacturing study is the Large and Medium Scale Manufacturing Industries (LMSMI) Survey conducted annually by the Central Statistical Agency (CSA) of Ethiopia for the period 1996–2016. The LMSMI Survey is a census of medium and large manufacturing industries (i.e. employing ten or more workers) and contains a rich set of information on inputs and outputs crucial for the calculation of productivity. Our team checked, cleaned and reconstructed this survey data to create an integral database before conducting panel data analysis. We also use the USD-based UNIDO database for international comparisons.

The rest of the report is structured as follows. Chapter 2 offers a literature review which covers the concept of productivity, productivity measurements, and the importance of productivity in general and in the context of Ethiopia. It also identifies some conceptual issues and warns of pragmatic caveats related to the measurement of productivity. Chapter 3 presents an analysis of economy-wide labor productivity, characterizing the current status of labor productivity and decomposing it into capital deepening and total factor productivity (TFP). Economy-wide labor productivity growth is further decomposed by means of shift-share analysis. Chapter 4 discusses productivity in Ethiopian manufacturing. It examines Ethiopia's manufacturing labor productivity and TFP in time-series and subsector disaggregation, and compares Ethiopia's performance with that of selected peer countries.

The issue of Ethiopia's wage-productivity nexus is also discussed, and held up for international comparison. Chapter 5 reports the results of an in-depth survey of garment factories in Hawassa, Bole Lemi and Mekelle, mostly operated by FDI. Various aspects of the Ethiopian worker mindset problem are identified and discussed, and possible causes and directions for remediation are explored. In Chapter 6, we propose ten policy directions for enhancement of Ethiopian productivity, some related to policy framework creation, and others to areas for policy implementation.

2. Productivity: Concept, Measurement and Significance

In this section, we examine the concept of productivity and its measurement. We go on to discuss the importance of productivity and the decomposition techniques of labor productivity. We also present some caveats related to measuring productivity.

2.1 The concept of productivity

Productivity is a fundamental concept in economic analysis. It is a key measurement of economic effectiveness, revealing how well resources are combined and utilized to achieve the desired and expected results. For countries, productivity is a tool for value creation from available resources such as raw materials, labor, skills, capital equipment, land, intellectual property, managerial capability and financial capital. If the right choices are made, higher production, higher value and higher income can be achieved for every hour worked. According to Krugman (1994), "productivity is almost everything in the long run."

Productivity can be studied at three levels: international, national and enterprise. Productivity at the international level reflects a view of competition among countries to attain high technology, quality products, high-value services and low production costs. At the national level, productivity uses the available resources to maximize overall yield, increase employment and improve the living standard of the citizens. At the enterprise level, productivity is associated with the optimal utilization of in-company resources, aimed at superior business performance.

Productivity is defined as the link between the output resulting from a production process or service system, and the inputs used to generate that output (ILO, 2015; Prokopenko, 1987). It reflects how much is produced per unit of input. A productivity-enhancing society selectively mobilizes new ideas, technological innovations and competing business models to generate more value by realizing a better combination of a country's resources (Conway, 2016; Cusolito & Maloney, 2018; OECD, 2015a).

2.2 Measuring productivity

Productivity is defined as the ratio of output to input.

$$Productivity = \frac{Output}{input}$$

Despite the simplicity of the formula, there is no unique way of measuring productivity in the real world. The productivity literature provides us with many different measures of productivity, and selection of the optimum measure depends on the purpose of the analysis and the availability of data. Generally, tools for the measurement of productivity are classified into single factor productivity measures and multi-factor productivity measures. Single factor productivity, also referred to as partial productivity measure, pairs a measure of output with a single input such as labor or capital. Multi-factor productivity, a measure of output combined with more than one input, is commonly known as total factor productivity, or TFP (OECD, 2001). This report focuses mainly on labor productivity, invoking TFP as need arises. Labor productivity is important for policymakers because it is a key economic indicator closely associated with a country's economic growth, competitiveness and living standards (ILO, 2015; OECD, 2001).

Labor productivity is defined as the amount of output produced divided by the amount of labor expended to produce that output. It reveals how efficiently labor is used to produce gross output or value added (OECD, 2001). Here, gross output is the entire physical product emerging from the production process, and value added is the part of this product value which is newly added by the current production process after deduction of the value of purchased materials and components. Labor productivity based on gross output captures required labor per unit of output, while the value added measure enables the gauging of living standards and income per capita. From a policy viewpoint, value added-based productivity is also a useful indicator for wage negotiation and setting.

$$Labor\ Productivity = \frac{Output(Value\ Added)}{Number\ of\ Employees}$$

Labor productivity as characterized above is relatively easy to calculate with reasonable accuracy and to compare across countries. For this reason, it is widely used in policy work by governments of both developing and developed nations, and in international comparisons as well. The ILO Manual on Productivity Improvement identifies labor as the key among all factors of production, including capital, land, equipment and materials. It likens the role played by labor to child delivery—just as a child cannot be delivered without labor, all elements of production remain unrealized unless they are combined with labor.

2.3 Decomposition of labor productivity

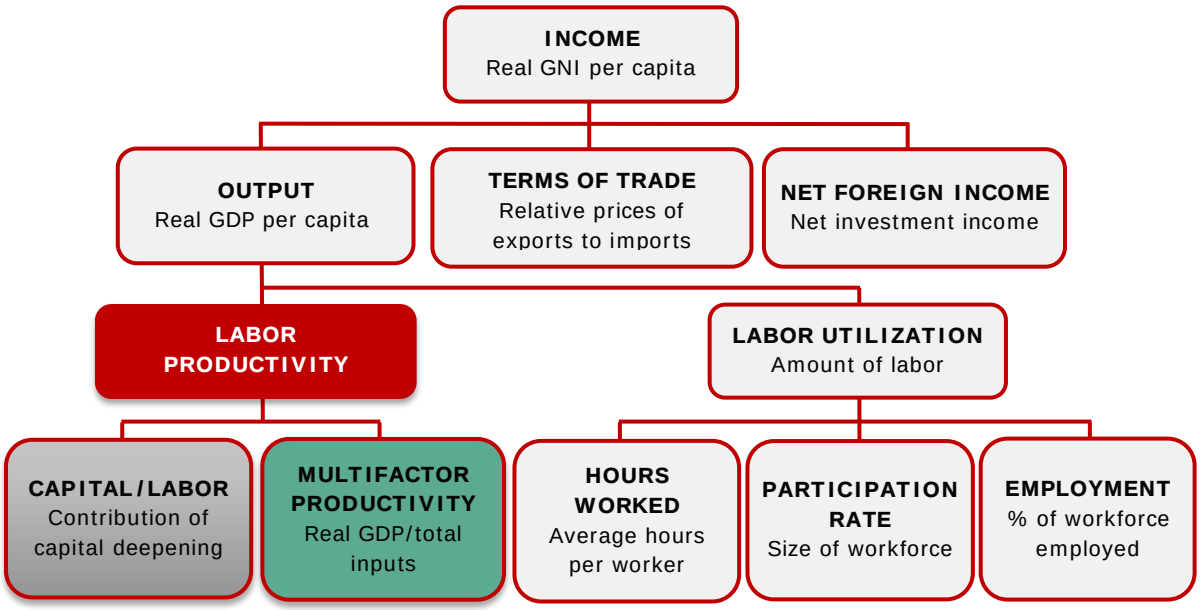
Labor productivity can be decomposed in a variety of ways. Most frequently, it is decomposed into two main factors: capital deepening and TFP (Anderson & Kliesen, 2006; OECD 2001, 2015a, 2015b).

Capital deepening (capital intensity) is defined as the amount of capital available to each unit of labor. It contributes to labor productivity improvement by giving each worker more capital—tools, machinery and equipment—to work with in the production process (Conway, 2016). The rise of labor productivity due to capital deepening occurs naturally in any sector or country, and is basically unrelated to the attainment of higher skills or to the dexterity of labor itself. Meanwhile, TFP is defined as the overall efficiency with which all productive inputs—not just labor—are combined in the production process to generate output (OECD, 2015a). TFP reflects many aspects such as management style and strategy, different production methods, scale merits, accumulation of skill and technology, and the elimination of *muda* (wasteful actions or things in production). The conceptual ambiguity and multi-facet nature of TFP makes it far more difficult than labor productivity to estimate statistically.

Labor productivity can also be decomposed into three components: capital deepening, labor quality and TFP (Jorgenson & Stiroh, 2000; APO, 2010; Fernald & Matoba, 2009). Jorgenson & Stiroh, for example, consider labor quality as time allocation in terms of number of hours worked by workers who have higher marginal products (and therefore enjoy higher wages) than those with lower marginal products. This concept of labor quality is directly connected with both labor productivity enhancement and labor compensation.

This report adopts the two-way decomposition of labor productivity into capital intensity and TFP, given the paucity of data such as total hours worked or classification of labor by education and skill levels, which are necessary for the measurement of labor quality. This two-way decomposition reflects labor quality indirectly in TFP rather than as a separate entity. The national-economy context of labor productivity and its decomposition is illustrated in Figure 2.1. In broad terms, higher income per capita can be achieved by producing more output per person, or by getting higher world prices for what is produced via improvements in the terms of trade (the prices of exported domestic products relative to those of imported foreign products). Increasing the amount of output produced per person can be achieved by increasing hours worked per capita (higher labor utilization) and/or by achieving more output from each hour worked (higher labor productivity).

Figure 2.1 Components of Real GNI per capita



Source: Conway & Meehan, 2013.

2.4 The importance of productivity in general and in the context of Ethiopia

Concern with productivity is ubiquitous. National leaders, bureaucrats and public administrators talk about productivity improvement as a solution to many problems affecting society. Economists consider productivity as an important source of economic growth and increased real income in the different segments of society. Business executives and managers consider it as a viable response to increased global competition and a means to reduce production costs and improve profitability. Industrial supervisors and engineers are interested in keeping abreast of production schedules, reducing the frequency of defects and rejections, achieving high quality and cutting expenses—all through productivity improvement.

The ILO describes productivity as the chief source of real economic growth, social progress and better standard of living. Given its direct relationship with national income and welfare, productivity has become an important concept in national policy formulation and corporate strategy. Productivity appears to provide the only explanation why some countries with scarce resources can enjoy a better standard of living than others with ample resources (ILO, 2015). Enhanced productivity is good for sustainable economic growth and as such is a crucial element of policymaking (Conway, 2016). Productivity was highlighted as “a game changer to achieving high economic growth” in the Eleventh Malaysia Plan (EPU, 2017). In August 2019, in Hanoi, Vietnam, Prime Minister Nguyen Xuan Phuc officially declared the

start of the National Labor Productivity Improvement Movement to accelerate economic growth.

The pursuit of quality, productivity and competitiveness (QPC) became Ethiopia's key policy direction in GTP II in which enhancing the productivity of agriculture and manufacturing is one of the major focus areas. Ethiopia aims to become a light manufacturing hub of Africa by 2025. To achieve this, the Ethiopian government has prioritized the development of the manufacturing sector, in which productivity improvement of the manufacturing sector should be a key policy pillar. Specifically, GTP II targeted structural transformation involving the shifting of activities from low to high productivity sectors, especially the manufacturing sector, in a relatively short period of time.

Ethiopia's current industrial activities are mostly labor-intensive since the country has a substantial workforce with a high percentage of young people but it has very limited capital accumulation except in simple tools and light-duty machines. Industries can attain a competitive advantage if equipped with a productive labor force with comparatively low wages (Rao & Tesfahunegn, 2015). In a country where labor is a dominant factor of production, labor productivity is a suitable indicator of a firm's productivity (Bernolak, 1997). Hence, the measurement of labor productivity has particularly high practical relevance in Ethiopia. Competitiveness cannot be realized unless these activities are accompanied by high labor productivity.

There are additional reasons why labor productivity is a strong policy focus in virtually all nations, not just in those with labor-intensive industries. First, the human factor is considered critical among factors of production, so labor productivity should be the starting point in productivity analysis (ILO, 2015). Second, labor productivity is a widely used indicator as a major determinant of living standard and economic growth. Third, labor productivity can be understood intuitively; it is relatively easy to calculate with reasonable accuracy; and it is amenable to international comparison. Fourth, labor productivity is also easier to measure and discuss at all levels including national, sectoral and enterprise levels (OECD, 2001, 2008).

In short, among the productivity measures, this report focuses on Ethiopia's labor productivity, with TFP also highlighted as a supplementary indicator of productivity.

2.5 Conceptual issues and pragmatic caveats

Although labor productivity is the most powerful and widely accepted measure of productivity today, it has limitations which must be mentioned upfront.

First, labor productivity is a partial measure of productivity which does not account for the contribution and cost of capital growth or any other important inputs to the enhancement of output (OECD, 2001). Findings based on labor productivity alone could be misleading as they do not directly address the role of other factors of production. For example, at certain stages of economic development, labor may become less important and the focus may shift to another input (e.g., machinery, IT, AI) whose contribution to economic growth has risen. Thus, the analytical value of labor productivity may vary over time and across industries due to the emergence of other important inputs (Conway & Meehan, 2013).

Second, labor productivity calculations may be influenced by the accuracy of statistics as well as the method of defining inputs and outputs. While it is relatively easy to measure value added in terms of current price, it is more difficult to measure it in terms of constant price, as separate price indexes are required to arrive at real outputs and inputs for different sectors and subsectors. Another problem relates to the measurement of labor itself. Different statistical sources, with different concepts and definitions, are used in different countries, which impede international comparability. Ideally, the measurement of labor inputs should adjust for workers' education, qualifications, skills and experience, but in practice, only number of hours worked is available in most advanced countries and only number of employees is available in many developing countries, including Ethiopia.

Theoretically, TFP is superior to labor productivity as an indicator of overall economic efficiency and performance. However, TFP too has major limitations. First, differences in data and technical assumptions adopted by various researchers often produce very different measurements of productivity growth, which renders TFP impractical for policymakers. Second, factors other than purely technical change, such as increasing returns to scale, markups due to imperfect competition, or gains from sectoral reallocations, contaminate TFP and lead to difficulty in interpretation (World Bank, 2000). Third, estimation of TFP demands substantially larger amounts of data than estimations of labor productivity, yet it is less able to identify causes of, or appropriate policy actions to cope with, productivity problems, as it deals with multiple input variables (EPU, 2017). Hence, caution is required when interpreting both labor productivity and TFP.

3. Economy-wide Labor Productivity in Ethiopia

This chapter focuses on economy-wide labor productivity. Data sources and limitations are provided in Section 3.1. Section 3.2 presents trends in economy-wide labor productivity in Ethiopia, and it is further disaggregated into major sectors of agriculture, industry and service. Ethiopia's economy-wide labor productivity is compared with that of selected countries in Section 3.3. In Section 3.4, economy-wide labor productivity is decomposed using growth accounting and shift-share methods.

3.1 Data sources and limitations

In our economy-wide labor productivity analysis, the key variables are value-added (GDP), value-added share by sector, GDP deflator, labor engaged in each sector, and capital stock. The main sources of data for this analysis are official data from the Planning and Development Commission (PDC: formerly the National Planning Commission), the World Bank's World Development Indicators (WDI), and the International Labor Organization (ILO).

Data for value-added and GDP deflator are obtained from the national accounts dataset prepared by PDC. The year 2011 is the base year for the GDP deflator. Employment data is obtained from WDI, sourced from ILO by the World Bank. National labor force surveys were conducted in 1999, 2005, and 2013 in Ethiopia. ILO estimates labor data for other years using the standard model it applies to all member countries.

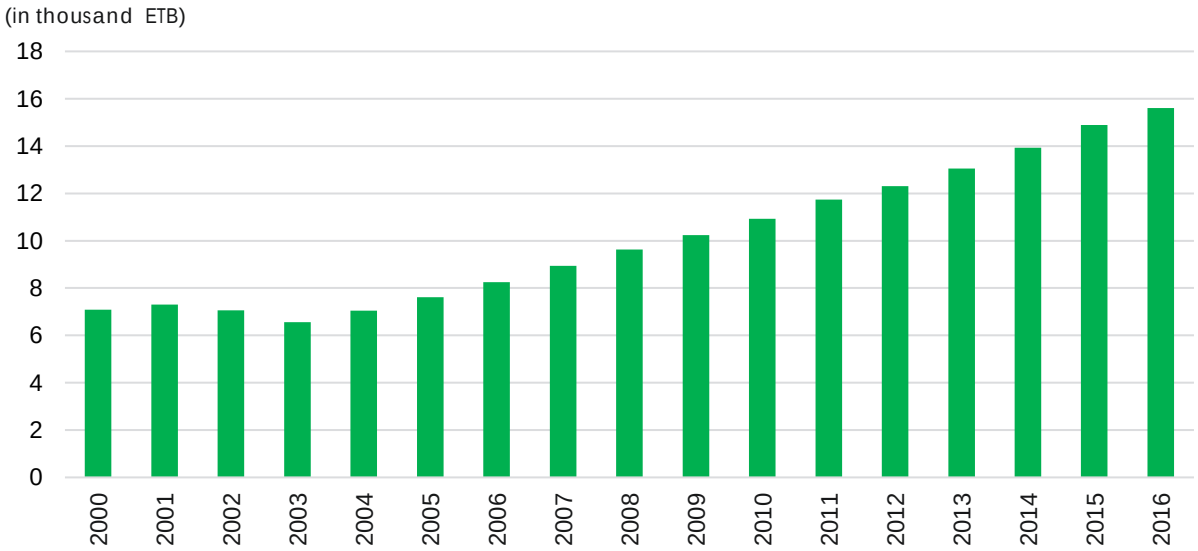
The national accounts data of PDC does not provide capital stock. Due to the absence of initial capital stock, it is difficult to compute capital stock using the inventory method even though NPC provides investment data. Moreover, that procedure would require a reliable depreciation rate. Hence, we resorted to the Penn World Table to source data for capital stock for Ethiopia from 2000-2014[1].

3.2 Trends of economy-wide labor productivity in Ethiopia

Using national accounts and employment data, the level and growth of economy-wide labor productivity are calculated as the ratio of output produced in any year to the total number of persons mobilized.

[1] Unless specified otherwise, we compute the growth rate of any variable by the change in its natural logarithm (i.e. $\Delta lnY_t = \ln Y_t - \ln Y_{t-1}$).

Figure 3.1 Economy-wide labor productivity (2011 prices)



Source: authors' calculation based on data from PDC and WDI.

$$Labor\ Productivity = \frac{GDP}{Total\ Number\ of\ Employed\ Persons}$$

Figure 3.1 shows the result. Economy-wide labor productivity increased from 7,080 Birr per worker in 2000 to 15,610 Birr per worker in 2016. This translates to an annual average growth of 4.94 % (Figure 3.2). Except for 2002 and 2003, when labor productivity growth was negative, the overall trend was fairly stable with slight declines in 2009, 2012, and 2016. The negative growth of labor productivity in 2002 and 2003 can be explained by the drought during that period which resulted in a significant drop in value added in both years. The slight deceleration in 2009 coincided with the global financial crisis. The decline in 2016 is related to another drought in 2015-16 which affected the agricultural sector in particular and the instability caused by violent protests within the country.

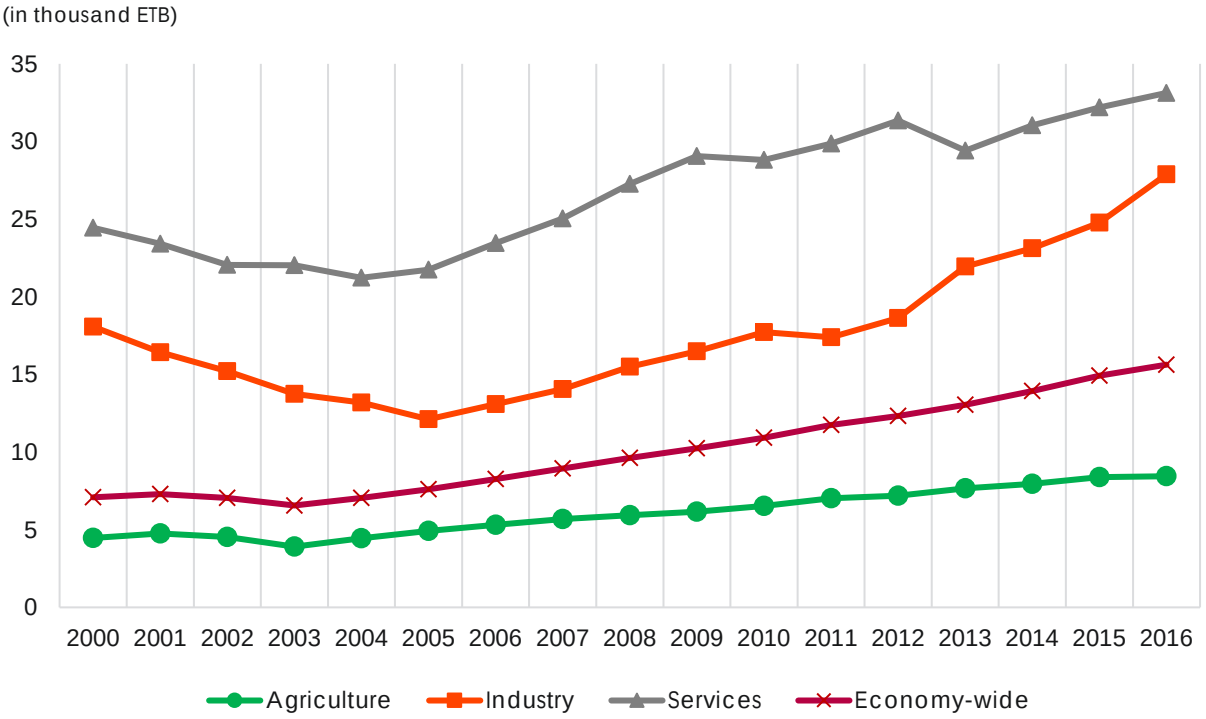
Figure 3.2 plots GDP growth and labor productivity. It is evident that labor productivity is highly correlated with the movement of real GDP, whereas changes in employment are not.

Labor productivity by major sector is provided in Figure 3.3. The service sector stands out for its relatively high labor productivity. Even though the industrial sector accounts for the smallest share of GDP, its value added per unit of labor has been approaching the level of the service sector. The data indicate that the agricultural sector had the lowest labor productivity. In terms of average labor productivity growth during 2005-2016, the productivity of the industrial sector rose faster than that of the other two sectors. In 2016, the

Figure 3.2 Economy-wide growth of GDP and labor productivity

Source: authors' calculation based on data from PDC and WDI.

Figure 3.3 Labor productivity by major sectors (2011 prices)



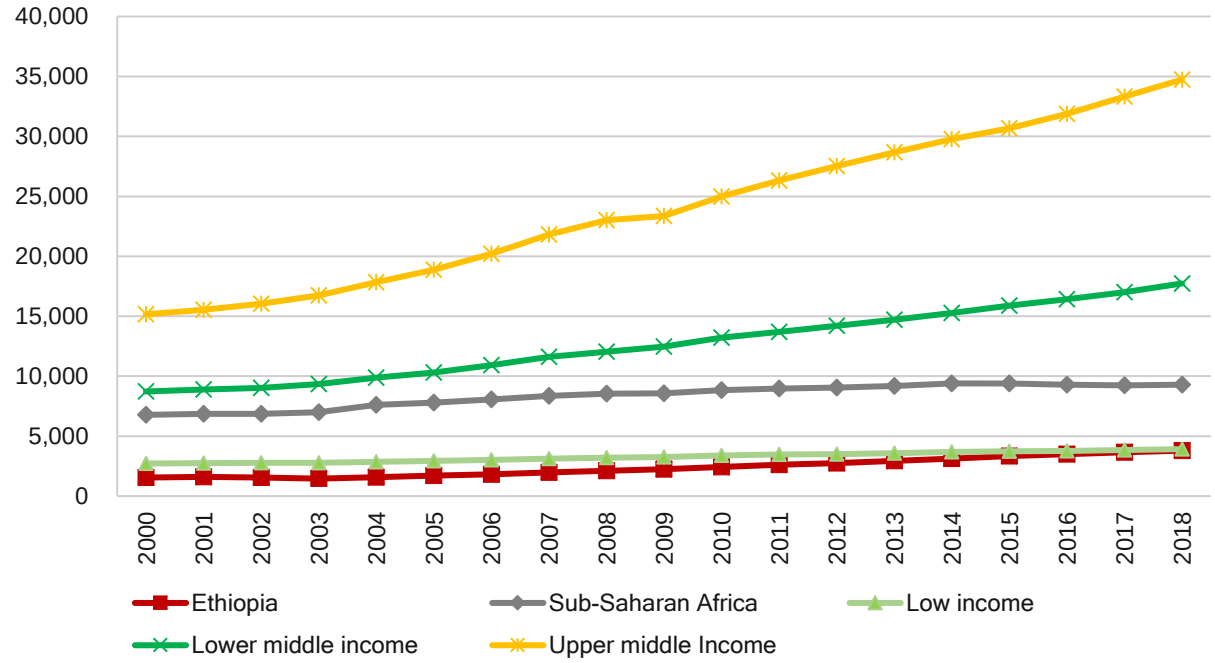
Source: authors' calculation based on data from PDC and WDI.

labor productivity of the services sector and the industrial sector were 3.9 and 3.3 times more, respectively, than that of agriculture. Nevertheless, the pace of structural transformation has been slow. The large variation in labor productivity among the three major sectors suggests considerable potential for structural transformation through inter-sectoral labor movements accompanied by overall productivity gain and economic growth.

3.3 Ethiopia's economy-wide labor productivity compared with peer countries

To assess Ethiopia's position among its peer countries, we use ILO's labor productivity estimation in constant USD. Ethiopia's economy-wide labor productivity for the period 2000-2018 is at the low end of the distribution of global and regional productivity. As shown in Figure 3.4, it has been consistently lower than the average for low-income countries although the gap has almost closed in recent years. However, it continues to be substantially lower than that of other groups. In 2018, the labor productivity of Ethiopia was 40% of the average for Sub-Saharan Africa, a quarter of the average for lower-middle income countries, and 10% of the average for upper middle income countries.

Figure 3.4 Comparison of Ethiopia's labor productivity and that of peer countries, by income category (Output per worker, GDP measured in constant 2011 international $ in PPP)

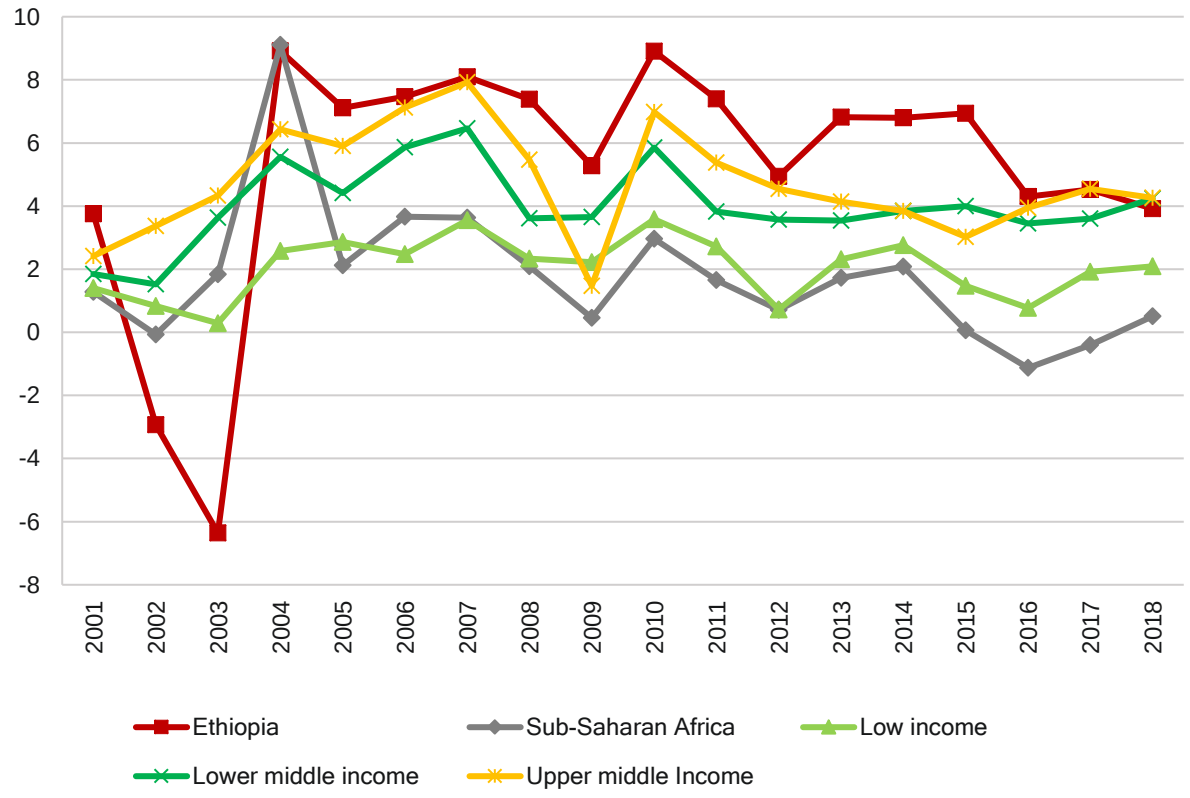


Source: ILO estimation of economy-wide labor productivity.

Figure 3.5 provides a comparison of the labor productivity growth of Ethiopia and that of its peer countries. Even though Ethiopia's labor productivity remains low compared to that of its peer countries, it has registered slightly higher productivity growth than the other countries examined here. Labor productivity growth has been positive in the last two decades, with the exception of 2002-03. The countries compared here experienced positive labor productivity growth through most of the last two decades.

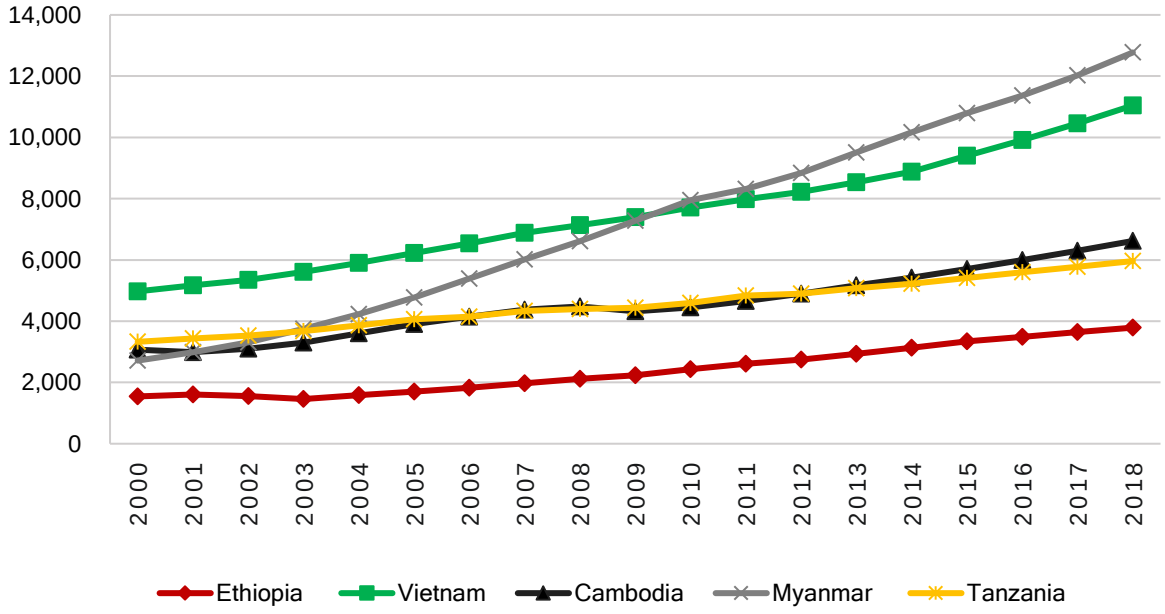
Ethiopia's labor productivity relative to that of selected individual peer countries is illustrated in Figure 3.6. Ethiopia's labor productivity was lower than that of every other country selected. In 2018, Myanmar, Vietnam, Cambodia, and Tanzania had labor productivity 3.4, 2.9, 1.7, and 1.6 times higher, respectively, than that of Ethiopia.

Figure 3.5 Comparison of labor productivity growth of Ethiopia and peer countries, by income category



Source: authors' calculation from ILO economy-wide labor productivity

Figure 3.6 Comparison of Ethiopia's labor productivity and that of selected peer countries, by category (Output per worker, GDP measured in constant 2011 international $ in PPP)



Source: authors' calculation from ILO economy-wide labor productivity.

3.4 Decomposition of economy-wide labor productivity

As discussed in the preceding sections, economy-wide labor productivity in Ethiopia grew on average by 4.9% between 2000 and 2016. In this section, we focus on the period 2000-2014, given that capital stock data are not available for the period after 2014 (economy-wide labor productivity grew on average by 4.8% between 2000 and 2014). We analyze the sources of labor productivity growth using growth accounting and shift-share analysis methods[2].

Growth accounting theory holds that labor productivity growth can be explained by changes in labor quality; capital intensity (also known as capital deepening, which is an increase in the use of capital per unit labor); and TFP growth (which reflects innovation or an overall improvement of efficiency). In the absence of data on labor quality, we follow previous researchers and decompose labor productivity growth into two factors, capital deepening and TFP growth.

3.4.1 The growth accounting method

Our growth accounting decomposition is derived from a Cobb-Douglas type production function which assumes constant returns to scale (see Annex 3.1 for more information on

[2] For growth accounting decomposition, we examine the period 2000-2014 due to data limitations for capital stock, while for the shift-share analysis we extend the period to 2016.

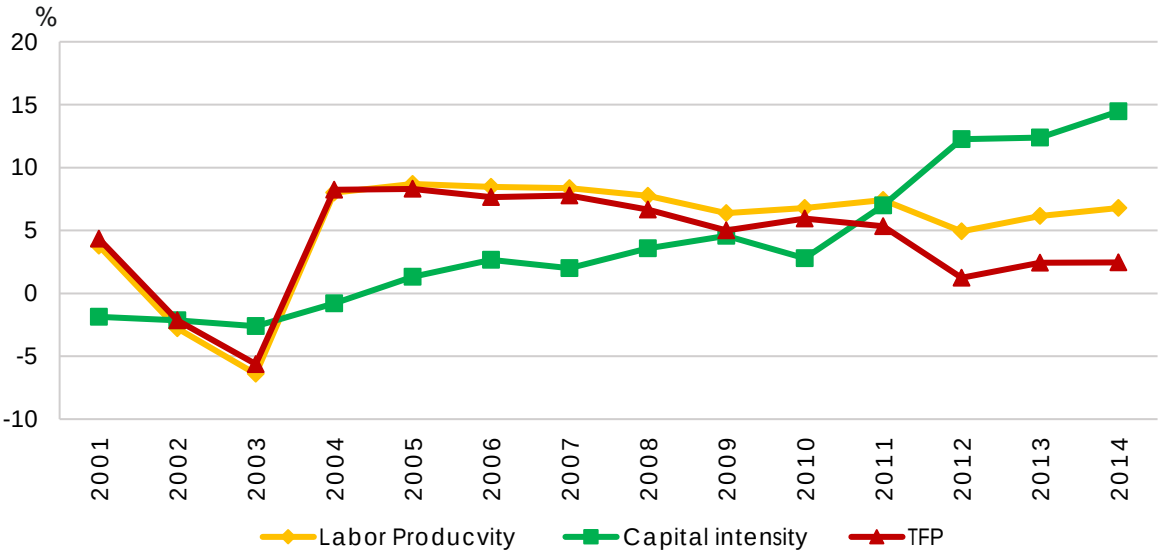
methodology). We copy capital stock data for Ethiopia from the Penn World Tables, which report capital stock and real GDP in 2011 prices. We use the national accounts data to recalculate capital stock with the Penn World Table estimate of the ratio of capital stock to GDP. This recalculation is necessary as national accounts data are in local currency in 2011 prices.

Determination of the capital share of national income is challenging due to the lack of data. Most studies assume a certain share of capital in GDP. For example, Collins et al. (1996) and Thanh et al. (2018) both assume capital share $\alpha = 0.35$ for East Asia and Vietnam, respectively. We adopt α of 0.3 from Mengistu et al. (2018); that value was calculated from the 2015/16 Input-Output and Social Accounting Matrix of Ethiopia.

National accounts data expresses real GDP in constant 2011 price. Our employment data is the number of employed persons of age 15 and higher, as reported in WDI, which in turn is based on ILO modelled estimates. Details of the data constructed from national and international sources are provided in Annex 3.2.

Results of the decomposition are given in Figures 3.7 and 3.8. In Figure 3.7, capital intensity rose throughout the sample period, while TFP growth declined from 2004 onward. In 2011, capital intensity replaced TFP growth as the largest determinant of labor productivity growth.

Figure 3.7 Growth rate of labor productivity, capital intensity, and TFP (%)



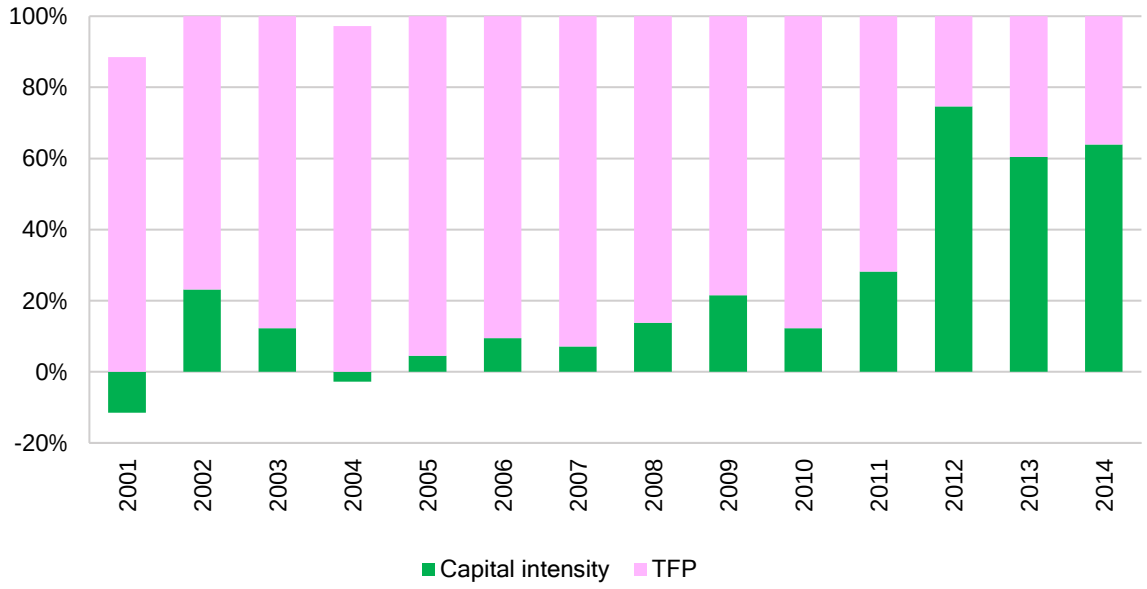
Source: authors' calculation based on data from PDC, WDI and the Penn World Tables.

Figure 3.8 shows the same information in terms of contribution to labor productivity growth. Until 2011, the contribution of TFP growth was dominant, at 70% or larger, suggesting that Ethiopian productivity at that time was driven by improvements in efficiency. From 2012 onward, however, the main driver of labor productivity growth was capital intensity, with a contribution of 62% in 2014. The shift from TFP to capital intensity as the main driver of labor productivity growth indicates an efficiency slowdown accompanied by vigorous investment in infrastructure and other capital, equipping each worker with more machinery and structures, which sustained labor productivity. This is not good news for Ethiopia as such enhancement of labor productivity cannot continue in the long run.

This trend may have more than one cause. One possible explanation is that labor-intensive manufacturing industries, such as garments and leather, were sluggish while the capital-intensive manufacturing sector, such as machinery and equipment, and perhaps also the capital-intensive service sector, fared better. If this explanation is valid, a rising contribution of capital deepening is not necessarily a bad thing, as it signifies a structural transformation from light manufacturing to capital-intensive manufacturing (and services). To date, however, such a transformation has not been corroborated by other data.

Another possible explanation is excessive public investment with low efficiency. Ethiopia recently invested heavily in physical infrastructure, particularly after the launch of the country's First Growth and Transformation Plan in 2009/10. This might have led to excessive

Figure 3.8 Contributions of capital intensity and TFP to Ethiopia's labor productivity



Source: authors' calculation based on data from PDC, WDI and the Penn World Tables.

investment, low capital efficiency and inefficient use of capital by labor. A World Bank report (2016) finds that while public investment has been one of the drivers of growth in Ethiopia, the estimated marginal return to public investment has been low even by the standard of low-income countries. The report also suggests that Ethiopia would benefit from directing its resources to more private investment. A number of large-scale public power and transport investment projects in recent years will surely have positive effects on private sector production and investment in the future. However, questions regarding appropriate speed and size, cost performance, debt sustainability, and the risk of crowding out private activities must also be addressed.

The Asian Productivity Organization (APO) reports the labor productivity of Asian countries annually. Its 2017 report finds that the situation surrounding labor productivity is not uniform across countries or over time. From 1970 to 2015, capital intensity was the main driver of labor productivity growth in China, Vietnam, and Indonesia. Meanwhile, during the same period, TFP appears to have been the main driver in Cambodia, India, and Sri Lanka. Sub-period observations also reveal changes of driver. In Vietnam, for example, TFP mainly contributed to labor productivity from 1970 to 1995 but capital intensity was more important from 1996 to 2015. The Vietnamese case, where capital intensity overtook TFP as the main driver of labor productivity growth, is similar to the Ethiopian situation we examined above.

3.4.2 Shift-share analysis

In this section, we use the shift-share method to examine another strand of labor productivity: labor mobility between sectors and subsectors.

Before discussion of the results, it is useful to briefly check how the three major sectors of the Ethiopian economy fared in terms of labor productivity. Figure 3.2 in the preceding section and Table 3.1 below show the relevant data.

Between 2000 and 2005, productivity in the agricultural sector increased while that in the

Table 3.1 Labor productivity of Ethiopia, by industry (in thousand ETB, 2011 prices)

Year	Agriculture	Industry	Services	Economy-wide
2000	4.47	18.08	24.45	7.08
2005	4.93	12.11	21.75	7.61
2010	6.54	17.73	28.81	10.93
2016	8.44	27.88	33.13	15.63

Source: authors' calculation based on data from PDC and WDI.

industrial and service sectors declined. After 2005, all three sectors showed positive growth in productivity. Between 2005 and 2016, industrial sector productivity grew by a factor of 2.3 while the service sector and the agricultural sector grew by factors of 1.5 and 1.7, respectively. In 2016, labor productivity in the service sector and the industrial sector was respectively 3.9 and 3.3 times more than that of agriculture. The service sector comprises heterogeneous sub-sectors including Ethiopian Airlines, financial institutions, transport services, professional and consultation services, tourism, wholesale trade, small shops and restaurants—some of which are high-tech and capital intensive while others are low-tech and labor-intensive. The relatively high labor productivity in the service sector may reflect the dominance and growth of high-tech services but this cannot be confirmed. Due to data paucity, disaggregated analysis of service sub-sectors is hardly possible.

Economy-wide productivity can be expressed as the sum of the productivity levels of the sectors weighted by their employment shares. Labor continuously moves within sectors, e.g., from low productivity firms to high productivity ones, or across industries from low productivity sectors to high productivity ones—both of which affect the labor productivity of the entire economy ('sector' and 'subsector' are used interchangeably in this section). This process can be captured by means of the shift-share method (see Annex 3.3 for the derivation of shift-share method), decomposing labor productivity growth into three factors: (i) the within effect; (ii) the shift effect; and (iii) the interaction effect.

The within effect reflects the contribution of the labor productivity growth of each sector to economy-wide labor productivity, assuming the labor share of each to be constant. This captures improvement in each sector as a driver of economy-wide labor productivity. If there is improvement in technology, management or production method, the within effect will have a positive sign.

The shift effect is the effect of labor reallocation across sectors, assuming unchanged labor productivity in each sector. Economy-wide labor productivity increases due to the movement of labor from low productivity to high productivity sectors.

The interaction effect captures the second-order impact of labor mobility, namely, the correlation between changes in labor share and labor productivity growth in each sector. A positive sign means that the within effect and the shift effect are complementary, or that sectors with rising (not necessarily high) labor productivity are absorbing more labor and expanding. If the interaction effect is negative, the two effects are substitutes, or sectors with slow or falling labor productivity growth are receiving more labor.

Table 3.2 Decomposition of labor productivity growth: shift-share analysis

Period	Productivity growth	Sources of labor productivity growth (%)			Contribution shares to Labor productivity growth (%)		
		Within effect	Shift Effect	Interaction Effect	Within effect	Shift Effect	Interaction Effect
2004-2007	7.92	21.73	4.56	0.54	80.99	17.00	2.00
2008-2011	6.61	14.18	7.22	0.52	64.70	32.93	2.37
2012-2016	5.96	15.70	9.94	1.28	58.31	36.92	4.77
2004-2016	6.60	79.50	26.68	15.52	65.32	21.93	12.75

Source: authors' calculation based on data from PDC and WDI

As shown in Table 3.2, in the period 2004-2007, the major contributor was the within effect, accounting for 81% of labor productivity growth[3]. The shift and interaction effects contributed the remaining 17% and 2%, respectively. For the period 2008-2011, the within effect dominated, but its contribution decreased by about 16 percentage points, while the contribution of the shift effect increased to about 33%. For the recent period of 2012-2016, the within effect was still large but its share decreased further, to about 58%. The contribution of the shift effect rose to about 37%.

For the whole period under consideration, the within effect contributed 65% of labor productivity growth, the shift effect contributed 22%, and the smallest contribution, 13%, came from the interaction effect. Ferede and Kebede (2015) find similar results for Ethiopia, and stress the importance of the within effect for aggregate labor productivity in Ethiopia.

In sum, labor productivity growth has been driven mainly by the within effect, which suggests that there have been efficiency improvements within individual sectors. This may have been due to capital accumulation, technological change or improved allocation of resources across firms, but the precise causes and their relative weights cannot be identified. However, the contribution of the within effect gradually declined and the importance of the shift effect gradually rose over time. This suggests labor movement from low productivity sectors to high productivity ones. The large but gradually falling share of the *within effect*, combined with the rising share of the *shift effect*, signifies that Ethiopia is in an early stage of structural transformation. The small share of the interaction effect, which stood at 10% for 2004-2016, combined with the still relatively small contribution of the shift effect, implies that massive inter-sectoral labor mobility has not yet occurred and the structural bonus

[3] Due to the drought in 2002/2003, labor productivity growth between 2000 and 2004 was negative. Hence, for ease of interpretation we start the period of analysis for the shift-share model from 2004.

hypothesis is yet to be realized in Ethiopia. If Ethiopia's industrialization is sustained into the next stages of structural transformation, the shift effect and the interaction effect are expected to account for the lion's share of economy-wide labor productivity enhancements.

It would be preferable to conduct shift-share analysis on individual sectors instead of the entire economy. Table 3.3 reports the results of such an analysis, with disaggregation limited to the major categories of agriculture, industry and services. Due to the lack of data, further disaggregation is not possible. Agriculture had the largest contribution to the within effect (58.3%) followed by the services sector (26.5%) and the industrial sector (15.3%). In terms of the shift effect, labor movement was mostly from the agricultural sector to services, while movement to the industrial sector was modest. The negative interaction effect in the agricultural sector suggests the possibility of labor shifting to less productive industrial and services sectors such as informal trading. Overall, our results are in line with those of Ferede and Kebede (2015), who use the national labor force survey to study labor productivity drivers during 2005-2013.

Data on sectoral labor shares, obtained from WDI data based on ILO computation, also confirms our suspicion. It shows movement of labor away from agriculture to service and industry. In 2000, the agricultural sector employed about 86% of the labor force, while service and industry absorbed the rest, 11% and 3.5%, respectively. By 2017, the share of agriculture had declined to about 68% while the shares of service and industry had risen to 22% and 10%, respectively.

This Ethiopian trend deviates from the past pattern of structural transformation experienced by today's developed economies, where the path of development was characterized by a strong rise of manufacturing industries and a transformation from agrarian societies to urban ones. Over time, services overtook manufacturing as high income was attained, with labor moving initially from agriculture to manufacturing and then to the service sector.

Table 3.3 Decomposition of labor productivity growth by sector: shift-share analysis

2004-2016	Sources of labor productivity growth (%)			Contribution shares of labor productivity (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Within effect	46.31	12.14	21.05	58.25	15.28	26.48
Shift Effect	-8.03	5.89	28.82	-30.08	22.08	108.00
Interaction Effect	-7.21	6.56	16.16	-46.47	42.28	104.18

Source: authors' calculation based on data from PDC and WDI.

In "The Perils of Premature Deindustrialization," Rodrik (2013) finds that the manufacturing share of employment in today's developed countries (before their deindustrialization) peaked at 45%, 27%, 33%, 40% and 28% in Britain, the United States, Sweden, Germany, and South Korea, respectively. However, Rodrik notes that the pattern of industrialization in today's developing world is different: not only has the process been slow, but deindustrialization sets in much sooner, even before economic maturity is reached. He calls this "premature deindustrialization." Similarly, Tran and Karikomi (2019) point to the risk of premature deindustrialization as one of the major symptoms of middle income traps. They compare high performing economies of Northeast Asia, such as Japan and Korea, which did not experience premature deindustrialization, with industrializing but less spectacular economies of Southeast Asia, which are trapped or about to be trapped in middle income and may deindustrialize prematurely in the future.

The low but rising level of the shift effect and the high within effect are at least welcome indicators for Ethiopia, at a very early stage of industrialization where a strong emergence of manufacturing and massive internal labor movement associated with it has not yet begun. Given that labor mobility across sectors and from rural to urban areas is at present limited, it is important to promote and sustain the high level of the within effect along with a rising contribution of the shift-effect for an extended period. These two effects must be more dynamic and mutually enhancing to achieve overall economic growth and visible structural transformation.

3.5 Summary of findings

This chapter presented our analysis of the evolution and the current state of economy-wide labor productivity in Ethiopia, using data from PDC, the World Bank's WDI and the Penn World Tables for growth accounting and shift-share methods.

Ethiopia's economy-wide labor productivity grew by an average of 4.94% per annum from 2000 to 2016. However, in terms of absolute level, Ethiopia's labor productivity is still low even by the standard of latecomer countries. International comparison indicates that Ethiopia's economy-wide labor productivity is lower than that of Myanmar, Vietnam, Cambodia, and Tanzania.

Our growth accounting analysis revealed that in recent years the source of economy-wide labor productivity growth was mainly capital deepening rather than TFP growth. This means that efficiency improvement slowed, while large investments in infrastructure and other physical assets equipped workers with more machinery and buildings, and thus sustained

labor productivity growth. This is alarming as it is a sign of declining efficiency in the overall economy.

Furthermore, our shift-share analysis shows that Ethiopia's labor productivity growth has been predominantly driven by the within effect. This suggests that there has been an improvement in efficiency in individual sectors. However, that contribution has declined over time. Instead, the shift effect increased over time, with labor moving away from agriculture, largely to the service sector and to a smaller extent to the industrial sector. The service sector which receives labor may be informal and low productivity rather than high-tech and high productivity, but this suspicion cannot be corroborated due to lack of data. The large share of the within effect, combined with an increasing share of the shift effect, is in line with the profile of Ethiopia, which is at an initial stage of industrialization and structural transformation. In the following stage, the shift effect and the interaction effect should both be further activated to contribute greatly to the improvement of economy-wide labor productivity. If they do not, there will be a risk of growth slowdown before sufficient development is attained, premature deindustrialization, and a middle income trap after Ethiopia reaches lower middle-income in 2025.

While a nascent process of structural transformation is visible in Ethiopia, so far labor shift has mainly been from agriculture to services rather than to manufacturing, despite the government's aim of vitalizing the industrial sector based on the dynamic achievement of the agricultural sector. This points to the need to identify the constraints on the industrial sector, particularly the manufacturing sector, and measures to remove them, in order to ensure that structural transformation proceeds at a suitable pace and scope.

4. Zooming in on the Manufacturing Sector

In this section, we focus on manufacturing sector productivity. The section is divided into six parts. The first part reviews three policy instruments adopted by Ethiopia to enhance the manufacturing sector. The second part describes the dataset we have reconstructed together with its limitations, and the general characteristics of the Ethiopian manufacturing sector. The third part presents a time-series disaggregation of manufacturing labor productivity and TFP into sub-sectors. The fourth part compares Ethiopia's manufacturing labor productivity with that of peer countries. The fifth part discusses the wage-productivity nexus of Ethiopia and compares it with that of the benchmarking countries. The last part is a summary of the main findings.

This section works with data from the Ethiopia Large and Medium Scale Manufacturing Industries (LMSMI) survey of the Central Statistical Agency (CSA), covering the period 1996-2016. The manufacturing sector discussed below is defined as the large and medium scale manufacturing industries reported by the LMSMI survey, which do not include micro and small establishments. For international comparison, we will use the UNIDO database (INDSTAT 2 2018, ISIC Revision 3).

4.1 Review of past policy interventions

This section presents a review of the impact of policy interventions undertaken by the Ethiopian government, which include benchmarking, kaizen, twinning, and the small business support scheme. The main objective of these policy instruments was enhancement of the productivity of the manufacturing sector.

4.1.1 Benchmarking, Kaizen and Twinning

The Government of Ethiopia has adopted benchmarking, kaizen and twinning as policy tools for the enhancement of quality, productivity, and competitiveness (QPC) in the industrial sector of Ethiopia. The three are explained briefly below.

Benchmarking is the systematic comparison of current reality with the situation of target countries and/or companies, and the setting of clear numerical goals for improvement defined as the addressing of identified gaps. With UNIDO support, the government launched a benchmarking program in 2005 with the initial target of the leather sector. The program aimed to upgrade technology and raise the capacity of prioritized sectors, thereby raising their international competitiveness. Selected garment and leather enterprises received direct

support from globally renowned companies and experts. However, the impact of the program on the performance of implementing factories was moderate. In a commissioned study, IPE Global (2017) stated that despite some modest results, benchmarking led to neither the solution of targeted problems nor the achievement of the pre-set goals due to high staff turnover, insufficient commitment by the implementing firms and supporting institutes, and insufficient funding for continuation after the completion of the benchmarking project. Moreover, some firms saw benchmarking as imposition from outside, which reduced the sense of ownership and interest of the beneficiaries, posing a risk to sustainability.

Twinning is an institutional cooperation agreement between a domestic institution and an exemplary foreign institution of the same kind, intended to raise domestic capacity through training, visits, institution-building, and experience-sharing. Twinning brought significant improvements in certain Ethiopian organizations, most notably the Leather Industry Development Institute (LIDI), which received the support of the Central Leather Research Institute of Chennai, India from 2011 to 2014. Through research and product development as well as industrial consultancy services, the twinning arrangement significantly raised LIDI's institutional capacity. Beneficiary companies supported by LIDI witnessed improved productivity and motivation on LIDI's part to engage in new product development. Following the success of the LIDI project, the Textile Industry Development Institute (TIDI) in 2014 and the Metal Industry Development Institute (MIDI) in 2017 also entered similar twinning arrangement. However, problems related to complementarity have been observed in the implementation of the scheme. LIDI and TIDI in particular are busy institutions, simultaneously conducting many projects and receiving many kinds of international support, which tends to generate uncertainty among beneficiary factories when new initiatives are introduced in parallel, giving rise to confusion as to relationships with and integration with existing programs (IPE Global, 2017).

Kaizen: Ethiopia officially introduced kaizen in 2009 in collaboration with Japan. Kaizen, a Japanese management philosophy with many concrete tools, features continuous quality and productivity improvement at low cost and requiring little investment. It has brought remarkable qualitative and quantitative achievements wherever it is seriously embraced. One advantage of kaizen is that results are quickly obtained, concrete and quantifiable. For example, Otsuka et al. (2018) reports initial achievements at kaizen implementing factories in Ethiopia from 2012-2014 as follows: (i) securing additional workspace ranging from 52.6 to 9,053 square meters depending on firms; (ii) an increase in labor productivity ranging from

1.29% to 60%; (iii) a rise in capacity utilization of machinery ranging from 25% to 75%; (iv) decline in the defect ratio ranging from 57.1% to 5.0%; (v) cost reduction ranging from 6% to 33%; and (v) decline in accident occurrences from 49.5% of firms to 14.3%. Improvement in labor productivity was especially notable in the textiles and leather sectors. Kaizen also brought improvements in product quality and customer satisfaction.

The Ethiopian Kaizen Institute (EKI), established in 2011, has grown to be a capable implementing agency with an expanding scope of work. Ethiopian Kaizen Consultants can now teach basic kaizen without Japanese support. National, regional, city-wide and institutional kaizen movements are guided by EKI. Other African countries, and the African Union and New Partnership for Africa's Development (NEPAD) as well, began to learn kaizen from Ethiopia. Achievements so far owe much to the strong commitment of Ethiopia's national leaders, to the adequate budgeting, staffing and incentivization of EKI, and to Japanese cooperation.

However, kaizen has also encountered many challenges, including unwillingness of selected firms to introduce kaizen, workers' reluctance to participate, frequent turnover of managers and kaizen leaders, imperfect understanding of the kaizen philosophy[4], and limitations associated with hasty learning and poor information management. Companies are sometimes wary of EKI consultants, suspecting they might report sensitive information to tax agencies. At other times, companies become heavily dependent on EKI consultants, expecting them to do everything for them. Good managers and kaizen leaders may be poached by other firms that want to implement kaizen, which can lead to high personnel turnover and lack of continuity in kaizen effort. There are also reports of problems at companies that introduce kaizen without including everyone from top executives to line workers.

Perhaps the greatest challenge for Ethiopia, even after implementing kaizen for more than ten years, is that of mindset transformation. Despite awareness campaigns, not all kaizen implementers at factories and other workplaces have developed a mindset based on a full understanding of kaizen philosophy and the proper conduct of kaizen in every instance. In Ethiopia, the spread of kaizen is still viewed as a forced efficiency tool rather than a spiritual awakening. Kaizen in Ethiopia has not yet emerged as a genuine national productivity movement.

[4] In policy dialogue sessions with Japan, former prime ministers Meles and Hailemariam both regularly stressed that kaizen was not merely a convenient toolbox for achieving quick results but a deeply ingrained life and work philosophy which should be embraced by all Ethiopians at heart.

4.1.2 Small business support schemes

In 1997, Ethiopia formulated a Micro and Small Enterprises (MSEs) development strategy to address the issues of unemployment and inequality, and to enhance economic growth. This strategy was revised in 2011, with a reiteration of its key objectives of raising the income of a broad segment of society, creating far-reaching job opportunities, and thereby reducing poverty and inequality. The revised strategy also emphasizes the role of MSEs in laying a foundation of sustainable and productive industrial development. It pays special attention to manufacturing enterprises, particularly those that are export-oriented or substitute imports in line with the priorities of GTP I (2010/11-2014/15).

The MSE strategy comprises several key interventions and support programs, including the promotion of human capital and technology development through entrepreneurial, technical and marketing training, and provision of an industrial extension service that reaches out to MSEs. This package consists of four components: entrepreneurship training, technical skill training, kaizen, and technology support. The Ethiopian government has mandated the technical and vocational education and training (TVET) colleges to provide these support services. Other interventions include improved access to financing, rental working premises, and market linkages.

Hundreds of thousands of MSEs, established through the successive GTPs and the MSE strategy, created millions of jobs. However, despite such quantitative achievements, the majority of workers are engaged in low skill and low technology activities. MSEs generally have weak linkages with medium and large enterprises, and they contribute little to exports as most of them target the domestic market. Due to their low quality and productivity, not many MSEs are able to compete in the international market.

Gebreeyesus, et al. (2018) argue that the current business development services provided to small firms are insufficient in coverage and lack diversity and depth. They only offer generic guidance and are supply (or donor) driven, giving rise to a mismatch of supply and demand, duplication and a lack of coordination among multiple service providers, and thus are not sustainable. More importantly, their support instruments do not differentiate dynamic, growth-oriented entrepreneurs from the rest, which leads to a blanket approach that does not identify the individual capacity and needs of potential entrepreneurs.

4.2 Description of the manufacturing survey data

4.2.1 The survey data, source and limitations

a) Data compilation process and limitations

The main source of data for the manufacturing study is the Large and Medium Scale Manufacturing Industries (LMSMI) survey of CSA. The CSA has been conducting this survey annually since the mid-1970s, but at present the data is only available from 1996 onward. Thus, our analysis is for the period 1996-2016. The survey, a census of medium and large manufacturing industries, provides a rich set of information about their inputs and outputs and other key indicators of productivity[5].

The CSA defines manufacturing as "the physical or chemical transformation of materials or components into new products, whether the work is performed by power-driven machines or by hand, whether it is done in a factory or in the worker's home, and whether the products are sold at wholesale or retail. The assembly of the component parts of manufactured products is also considered as a manufacturing activity" (CSA, 2018). This definition is based on the International Standard Industrial Classification (ISIC Revision-3.1). The CSA defines large and medium scale manufacturing industry as all manufacturing establishments which employ ten or more people and use power for production.

Although this survey is the main source of information about the structure and function of the manufacturing industries in Ethiopia, it suffers from many shortcomings. The main issue in using the CSA's LMSMI data is that variables often change in terms of structure, code and name across years due to new variable coming to the data, omitted variables, changes in variable names, and so on. Among these, the greatest problem arises with the wholesale change in the establishment numbers of surveyed firms between 2011 and 2012. Hence, merging the data across this gap poses a particular challenge. We approached this problem by systematically matching the features of each establishment before and after the gap—features such as line of business, establishment year, address, telephone number, etc.—to rediscover the old number. We are confident that this procedure successfully re-connected the two parts of the database at the establishment level.

In addition, there are inconsistencies in the assignment of ISIC codes to different activities, which creates problems for sub-sector level analysis. Aggregate features of our final dataset were compared with their equivalents in the summary reports prepared by the CSA. The matching was reasonably close, suggesting reliability of data reconstruction.

During the productivity analysis, we encountered several outliers which could have been a result of entry errors regarding units or variable names. We eliminated such outliers as much

[5] In this report the manufacturing sector refers to large- and medium-size manufacturing firms unless indicated otherwise.

as possible. In some cases, we took the average of preceding and subsequent years for a particular variable or firm. In other cases, we decided to remove the variable or the firm from the dataset. For the 2016 data, it was more difficult to determine whether a variable was an outlier or not, as new firms were included in 2016 with no data history as a basis for determination of whether the data was an error or a genuine figure.

The reconstructed dataset presented here is a result of our painstaking effort to get an accurate picture of the manufacturing sector. Even though we can hardly claim the revised dataset to be completely free of errors, we now have a connected and reasonably good dataset spanning twenty-one years from 1996 to 2016. The final panel dataset comprises 3,378 establishments and 30,609 observations. It should be noted that the structure of the panel data is unbalanced, given a significant number of firm entries to and also firm exits from the LMSMI Survey every year.

b) Variable Definitions

Large and medium industry price deflator: we compute price deflators for medium and large manufacturing enterprises using data obtained from PDC. The PDC computes GDP data disaggregated by sector at both current and constant prices. We compute the deflator for medium and large enterprises by dividing nominal values by real values for medium and large enterprises. These disaggregated price deflators are more appropriate than the aggregate GDP deflator because the manufacturing sector, and in particular large and medium sub-industries, may not experience the same price changes as the rest of the economy. However, the key shortfall of such price deflators is that they assume the same price changes for all sub-sectors within the large and medium manufacturing enterprise group. Moreover, applying the same price deflator for different inputs such as materials, labor, and capital is also questionable. This problem may be mitigated if the prices of different inputs and outputs within the same large and medium enterprises group are highly correlated, which we believe to be the case.

Labor: labor engaged in the large and medium-manufacturing industry is computed as the sum of paid employees, working proprietors, active partners, and unpaid family workers. We have converted temporary workers into the equivalents of full-time workers.

Value added in the National Account concept at market price: this is defined as the difference between the gross value of production and the sum of industrial and non-industrial costs. In addition to total sales values, gross value of production includes: the value of contracted work done for others using the firm's materials, receipts for repair and maintenance works done for others, receipts for products bought and resold without further

processing, value of capital goods produced by firm's own employees and materials for own use, interest received, rental income from the lease of machinery and equipment, insurance claims, and other income, but excludes subsidies received. Industrial cost is the sum of the values of total raw materials, fuel and lubricating oil, electricity consumed, wood and charcoal for energy, cost of repair and maintenance, water consumed, goods bought and resold, and contracted works done by others for the establishment. Non-industrial cost includes: license fees, cost of advertising, stationery, telephone and mailing, accounting and legal commissions, and rent payable for rental of structures and equipment. Real value added is computed by deflating nominal values using the medium and large manufacturing industry deflator mentioned above.

Capital stock: this refers to the total year-end book value of fixed assets as provided by respondents in the survey. The assumption is that the respondents compute capital stock as net value at the beginning plus new capital expenditure minus capital sold, disposed and depreciated. However, some respondents may simply estimate the current value without following the appropriate procedure. Therefore, there may be inaccuracies in capital stock declared by some firms. Like the other variables, the sub-sector price deflator for large and medium industry is applied to capital stock so as to arrive at real capital stock[6]. The data on capital stock is used mainly for TFP computation.

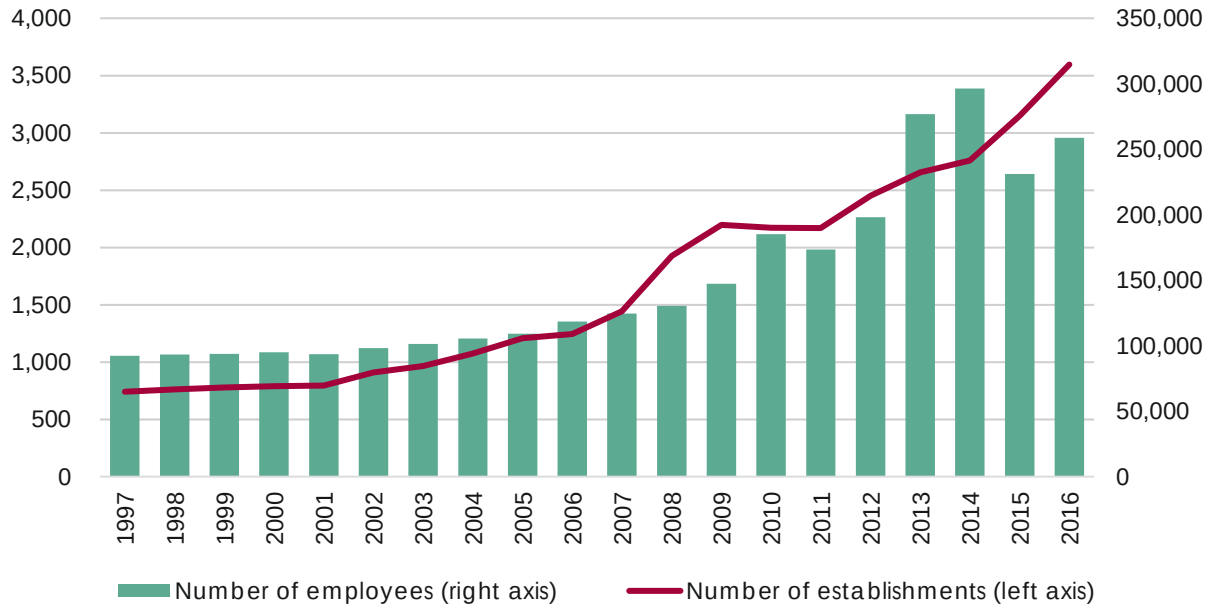
Our sub-sector analysis is based mainly on two-digit ISIC. The sub-sectors included are food & beverages, textiles, garment, leather, wood, paper, publishing & printing, chemicals, rubber & plastics, other non-metallic minerals, basic metals, fabricated metals, and machinery & equipment. The analysis is done on a total of 30,315 observations, sorted into 21 years and 15 sub-sectors.

4.2.2 General characteristics of the manufacturing sector

Figure 4.1 presents the number of establishments and employees in the LMSMI sector covering the period 1997-2016. During that period, the number of establishments rose from 741 to 3,596, a 4.7-fold increase. Employment also increased 2.8-fold over the same period and reached a quarter million by 2016.

[6] We tried to extract capital good price deflators from the World Bank's WDI by examining the nominal and real capital formation (investment) data. However, that data is available only for the period after 2011. Moreover, it is for capital formation (investment) in the whole economy and is not unique to medium and large manufacturing enterprises, which raises another representation problem. We decided to stick to the medium and large enterprises deflator computed from the PDC data even though it does not distinguish price movements of different inputs and outputs.

Figure 4.1 Trends in number of establishments and employees



Source: authors' calculation based on the CSA's LMSMI Survey.

The first three columns of Table 4.1 give real value added[7], adjusted by the manufacturing deflator, by industrial group for selected years. In 2014/15, the overall manufacturing real value added was 25.8 billion Birr, which was 1.7 times and 6.8 times larger than value added generated in 2004/2005 and 1995/1996, respectively. In the sub-sectoral distribution of value added, food & beverages accounts for over 40% of total manufacturing value added. This share has changed little over the last twenty years.

With a value added share of 14.7%, the second largest sector in 2014/15 was the non-metallic mineral products industry including cement, clay and glass products. The share of this sub-sector increased over time. On the other hand, the shares of the priority sub-sectors designated by the government—textiles, garment and leather—declined over the sample period. From 1995/1996 to 2014/2015, the value added share of these sectors dropped sharply, 9.8% to 3.2% for the textiles sector, from 1.0% to 0.6% for the garment sector, and from 9.2% to 3.3% for the leather sector.

Table 4.1 also reports employment share by industry group. In the last twenty years LMSMI employment tripled, reaching 333,084 in 2014/2015. Similarly with value added, the food & beverages industry performed relatively well over the last twenty years, increasing its employment share from 25.8% to 39.0%. Furniture was the second-best performer in terms

[7] Value added in the national account concept is defined as the difference between gross value of production and intermediate consumption, adjusted for tax on products, e.g., license tax.

Table 4.1 Large and medium scale manufacturing: real value added and employment share by industrial group

	Value added in national account concept share (%)			Employment share (%)		
	1995/96	2004/05	2014/15	1995/96	2004/05	2014/15
Food & beverages	41.15	44.05	42.83	25.76	29.14	39.00
Tobacco	4.83	4.36	1.45	1.09	0.63	0.67
Textiles	9.83	5.66	3.18	31.53	18.82	9.23
Garment	0.95	0.53	0.59	4.50	2.40	1.87
Leather & footwear	9.15	3.85	3.34	8.61	7.23	5.17
Wood	2.02	0.65	0.46	2.77	1.43	1.13
Paper	6.65	7.07	2.95	6.16	6.83	2.89
Chemicals	3.18	5.17	5.36	3.14	5.43	4.28
Rubber & plastics	3.32	4.91	3.72	2.46	5.16	5.94
Non-metallic minerals	9.49	8.80	14.70	6.71	8.32	8.77
Basic metals	3.28	7.66	5.14	1.25	1.60	2.45
Fabricated metal	2.02	3.25	5.86	2.23	3.55	2.84
Machinery & equipment	0.23	0.08	0.41	0.48	0.20	0.55
Motor vehicles	2.35	1.01	6.63	0.78	1.12	1.38
Furniture	1.55	2.94	3.35	2.53	8.13	13.83
Total share	100.00	100.00	100.00	100.00	100.00	100.00
Total value added (million ETB)	3,795	15,066	25,842			
Total employment				101,155	110,160	333,084

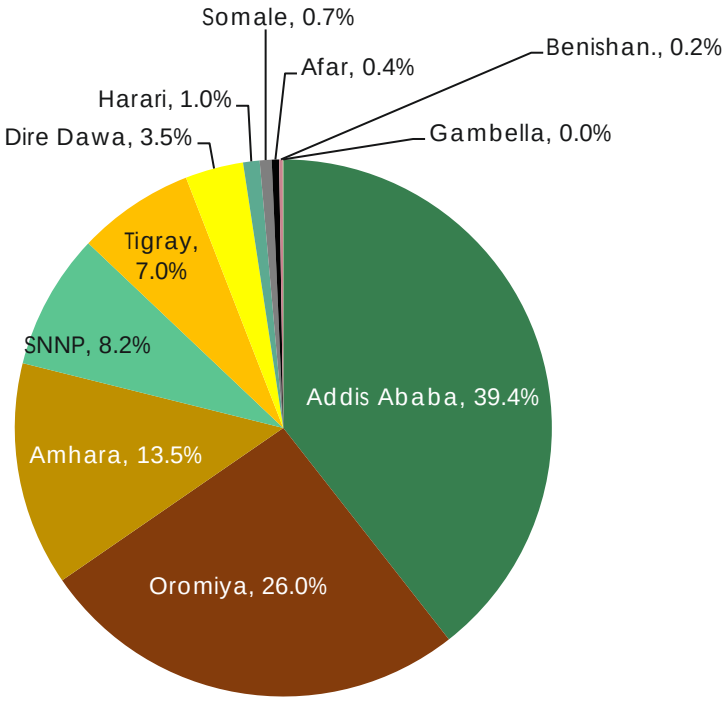
Source: authors' calculation based on the CSA's LMSMI Survey.

of employment generation, increasing its share from 2.5% in 1995/1996 to 13.8% in 2014/2015.

In contrast, the employment share of the textile industry, initially the largest employment source, declined continuously over the sample period. Its share dropped from 31.5% in 1995/1996 to 9.2% in 2014/2015. The employment shares of the garment and leather sectors also fell over the sample period, declining in both value added and employment despite the policy effort of the government to promote those sectors.

Figure 4.2 presents the regional distribution of manufacturing establishments for the most recent available year of 2016/2017. Addis Ababa and Oromia account for 39% and 26%, respectively, suggesting high concentration of manufacturing establishments in these regions. Since most of the establishments in the Oromia region are in the areas surrounding Addis Ababa, it is clear that the capital city and its vicinity are Ethiopia's dominant manufacturing hub. This is a point of concern given the government's desire for more balanced spatial economic distribution.

Figure 4.2 Regional distribution in number of manufacturing establishments, 2016-2017



Source: authors' calculation based on the CSA's LMSMI Survey.

Table 4.2 gives the export share in total sales of LMSMI by sub-sector, based on the CSA's 2016/2017 Survey report. The total export of the LMSMI sector was 5.86 billion Birr, equivalent to 261.6 million USD at the average official exchange rate of that year (22.4 Birr/USD). The average share of export in the total sales reported in LMSMI remained very small at 3.7%. In recent years, manufactured exports, and for that matter total merchandise exports, have not shown any tendency to rise. Manufactured exports are dominated by a few sub-sectors including food & beverages (41.7% of total manufactured exports) and leather (24.5%) in the reference year. The contributions of textiles, which have been expected to become leading export sub-sectors, remained small, accounting for 9.1% and 4.5% of total manufactured exports, respectively.

Finally, we examine the level of capacity utilization in the manufacturing sector. As can be seen in Figure 4.3, despite small signs of improvement, the capacity utilization rate of manufacturing has remained below 67%. When firms are asked to give the main reason for their low capacity utilization, they often cite the shortage of input supply. In 2016, about one-third of the respondents replied that the shortage of input supply was their largest obstacle to achieving greater capacity.

Table 4.2 Share of export sales of the manufacturing sector, 2016-2017

	Revenue from sales in 2016-2017 (million ETB)			Export share in total sales (%)	Industry share in total export (%)
	Local	Export	Total		
Food & beverages	49,844.88	2,445.40	52,290.28	4.68	41.69
Tobacco	1,606.67	568.76	2,175.44	26.14	9.70
Textiles	3,031.93	536.29	3,568.22	15.03	9.14
Garment	8,131.86	263.83	8,395.69	3.14	4.50
Leather & footwear	3,223.09	1,434.11	4,657.20	30.79	24.45
Wood	549.88	0.38	550.26	0.07	0.01
Paper	7,635.72	0.37	7,636.09	0.00	0.01
Chemicals	9,342.54	157.46	9,500.01	1.66	2.68
Rubber & plastics	11,481.50	40.29	11,521.79	0.35	0.69
Non-metallic minerals	26,505.30	164.40	26,669.70	0.62	2.80
Basic metals	10,041.32	0.11	10,041.42	0.00	0.00
Fabricated metal	7,012.53	82.85	7,095.38	1.17	1.41
Machinery & equipment	773.22	113.67	886.89	12.82	1.94
Motor vehicles	4,364.03	0.00	4,364.03	0.00	0.00
Furniture	9,727.57	57.37	9,784.93	0.59	0.98
Total	153,272.00	5,865.29	159,137.30	3.69	100.00

Source: authors' calculation based on the CSA's LMSMI Survey.

Figure 4.3 Average capacity utilization of the manufacturing sector

Source: authors' calculation, based on the CSA's LMSMI Survey.

4.3 Productivity in the Manufacturing Sector

4.3.1 Methodology

In this sub-section, we analyze the current state of labor productivity and TFP in the manufacturing sector of Ethiopia, based on data from the reconstructed LMSMI survey of the CSA covering the period of 1996-2016.

We compute the labor productivity of the manufacturing sector as the ratio of real value added of production to the size of labor force as measured by number of workers,

$$Labor\ productivity_i^t = \frac{Real\ value\ added\ of\ production_i^t}{Number\ of\ people\ engaged_i^t} \quad (1)$$

where t refers to year and i refers to sector or sub-sector depending on the context of the analysis. For the entire manufacturing sector, total manufacturing value added is divided by total number of workers engaged in the sector.

The limitations of labor productivity as a productivity measure, discussed in Section 2.5 for the case of the whole economy, should be reiterated here for the manufacturing sector. Labor productivity based on value added is supposed to capture the efficiency with which labor is mobilized and performs work. However, as it is a partial measure rather than a multiple-factor one, it reflects a number of other influences as well, such as changes in capital and technology within and across firms, economies of scale, degree of capacity utilization, and measurement errors (OECD, 2001). Therefore, manufacturing labor productivity is an imperfect indicator of what we actually want to measure, namely the contribution of workers as they improve capacity and are allocated to appropriate tasks, as well as the degree of effort they expend in the manufacturing process.

Following the World Bank enterprise survey report on productivity (Saliola & Seker, 2011), we estimate a Cobb-Douglas production function with three factors of production: capital, labor, and intermediate goods.

The gross value of production as measured by total sales is used as a measure of output. The total book value of the fixed assets at the end of each year, estimated by the survey respondents, is used as the value of capital. This is assumed to capture the replacement value of machinery, vehicles, buildings, and equipment. We measure labor as the total number of paid employees, working proprietors, active partners, and unpaid family workers, with temporary workers converted to fulltime equivalents. Intermediate goods are assessed by the cost of raw materials and intermediate goods purchased. All variables are adjusted for price levels and hence are real values.

TFP is computed as the residual of the estimated Cobb-Douglas production function. Specifically, we compute TFP at the firm level as

$$Y_i = \beta_l L_i + \beta_k K_i + \beta_m M_i + \gamma_s + \omega_i + \varepsilon_i \qquad (2)$$

where Y_i is the logarithm of the firm's output, measured by gross sales value; L_{it}, K_{it}, and M_{it} are the logarithms of firm $i's$ costs of labor, capital, and materials, respectively; β is a vector of input elasticities of firms; γ_s is a vector of industry-specific effects; ω_i represents firm $i's$ total factor productivity as a logarithm; and ε_i denotes an *i.i.d.* component capturing idiosyncratic deviations from the mean due to unexpected events such as external factors and measurement errors. We estimate (2) to solve for TFP ($\widehat{\omega}_i$):

$$\widehat{\omega}_i = Y_i - \widehat{\beta_l} L_i - \widehat{\beta_k} K_i - \widehat{\beta_m} M_i - \gamma_s \qquad (3)$$

Estimated TFP in normal scale can be expressed as the exponential of $\widehat{\omega}_i$, that is, $\widehat{\Omega}_i = e^{\widehat{\omega}_i}$.

We estimate TFP using equations (2) and (3) for each year for the period 1996-2016. Estimating TFP separately for each year permits exploration of the trend over time. We also report estimated TFP by sector and sub-sector.

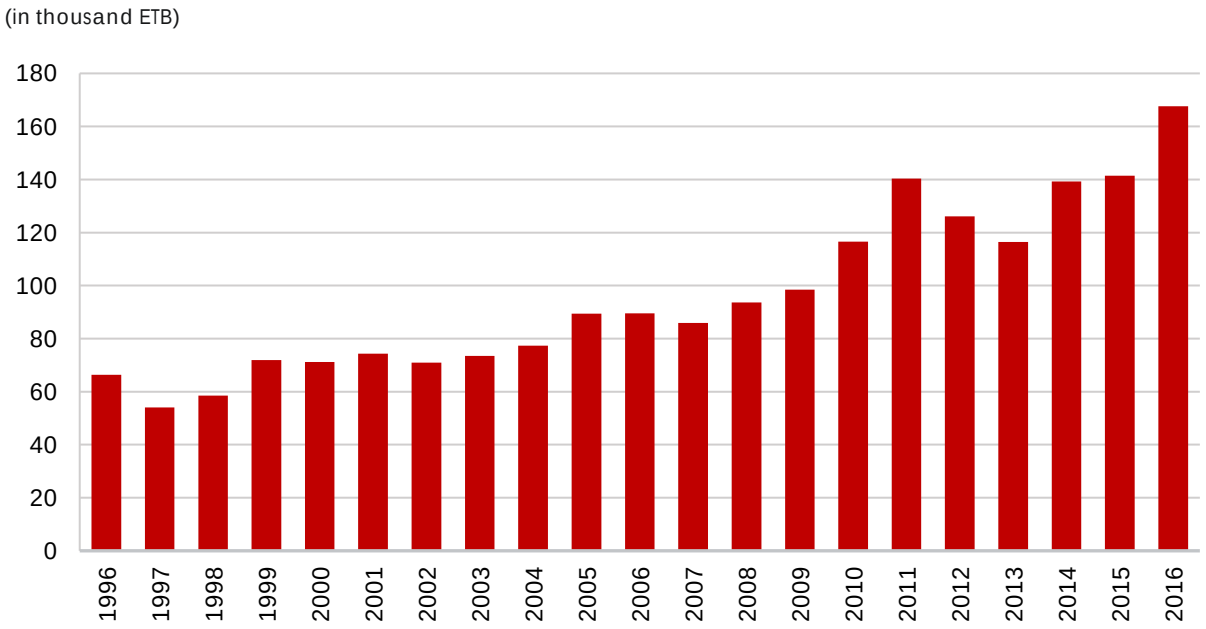
4.3.2 Productivity in time series

This section depicts the past history of labor productivity and TFP of the manufacturing sector. In Ethiopia, manufacturing labor productivity has shown an upward trend over time, particularly in recent years. Between the two end periods, 1996 and 2016, labor productivity increased from 66,400 Birr per employee to 167,600 Birr per employee (Figure 4.4). This translates to annual labor productivity growth of 4.63%.

However, the growth of labor productivity was not smooth. It exhibited negative growth in 1997, 2000, 2002, 2007, 2012, and 2013 (Figure 4.5).

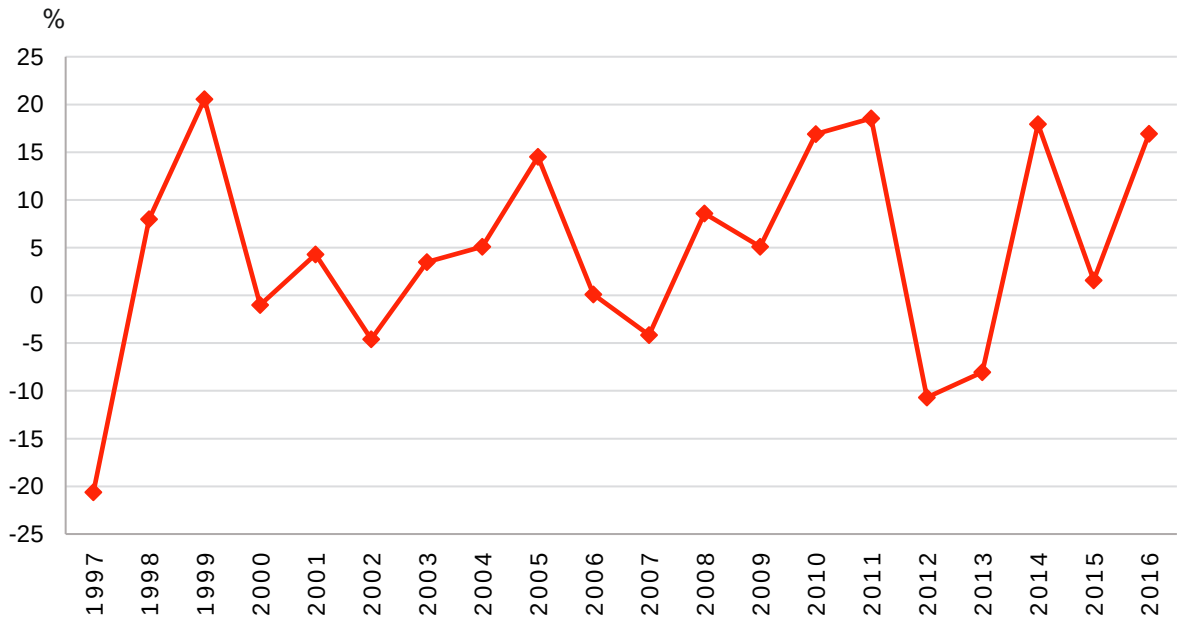
We exclude the year 2016 from the calculation of manufacturing labor productivity growth because of many outliers in that year: food & beverages, wood, paper, publishing & printing, and fabricated metal. For 1996-2015, then, average labor productivity growth of the medium and large manufacturing sector was 3.98%. The World Bank estimate of labor productivity growth of the Ethiopian manufacturing sector for 1999-2013 was 4.4% (World Bank, 2016), similar to our estimate of labor productivity for large and medium manufacturing enterprises. The difference is likely due partly to different sample periods.

Figure 4.4 Labor productivity in the manufacturing sector (real value added per employee)



Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

Figure 4.5 Labor productivity growth in the manufacturing sector, Ethiopia



Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

The high volatility of labor productivity, both in level and growth, can be ascribed to a number of proximate factors such as the capacity of workers (labor efficiency in the true sense), total factor productivity, and capital intensity. However, there are deeper reasons for highly volatile labor productivity and overall low labor productivity in the manufacturing sector. A UNDP survey of 55 private and public manufacturing enterprises identifies power interruptions, foreign exchange shortages, and the lack of domestic raw materials, internet, and operational loans as top constraints in Ethiopia (UNDP, 2017). It additionally suggests that a rigorous study of technology and skill gaps is required for accurate assessment of the performance of the Ethiopian manufacturing sector.

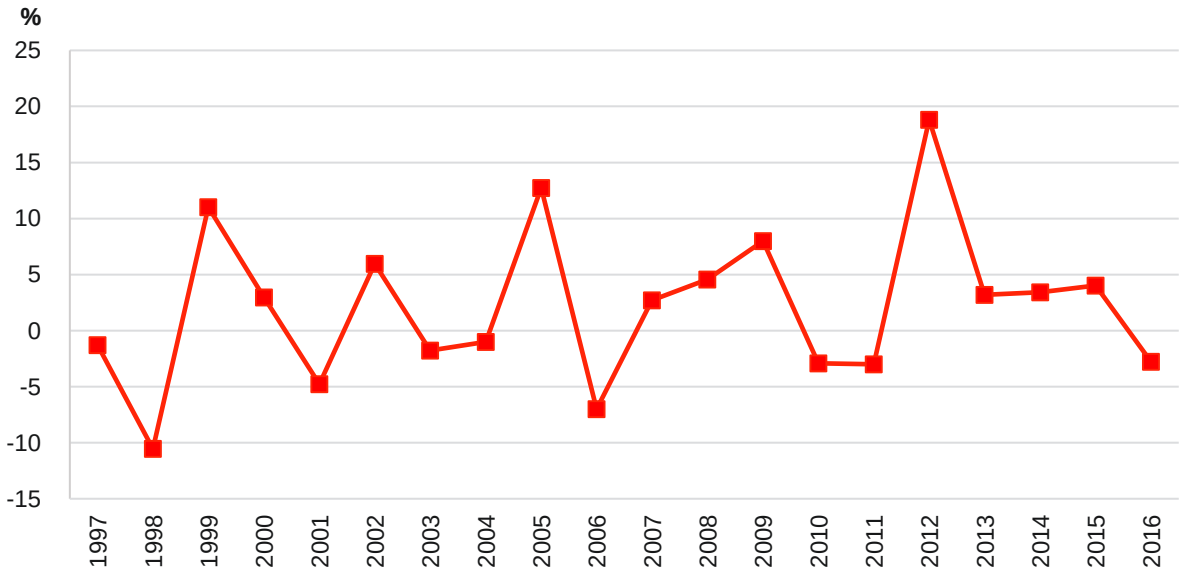
A separate survey of the textiles and garment sub-sector by the Ethiopian Development Research Institute (EDRI) identifies key constraints in the manufacturing sector: electricity problems, shortage of raw materials, lack of adequately educated workforce, and problems associated with access to finance, foreign currency shortage, and logistics and transportation (EDRI, 2016). The two studies identify similar external barriers to efficient manufacturing, barriers which reflect the lack of a conducive business environment, and are therefore beyond the control of individual entrepreneurs. Two causes of productivity problems in Ethiopia must be distinguished: those related to the mindset and capacity of managers and workers in manufacturing establishments and those that are external and whose mitigation depends largely on the policy actions by government.

Figure 4.6 shows the evolution of TFP in manufacturing enterprises in Ethiopia. TFP initially remained stagnant for an extended period but began to rise significantly in 2012.

Figure 4.6 The level of manufacturing TFP

Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

Figure 4.7 The growth of manufacturing TFP



Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

Figure 4.7 plots the growth rate of manufacturing TFP. The annual average growth over the period 1996-2016 was 2.11%. Growth in the second half of the period (2006-2016) was 2.64%, much higher than that in the first ten years (1996-2005) which was only 1.48%.

In the latter period, however, the average growth of TFP (2.11%) was much lower than the average growth of labor productivity (4.6%). This means that in recent years manufacturing labor productivity was driven mostly by capital deepening, an observation confirmed for the entire economy in Chapter 3.

4.3.3 Productivity by sub-sector

Productivity of manufacturing labor exhibits significant variation across sub-sectors in the period under examination[8]. Table 4.3 reports the level and growth rate of labor productivity at the sub-sector level for selected years. In the most recent year (2016), high labor productivity was observed in motor vehicles, basic metals, food & beverages, and fabricated metal (in descending order). In contrast, labor productivity was low in the garment, wood, textiles, furniture, and leather sectors (in ascending order). Comparing the highest with the lowest, value added per employee in the motor vehicle sector (400,590 Birr) was some 14 times higher than that in the garment sector (27,760 Birr). This difference may be partly explained

[8] To compute the labor productivity of each sub-sector, we applied the same manufacturing price deflator for all sub-sectors. To the extent that sub-sector deflators diverge, reported figures will deviate from the actual levels. If such divergence is small, our procedure is largely innocuous. At any rate, our results should be interpreted with some caution.

Table 4.3 Labor productivity by sub-sector for selected years (in thousand ETB)

	Labor productivity level					Labor productivity growth (%/year)		
	1996	2000	2005	2011	2016	1996-2016	1996-2005	2006-2016
Food & beverages	134.54	122.68	155.63	159.17	266.40	3.42	1.62	5.38
Textiles	19.15	20.60	22.69	33.24	46.22	4.40	1.88	7.11
Garment	19.17	13.50	19.70	35.25	27.76	1.85	0.30	3.43
Leather	52.41	48.16	45.44	84.83	72.05	1.59	-1.59	4.61
Wood	41.43	35.86	40.07	69.64	35.77	-0.73	-0.37	-1.14
Paper	60.39	58.91	79.26	141.12	141.59	4.26	3.02	5.80
Publishing & printing	52.13	54.88	91.11	94.75	180.55	6.21	6.20	6.84
Chemicals	103.69	74.10	82.84	196.19	185.43	2.91	-2.49	8.06
Rubber & plastics	62.68	101.08	72.93	154.22	77.56	1.06	1.68	0.62
Non-metallic Minerals	77.48	77.03	111.69	184.58	189.63	4.48	4.06	5.29
Basic metals	143.62	93.71	220.47	212.22	314.29	3.92	4.76	3.55
Fabricated metal	56.12	37.91	55.39	145.51	228.73	7.03	-0.15	14.18
Machinery & equipment	24.59	15.66	33.44	35.22	123.51	8.07	3.42	13.07
Motor vehicles	131.66	259.59	165.80	180.22	400.59	5.56	2.56	8.82
Furniture	24.05	25.39	48.22	53.77	50.19	3.68	7.73	0.40

Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

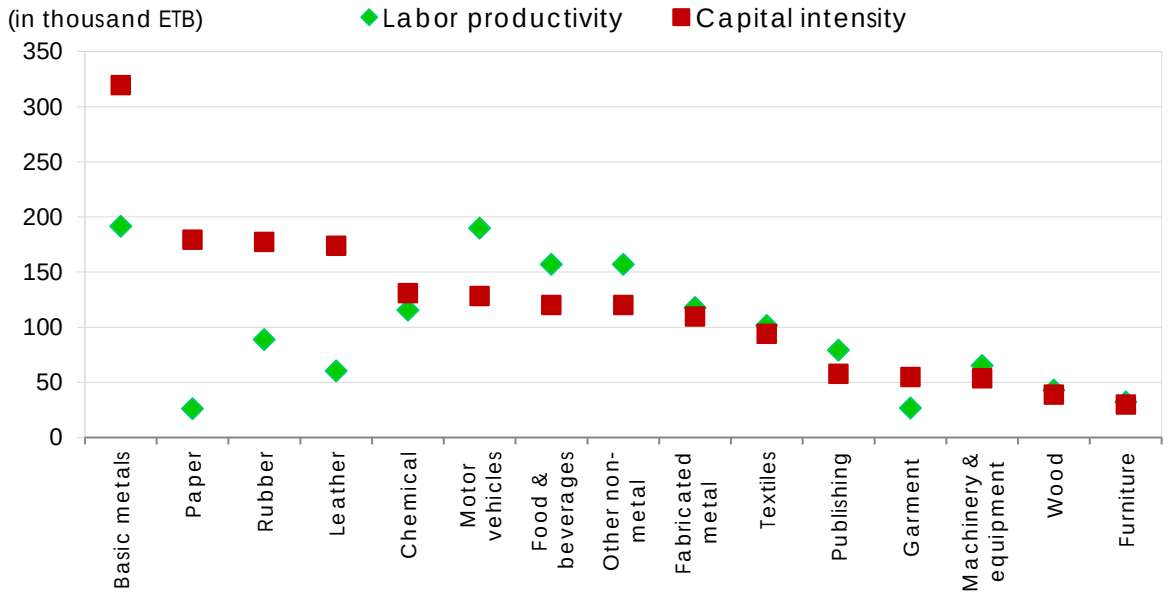
by the capital-intensive nature of the motor vehicle assembly sector, rather than a genuine lack of efficiency in managers and workers in the garment sector. But even when compared with the labor productivity of food & beverages, generally considered to be labor-intensive, the labor productivity of the garment sector is one tenth of that of the food & beverages sector. This very low labor productivity may be due to the primitive stage of the Ethiopian garment industry, where Cut, Make and Trim (CMT) operation generates only small domestic value added and where virtually all fabrics and other materials are imported.

The rightmost three columns of Table 4.3 present the average compound growth rate of labor productivity for each sub-sector. With the exceptions of wood, all sub-sectors had positive labor productivity growth in the period 1996-2016, although the variance was large. The fastest growth, above 6% annually, was observed for machinery & equipment, fabricated metal, and publishing & printing.

Figure 4.8 shows the sub-sectoral pattern of labor productivity (value added per labor unit) and capital intensity (capital per labor unit) for the period 1996-2016. There is a positive correlation between these two variables with the correlation coefficient of 0.52, which

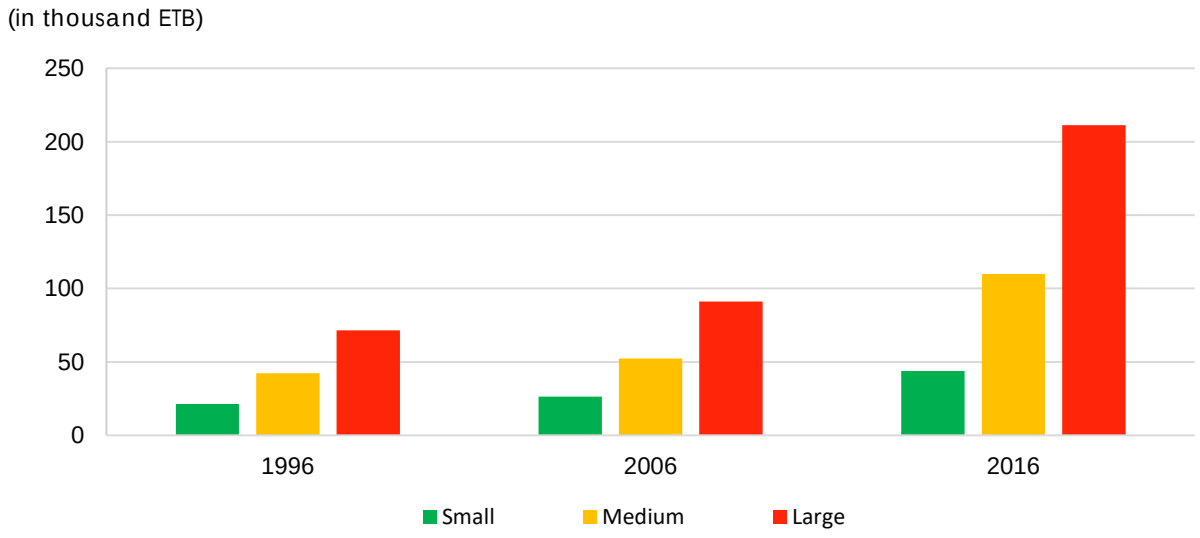
suggests much of the labor productivity difference across sectors can be explained by capital intensity. The tardy performance of labor-intensive sub-sectors relative to more capital-intensive ones is consistent with our previous finding that economy-wide labor productivity has been increasingly driven by capital deepening rather than TFP. But low labor productivity per se in labor-intensive sectors does not necessarily imply they are less competitive vis-à-vis capital intensive ones.

Figure 4.8 Labor productivity and capital intensity by sub-sector, 1996-2016



Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

Figure 4.9 Labor productivity by firm size



Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

Figure 4.9 shows labor productivity by firm size for selected years. Here, small firms are those employing 10 to 29 workers, medium firms are those employing 30 to 100 workers, and large firms are those employing more than 100 workers. Labor productivity increases with firm size in all selected years. In 2016, for example, labor productivity of large firms was twice that of medium firms and 4.8 times higher than that of small firms. Söderbom (2012) finds similar results in the Ethiopian manufacturing sector using the same data as that used here, but covering only the period 1998-2008. Söderbom reports that firms with 50 or more employees had labor productivity 10 times higher than that of firms employing fewer than 50 workers, and points to better management and technology of large firms as a possible cause of that striking difference. Söderbom also notes that the capital-labor ratio of large firms is 10 times that of small firms, which may additionally explain the labor productivity gap between small and large firms.

Turning to TFP, Table 4.4 reports TFP levels and growth rates by sub-sector for selected years. TFP shows little improvement in the majority of sectors over the last two decades. As with labor productivity, TFP levels and growth rates differ greatly across sub-sectors. A relatively high TFP annual growth rate of over 3% was attained during 1996-2016 by non-

Table 4.4 TFP level and growth by sub-sector for selected years

	TFP level					TFP growth (%/year)		
	1996	2000	2005	2011	2016	1996-2016	1996-2005	2006-2016
Food & beverages	1.04	0.97	1.24	1.24	1.97	3.19	1.97	4.18
Textiles	0.96	0.95	1.13	1.29	1.31	1.53	1.73	1.36
Garment	0.89	0.89	0.96	1.96	1.75	3.36	0.77	5.48
Leather	1.04	1.21	1.08	1.00	1.27	0.98	0.43	1.44
Wood	1.69	1.33	1.22	1.24	1.03	-2.47	-3.63	-1.52
Paper	0.65	1.06	1.39	0.94	1.25	3.31	8.55	-0.97
Publishing & printing	0.93	1.10	1.13	1.28	1.64	2.82	2.13	3.38
Chemicals	0.97	1.09	1.07	1.38	1.42	1.90	1.13	2.53
Rubber & plastics	0.99	1.10	1.11	1.31	1.26	1.21	1.22	1.20
Non-metallic minerals	1.21	1.51	1.20	1.23	2.70	4.01	-0.07	7.35
Basic metals	1.15	0.86	1.18	1.11	1.42	1.06	0.30	1.68
Fabricated metal	0.83	0.88	0.96	1.16	1.49	2.94	1.59	4.04
Machinery & equipment	1.18	0.85	0.94	1.22	1.87	2.30	-2.50	6.23
Motor vehicles	1.25	1.42	2.28	0.90	2.20	2.81	6.68	-0.35
Furniture	0.99	0.88	1.12	1.21	1.53	2.20	1.43	2.79

Source: authors' calculation based on the CSA's LMSMI Survey and PDC data.

metallic minerals, garment, paper, and food & beverages. Meanwhile, average growth in the wood sector was negative, similar to the situation of labor productivity discussed earlier. Textiles, leather, chemicals, rubber & plastics, and basic metals also showed weak performance at below 2% growth. It is noteworthy that the TFP growth of capital-intensive sectors such as basic metals, vehicles, machinery & equipment, and fabricated metal was much lower than their labor productivity growth reported above. This points strongly to the possibility that labor productivity in those sectors was driven largely by capital accumulation.

4.4 Manufacturing labor productivity: Ethiopia and other countries

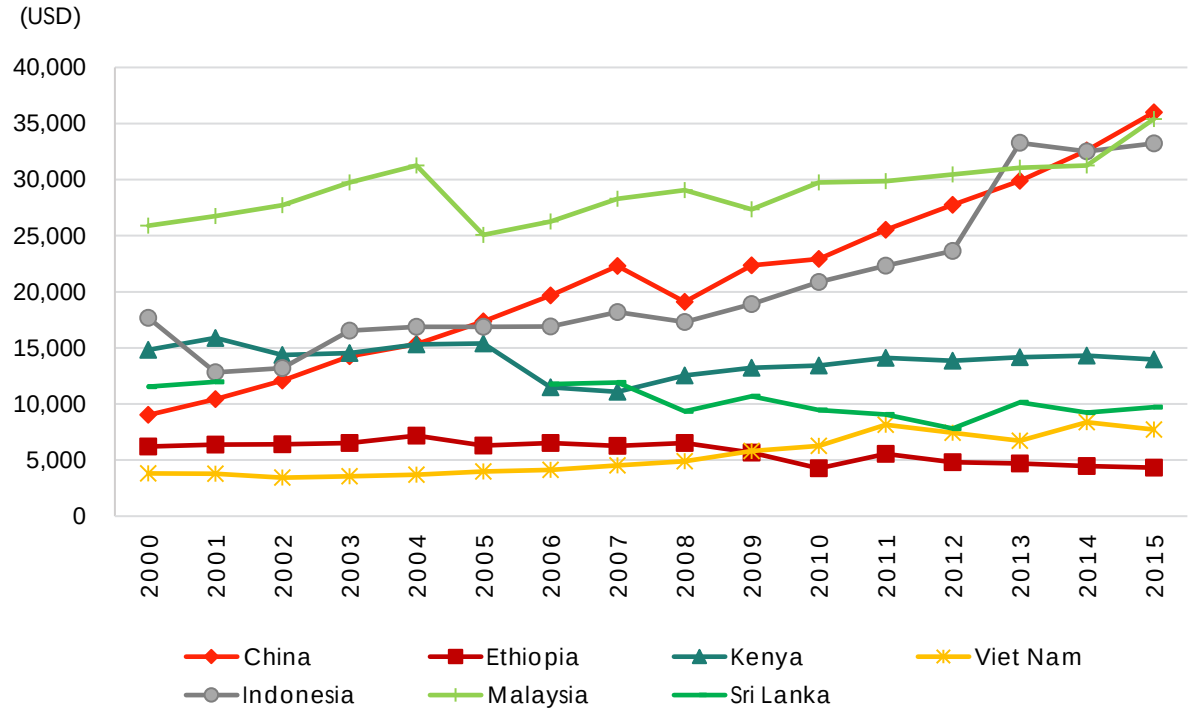
This section compares Ethiopia's manufacturing labor productivity with that of selected countries in Asia and Africa, including China, Vietnam, Malaysia, Indonesia, Sri Lanka, Kenya and Tanzania. Manufacturing labor productivity, defined as the ratio of industrial value added to the number of persons employed in the sector, is measured in USD and expressed in constant 2010 prices by deflating nominal value added by each country's deflator. The data is taken from UNIDO's INDSTAT 2 2018, ISIC Revision 3. Results for Ethiopia are basically the same, except USD conversion, as the above analyses based on domestic manufacturing data[9].

4.4.1 Pattern and growth of manufacturing labor productivity

Figure 4.10 presents the manufacturing labor productivity of selected countries for the period 2000-2015. China's labor productivity increased dramatically over the last decade-and-half, surpassing all other countries in the sample. In contrast, Ethiopia's manufacturing labor productivity, expressed in USD, was generally stagnant and even decreased in some years. It ranked at the bottom of this country group by the end of the sample period. In 2000, Ethiopia's productivity level was 94% of that of China. However, the gap widened over time, and Ethiopia's productivity was only 13% of China's in 2015. Even Kenya's labor productivity was three to four times that of Ethiopia in the same year. Vietnam's productivity was less than that of Ethiopia until 2009, but rose above Ethiopia since then.

[9] UNIDO receives data from each country's statistics office but makes some adjustments including conversion to foreign currency. We checked the UNIDO data for Ethiopia against the CSA data by converting the latter to USD using the average annual exchange rate of Birr/USD. The two sets of data are similar except for a scale difference which must be due to normalization to 2010 constant price by UNIDO.

Figure 4.10 Manufacturing labor productivity: selected countries



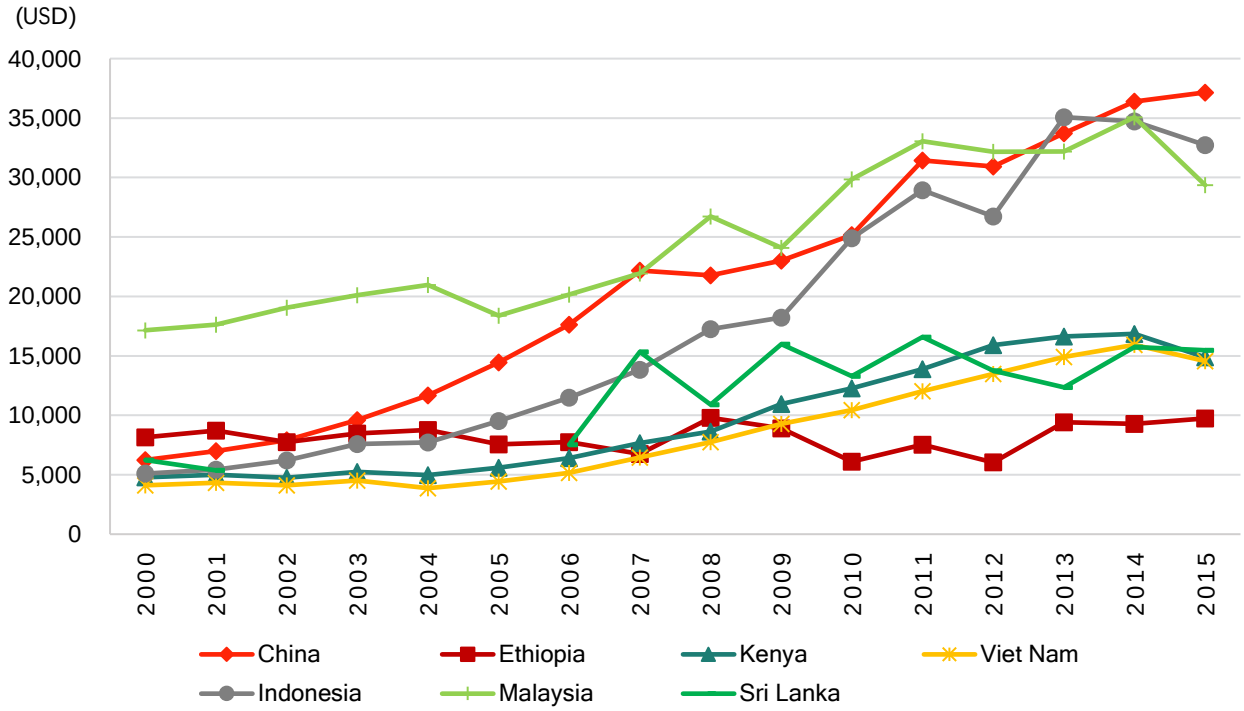
Source: authors' calculation using the UNIDO's INDSTAT 2 2018, ISIC Revision 3.

4.4.2 Labor productivity pattern in selected labor intensive sectors

Here we compare labor productivity across countries, focusing on labor-intensive export-oriented sectors such as food & beverages, textiles, apparel, and leather (Figures 4.11 to 4.14). These sectors are among the priority industries designated by the Ethiopian government since the early 2000s.

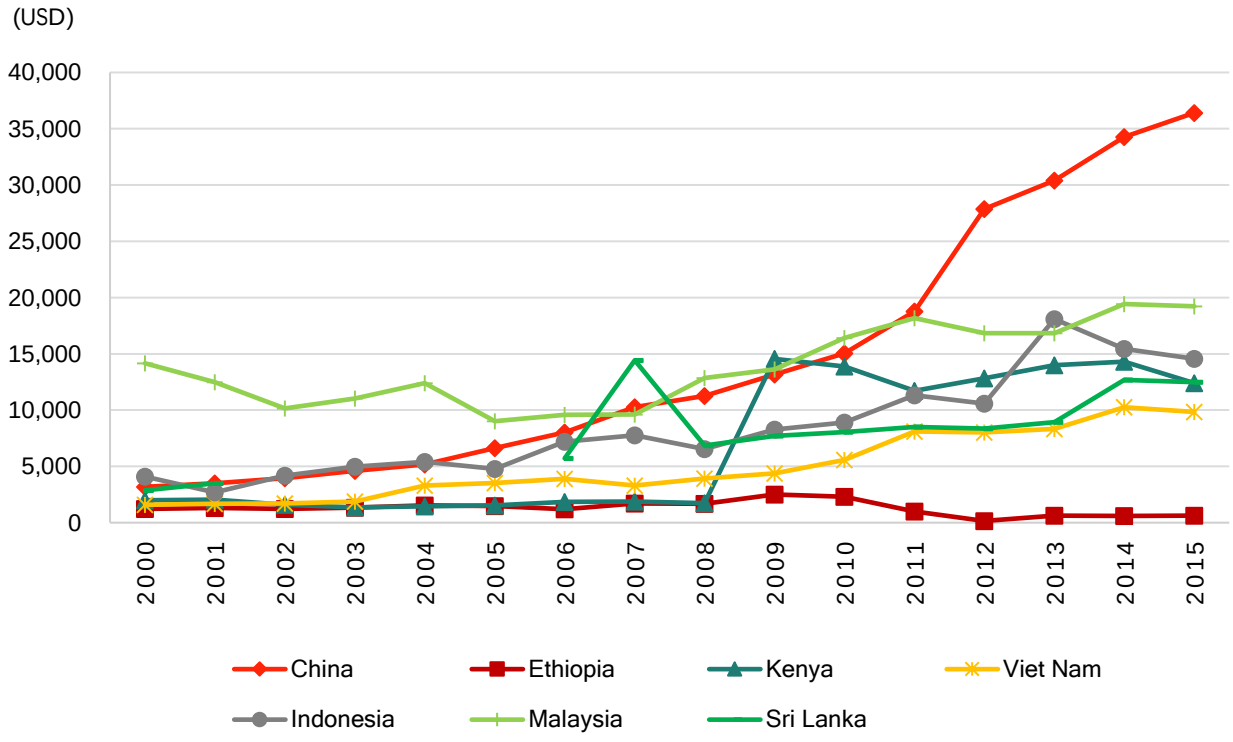
The sectoral patterns of labor productivity are similar to the performance of overall manufacturing labor productivity. For each sub-sector, there is visible divergent trends in labor productivity among sample countries. China, Indonesia, and Malaysia strengthened their labor productivity in all sub-sectors, and the gap between them and the other group of countries widened over time. Kenya, Vietnam and Sri Lanka are in the latter group, but in most cases even their productivity is much higher than that of Ethiopia. Viewed against the rest of the world in USD terms, Ethiopia's productivity is not only low but stagnant or decreasing in recent decades despite the fact that its labor productivity measured in Birr has risen.

Figure 4.11 Value added per employee: food & beverages



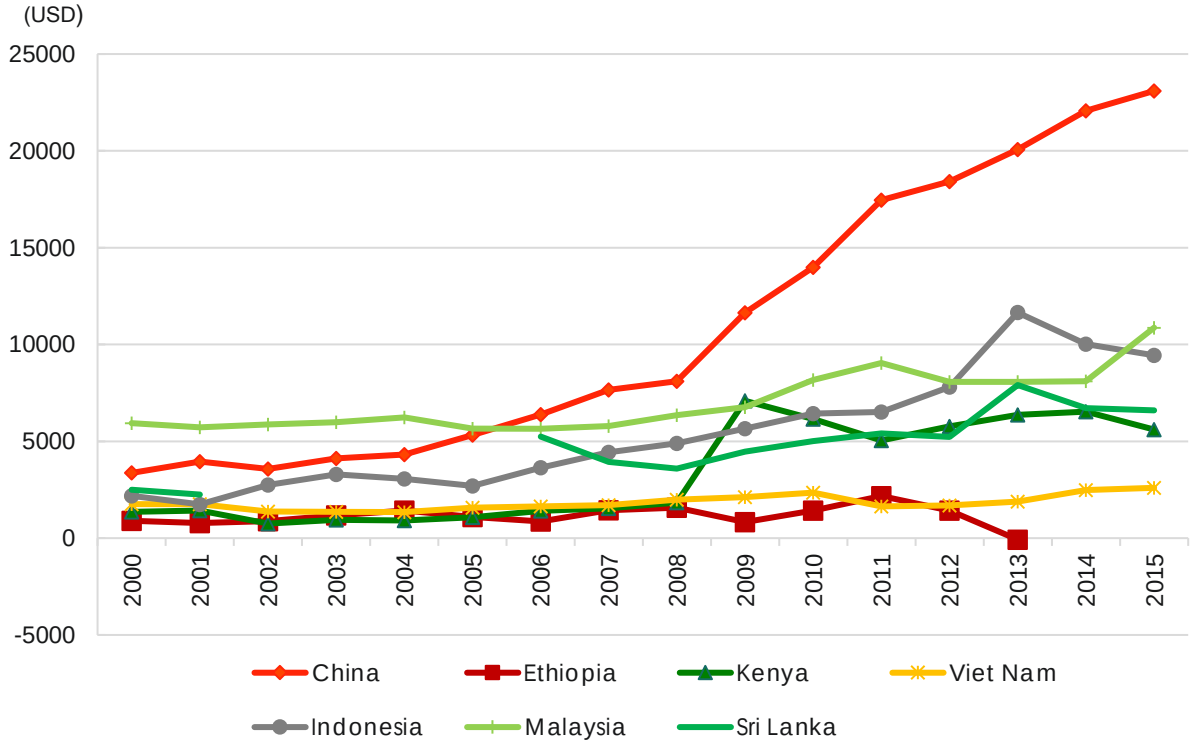
Source: authors' calculation using the UNIDO's INDSTAT 2 2018, ISIC Revision 3.

Figure 4.12 Value added per employee: textiles



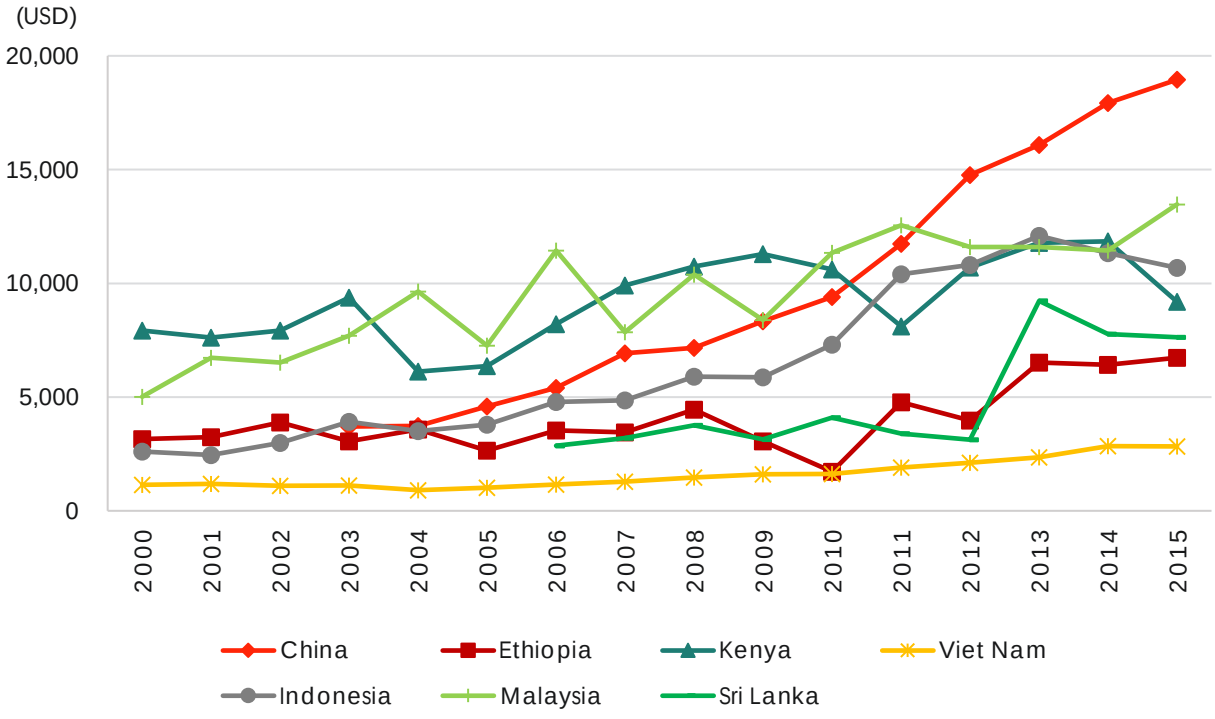
Source: authors' calculation using the UNIDO's INDSTAT 2 2018, ISIC Revision 3.

Figure 4.13 Value added per employee: apparel



Source: authors' calculation using the UNIDO's INDSTAT 2 2018, ISIC Revision 3.

Figure 4.14 Value added per employee: leather



Source: authors' calculation using the UNIDO's INDSTAT 2 2018, ISIC Revision 3.

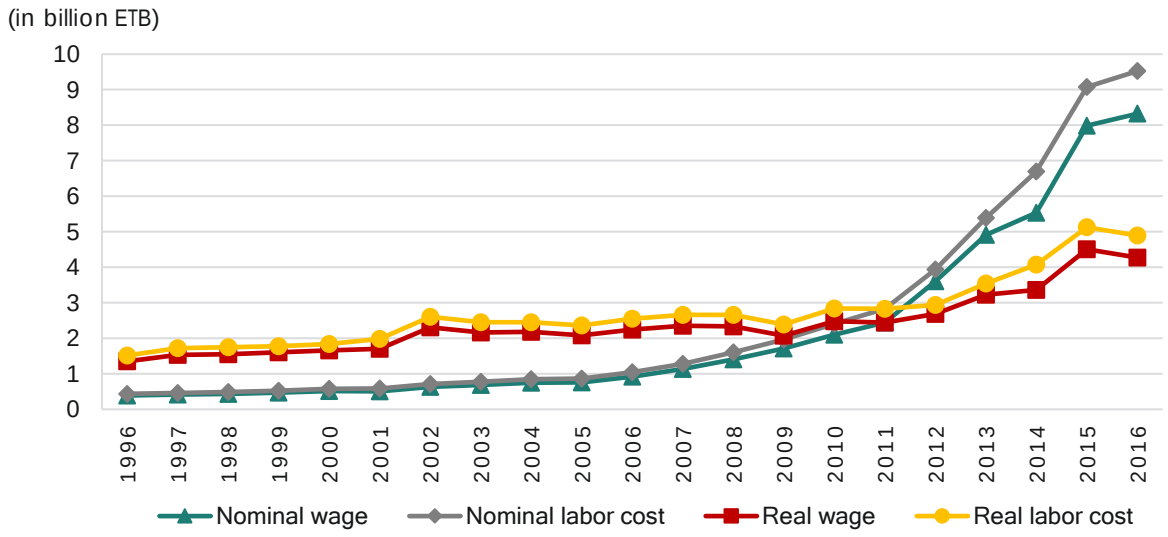
In food & beverages (Figure 4.11), all countries except Ethiopia saw increases in labor productivity, albeit at different speeds. China, Malaysia, and Indonesia achieved sharp productivity rises while the performance of Vietnam, Sri Lanka and Kenya was more moderate. Meanwhile, Ethiopia's productivity remained stagnant and even declined. In 2015, Ethiopia's labor productivity in food & beverages was only 26% of that of China. The three other countries in the low group—Kenya, Vietnam, and Sri Lanka—had 40%, 39% and 42% of China's productivity respectively in the same year.

In the textiles sector (Figure 4.12) and the apparel sector (Figure 4.13), Ethiopia's low and declining productivity is also visible. The labor productivity of these sectors in Ethiopia has been negative recently, a worrying development. Meanwhile, labor productivity in Ethiopia's leather industry displayed a small upward trend since 2010 (Figure 4.14), reaching 36% of that of China in 2015. In that sector, Vietnam ranked lowest with only 15% of China's productivity.

4.5 The wage-productivity nexus in manufacturing

In this section, we analyze labor cost in the Ethiopian manufacturing sector. Labor cost includes payments of wages and salaries and non-wage payments such as commission, bonuses and allowances for food, medicine and the like. In order to adjust for price changes, we deflate labor cost by the consumer price index (CPI) or the manufacturing output deflator. We further compare the trends of Ethiopia's labor cost and labor productivity with those of peer countries and calculate USD-based labor cost and unit labor costs.

Figure 4.15 Manufacturing labor cost (real labor cost in 2011 prices)



Source: authors' calculation based on the CSA's LMSMI Survey.

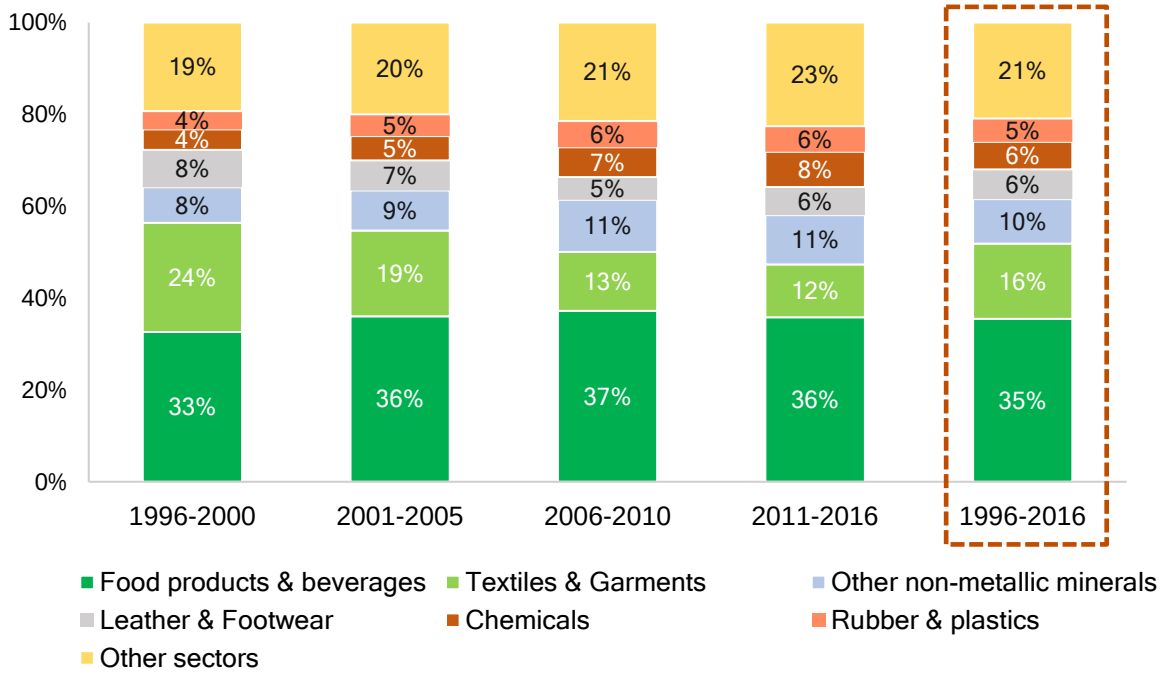
4.5.1 Trends in manufacturing labor cost

Figure 4.15 illustrates the pattern of labor cost in the Ethiopian manufacturing[10]. Labor cost has increased steadily over the past twenty years. In nominal terms, labor cost grew by an average annual rate of 15.4% during the period 1996-2016. The increase has been substantial since 2006. In the period 2006-2015, labor cost grew between 16% and 30% each year. In real terms, increases in labor cost were more moderate. On average, real labor cost in the manufacturing sector grew by about 6% annually over the past twenty years[11].

Movements in total labor cost were driven mostly by changes in wages and salaries while changes in non-wage payments such as bonuses and allowances had less impact. Wages and salaries accounted for 88% of total labor cost, while non-wage earnings occupied the remaining 12% on average over the past twenty years.

Within manufacturing, the food & beverages sector had the largest wage bill accounting for 35% of total labor cost in the period 1996-2016, followed by the textiles & garment sector accounting for 16% (Figure 4.16). The textiles & garment's share declined continuously from

Figure 4.16 Sectoral share of labor cost in total manufacturing



Source: authors' calculation based on the CSA's LMSMI Survey.

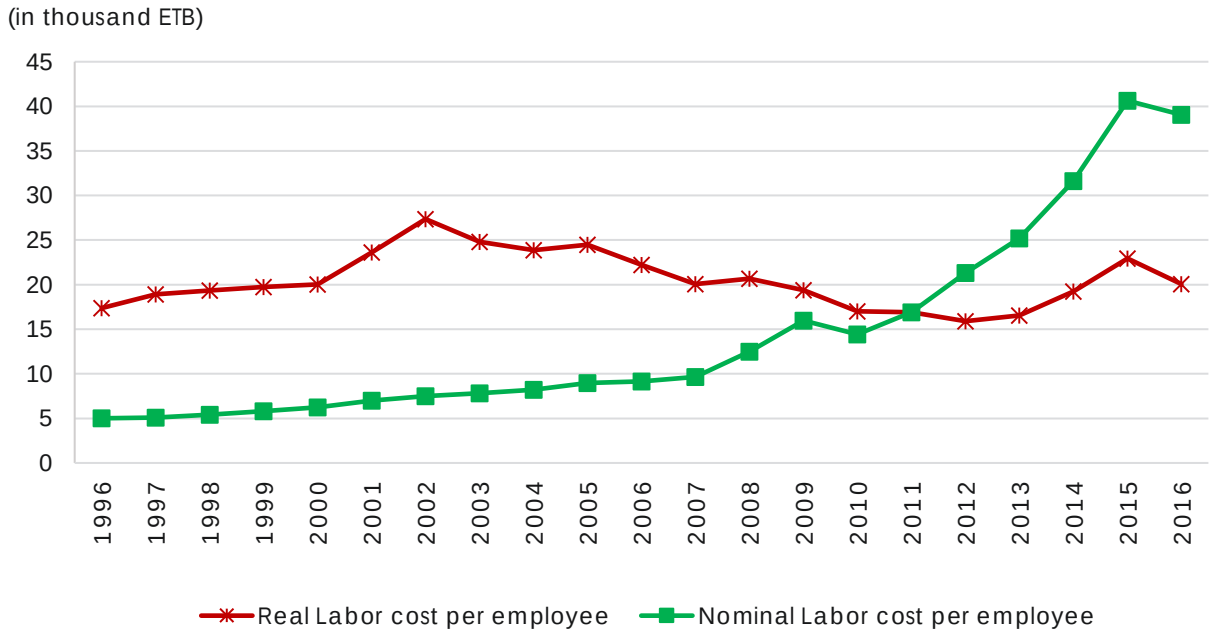
[10] One firm is excluded from the rubber & plastics sector due to an exaggerated data for wage payments for the year 2016.
[11] See Annexes 4.2 and 4.3 for the trends and the growth rate of labor cost in overall manufacturing and at sub-sector level.

24% in 1996-2000 to 12% in 2011-2016. The shares of other non-metallic minerals, leather & footwear, chemicals, and rubber & plastics were 10%, 6%, 6%, and 5%, respectively, in total labor cost during 1996-2016.

Nominal labor cost per employee increased annually since 1996, except in 2010, when a decline of about 10% was observed, and in 2016 (Figure 4.17). Over the past twenty years, nominal labor cost per employee rose by 10.3% on average. Meanwhile, real labor cost per employee deflated by CPI was more stable with fluctuation. It grew by only 0.7% on average over the last twenty years implying the increase in nominal labor cost was largely in tandem with general inflation.

Nominal labor cost per employee rose significantly in the period 1997-2016 in all sub-sectors except wood (Tables 4.5 & 4.6). In real terms, however, textiles, leather & footwear, wood, paper, rubber & plastics, basic metals, machinery & equipment, and furniture experienced a decline over the same period in varying degrees. In nominal terms, the largest increase in the cost of labor per employee was registered in chemicals followed by food & beverages. In the garment industry, the cost of labor per employee rose by close to 10% in nominal terms while it went up slightly (0.3%) in real terms.

Figure 4.17 Real and nominal labor cost per employee (real labor cost in 2011 prices)



Source: authors' calculation based on the CSA's LMSMI Survey.

Table 4.5 Manufacturing labor cost per employee by sub-sector in thousand ETB (real labor cost in 2011 prices)

	1996		2000		2005		2011		2016	
	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real
Food & beverages	5.92	20.53	6.97	22.30	11.26	30.73	17.24	17.24	58.03	29.81
Textiles	3.73	12.93	4.76	15.23	5.68	15.49	15.53	15.53	23.87	12.26
Garment	3.03	10.49	4.09	13.08	4.98	13.58	10.01	10.01	21.71	11.16
Leather & footwear	6.00	20.79	7.16	22.94	7.94	21.66	14.60	14.60	27.03	13.89
Wood	4.60	15.94	6.21	19.87	6.85	18.68	14.64	14.64	3.24	1.67
Paper	6.16	21.34	6.40	20.49	10.67	29.12	20.90	20.90	33.70	17.32
Publishing & printing	6.48	22.47	7.57	24.22	9.75	26.59	17.72	17.72	53.67	27.58
Chemicals	5.39	18.68	6.54	20.94	9.25	25.24	19.13	19.13	61.88	31.79
Rubber & plastics	5.97	20.69	7.75	24.82	8.34	22.76	16.64	16.64	26.88	13.81
Non-metallic minerals	5.26	18.24	6.70	21.46	9.66	26.37	16.35	16.35	48.30	24.82
Basic metals	7.45	25.80	7.81	25.01	16.29	44.44	22.66	22.66	48.07	24.70
Fabricated metal	6.00	20.78	6.21	19.89	8.90	24.27	19.52	19.52	55.76	28.65
Machinery &equipment	5.16	17.88	4.59	14.69	7.47	20.38	19.46	19.46	26.20	13.46
Motor vehicles	7.90	27.36	8.82	28.24	15.30	41.75	32.92	32.92	53.17	27.32
Furniture	4.24	14.71	5.55	17.78	7.69	20.98	12.60	12.60	24.41	12.54
Total	5.01	17.36	6.25	20.02	8.97	24.49	16.89	16.89	39.05	20.07

Table 4.6 Annual growth rate of labor cost per employee by sub-sector (%, real labor cost in 2011 prices)

	1997-2000		2001-2005		2006-2010		2011-2016		1997-2016	
	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real
Food & beverages	4.05	2.07	9.61	6.41	9.85	-6.89	19.11	5.24	11.41	1.87
Textiles	6.07	4.09	3.53	0.34	8.64	-8.11	16.74	2.86	9.28	-0.27
Garment	7.51	5.53	3.94	0.74	14.43	-2.32	12.53	-1.34	9.85	0.31
Leather & footwear	4.44	2.46	2.05	-1.14	7.69	-9.06	14.01	0.14	7.53	-2.02
Wood	7.49	5.51	1.96	-1.24	12.83	-3.92	-23.15	-37.03	-1.75	-11.30
Paper	0.96	-1.02	10.23	7.03	3.91	-12.83	15.90	2.03	8.50	-1.04
Publishing & printing	3.85	1.87	5.06	1.87	8.43	-8.31	21.41	7.53	10.57	1.02
Chemicals	4.83	2.85	6.94	3.74	12.58	-4.16	21.19	7.31	12.20	2.66
Rubber & plastics	6.53	4.55	1.46	-1.74	9.29	-7.45	11.76	-2.11	7.52	-2.02
Non-metallic minerals	6.04	4.06	7.32	4.12	9.74	-7.00	18.70	4.83	11.08	1.54
Basic metals	1.21	-0.77	14.69	11.50	-5.60	-22.35	22.71	8.83	9.33	-0.22
Fabricated metal	0.89	-1.09	7.18	3.98	15.54	-1.21	17.64	3.77	11.15	1.61
Machinery & equipment	-2.93	-4.91	9.73	6.54	2.29	-14.46	19.01	5.14	8.12	-1.42
Motor vehicles	2.77	0.79	11.02	7.82	-42.38	-59.13	56.08	42.20	9.54	-0.01
Furniture	6.72	4.74	6.51	3.32	2.49	-14.25	17.17	3.30	8.75	-0.80
Total	5.54	3.56	7.23	4.03	9.48	-7.26	16.61	2.73	10.27	0.72

Source: authors' calculation based on the CSA's LMSMI Survey.

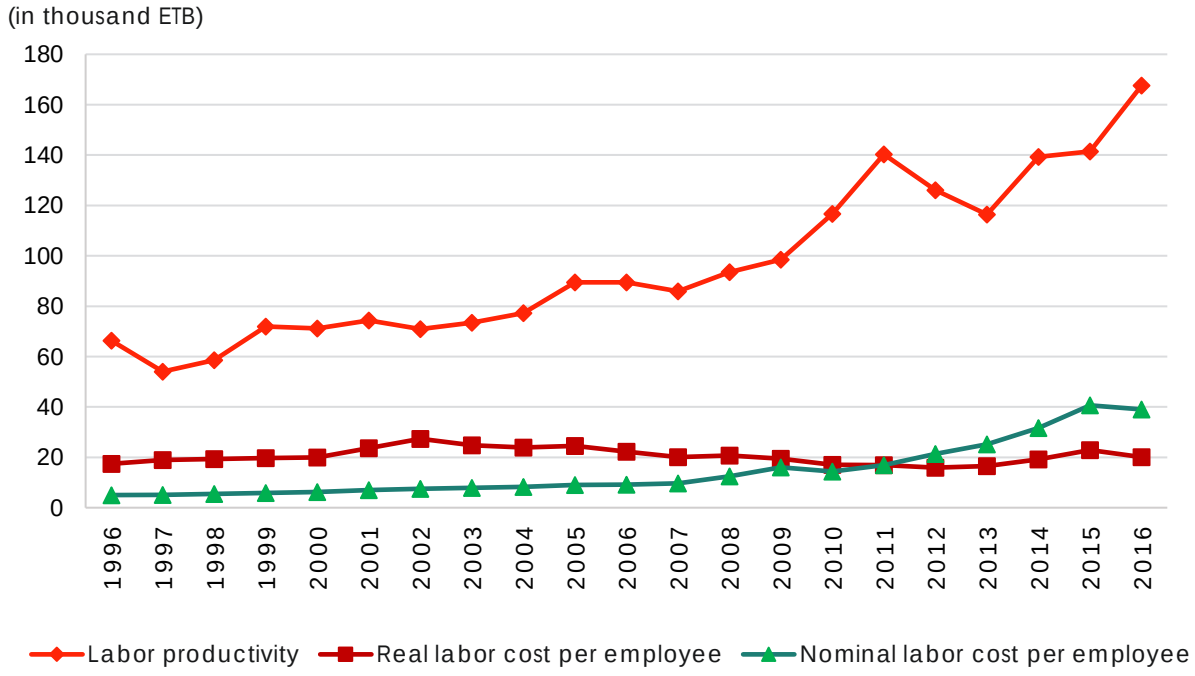
4.5.2 The wage-productivity nexus

As discussed earlier, productivity growth is closely associated with an economy's capacity to generate productive employment and raise wages, and hence is a crucial prerequisite for a sustained increase in living standards. According to economic theory, labor productivity determines (is equal to) real wage provided that the market is competitive without distortions. The relationship between wage growth and labor productivity growth has important implications at both macroeconomic and microeconomic levels. In reality, they often do not move together. If wage grows faster than labor productivity, production cost increases and competitiveness is eroded. Rapid wage growth unaccompanied by labor productivity improvement also restrains firms from hiring workers or prompts them to replace workers with machines, thus reducing employment growth. On the other hand, if wage is suppressed below labor productivity growth, the income share and living standard of workers suffer, which also negatively affects national economic development. It is essential that wage increase and labor productivity growth move in tandem.

Wage-labor productivity balance may be lost by the action of various stakeholders. Labor unions and belligerent workers may press for high wages beyond labor productivity. The government may succumb to such political demand, and it may even legalize high (minimum) wage for winning favor among voters, especially before a major election. Besides these, if FDI firms are attracted to Ethiopia only by low wages (while they last), they have little incentive to transfer skills and technology, and they will surely pack up and leave to another low-wage country when local wage rises sufficiently. By contrast, if FDI firms intend to stay in Ethiopia for a long time and are willing to train workers and improve partner companies, they will greatly contribute to labor productivity growth. These two types of FDI must be distinguished. The government must encourage all players to enhance productivity while exercising restraint on wage pressure beyond productivity growth.

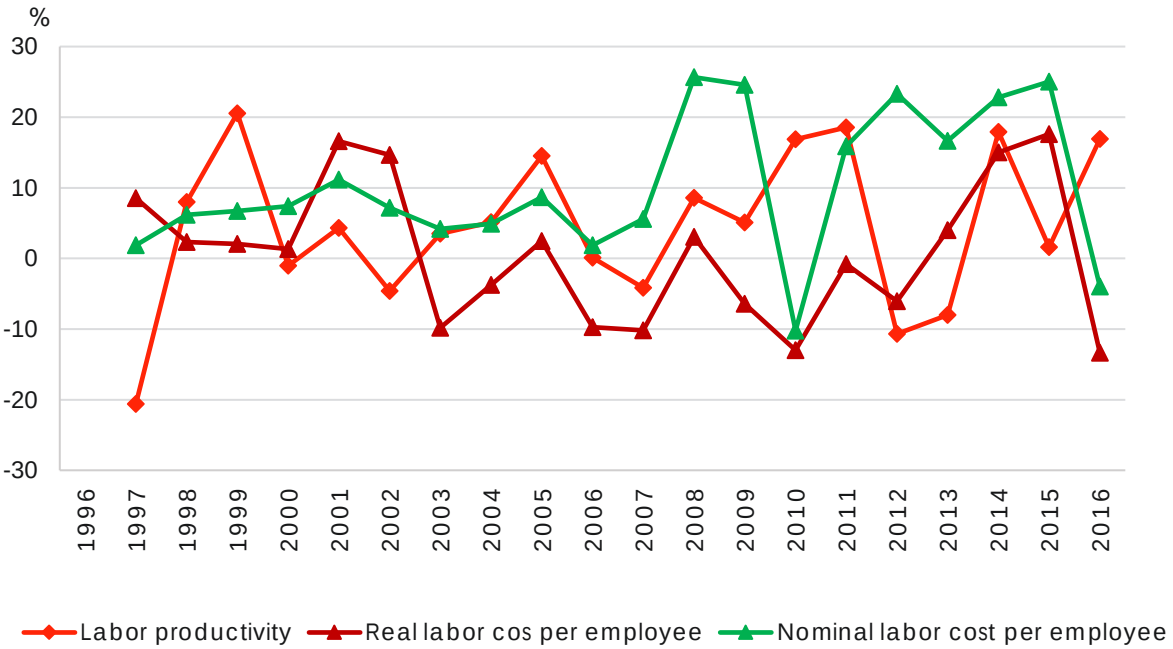
With this background, it is useful to examine trends in wage and labor productivity in the Ethiopian manufacturing sector. Figure 4.18 shows the level of labor productivity and nominal and real labor cost per employee in the manufacturing sector. The first two continued to increase while real labor cost had a declining trend from around 2002 to 2012. Figure 4.19 reports the growth of the same variables during the period 1997-2016. Labor cost growth and labor productivity growth varies considerably from year to year. Looking at the manufacturing sector as a whole, labor productivity grew by 4.6% annually over the period 1997-2016. Average labor cost increased at the rate of 10.3% per year in nominal terms and

Figure 4.18 Labor productivity and labor cost per employee



Source: Authors' calculation based on the CSA's LMSMI Survey.

Figure 4.19 Growth of labor productivity and labor cost per employee



Source: authors' calculation based on the CSA's LMSMI Survey.

0.7% per year in real terms over the same period. The fact that nominal labor cost increased much faster than labor productivity means Ethiopian labor became more expensive (in nominal Birr) relative to their work efficiency. In the meantime, the slight increase in real labor cost (wages deflated by consumer price inflation) with fluctuations suggests that the living standard of manufacturing workers virtually remained the same over the years, without any distinct upward or downward trend.

4.5.3 Labor cost for different stakeholders

Up to now, we studied labor cost deflated by consumer prices. We now look at labor cost from the viewpoints of different stakeholders. The key stakeholders we examine are workers, domestic firms, and FDI firms.

(i) For workers' living standard and welfare, nominal wage (W) deflated by CPI, as analyzed above, is relevant: W/CPI.

(ii) For domestic firms whose sales are mainly in Birr, nominal wage (W) deflated by its output price in Birr (P) is relevant: W/P (where P is the manufacturing output deflator).

(iii) For FDI firms, nominal wage (W) converted to USD is highly relevant: W/(ETB/USD); theoretically, this should further be deflated by the international price level (P*) but most foreign firms in this age of globally low inflation are interested in nominal USD wages for comparing labor costs across countries.

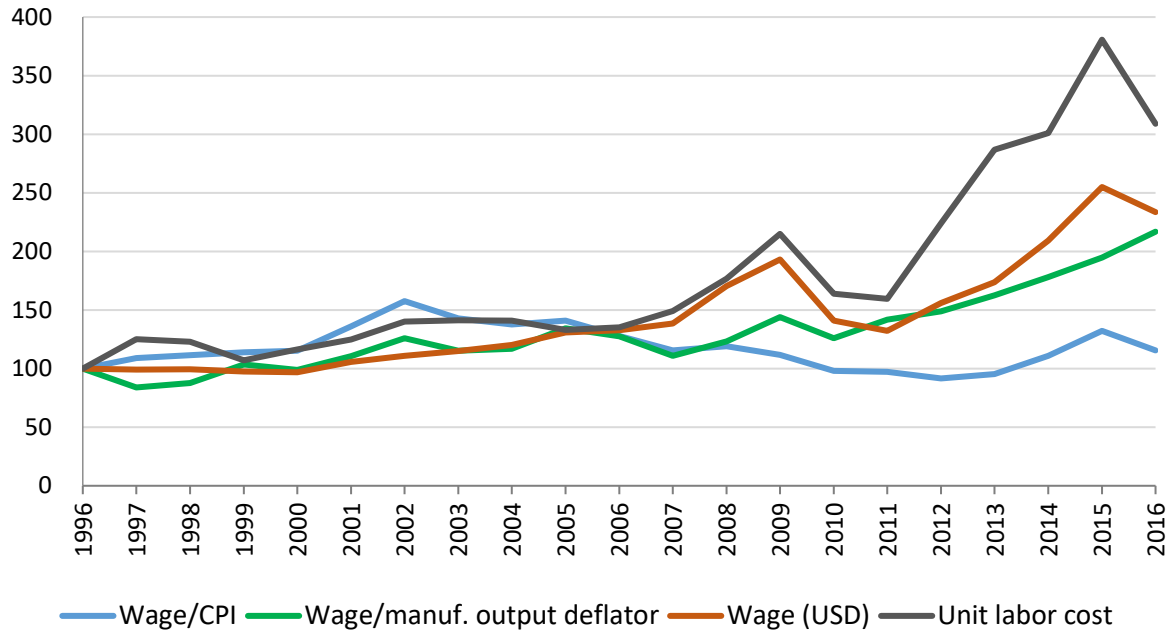
Note that, if domestic relative prices are stable so CPI and manufacturing output deflator move together, (i) and (ii) will be equivalent. If the exchange rate is maintained at purchasing power parity (P/P*= (ETB/USD) where P* is assumed constant), (ii) and (iii) will be equivalent. In reality, these conditions do not usually hold, so we need to look at labor cost for workers, domestic firms and FDI firms separately.

Another commonly used indicator for cost comparison is the unit labor cost (ULC), calculated as the ratio of labor cost (nominal wage) to value added per worker (labor productivity), usually at a highly aggregated level[12]. This represents the labor cost from the viewpoint of enterprise management.

The three measurements of Ethiopian labor cost as well as ULC are plotted in Figure 4.20. The four variables moved roughly together and were relatively stable in the first decade in our sample period but they diverged significantly in the second decade, proving that the labor cost for each stakeholder did evolve differently from each other. In particular, the living standard

[12] The OECD Glossary of Statistical Terms states: "ULC measure the average cost of labor per unit of output and are calculated as the ratio of total labor costs to real output."

Figure 4.20 Comparison of four labor cost indicators (1996 = 100)



Source: Authors' calculation based on the CSA's LMSMI Survey.

of workers was generally stagnant in the last two decades while the labor cost for domestic enterprises rose greatly, especially in the recent period. USD-based wage and ULC, which are the main concerns of FDI firms, were more volatile and rose greatly in recent years, especially ULC. This points to the loss of Ethiopia's labor competitiveness as seen from globally operating FDI firms.

4.5.4 The wage-productivity nexus in international comparison

Figure 4.21 illustrates manufacturing labor productivity and wages and salaries (hereafter referred to as wages) for selected countries. This helps us to understand where Ethiopia stands relative to peer countries. Ethiopia's wage is low compared with those of China, Kenya, Vietnam, Indonesia, Malaysia, and Sri Lanka. Within this group, monthly manufacturing wage in 2015 was highest in China (USD 676) followed by Malaysia (USD 669), Vietnam (USD 283), Kenya (USD 271), Indonesia (USD 246), and Sri Lanka (USD 176). The Ethiopian wage was USD 100 implying the availability of low-cost labor compared to other countries. Looking across sub-sectors, Ethiopia's wage is even lower, as little as USD 20, in the rubber & plastics sector and around USD 50 and USD 76 in the textiles and garment sector, respectively.

Figure 4.21 Labor productivity and real and nominal wages in 2015: selected countries

Source: authors' calculation using UNIDO INDSTAT 2 2018, ISIC Revision 3.

However, Ethiopia's low-wage advantage alone does not give it a competitive advantage. Productivity and wages are equally important determinants of international labor competitiveness. As analyzed above in detail (section 3.3), Ethiopia's labor productivity is far below those of virtually all competitor countries. Not only that, the productivity gap between Ethiopia and the peer countries has generally widened through time. For Ethiopia, low productivity disadvantage more than offsets low wage advantage. This fact is re-confirmed in Figure 4.21.

Another way to gauge international labor competitiveness is to compare Ethiopia's manufacturing wage-productivity nexus with the experiences of high-income countries when they were growing rapidly. Many latecomer developing countries in Asia—especially Indonesia, Vietnam, and Cambodia—recently had nominal wage increases which were much faster than labor productivity growth, eroding their competitiveness (GRIPS Development Forum, 2016). By contrast, East Asia's early industrializers including Japan, Korea, Singapore, and Taiwan did not face this problem. In these economies, rapid wage increases were matched by equally vigorous labor productivity growth during their high-growth eras, enabling them to strengthen international competitiveness while constantly improving the average living standards of their workers. These economies rose to high income without stopping at a middle income trap.

During Japan's high growth period of 1955-1970, manufacturing labor productivity on average grew 10.0% per year while manufacturing wages grew 10.2% per year. Thus, Japan was able to preserve wage competitiveness for fifteen years as industrialization proceeded rapidly and product quality and diversity were enhanced. In Korea, labor productivity rose slightly faster (12.9 %) than real wage growth (11.8%) during its high growth period of 1966-1978 strengthening Korea's labor competitiveness (Kim, 1991).

Nations encounter different phases of FDI attraction as national wages rise in tandem with labor productivity (if only wages rise without productivity enhancement, FDI-led industrialization will be aborted). From the experiences of many Asian economies, the following rough wage thresholds can be detected. Monthly wages below USD 200 are generally suitable for attracting light manufacturing FDI. If wages rise to between USD 200 and 300, existing light manufacturing FDI can stay by improving productivity or introducing mechanization, but not for long. If wages rise above USD 300, few new labor-intensive greenfield FDI will be coming. At this wage level, labor-intensive factories start to consider relocating abroad where wages are lower, and the government of the host country also begins to discourage labor-intensive manufacturing in an effort to shift to technology-intensive investments.

Manufacturing wages of China and Malaysia are already above USD 300, and their labor-intensive factories are exiting to other countries in search of low-cost labor. Monthly wages in Vietnam, Kenya, and Indonesia are approaching USD 300. At this wage level, light manufactured products may continue to be exported if they shift to high-end products or partially adopt automation, but few new investors come to exploit labor abundance. However, these general trends may be modified by other factors such as labor market tightness, the speed of labor productivity enhancement, and policy design and effectiveness [13]. Manufacturing wages in Ethiopia are bellow USD 100, which seems competitive enough to attract labor-intensive FDI exiting from high-wage countries *provided that* Ethiopian labor productivity rises significantly. So we come to the same conclusion: at the current level of labor productivity, Ethiopia is not an overwhelming choice for light manufacturing FDI even though its wages are low.

[13] For example, in Mauritius, FDI firms produce high-end apparels for export using advanced equipment and technology. Although manufacturing wages are high at $300-600 (depending on workers' skill and productivity), the industry is booming and factories are expanding capacity (observation as of 2012 by a GRIPS study mission).

4.6 Summary of findings

Using the reconstructed CSA manufacturing database, we have examined the productivity of Ethiopia's manufacturing sector in terms of both labor productivity and TFP. Manufacturing labor productivity had a moderate growth rate of 4.6% per year over the last two decades. However, labor productivity was highly volatile due to external factors beyond the control of individual firms such as the shortages of foreign currency, power supply, input materials and finance. Meanwhile, manufacturing productivity measured in TFP remained stagnant over the sample period except brief spikes in 1999 and 2015. The average annual growth of TFP was around 2.5%.

We also find heterogeneity across sub-sectors in manufacturing. Motor vehicles, basic metals, fabricated metal, and food & beverages had higher labor productivity than garment, wood, textiles, furniture, and leather & footwear. However, capital intensive sub-sectors such as machinery & equipment, fabricated metal, publishing & printing, and motor vehicles perform poorly in terms of TFP despite their relatively good records in labor productivity. The tardy performance of labor-intensive sub-sectors relative to more capital-intensive sub-sectors is consistent with our earlier observation that economy-wide labor productivity has been driven increasingly by capital deepening than by TFP.

This section also compared Ethiopia's manufacturing labor productivity with those of other developing countries including China, Malaysia, Indonesia, Kenya, Sri Lanka, and Vietnam. For this international comparison, the UNIDO data, which measures value added in USD, was used. Ethiopia's labor productivity in both overall manufacturing and selected individual sub-sectors has remained low and stagnant, and in some cases even declined. As a result, the gap between Ethiopia and the other countries in the sample widened dramatically. For example, in 2000, Ethiopia's manufacturing labor productivity was roughly equal (94%) to China's, but by 2015 Ethiopia's productivity was only 13% of China's. This should be a great concern for Ethiopian policy makers who aspire to make the country a light manufacturing hub in Africa by 2025.

We also examined the wage-productivity nexus in Ethiopia's manufacturing. The available evidence indicates that labor productivity and nominal wage both increased. However, the growth of the latter has been faster than that of the former. In addition, the ULC of the manufacturing sector, calculated as labor productivity divided by labor cost, has been decreasing for two decades. This is good news, but this result is in Birr, not USD. Foreign investors are more interested in ULC calculated in USD than in Birr. These findings suggest

that Ethiopian manufacturing may be losing rather than gaining labor cost competitiveness. UNIDO data comparison of Ethiopia's manufacturing labor productivity and wages with those of China, Kenya, Vietnam, Indonesia, Malaysia and Sri Lanka shows Ethiopia to be the lowest in both average monthly wages and labor productivity. Low wage advantage alone is enough to attract light manufacturing FDI unless labor productivity is enhanced far above the current level.

5. Labor Productivity Challenges in the Emerging Ethiopian Apparel Industry: Survey Results

5.1 Introduction

Earlier sections have shown that Ethiopia's economy-wide labor productivity is among the lowest in the world. Labor productivity in the manufacturing sector is also much lower than that in peer countries. In this section, we report the results of an in-depth firm survey of productivity in the apparel industry, explore the causes of low manufacturing labor productivity in Ethiopia, and make some recommendations for overcoming the challenges.

The apparel sector is important for Ethiopia's industrialization. The Ethiopian government has long identified the textiles and apparel sector as one of the priority industries. Various support programs have been designed and implemented, including a recent ambitious plan to build ten state-owned industrial parks exclusively for textiles and apparel production. As of mid-2019, four of those public industrial parks had been inaugurated and two others were under construction. These parks have started to attract many foreign investors including globally renowned apparel brands[14].

The survey covered firms located in Hawassa Industrial Park and Bole Lemi Industrial Park, and firms operating in and around Mekelle (outside the public industrial park). Eighteen apparel firms, most of them foreign owned, were interviewed. The sampling was purposive rather than representative, since we want to understand the productivity-related challenges and opportunities faced by Ethiopia, by benchmarking the practices of global firms which are widely thought to have more advanced management and technology than purely domestic ones.

After formulating working hypotheses and preparing survey instruments, the research team interviewed in advance a number of stakeholders such as factory managers, government

[14] At one of the interim report workshops, a question was raised as to whether labor-intensive apparel production would survive the combined waves of AI, robots, Industry 4.0, and the like. It is highly likely that sewing, cutting, and finishing as we know them today will be replaced by intelligent machines in the future. However, transition will take some time, and the timing also depends on the relative cost of such machines versus skilled workers. For latecomer countries with idle workforce such as Ethiopia, there should be at least a few decades before labor-intensive light manufacturing becomes unprofitable, during which skills and technology can be learned and quality and productivity should be enhanced in preparation for the next step of industrialization. Thus, Ethiopia should not abandon light manufacturing now but take advantage of this learning opportunity, although this may be the last chance for latecomers and the window of opportunity for traditional garment making may become increasingly narrow.

officials, industrial experts and researchers, in order to classify causes of productivity problems. The literature on labor productivity issues in Ethiopia and elsewhere was also reviewed. As a result, we identified the following three major groups of factors affecting labor productivity in the light manufacturing sector, especially the apparel industry:

(i) Labor mindset and quality, which include workers' basic skills, mindset, wages, incentives and working conditions
(ii) Management strategy, comprising management style, experience and attitude
(iii) Public policy and external factors

A survey instrument was then formulated for the collection of information on these three dimensions. There were both qualitative and quantitative interview questions, and in most cases the main respondent was top management. The qualitative survey mainly covered issues related to management, labor and external conditions. The quantitative survey, on the other hand, gathered concrete facts and data related to each of the above issues and also to measure production and labor productivity. A focus group discussion of selected workers was additionally conducted to explore more in detail labor related issues such as training, workers' mindset, wages, incentives and working conditions[15].

The remaining sub-sections are organized as follows. Sub-section 5.2 describes the survey method and presents the basic characteristics of the sampled firms. The next three sub-sections report findings on labor mindset and quality, management strategy, and public policy and external conditions.

5.2 Survey method and basic characteristics of the sampled firms

A list of all apparel enterprises operating in the three designated locations was compiled from multiple sources, including IPDC and EIC. The list was narrowed slightly to a total of 18 firms—four in Mekelle and seven each in Bole Lemi and Hawassa—which were asked to participate in the qualitative survey. Almost all of the garment factories in Bole Lemi and Mekelle were included in the list while the sample for Hawassa accounted for approximately

[15] The survey results reported below are different in scope from, but complementary to, the findings of the SKY Project organized by Nagoya University in collaboration with local partners in Ethiopia, Ghana, and South Africa during 2017-2018 (Yamada, et al., 2018). In Ethiopia, the Project conducted systematic questionnaires and skills tests at garment factories and related institutions to quantitatively identify (i) perception gaps among workers, TVET trainers, and factory managers, and (ii) various labor demands by groups including FDI firms, domestic firms, and self-employed garment producers. The results show that perception gaps among key stakeholders and diverse labor needs at different establishments are main reasons for low impact and frequent mismatches in worker training in both soft skills (closely related to mindset) and technical skills. On the other hand, our firm survey explored possible causes of mindset problems which include, but are not limited to, current technical training.

half of the operational garment firms in that park (Table 5.1). Note that the sample firms for Mekelle were all located outside Mekelle Industrial Park, as the park had no fully operational firms at the time of the survey.

For the quantitative survey, only 15 firms—seven in Bole Lemi, six in Hawassa, and two in Mekelle—responded to our request. Among the 15 firms, 14 were foreign-owned and one had joint owners, Ethiopian and Spanish. Among the foreign-owned firms, five were originally from India, two from Korea and two from Sri Lanka. The remaining five firms were from China, Hong Kong, Taiwan, Singapore, Indonesia, Bangladesh, Italy, and Saudi Arabia (many had more than one country of origin). Aside from the domestically owned firm, all firms came to invest in Ethiopia between 2014 and 2018.

Table 5.1 Firms sampled in the survey

Company	Country of Origin	Products	Date of establishment
Hawassa IP (7 firms)			
Firm 1	Spain and Ethiopia	Women's trousers, blouse/dress/skirt, men's pants and dress shirts	Feb. 2017
Firm 2	Sri Lanka	Socks and tights	2016
Firm 3	Sri Lanka	Underwear, synthetic knit tops	Jun. 2015
Firm 4	Singapore	Woven shirts	Apr. 2016
Firm 5	Taiwan and Hong Kong	Outdoor pants, outdoor shirts, jackets, towel, sport suits	Feb. 2016
Firm 6	UAE and India	Tailored jackets and tailored trousers	Sep. 2016
Firm 7	Indonesia and Singapore	Woven shirts	Jun. 2016
Bole Lemi (7 firms)			
Firm 8	South Korea	Woven wear, outdoor jackets/sport wear, pants, sports/casual wear, motor cycle wear, waterproof seam sealing wear	Jan. 2014
Firm 9	India	Men's shirts	Jun. 2014
Firm 10	India	Baby and kids wear	Oct. 2013
Firm 11	China	Woven shirts, pants, medical scrubs, tops	Dec. 2013
Firm 12	India	Woven shorts	Feb. 2014
Firm 13	India	Shirts, woven bottoms (denim and other), knitted underwear (men & women)	
Firm 14	South Korea	Shirts & jackets	Aug. 2016
Mekelle (4 firms)			
Firm 15	Bangladesh	Textiles and garment	
Firm 16	Dubai based	Textiles and garment	
Firm 17	Italy	Garment	
Firm 18	Saudi Arabia	Textiles and garment	

Source: PSI (2018).

Table 5.2 gives the number of workers overall and by location. The number of workers at the 15 firms surveyed totaled more than 24,000, of which 96% were production workers. The average number of workers per firm was 1,614 although number differed by location, the highest being Bole Lemi. One reason for this may be that many firms in Hawassa and Mekelle, which were newer industrial parks than Bole Lemi, had not yet started full capacity operation. Among production workers, 93% were female, which reflects the global trend of female workers dominating the garment industry labor force.

Operators in the garment industry are classified into four task categories: cutting, sewing, finishing, and quality control. Sewing workers were the most numerous, accounting for 75% of total operators in our sample. Operators in finishing, quality control, and cutting accounted for 11%, 9%, and 6%, respectively, of the total (Table 5.3). 95% of the sewing workers were female.

Responding firms were asked to report the efficiency and productivity levels of a few representative products. Several firms reported that they only achieved 30-40% of efficiency as measured by effective use of labor hours. We also formally calculated the line efficiency of selected products, as

line efficiency (%) =

$$\frac{Production\ output\ from\ the\ line \times Standard\ allowed\ minutes\ (SAM) for\ garments}{Total\ number\ of\ operators\ \times\ Total\ working\ hours\ \times\ 60} \times 100$$

line efficiency (%) = $\frac{Total\ minutes\ produced\ by\ the\ line}{Total\ minutes\ attended\ by\ all\ the\ operators} \times 100$

Table 5.4 shows estimated line efficiency and labor productivity measured by number of pieces per worker per shift. Results may not be generalizable as the number of firms producing each type of product is small. Even so, these calculations can give some insight into the efficiency of the industry. The first column reports the estimated line efficiency in sampled firms by product type. Efficiency was generally low, ranging from 29% for woven jackets to 58% for T-shirts. The remaining columns provide a selective comparison of Ethiopia's labor productivity as measured by number of pieces per worker per day with that of prominent apparel exporting countries such as Bangladesh, China, and Vietnam. Not only is Ethiopia's productivity lower than that of the other countries, but also dispersion among firms is wide, both of which suggest great potential for improvement.

Table 5.2 Number of workers by type of work, gender and location

	Total number of Workers			Number of firms in the sample	Average number of workers	Share of production workers by gender (%)	
	Production	Office	Total			Male	Female
Mekelle	2,436	192	2,628	2	1,314	6	94
Bole Lemi	13,903	517	14,420	7	2,060	8	92
Hawassa	6,852	311	7,163	6	1,194	7	93
Total	23,191	1,020	24,211	15	1,614	7	93

Source: PSI productivity study survey (2018).

Table 5.3 Percentage of workers by task category

Work Category	Male	Female	Total
Cutting	29	71	6
Sewing	5	95	75
Finishing	20	80	11
Quality control	9	91	9
Total	8	92	100

Source: PSI productivity study survey (2018).

Table 5.4 Average line efficiency and labor productivity of selected products, by country

Product type	Reported line efficiency (Ethiopia)		Labor productivity (number of pieces per worker per day)			
	%	Number of firms reporting	Ethiopia	Bangladesh	China	Vietnam
T-shirt	58	3	26-55	50	n.a.	n.a.
Shirt	51	2	3-9	10	n.a.	6-15
Polo shirt	43	1	7-18	13-27	18-35	8-14
Fleece jacket	34	1	4	n.a.	n.a.	n.a.
Woven jacket	29	1	3	n.a.	n.a.	n.a.

Source: Ethiopia's data source is from PSI (2018); for Bangladesh, Ionele (2008), as cited in Sorri (2010) for T-shirts, Islam & Adnan (2016) for shirts, and World Bank (2013) for polo shirts; for China, World Bank (2011); for Vietnam, Goto (2012) for shirts, and World Bank (2011) for polo shirts.

Note: for calculation of labor productivity and line efficiency, major and commonly produced products which could also be used in international comparisons are selected.

5.3 Labor mindset and quality

In this sub-section, we examine labor-related factors that affect productivity. We categorize these issues into: (i) initial characteristics (basic skills and mindset); (ii) workers' education, trainability and acquisition of firm-specific skills; and (iii) appropriateness of worker

incentives and working conditions. Table 5.5 shows the framework of the analysis and the detailed content of issues related to labor mindset, skills, quality, and incentives.

5.3.1 Workers' mindset

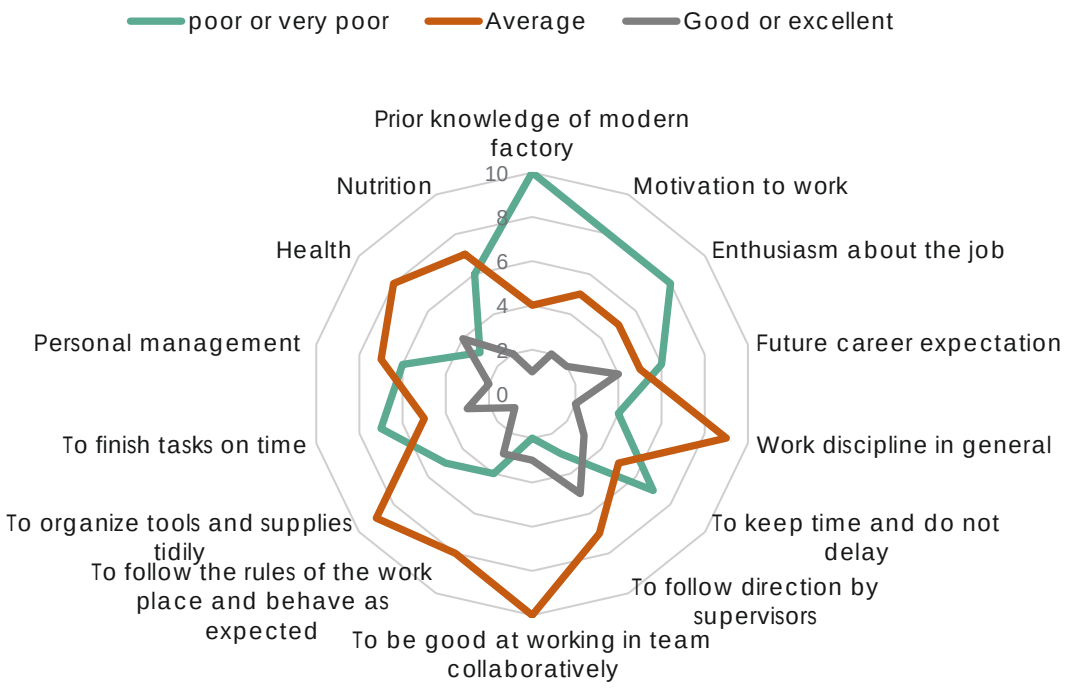
In this sub-section, we examine labor mindset such as attitude and discipline, absenteeism, and attrition, as it relates to productivity. In interviews company managers identified poor work culture and worker attitude as the most serious problem affecting labor productivity.

Most workers, being from rural areas, have little familiarity with urban environment, and no prior industrial work experience. Despite the training they are given in technical and soft skills, they still lack industrial work discipline.

Table 5.5 Framework of analysis for labor quality and incentives

Areas	Description of details
Mindset of workers	- Value, attitude and discipline - Emotional stability, openness, tidiness, punctuality, etc. - Motivation and expectation in factory work - Labor absenteeism - Labor quitting work (turnover)
Basic skills of workers	- Literacy - Cognition, comprehension and memory - Basic math - Communication skill - Problem-solving ability
Trainability and technical skills of workers	- Level of worker skills for different tasks - Main skills lacking in new and experienced workers - Speed and efficiency of learning - Teamwork, organizational behavior, active participation - Dynamic leveling up of worker
Incentives of workers and working conditions	- Salary and other monetary conditions - Non-monetary benefits such as leaves and insurance - Promotion prospects and career track - Working hours, intensity of effort, overtime - In-factory safety, health, comfort and meals - Housing and/or commuting conditions - Human relations in the workplace (relations with higher-ups, colleagues) - Labor-employer relations and dialogue

Figure 5.1 Labor mindset: rating by managers



Source: PSI (2018).

Interviewed firms were requested to rate various aspects of the mindset of their workers using numerical indicators. Figure 5.1 summarizes the results of the 15 firms that responded to this request. The mindset of workers was most frequently rated as "average" or "poor or very poor," while only a few firms rated it as "good or excellent." More specifically, seven to ten firms rated teamwork, following directions from supervisors, general work discipline, tidy organization of tools and supplies, personal management, health, and nutrition as "average." On the other hand, managers from seven to ten firms rated prior knowledge of modern factory work, motivation to work, enthusiasm about the job, finishing tasks on time, and not delaying as "poor or very poor." No aspect of worker mindset was rated as "good or excellent" by the majority of responding managers.

Managers identified four key manifestations of poor work culture and attitude of workers: high attrition, high absenteeism, no sense of urgency about work, and low motivation to work overtime. Those four elements are discussed in detail below.

Attrition rate: the rate of attrition is very high among garment workers in Ethiopia although it differs by location (Table 5.6). Among the sampled firms, the annual rate of attrition ranged from 27% in Mekelle to 35% in Hawassa and 84% in Bole Lemi. The major

Table 5.6 Attrition and absenteeism by location

Location	Rate of attrition		Rate of absenteeism
	Volunteer attrition	Fired	
Bole Lemi	84	2	9
Hawassa	35	3	6
Mekelle	27	5	2

Source: PSI (2018).

reason for workers quitting is low wages and poor worker benefits. Workers do not consider garment work as a long-term sustainable career; rather they see it as a transitory job. Moreover, many workers find high work pressure very taxing. Some workers come to modern factories just to see the situation, and leave quickly if they find the work very hard. In interviews workers reported that turnover is high in a worker's first year but declines as the worker becomes familiar with the work.

Table 5.6 reveals a wide variation in attrition rate across industrial parks, with Bole Lemi reporting highest attrition. There are a few reasons why this may be so. First, Bole Lemi is located in the capital city, where the cost of living is very high and where, on the other hand, there are more alternative work opportunities nearby for unskilled workers such as construction work and housemaid work than in other industrial parks. Globally, labor movement is generally more active in urban industrial parks, where most workers are migrants from rural areas, than in rural industrial parks, where workers commute daily from nearby villages.

Another reason for high attrition in Bole Lemi is poaching of workers among firms. Workers tend to move between firms within the park, even for very small improvements in salary or benefits. In contrast, internal regulations imposed by Hawassa tenant firms prohibit poaching of workers; this naturally reduces attrition there. Some criticize this practice as a breach of the right of movement of workers, and as a factor reducing knowledge transfer across firms through worker migration. Meanwhile, attrition in Mekelle is lower than in either Hawassa or Bole Lemi. Unlike Hawassa, Mekelle has no internal regulations to curb labor movement. The fact that the firms studied here are located outside the industrial park and physically separated from each other by five to seven kilometers, with most workers currently commuting from nearby areas on foot or by bus, significantly reduces the possibility of labor poaching.

Absenteeism: firm management also report high absenteeism as another manifestation of poor work discipline. The rate of absenteeism is also higher in Bole Lemi (9%) than Hawassa (6%) and Mekelle (2%). The firms report that absenteeism is much higher during holiday periods, the rainy season and after pay days. Absenteeism is also high on Saturdays and Mondays, particularly in Hawassa, as workers usually go back to their villages to obtain food. The firms attribute absenteeism mainly to the fundamental lack of work discipline and motivation. Sickness and family death incidents are common justifications given for absenteeism. In some cases, this is exacerbated by cooperating doctors who sign false medical certificates. Some firms in Hawassa even claim that non-medical personnel sell fake medical certificates at the gate of the park.

Time consciousness: a related work culture problem is a poor understanding of the value of time and a lack of sense of urgency among the workers. Workers often arrive late to work and do not start work immediately after arriving. Moreover, workers waste considerable amounts of time, up to two hours a day according to estimates of some firms, by taking tea breaks, going to the toilet, and other excuses for staying away from work. Also, coming from an agrarian culture, workers find it difficult to work continuously for eight hours.

Overtime work: low motivation of workers to work overtime is another serious problem mentioned by the firms. The majority of workers are not interested in working overtime, mainly due to the low level of pay. The overtime pay rate is 1.25 to 1.5 times the basic salary, which is very small. Security concerns are another reason for refusal to work overtime. Many workers live far from the factory site and thus face security problems if they work into the late evening. A firm in Hawassa was forced to reduce work shifts from two to one due to security problems as workers were being attacked on their way home. Some workers also attend evening classes for self-improvement, which is another reason for not wanting to stay to work overtime.

Responding managers also voice complaints that, in addition to the lack of worker interest in overtime, an Ethiopian law which severely restricts the number of permissible days and hours of overtime work is an impediment to firms which have to compete globally and respond quickly to changes in foreign demand. This issue is further discussed in the policy and external conditions section below.

5.3.2 Workers selection, education, trainability, and skills Workers selection and composition

In the Ethiopian apparel industry, educational background is not a major criterion for

selection of workers, particularly sewing operators. Most managers argue that six years of schooling (i.e. basic numerical and reading skills) are sufficient for sewing operators. Worker screening is more often concerned with age, gender (preferably female), personal integrity, and physical strength (eyesight and bodily constitution in particular). Most firms prefer to recruit young people in the area near the factory so as to minimize transport time and costs, and also as an expression of social responsibility to the local community.

Hawassa Industrial Park has a centralized mechanism for worker recruitment and grading, whereas Mekelle and Bole Lemi do not. Hawassa has established its Grading Center within the park; the center screens workers and dispatches them to tenant firms upon request. The objective of the center is to reduce investor expense and time related to hiring. The cooperating partners of the Grading Center are: Enterprises Partners (EP) funded by the Department for International Development (DFID), TIDI, the Labor Unit of EIC, and the regional Industry and Trade Bureau. Hawassa Industrial Park and IPDC act as facilitators. The regional Industry and Trade Bureau compiles a list of candidate workers from ten catchment areas in the region. The criteria for inclusion in the list are eighth grade education or higher, and female gender. TIDI grades the candidate workers on this list, and the EIC Labor Unit adds qualified workers to the database and dispatches them to tenant firms upon request.

Actually, the average education level of Ethiopian garment workers is higher than the minimum requirement set by the recruiters. For example, 50% of sewing operators have 9 to 12 years of schooling, and another 9% are the technical and vocational education and training (TVET) graduates (Table 5.7). As expected, the majority (89%) of sewing operators are of age 18 to 25. Only 1% of sewing operators are over 35 years of age.

The survey also confirms that most of the country's garment workers are migrants from rural areas, accounting for more than 80% of total workers in the surveyed firms in Bole Lemi and Hawassa. In Mekelle, the share of rural migrant workers is only 50%.

Table 5.7 Sewing workers, by education and age

Education level	Share
Grade 8 or below	41%
Grade 9-12	50%
TVET graduates	9%
Age group	**Share**
18-25 years old	89%
25-35 years old	10%
Above 35 years old	1%

Source: PSI (2018).

Company managers were also asked about the number of expatriate employees and the nature of their work activities. At the 15 garment firms surveyed, there were a total of 503 expatriates engaged in different activities. Many (66%) worked in management positions that require technical expertise (66%), while 24% were engaged in management and supervision only.

5.3.3 Training and trainability

Operator training lasts for one to three months, depending on the firm. The trainees acquire both technical skills and soft skills such as work attitude and discipline. Almost all firms agreed that Ethiopian workers are quick learners of technical skills. At the same time, most firms also agreed that workers do not pay enough attention to details and lack focus and consistency.

As can be seen in Table 5.8, many firms regard the skill level of their workers as "average." In particular, basic numeracy and communication skills are rated mostly as "average" while language skill is frequently rated as "poor." Regarding technical skills, sewing and quality control are mostly rated as "average" while cutting is often rated as "good."

Based on the above results, it can be said that many FDI garment firms are generally happy with the quality, trainability and progress of local labor. Foreign managers of different nationalities, often with experience in many other countries, say Ethiopian workers are good, or at least no worse than other workers they have seen. Newly recruited workers are initially uninformed and inexperienced and do not even know how to use a canteen or a toilet, but they learn quickly in response to guidance and pressure from the management. This is contrary to the popular notion that Ethiopian workers are unproductive and lack work discipline. Compared to workers from other countries, they are rather trainable and quick to learn. They are raw gemstones which will shine with appropriate cutting and polishing.

The above points to the important issue of plasticity and possible development of Ethiopian workers. In many latecomer countries, including Ethiopia, where industry is just taking root and many foreign ideas and investors co-exist and compete, a unified national character of workers has yet to emerge. Some workers are diligent and serious, others are selfish and short-term oriented, and still others try to adopt a model they learn from instruction, observation, and other means. This is unlike the situation in advanced societies such as Japan, Singapore, Korea, or Taiwan where national characteristics have already solidified and workers are more uniform, predictable and productive. There is no need to explain to those workers why it is important to report to work on time, dress properly, report

Table 5.8 Firm rating of worker skills (number of firms)

	Very poor	Poor	Average	Good	Excellent
Basic education					
Basic numeracy skills	0	2	12	1	0
Communication skills	0	3	9	3	0
Language skills (English)	2	7	5	1	0
Critical thinking & problem solving	2	4	6	3	0
Technical skill					
Designing	2	2	4	3	1
Cutting	0	4	4	5	1
Pattern making	3	2	2	3	2
Sewing	0	1	7	6	1
Finishing	0	3	6	5	1
Quality control	1	3	7	3	1
Machine operation /maintenance	1	4	5	3	2

Source: PSI (2018).

any problems to supervisors, and save and spend money wisely, nor to convince them that there are times when everyone must work overtime to keep customers happy and win in global competition. Without such instructions, workers in those countries all work efficiently. But these basic things must be told repeatedly to new workers in developing countries until they understand and perform accordingly.

Put differently, a concrete means of guiding such workers to efficiency and convincing them of its value is crucial to the formation of their workmanlike behavior and to the improvement of their productivity. As one Ethiopian CEO confided, the problem of productivity rests fundamentally with management, not with the workers. FDI firms bring their home methods to Ethiopia (or any other destination) and stick to them as long as they get results. If that approach does not work well, adjustment to the local situation becomes necessary, although the core method is—and should be—preserved.

5.3.4 Incentives and working conditions

The surveyed firms seem to have similar wage structures. As can be seen in Table 5.9, on average, a sewing operator with no prior experience is paid 863 Birr per month and an average monthly bonus and allowances of 509 Birr. The average monthly salary of sewing operators is a slightly lower than that of other operators. However, they receive higher bonuses and allowances than other workers. The minimum bonus and allowances among all surveyed workers is 100 Birr per month, while the maximum is 900 Birr per month, aside

Table 5.9 Salary and benefits by task category (ETB)

Task category	Initial Salary			Salary after a year			Bonus and allowances		
	Average	Min.	Max.	Average	Min.	Max	Average	Min.	Max.
Cutting	886	650	1,200	1,345	725	2,250	463	100	900
Sewing	863	650	1,200	1,138	750	2,011	509	100	1,366
Finishing	880	650	1,400	1,224	725	2,200	458	100	900
Quality control	978	750	2,500	1,403	825	2,500	431	100	900

Source: PSI (2018).

from sewing workers, whose maximum monthly allowances is over 1,300 Birr.

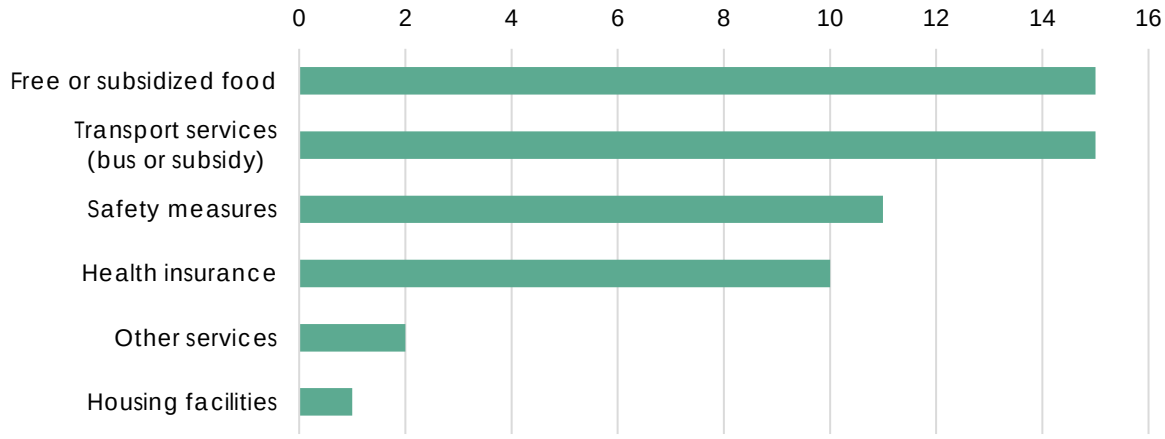
The basic worker salary differs slightly by location. The starting salary in Mekelle ranges from 800 to 1,050 Birr; in Bole Lemi it is as high as 1,200 Birr. In Hawassa, the starting salary is not only small, at 750 Birr, but also it is uniform across firms as a result of a tenant association agreement.

In addition to basic salary and bonuses, companies provide various incentives to motivate workers. As shown in Figure 5.2, free or subsidized food and transportation are offered by all firms. Most firms provide food on their premises and arrange a transport service (usually buses), while a few pay a transport allowance. Health insurance is offered by ten of the companies, while safety measures are in place in eleven of them. However, to date only one out of 15 firms provides housing facility for workers.

We conducted focus group discussions with workers to gain an understanding of their desires and grievances. Workers claim that the high attrition rate is caused by low rewards. They express extreme dissatisfaction with the low wages they are paid. They are also dissatisfied with other incentive schemes. For example, the absenteeism bonus and the upgrading system mostly require perfect attendance, which is not practical. In some cases, productivity bonuses are available for sewing workers but not for cutting and quality control workers. Furthermore, some transport services are not adequate due to the small capacity of buses and to the great distances workers must travel from the pick-up and drop-off points, which create a security problem, particularly at night time. Dissatisfaction is also voiced regarding the quality of food provided by firms.

Workers also complain about poor working conditions including: (i) the lack of basic facilities such as ventilators, restrooms, and safety equipment; (ii) health issues arising from work conditions—for example, kidney problems due to restrictions on going to the toilet; respiratory problems caused by dust particles and congested buses; high temperature in production areas; typhoid caused by low-quality food; (iii) cumbersome bureaucracy related

Figure 5.2 Number of firms providing incentives (out of 15 surveyed)



Source: PSI (2018).

to permission for sick leave and annual leave; and (iv) mistreatment by supervisors.

We now turn to the issue of housing, which is crucial in factories and in industrial parks where employees are mainly young women. Failure to provide free or cheap housing within the workplace or in the vicinity negatively affects worker motivation and productivity, given that it gives rise to additional transport time and consumes a significant share of worker income.

Industrial parks and their tenant firms are often advised to offer commuter bus service and dormitories or other accommodation for workers. However, the quality of transport and housing arrangements varies from one industrial park to another, and even from one tenant firm to another.

With respect to location, there are two types of industrial parks. The first type is located in the area surrounding a large city, typically the capital city, with a population of a few to several million. Those urban parks offer easy access to amenities and services such as shopping, education, medical care, hairdressers, café and restaurants, and other entertainment. Because urban residents enjoy relatively high income and do not want to work in factories for low wages, these parks must bring migrant workers from rural areas, forcing them to relocate and find adequate accommodation. Rural workers tend to come in groups from the same village. Such workers are footloose and sensitive to slight differences in salary or benefits. They also have the alternative of working in a big city, as housemaids, shop clerks, table servers, and construction workers. As a result, industrial parks must compete with those urban labor demands. Furthermore, dissatisfied workers always have the option of going home. Labor shortages, wage inflation and frequent job hopping are common features of industrial

parks near big cities. Dormitory or other reasonable housing becomes an issue, although workers often rent or share rooms in the local market without official assistance or company support. The market may provide opportunities for better accommodation than that offered by planned housing projects.

The above is a better description of Bole Lemi Industrial Park than of the other parks. Firms in Bole Lemi do not provide accommodation for workers, although some, beginning to realize the seriousness of the housing problem, have plans to build dormitories. Almost all firms provide transport services (buses or subsidies). Workers in Bole Lemi live in private rented houses (mostly shared) in and around Addis Ababa. As rental rooms in the city center are quite expensive, many workers commute from faraway areas, which lead in turn to long commuting hours and lateness in reporting to work. Housing allowances may become necessary in such circumstances.

The second type of industrial park is located in rural areas or near small cities in remote but populated areas. The supply of agricultural surplus labor is large there, and workers usually commute from their own homes, which eliminates the need to find accommodation, but transport to and from their scattered villages must be arranged unless workers live sufficiently nearby or can arrange their own transport or walk. Industrial parks of this second type face fewer labor shortages, and FDI firms often choose rural locations precisely for that advantage. However, the safety of workers, especially young female workers, returning home at night must be ensured, as noted above. That security concern is a reason why most workers refuse to work overtime. Firms in Mekelle and its vicinity, and in Hawassa Industrial Park are of this second type.

Mekelle is a small regional city where at least three large FDI firms have built new textiles and garment factories in the region (not in Mekelle Industrial Park). One FDI firm is building dormitories, cinemas and shops on the premises in order to create a new city with a huge factory as the core, and inviting workers, who now commute by bus, to live there. In contrast, the other two FDI firms located near Mekelle do not plan to build dormitories; instead, they want their workers to continue to live in their villages and commute to the factory. Their strategy is to hire workers from nearby towns and villages (not faraway places) and thus contribute to local job creation and economic prosperity. However, if more and more light manufacturing factories come to Mekelle and its vicinity, at some point the local labor supply will be fully absorbed, and labor will have to be recruited from more distant areas. The need to build dormitories and other facilities for workers will arise at that time.

In Hawassa, the government responded differently to the problem of housing for workers: it implemented an officially sponsored low-cost housing scheme by offering incentives to house owners in the town to construct additional accommodation on their land for renting to industrial park workers. Responses to our interviews indicate that this scheme does not seem to be working, partly because landlords refuse to offer reasonable rents to workers who commute to Hawassa Industrial Park. IPDC in Hawassa is now considering another type of housing solution, where dormitories are to be built within the park in collaboration with investors. Some firms have already received land to build dormitories for their workers.

5.4 Management practices

A growing body of literature is pointing to differences in management practices as a key factor explaining variation in productivity across firms and countries. The literature offers the persuasive argument that improved management can bring about substantial increases in firm productivity. To assess that argument, we qualitatively examined the relationship between management practices and labor productivity, by means of face-to-face interviews at 18 companies in three sites (Hawassa Industrial Park, Bole Lemi Industrial Park, and Mekelle). The results are presented below.

5.4.1 Composition of managers

Broadly speaking, there are three levels of management: top executives, middle level managers, and line managers. The shares of foreign and Ethiopian managers vary from level to level. Top management positions at FDI firms are predominantly held by foreigners. In contrast, middle level managers are a mixture of foreigners and Ethiopians. At that level, Ethiopians are often assigned to human resources and finance departments. Meanwhile, their participation in technical functions in departments such as production is usually scant. However, there is variation across establishments. At some exceptional FDI firms, all middle management positions are held by Ethiopians, though we find a higher proportion of Ethiopian managers farther down the hierarchy. Nearly all lower level management positions, such as line manager, team leader, and supervisor, are held by Ethiopians.

Foreign managers at all levels are of varying nationality, not necessarily from the country of origin of the firm. In the Ethiopian garment sector, many managers are Indian, Sri Lankan, Bangladeshi, Vietnamese, Chinese, Taiwanese, and Korean, and some are Spanish, Italian, Myanmar and Kenyan.

5.4.2 Approaches to management and guidance of workers

How companies guide their workers makes a great difference in labor productivity. Each country, and even each company, has different corporate cultures and strategies which influence the goals, perceptions and approaches to the issue of labor mindset and productivity. Based an examination of global experiences (mainly in Asia), we can identify several management approaches to the question of labor mindset and productivity in light manufacturing, including:

(i) Top-down order and punishment
(ii) Creation of corporate family oneness
(iii) Mindset reform through instruction and persuasion
(iv) Mindset reform through monetary rewards and incentives
(iv) Use of middle managers as an interface between foreign management and local workers

Approach (i) is adopted by highly hierarchical organizations with strong top management. Type (ii) is typically seen in traditional Japanese—and some other Asian—companies. These two approaches are diametrically opposed and mutually incompatible. Meanwhile, types (iii), (iv) and (v) are more "partial" in the sense that they can be implemented under most corporate cultures and structures. These three approaches are not mutually exclusive, and can be adopted simultaneously. Properly tuned, they contribute to worker mindset reform regardless of whether the corporate model is top-down, bottom-up, or otherwise. Note that the above list of approaches is far from exhaustive; other approaches and variations are possible.

These management styles—or attempts to introduce them at least partly—were visible in our interviews at the three locations in Ethiopia. Below we explain these approaches in more detail and report how garment firms operating in Ethiopia apply those approaches to dealing with mindset and productivity issues.

(i) Top-down order and punishment

Some interviewed firms stated that apparel production must be "autocratic." They believe that being tough on workers is one way to meet tight schedules, ensure quality, and stay competitive. Such an approach is often used when local workers are unacquainted with modern production processes, and the firm is a global player facing strong market competition. Foreign managers operating in developing countries are under severe pressure to cut costs and deliver quickly; they tend to take a tough stance with their workers with respect to rules, discipline and working time (including imposition of overtime). Workers who do not perform as instructed are punished through low

evaluations, denial of promotion, wage cuts, or even dismissal. This authoritarian approach does not require a deep knowledge of local customs or social sentiment, and can be executed in almost any country. Workers comply because of coercion and fear, not because they truly understand the value of the instructed actions for themselves and their company.

This "dictatorship" style is sometimes accepted or even praised as an effective way to run a global factory in countries where workers lack basic knowledge and discipline. However, the risk of overstepping legal bounds is real. In some extreme cases, foreign managers violate human rights or domestic or international laws, actions which may be either penalized or go undetected. The harsh approach may work for some time, but it does not generate essential trust and understanding between management and labor. It cannot be regarded as a permanent model in a civilized society where workers' rights and well-being are critically important. If adopted, the harsh approach should be regarded as a temporary measure acceptable only until the workers gain experience and improve their performance.

(ii) Creation of corporate family oneness

We have learned that some of the firms we interviewed are taking up the family oneness approach. There are signs of a family-type community bond among staff at those companies. This approach reflects a traditional Japanese management style, and the model has spread to other countries, especially in Asia where Japanese FDI is prevalent. Virtually all Japanese manufacturing firms, large and small, introduce this principle when they invest overseas and hire foreign workers.

In Japan, regular employees can climb the corporate ladder over the years and eventually compete for the top executive positions. In the workplace, discrimination based on ethnic, regional and cultural background is virtually nonexistent. Managers and workers are not separated psychologically; they share the same career track and work experience. The only difference between them is that the former are farther along in the career process than the latter. Moreover, many Japanese managers are happy to visit *gemba* (production sites) to work with engineers and technicians on R&D or on a new production process. Employees are encouraged to work as a team and suggest ideas to higher-ups. Often managers and workers share the same canteen and toilets. Morning meetings are common. Daily information is shared and everyone joins in 10 minutes of physical warm-up exercises. Company sports events and excursions are arranged, with all

families are invited. This tradition is still alive in Japanese factories though it was stronger during Japan's high growth era of the 1960s and 70s. Many firms in Southeast Asia also adopt this model, especially company-sponsored events and entertainment.

This approach creates a positive corporate atmosphere where management and labor trust each other and confrontation is played down. Some argue that this model does not work in societies where top-down order and strict career separation are the rule. However, the fact is that many firms in nations whose cultures are very different from that of Japan, and who have no history of corporate oneness (such as the United States, India, and Argentina) embrace the Japanese model (with local adjustments) and succeed in creating a positive work atmosphere conducive to efficiency and cooperation. This suggests that the family oneness approach is not limited to the case of Japan, and that corporate culture can be changed, given proper guidance.

(iii) Mindset reform through instruction and persuasion

In this approach, companies teach workers—and local supervisors as necessary—why certain actions are beneficial for the company and for the workers themselves. Mindset reform is never easy and may not bear fruit immediately, but sincere and persistent counseling, through the words or actions of credible instructors who devote much of their time to productivity improvement, moves many, if not all, participants.

In Cambodia, a large Japanese firm employs a local Buddhist monk to explain work ethics to young recruits from rural areas. They listen to the Buddhist monk much more attentively than to their Japanese bosses. At another large motorcycle assembly plant abroad, Japanese CEOs routinely picked up rubbish which workers have dropped, demonstrating through real actions how and why a factory floor can be kept clean and tidy. This has led workers to stop throwing things on the floor. Similarly, in Japanese SMEs at home and abroad, the serious attitude of Japanese general director toward kaizen (quality on-time delivery) usually has a visible influence on the foreigners working there as regular staff or technical interns. In Vietnam, Dr. Nguyen Dang Minh, who holds a PhD in management and has many years of working experience at Toyota Headquarters in Japan, is developing a method to renovate Vietnamese minds, starting from the basics.

If training is given with sound logic and a warm heart, the mindset of any worker can be transformed. Workers transformed in this manner begin to act proactively, reflecting their own understanding and convictions, without any enforcement from managers.

(iv) Mindset reform through rewards and incentives

This approach is widely exercised in the firms we visited. These firms have established clear and rational performance-based rules governing promotion, salary increases, bonuses, support for training or other benefits, and they implement them as fairly and visibly as possible. The underlying notion is that workers respond to financial incentives. Even if workers are not convinced of correctness of the instructions they are given, most of them follow them if there are pecuniary and/or non-pecuniary rewards attached. And even if they are already convinced, rewards lead them to execute the needed actions more readily, and to make a habit of it. Well-crafted incentives have the additional advantage of instilling company loyalty in workers, thus curbing job hopping.

For the incentive mechanism to work, objective assessment of workers must be in place, so that all parties accept the value of high assessments. One common practice is to record workers' attendance and productivity regularly. Many firms in Asia's advanced economies have firm-specific methods of worker evaluation which are the basis for the awarding of internal technical certificates and new job assignments including promotion. Meanwhile, at one Ethiopian company which won one of the top kaizen awards, the workers complained because the privilege and honor bestowed on the company by the prime minister and EKI were not reflected in any pay increase or special bonus for them. A day-excursion for the workers' families after the award ceremony, paid for by the company, was not enough to motivate the workers to do better.

(v) Use of middle managers as an interface between foreign management and local workers

One effective way to combine instructions and incentives is the use of line leaders (middle managers) as an interface between foreign managers and local workers. This point was stressed by virtually all FDI garment firms which began operation in the three sites. Among them, one firm reported that factory efficiency and the operation ratio improved greatly after only six months of operation. The speed and scope of improvement were just as expected of a country in which the firm begins new operation.

The main driver of improvement was the training and utilization of the line leaders, all Ethiopians, trained within the firm or recruited from outside. Most FDI firms pick line leaders internally, from among line workers who show exceptionally good skills and attitude. The role of line leaders is crucial for changing the mindset and improving the productivity of all workers. Line leaders monitor the daily activities of the production line and take corrective measures such as changing the seating arrangement of the operators (line balancing). This has a direct impact on worker productivity, which

demonstrates that labor productivity problems lie mainly in the hands of the middle managers. Line leaders are also tasked to make the workers aware of global market pressure and the close linkage between the company's success and worker welfare. Line leaders also listen directly to workers' demands and complaints, and communicate them to the foreign management as appropriate. This is a good way to bridge different cultures in globally oriented business operations.

5.4.3 How firms upgrade workers to management positions

Finding skilled Ethiopian workers for management positions is challenging, as the garment sector of Ethiopia is still underdeveloped. Most of the companies at the three sites have to rely on foreign managers until a sufficient number of skilled Ethiopian workers are available. However, employing foreign managers is costly, so the companies normally want to replace foreign managers with Ethiopians with managerial experience.

FDI companies offer good opportunities for local people with suitable attitude and education to move up to management positions of various types. Those companies usually select for training middle managers and line leaders from among operators, and the training programs are basically the same as in the home country. The training, supervised by expatriate experts, includes brainstorming, communication skills, learning of corporate culture, and analysis of buyer complaints. Some good workers manage to quickly climb the ladder and take up supervisory positions, after as little as half to one year of factory operation; this is a much shorter time than normally thought necessary for producing middle managers and line leaders. As noted above, most low- to middle-level managers are promoted from among operators, with some directly recruited as fresh graduates. Those promoted from operator tend to be efficient and loyal to the company. The approach taken by foreigners to the training and the provision of work and promotion opportunities for these middle leaders is very important. It strongly influences the speed and effectiveness with which the firm will secure capable middle leaders and efficient workers.

5.4.4 Adaptability of foreign managers to local conditions

Certain problems do arise when foreigners manage and guide workers. Foreign managers tend to pursue the management style of their home countries without fully understanding the characteristics and the requirements of local workers. Some foreign managers are not flexible, and mostly concerned about daily production targets. As they work to meet production targets, some even use force, which results in conflict with the workers. Foreign managers often have difficulty adapting to local conditions and customs. For example, it is reported that some

managers at Hawassa Industrial Park shout at the workers, which is problematic since in the culture of Sidama, shouting at women is unacceptable. Moreover, Ethiopians observe a number of holidays during the year. Workers have a strong attachment to those holidays, which provide opportunities go back to their home villages and spend time with their families and the community. Some foreign managers do not understand the importance of this strong communal bond and the value of maintaining such relationships. Some foreign managers have also been accused of treating workers unequally, favoring some workers and building a special relationship with them, which creates bad feelings among the other workers.

5.4.5 Mindset problems of Ethiopian managers

The companies interviewed generally expressed satisfaction with the quality, trainability and progress of the local managers. The firms believe that, with training and gaining experience, managerial quality can be greatly improved. However, as in the case of operators, some local managers are unfamiliar with global business practices, which negatively affect their productivity. Basic work discipline has not yet been acquired. The mindset problems of local managers can be manifested in several ways.

(i) Lack of absence of sense of purpose and urgency

Local managers are often characterized as lacking a sense of urgency. They seem to be insufficiently concerned about quality and productivity, and to consider existing inefficiency as normal—all of which reflect their lack of experience and international exposure. Local managers are also viewed as not as pushy as foreign managers in terms of achieving production targets.

(ii) Lack of consistency in learning

Although their learning curve is relatively steep, local managers lack consistency in learning and do not pay sufficient attention to detail. Their learning tends to fluctuate between fast and slow, lacking a specific pattern or speed. They are also slow to adapt to new environments, perhaps because of the highly demanding nature of industrial work relative to their experience and knowledge.

(iii) Poor time management

In general local managers are not time-conscious. Personal use of mobile phones during office hours and lack of adherence to work rules are common. Like operators, local managers generally find it difficult to work continuously for eight hours.

(iv) Lack of sense of purpose and responsibility

Unlike foreign managers, Ethiopian managers are not very serious about goal setting, and seem unable to anticipate problems in advance. They consider industrial jobs transitory rather than long-term professional work. In addition, there is a general perception in Ethiopia that managers should spend most of their time sitting in the office. Ethiopian managers are generally less willing than foreign managers to go down to work stations to monitor and support the workers.

(v) Lack of global mindset

Unlike foreign managers, local managers are not buyer driven. Foreign managers are under strong cost-cutting and quick-delivery pressure from the global market, and tend to be very tough. Often they take a strong stance with their workers, especially regarding their skills, discipline, and overtime. On the other hand, Ethiopian managers want to avoid problems with the workers and thus remain soft about workers' undesirable attitudes and behavior.

5.5 Policy and external conditions

Labor productivity is also affected negatively by a number of business conditions generated by the government or due to external circumstances which are beyond the control of either the managers or the workers. There are many well-known impediments to productivity in Ethiopia, reported as serious by most of the interviewees of our survey. These external problems are discussed briefly below. Full analysis of any of these issues would require a separate study.

5.5.1 Labor laws

According to the company managers interviewed, Ethiopia's labor laws are highly restrictive by international standards in terms of minimum wage, overtime limits, and annual leaves.

(i) Minimum wage

All but one of the companies interviewed expressed a preference for establishment of a minimum wage in Ethiopia. The general thinking was that a minimum wage would help to reduce unnecessary movement (including poaching) of labor from one company to another.

(ii) Overtime

In a competitive global environment, industrialists are under pressure to deliver goods on time and reduce lead time as much as possible. Ethiopia's labor regulations are in

some aspects highly restrictive in comparison with the internationally accepted ILO standard, which stipulates that workers should not work overtime in excess of 60 hours per month. Ethiopia's labor laws limit overtime work to 20 hours per month, whereas in most other countries overtime hours are as much as 60 hours per month, in compliance with the ILO rule. This restriction seems to favor Ethiopian workers, but in reality it may adversely affect the productivity of garment factories and reduce their competitiveness in the global market—and ultimately have a negative impact on workers' wages and employment.

(iii) Leaves

Companies also complained that annual leave cannot be converted to cash payments. According to them, there are workers willing to receive cash payment in place of annual leave. There were also complaints about abuse of compassionate leave by workers who take sick leave by presenting false certificates from clinics and hospitals. This is a particularly serious problem in Bole Lemi and Hawassa. However, it is generally a problem of implementation of the sick leave system, not a question of the necessity or desirability of sick leave.

(iv) Income tax

Two issues arise regarding the imposition of income tax on workers. First, some argue that imposing tax on workers who receive low wages is unfair. Wages of 600 Birr or more per month are subject to income tax. However, it is unrealistic to assume that 600 Birr is sufficient to cover the monthly living expenses of a worker and pay income tax, given the cost of living and the living standard in Ethiopia. Furthermore, income tax is levied also on bonuses. Second, the income tax bracket is very narrow, so wage earners are quickly pushed to higher brackets as their income rises. The workers express dissatisfaction about taxation and the tax bracket structure, demanding to know why they are taxed. This suggests a lack of worker awareness about the income tax system and the pension system.

5.5.2 Logistic performance

Logistic performance can be measured in terms of cost and transit time (lead time). By these measures, Ethiopia's logistics sector is slow and very costly. One manager interviewed reported that about 16% of his company's sales turnover was spent on logistics-related costs. For foreign firms, the cost of transport via Ethiopia's newly-built railway is even higher than that of trucking. A recent study comparing Ethiopia's trade cost with that of comparator

economies found that Ethiopia's cost to export a 20-foot container is USD 2,660, compared with USD 600 for Vietnam and USD 2,350 for Kenya (PSI, 2019). That cost covers inland transportation and handling, customs clearance and control, port and terminal handling, and document preparation. Clearly Ethiopia's competitiveness in the global market is negatively affected.

Lead time has become a principal concern for international buyers. In the apparel industry in particular, where it is necessary to respond to fashion trends and beat the competition, buyers are demanding fast, on-time delivery. In this regard, all companies interviewed here observed that lead time is very long in Ethiopia. The time required from receipt of a client order to final delivery to the client is longer for Ethiopia than for other apparel exporting countries. Reasons for that include the existence of check points as well as the mismatch of working days in Ethiopia and in Djibouti, which causes large delays in the processing of imports and exports. Companies also claim that the roads from their factories to the port of Djibouti are in poor condition, resulting in longer transportation time and higher cost. Despite the recent construction of many roads and railways, Ethiopia still faces a very challenging business environment, which reduces its competitiveness in the global market.

5.5.3 Custom's clearance

Customs clearance in Ethiopia is very slow and garment unfriendly. Moreover, the time required for customs clearance is unpredictable. Unlike in other garment exporting economies such as Vietnam, Bangladesh, and Cambodia, customs officers in Ethiopia are not available 24 hours per day, seven days per week. They work only regular working hours, which results in additional delays.

5.5.4 Power supply

Frequent power outages for long periods of time continue to be a serious hindrance to the conduct of business in Ethiopia. Outages cause not only work stoppages and revenue losses but also damage equipment and materials, which substantially increases costs. Note, however, that power outages are not a big problem for firms in Hawassa Industrial Park as it has a dedicated sub-station.

5.5.5 Other business related problems

Regarding other business related problems, the interviewed companies mentioned the following: (i) a general shortage of materials, supplies, and spare parts in Ethiopia; (ii) inefficient banking services; and (iii) a shortage of foreign currency. Table 5.10 shows

Table 5.10 World Bank Ease of Doing Business rankings

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Singapore	1	1	1	1	1	1	1	1	2	2	2
Hong Kong	4	3	2	2	2	2	3	5	4	5	4
Korea, Rep.	23	19	16	8	8	7	5	4	5	4	5
Malaysia	20	23	21	18	12	6	18	18	23	24	15
Mauritius	24	17	20	23	19	20	28	32	49	25	20
Thailand	13	12	19	17	18	18	26	49	46	26	27
Rwanda	139	67	58	45	52	32	46	62	56	41	29
Japan	12	15	18	20	24	27	29	34	34	34	39
China	83	89	79	91	91	96	90	84	78	78	46
Kenya	82	95	98	109	121	129	136	108	92	80	61
Vietnam	92	93	78	98	99	99	78	90	82	68	69
Indonesia	129	122	121	129	128	120	114	109	91	72	73
India	82	133	134	132	132	134	142	130	130	100	77
Zambia	100	90	76	84	94	83	111	97	98	85	87
Egypt	114	106	94	110	109	128	112	131	122	128	120
Uganda	111	112	122	123	120	132	150	122	115	122	127
Cambodia	135	145	147	138	133	137	135	127	131	135	138
Tanzania	127	131	128	127	134	145	131	139	132	137	144
Zimbabwe	158	159	157	171	173	170	171	155	161	159	155
Ethiopia	116	107	104	111	127	125	132	146	159	161	159
Myanmar	NA	NA	NA	NA	NA	182	177	167	170	171	171
Bangladesh	110	119	107	122	129	130	173	174	176	177	176
No. of countries ranked	181	183	183	183	185	189	189	189	190	190	190

Source: the World Bank's Ease of Doing Business database.

Ethiopia's position globally in the World Bank's Ease of Doing Business rankings. It can be seen that that Ethiopia's business environment rating remains one of the lowest, even within Africa—and that rating continues to decrease, aside from a slight improvement in 2019.

5.6 Summary of findings

An in-depth survey of Ethiopian firms, particularly in the apparel industry, was conducted to identify possible causes of Ethiopia's low labor productivity. Eighteen firms in three locations were surveyed, all but one of them fully foreign-owned. The average firm size in the sample was 1,614 workers. At the time of the interviews, the operation ratio of the firms was generally low, in the range of 30% to 40%. Three major factors that affect labor productivity were examined: labor mindset and quality; management style and strategy; and policy and external factors.

The first determinant of labor productivity is labor mindset and quality. Labor mindset refers to attitude to work and work culture, while labor quality encompasses education, trainability, and skills. Provision of labor motivation (both financial and non-financial incentives) and working conditions were also examined as factors that influence labor mindset and quality.

Sewing, in which most garment workers are engaged (75% in our sample firms), requires only basic numerical and reading skills. Results of the field survey show that about 60% of the workers have high school graduation or higher, which makes them "overqualified." Almost all firms agreed that Ethiopian workers are quick learners of technical skills. However, workers' soft skills, including industrial work discipline and motivation, were reported as severely lacking, and the development of those skills was time consuming. Poor work culture and attitude are manifested in forms such as high attrition, high absenteeism, absence of sense of urgency regarding work, and low motivation to work overtime. The results of the study show that workers are extremely unhappy with their very low wages and poor working conditions. The average monthly salary and non-wage benefits for sewing operators are about USD 30 and less than USD 20, respectively, at the mid-2019 exchange rate. As a result, workers regard garment sector jobs as transitory, not permanent employment. Low wages, low non-wage compensation, and poor working conditions contribute to low work motivation, high attrition, and low productivity.

The issue of housing is a crucial one for the garment sector, where the employees are predominantly young women. Employers' failure to provide workers with free or cheap housing of decent quality near the workplace negatively affects worker motivation and productivity; it imposes additional transport time and requires payment of a significant share of the worker's monthly income. Refusal by workers to work overtime is due not only to low compensation, but also to the security problems faced by young females when overtime forces them to return to their residences at night.

The second determinant of labor productivity is management style and strategy. The means by which companies guide and incentivize their workers has a substantial impact on labor productivity. Each country, and even each company, has a different corporate culture and strategy. Approaches to labor mindset and productivity issues include: top-down order and punishment, creation of corporate family oneness, mindset reform through instruction and persuasion, mindset reform through rewards and incentives, and use of middle managers as an

interface between foreign managers and local workers. This list is not presented as comprehensive.

All of the above approaches were at least considered, and sometimes actually tried fully or partially, by the garment factories interviewed. Some CEOs argue that some elements of top-down order are inevitable in garment production in a global competition scenario, but that approach should not exceed legal bounds and should only be adopted temporarily, until the workers learn discipline and acquire skills. In contrast, creation of family oneness within a firm deserves due merit and is worthy of consideration. Research is needed to identify suitable approaches to implementing family oneness in Ethiopia in general, and within each firm. Meanwhile, many firms, including the ones interviewed, accept incentivization of workers by means of financial and other rewards as a standard approach. Another method of improving communication and trust is the mobilization of line supervisors as an interface between foreign managers and local workers. These local middle managers, selected from among good line workers and subsequently trained for the task, are already producing positive results at a number of the FDI garment factories interviewed.

As FDI flow into Ethiopia increases, the arrival of foreign managers, bringing different work attitudes, cultures, and experiences, may generate tension in the local workers. Many foreign managers impose their home methods without due awareness of and respect for local customs and conditions. Some foreign managers shout at or insult workers, a taboo behavior in the local culture. On the other hand, Ethiopian managers who have not been exposed to global business practices also have weaknesses such as: lack of sense of purpose and responsibility, a lack of consistency in learning behavior, poor time management, and lack of global mindset. Both foreign and domestic managers must improve their awareness and knowledge related to these cultural differences.

The third determinant of labor productivity is external conditions created by government, or resulting from global markets or other factors—none of which are the fault of managers and workers. Ethiopia has many such business impediments, including a shortage of foreign currency, unstable power supply, inefficient logistics, slow customs clearance, generally low availability of materials, supplies and spare parts, and labor issues related to minimum wage, overtime limits, leaves, and workers' income tax. The interviewed managers frequently mentioned these factors as very serious problems. For the enhancement of productivity at the national level, these issues must be addressed with strong policy resolve and effective implementation.

6. Policy Measures Towards Enhanced Productivity

Based on the findings of this report, we propose ten policy directions for the enhancement of productivity. Three are related to the policy framework while the other seven deal with aspects of productivity in which improvement is strongly needed. We offer only policy directions rather than concrete action details, construction of which we regard as separate work that must be done after overall policy directions are agreed by key policymakers and stakeholders. When such agreement is obtained, the next step will be to design, implement and monitor a concrete and feasible action plan for each policy item, with clear specification of budget, timeline and organizations responsible.

POLICY FRAMEWORK

1. Establishment of policy organization and operational organizations

It is essential to establish a central organization, with appropriate membership, for productivity policy deliberations (a national council or committee), headed by the Prime Minister or another person in a high level of government. The government should actively direct this organization to analyze key facts, set goals, approve and guide policy actions, monitor progress and solve emerging problems along the way. Meanwhile, a policy execution body (an institute, center or agency) should also be created or designated and given sufficient authority, budget and staff to design, implement, coordinate and review proposed policy actions in detail, with regular progress report to the policy deliberation organization. In order to avoid creating a nominal establishment with no real action, the Prime Minister or similar must effectively mobilize this policy formulation and execution mechanism, contributing strong personal interest, involvement and commitment.

2. Improvement of data collection and related publication

For Ethiopia to successfully prioritize productivity as a national goal, prompt publication of reliable productivity-related data is essential. Data availability is still sporadic and slow in Ethiopia. This study checked, cleaned and spliced data from the CSA manufacturing survey database for use in the analyses. Not all irregularities could be reconciled. The government should allocate sufficient human and financial resources for use in an appropriate designated organization, for the systematic and regular collection, analysis and publication of

productivity-related data[16]. Also, the scope of data collection should be broadened over time. Initially, besides basic GDP data, output, operation ratio, employment and wage data of the manufacturing sector should be targeted for prompt and reliable delivery and analysis. Agricultural data should be improved at an early stage, and capital stock data (for calculation of TFP) should be improved over time. Other data deficiencies should be identified and announced, and should be corrected step-by-step over the medium term.

3. Setting of medium-term targets

Ethiopia should set a small number of medium-term productivity targets which are concrete and monitorable and whose achievements depend on policy action. The exact number and nature of those targets will be an important agenda item for the proposed policy deliberation organization (see section 1 above). Possible candidate targets include (i) acceleration of labor productivity growth from the current 4-5% to at least 7-8% annually (as a trend; short-term fluctuations are permitted); (ii) requiring that TFP contribution dominate labor productivity growth (say, 70% or more; it must be born in mind that TFP estimates have a longer lag than estimates of labor productivity); (iii) setting labor productivity growth targets in key economic sectors, especially overall manufacturing and agriculture; (iv) benchmarking globally competitive apparel exporting countries including Vietnam and Bangladesh, as models for Ethiopia to catch up with—and surpass—in terms of line-worker productivity in concrete production processes such as the cutting and sewing of specific apparel products.

POLICY AREAS

4. Adjustment of investment policy for proper pace and more private projects

The report has shown that the TFP contribution to labor productivity growth fell in recent years, while the contribution of capital deepening rose sharply. This is not good news because labor productivity growth, driven mostly by large investments in infrastructure and other structures instead of true efficiency improvement, is more quantitative than qualitative. Ethiopia should revise its investment policy with an appropriate pace and scope so it can support the infrastructure building necessary for development, without jeopardizing the financial, fiscal and balance-of-payments soundness of the nation. Such management calls for following a narrow path requiring wisdom, moderation and balancing of opposing objectives.

[16] We are informed that the PDC has already instructed CSA to upgrade productivity-related data. We would like to monitor the progress of that upgrading until the new productivity database achieves the scope and reliability necessary for it to serve as the basis of policy formulation.

The government should also re-direct national investment away from large public projects toward private productive investments through various measures including budget allocation, foreign currency allocation, tax incentives and subsidies, as well as investment finance—given that the lack of financing has been identified as one of the most severe constraints on private investors. Both industrial infrastructure and private investments are necessary for growth, but available resources are limited. The nation's available resources should be allocated so as to address this trade-off, with increased recognition of the role of the private sector. Incentivizing firms to invest in worker skill acquisition and skill-intensive production can boost productivity in labor-intensive sectors. Another possible intervention is incentivizing firms to learn and adopt appropriate technology. These skill and technology-oriented policies should contribute to the acceleration of TFP growth and to the competitiveness of the national economy.

5. Speeding up of structural transformation

The report also indicates that labor productivity growth has long been dominated by the within-effect, with the shift-effect remaining small. This is consistent with the observation that to date Ethiopia's growth, though rapid, has not produced visible structural transformations, including rapid labor migration from low-productivity to high-productivity sectors.

To speed up the structural transformation process in Ethiopia, two groups of policy measures should be considered. First, direct policy effort should be made in sectors that employ a large proportion of the country's labor force and therefore have considerable impact on aggregate productivity. This means that Ethiopia needs to invest more in agriculture, which is the basis of the Ethiopian economy, and light manufacturing, which is quickly emerging as a result of attracting FDI. Second, labor mobility from low- to high-productivity sectors should be facilitated. This would typically take the form of rural-to-urban migration, but it could also happen as labor migration across sectors within the same geographical area. This would help not only to accelerate structural transformation, but also to enhance worker efficiency and create more jobs. A considerable number of policy measures are needed for the promotion of meaningful and productive labor migration, including: mindset reform; training that fits the needs of industry; information on job opportunities; information on workers' safety and rights; and incentives for private firms to conduct in-house training or send workers to external training. Additionally, the government should ensure labor rights and good working conditions; appropriate resolution of labor disputes; and attention to issues

associated with labor migration including culture shock, housing, commuting, hygiene and healthcare.

Part of the reason that Ethiopia's internal labor migration remains small is the existence of linguistic and cultural barriers across ethnicities and regions. This is a delicate matter that needs to be handled with care to promote more active and peaceful labor mobility.

6. Maintaining wage competitiveness

Manufacturing wages in Ethiopia are among the lowest in the world, and low even by the African standards. On the positive side, that wage competitiveness is a great advantage for Ethiopia in terms of attracting FDI and stimulating local investment. Thus, it is crucial to sustain this wage advantage so as to enable rapid industrialization. However, there is a constant tension between worker demands for higher wages and the desire of firm management for lower labor cost. Workers complain that their low wages cannot even cover living costs in rural cities. Meanwhile, foreign managers complain that Ethiopian workers are inefficient. The fundamental solution to this conundrum is to improve labor productivity so that wages can rise at the speed of labor productivity growth, without sacrificing industrial competitiveness. The obvious question is how to do that; serious policy learning and deliberations are required for this.

The second and equally important solution is to forge a social compact, under the government's initiative and commitment, so the fruits of productivity shall be distributed fairly among workers (for living), firms (for profit taking and further expansion) and government (for tax revenues), and that the workers will not be laid off or left behind when the nation improves productivity. Such a political arrangement was adopted by Japan and Singapore when they launched their national productivity movements. Emotional and politicized questions such as "Are Ethiopian wages too high or too low?" surface when labor productivity remains low or stagnant. Social tension will melt away when labor productivity begins to rise rapidly, as observed in Japan, Taiwan and Korea in the late twentieth century, creating a quickly-expanding pie for management and labor to share (and also for the payment of taxes to the government). If this happens, firms can raise wages annually, and workers can look to a brighter future even if their wages are currently low.

Ethiopia has decided to launch a national minimum wage system and established the National Minimum Wage Commission in 2019. The commission is mandated to analyze the labor market and set minimum wages scientifically, based on concrete facts rather than political pressure. It is hoped that this commission will successfully propose an appropriate

wage-setting formula. In East Asian economies such as Thailand, Indonesia, Vietnam, and Cambodia, the minimum wage has been pushed up politically, without productivity improvement, by aggressive labor unions and by governments wanting to secure additional votes in the next election, disappointing investors and harming competitiveness. Ethiopia's minimum wage system should not be allowed to fall into that trap.

7. Deepening and broadening Kaizen into a National Productivity Movement

With strong resolve and effort, Ethiopia has mastered the basic level of kaizen in the last ten years. The Ethiopian way of spreading kaizen has been established, and EKI can now implement a variety of kaizen consultations, research and training without Japanese support. Ethiopia also began to share the kaizen experience with the African Union and with individual African nations. These are great achievements that should serve as the basis for the second wave of National Productivity Movement, following a decade of kaizen introduction and practice, with higher and broader targets. The new movement should keep kaizen as its core, but should develop kaizen further and disseminate it more widely, to all firms, farms, offices, schools and other organizations in the whole country. That productivity movement should encompass not only kaizen but also key business enhancements including strategic management, global marketing, human resource management, acquisition of industry-specific technologies, and corporate finance (also see item 8 below).

8. Construction of an effective enterprise support system (especially for SMEs)

Ethiopian enterprises, especially small and medium units, are the main drivers of national productivity. The government should set the long-term goal of establishing a comprehensive and effective national enterprise support system. Japan, Taiwan and Malaysia could supply the necessary information and models for that work.

However, enterprise support systems are generally very broad and complex, and their construction must be done in staged and realistic steps. The fully constituted policy requires enactment of the necessary laws, the creation of a national policy mechanism and the construction of a wide network of implementation mechanisms at the central, regional, and local levels with an additional involvement of research institutes, NPOs, financial institutions and private firms. The nation must possess a thick layer of industrial experts in the fields of management, technology, marketing, personnel matters, ICT, tax, finance, environment, and legal affairs including bankruptcy and Intellectual Property Rights (IPR) (not just kaizen), and a state-operated mechanism for certifying and re-training these experts. Each enterprise must first be diagnosed, given a concrete business goal, and comprehensive support must be

provided to each firm to achieve that goal. The SME Bank, SME credit unions, SME loan guarantee and other financial systems must be in place. Training institutions, particularly universities, colleges and TVET centers, must be upgraded nationally in terms of programs, teachers and equipment. Training must teach not only skills but attitude, teamwork and creativity, and solid working relations must be developed between industry and training institutions to provide support in terms of internship, job placement and curriculum renewal. Additionally, technical support centers should be established in major cities and towns, staffed with competent experts and equipped with an array of testing and processing devices to support SMEs in their efforts to develop, modify and/or certify their products—all for low fees.

The above are the components of the fully developed enterprise support systems available in Japan, Taiwan and Malaysia. Ethiopia cannot offer all these services and facilities at once, so there is a need for a realistic step-by-step approach, beginning with the simplified or modified introduction of a few selected mechanisms, followed by the expansion of the list of policy elements as experience is accumulated and additional human and financial resources become available.

9. Simultaneous pursuit of productivity and ethical standards

There are two distinct global trends in achieving excellence at manufacturing establishments: (i) endless pursuit of certain desirable aspects of the product, such as cost reduction, high and consistent quality, on-time delivery, and efficient user support services (product excellence); and (ii) the setting of high standards of ethical conduct in the production process, with due attention to labor rights and environmental protection (ethical standards). The former is the traditional core of productivity improvement work, while the latter addresses broader social concerns. This dual set of standards is globally visible in all sectors, but particularly in sectors producing labor-intensive consumer products such as apparel, footwear and processed food. European and American consumers are highly sensitive to the conditions under which their goods are produced. They demand proof that child labor is absent, that workers are treated fairly and that the environment is duly protected. Meanwhile, many Asian—including Japanese—consumers are very interested in product quality per se.

Africa is a latecomer in the global value chain, and Ethiopia has emerged as a new supplier of apparel and footwear. Given the dual set of concerns related to global markets, Ethiopia must pursue both product excellence and ethical standards. This is not a choice: it is increasingly the de facto requirement for entry into and remaining in the global market.

However, this requires serious learning with international cooperation and appropriate policy, and also much time, resources and expertise. Ethiopia must be well informed of these industrial requirements as it takes on the global market challenge under significant constraints concerning time and resources, and must decide where to begin this work and how to attain the dual array of goals through realistic and concrete steps.

10. Transforming the mindset of workers and management

In many latecomer countries, including Ethiopia, workers come mostly from rural areas and have had limited exposure to urban life and modern production processes. The results of our survey show that Ethiopian garment workers have sufficient educational background and are quick learners of technical skills, though they are severely lacking in industrial work discipline and workplace motivation. FDI firms operating in Ethiopia have undertaken some practices for upgrading worker mindset, including top-down orders, creation of corporate family oneness, financial and non-financial incentives, and the use of local line managers as an interface between foreign and local work culture. Moreover, countries already globally competitive in apparel and footwear, such as Bangladesh, Vietnam, and Cambodia, have tried various approaches to transforming their workers, with mixed success. Mindset transformation is a great policy challenge that requires systematic preparation and planning. The Ethiopian solution must be formulated through selective learning, combining and modifying foreign model practices to fit the Ethiopian reality.

As the Ethiopian government develops industrial parks vigorously, it is essential to implement optimum mindset policy there. There is a need for a re-examination of the practicality and effectiveness of the current strategy, especially that spearheaded by the government, donors and the tenant association at Hawassa Industrial Park. Mindset reform requires appropriate instruction and learning, but it must also go hand-in-hand with the material welfare of workers, including salary and bonuses, affordable housing, daily transport, good canteen food, attractive and clean workplaces, medical service, good human relations, family events, and a clear understanding of the relationship between firm's objective and the well-being and career paths of workers.

At the same time, both foreign and Ethiopian managers need more knowledge and skills for their work towards productivity enhancement. Here again, systematic learning, supported by appropriate policy, is required for mindset transformation. Foreign managers tend to stick with home-grown corporate culture and management style, which may not be suitable for Ethiopia. They need to be educated towards local adaptation while retaining the core of their

management philosophy.

It is also found that productivity improvement at FDI firms is often in the hands of Ethiopian middle managers, who can reduce friction between foreign management and local workers. However, the mindset of local managers and line leaders sometimes lacks an understanding of the basic demands of global competition. Their managerial quality can—and should—be improved with additional training provided by the FDI firms. The government need not be involved directly in such training; rather it could promote, duly recognize, and subsidize private sector efforts.

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Annexes

Annex 3.1 Economy-wide labor productivity growth decomposition (growth accounting method)

The growth accounting method decomposes growth in labor productivity into *capital deepening* and *TFP growth*. Decomposition is derived from a Cobb-Douglas type production function. Thanh et al. (2018) applies the same procedure for Vietnam

$$Y = A.K^{\alpha}.L^{\beta} \qquad (1)$$

where, Y, K, L, A are output, capital, labor, and TFP, respectively.

Assuming constant return to scale, $\propto +\beta = 1$, and dividing both side of (1) by L

$$\frac{Y}{L} = \frac{A.K^{\alpha}.L^{\beta}}{L^{\alpha+\beta}} = A.\left(\frac{K}{L}\right)^{\alpha} \qquad (2)$$

Defining $y = \frac{Y}{L}$ and $k = \frac{K}{L}$, then y and k are labor productivity and capital/labor ratio (capital per unit labor). Equation (2) becomes:

$$y = A.k^{\alpha} \qquad (3)$$

Applying natural logs and differentiating both side of equation (3),

$$lny = \alpha lnk + lnA$$

$$\Delta lny = \alpha \Delta lnk + \Delta lnA \qquad (4)$$

Equation (4) implies that *labor productivity growth* can be decomposed into *capital intensity growth* ($\alpha \Delta lnk$) and *TFP growth* (ΔlnA). Capital intensity makes labor more productive by providing a greater amount of capital to work with, enhancing economy-wide labor productivity via the contribution share of capital in the production function (α). TFP growth enhances labor productivity growth by one-to-one ratio.

The growth rates of y (labor productivity) and TFP can be computed as:

$$g_y = \alpha.g_k + g_A \qquad (5)$$

$$g_A = g_y - \alpha.g_k \qquad (6)$$

In order to compute capital intensity (k) and capital intensity growth rate, g_k, we need to estimate capital stock (K) in equation (5). Replacing g_k, g_y (calculated from values of measured labor productivity) and α (parameter assumed by authors based on literature) with their estimates in formula (6), we obtain TFP growth rate, g_A.

We use capital stock data for Ethiopia from Penn Tables. Penn Tables report capital stock and real GDP based on 2011 prices. We take the share, and apply it to the national accounts

data and recalculate capital stock using the Penn Table capital stock to GDP share. This recalculation is required as national accounts data are based on 2011 prices and in local currency. Due to lack of initial capital stock, we couldn't compute capital stock using the perpetual inventory method.

Determination of capital's share in national income (α) is challenging due to absence of data. Most studies assume a certain share of capital in GDP (for example, Collins & Bosworth (1996) and Thanh et al. (2018) both assume, $\alpha = 0.35$ for East Asia and Vietnam, respectively). Following the 2015/16 Input-Output and Social Accounting Matrix for Ethiopia (Mengistu et al., 2018), we adopt a capital share, α, of 0.3.

Our measures of national accounts data for *Y, L, and K* are measured in terms of real value added at constant 2003 price, total employed persons in a year (total employed from age 15 and above working in the economy from WDI which in turn is based on ILO's modelled estimates). We use the unemployment rate computed by ILO to calculate the number of working labor from labor force.

The growth rates of GDP, labor productivity, and TFP in year t use the following information:

$$\textit{Contribution share of capital deepening} \text{ year } t = \frac{\alpha . g_k^t}{g_y^t} . 100(\%) \qquad (7)$$

$$\text{Contribution share of TFP growth in year } t = \frac{g_A^t}{g_y^t} . 100(\%) \qquad (8)$$

Annex 3.2 Data and Estimates of level and growth rates of variables used in economy-wide labor productivity analysis

Year	Labor force (millions)	Labor productivity (thousand Birr per worker)	Capital stock (billion Birr)	Capital intensity (thousand Birr per worker)	Growth rates (%)			Contribution share to labor productivity growth (%)	
					Labor product-ivity	Capital intensity	TFP	Capital intensity	TFP
2000	29.00	6.50	614.01	21.18					
2001	30.06	6.74	624.71	20.78	3.77	-1.87	4.34	-14.88	114.88
2002	31.21	6.56	634.49	20.33	-2.79	-2.15	-2.15	23.12	76.88
2003	32.41	6.14	641.68	19.80	-6.41	-2.61	-5.62	12.23	87.77
2004	33.64	6.63	660.95	19.65	8.01	-0.79	8.24	-2.95	102.95
2005	34.92	7.20	695.03	19.91	8.70	1.32	8.30	4.56	95.44
2006	35.97	7.81	735.07	20.43	8.45	2.66	7.66	9.43	90.57
2007	37.08	8.47	772.71	20.84	8.37	1.99	7.77	7.14	92.86
2008	38.24	9.12	825.45	21.58	7.74	3.57	6.67	13.84	86.16
2009	39.48	9.70	891.30	22.57	6.38	4.58	5.00	21.56	78.44
2010	40.80	10.36	946.55	23.20	6.78	2.78	5.95	12.29	87.71
2011	42.21	11.13	1047.74	24.82	7.43	6.98	5.33	28.19	71.81
2012	43.68	11.68	1217.12	27.87	4.93	12.27	1.25	74.68	25.32
2013	45.20	12.40	1415.47	31.32	6.15	12.39	2.43	60.44	39.56
2014	46.67	13.24	1672.88	35.85	6.79	14.46	2.45	63.92	36.08

Source: author computation from PDC, WDI, and Penn World Tables.

Note: Data on capital stock is not available for 2015 and 2016 for Ethiopia. Hence, the decomposition of economy-wide labor productivity is done for the 2000-2014 period.

Annex 3.3 Decomposing contributors of economy-wide labor productivity growth using shift-share analysis

The *shift-share method* is derived as follows[17].

Productivity for the whole economy is expressed as the sum of the productivity level of each sector weighted by their respective employment shares, as shown below.

$$P_m = \frac{Y_m}{L_m} = \sum_{j=1}^{n}\left(\frac{Y_j}{L_j} * \frac{L_j}{L_m}\right) = \sum_{j=1}^{n}\left(P_j * S_j\right) \qquad (9)$$

where Y, L, P (=Y/L) are output, number of employed persons, and labor productivity of sector *j* (*j* = 1, …, n) or of the economy (m). S_j is the labor share of sector *j* in the total number of employed persons of the economy.

Economy-wide labor productivity in year *t* is:

$$P_m^t = \sum_{j=1}^{n}\left(P_j^t * S_j^t\right) \qquad (10)$$

The change in economy-wide labor productivity in year *t* relative to base year 0 can be expressed as*:*

$$P_m^t - P_m^0 = \sum_{j=1}^{n}\left(P_j^t * S_j^t\right) - \sum_{j=1}^{n}\left(P_j^0 * S_j^0\right) \qquad (11)$$

Adding and subtracting both sides of equation (4.11) by $\sum_{j=1}^{n}\left(P_j^t * S_j^0\right)$, $\sum_{j=1}^{n}\left(P_j^0 * S_j^t\right)$, and $\sum_{j=1}^{n}\left(P_j^0 * S_j^{t-1}\right)$, rearranging, and dividing both sides by P_m^0, we obtain economy-wide labor productivity growth in year t relative to base year 0:

$$\frac{P_m^t - P_m^0}{P_m^0} = \frac{\sum_{j=1}^{n}\left[\left(P_j^t - P_j^0\right) * S_j^0\right]}{P_m^0} + \frac{\sum_{j=1}^{n}\left[P_j^0 * \left(S_j^t - S_j^0\right)\right]}{P_m^0} + \frac{\sum_{j=1}^{n}\left[\left(P_j^t - P_j^0\right) * \left(S_j^t - S_j^0\right)\right]}{P_m^0} \qquad (12)$$

[17] See, for example, Timmer & Szirmai (2000) and Thanh et al. (2018).

Annex 3.4 Data and estimates used to conduct *shift-share* analysis

Year	Value added per worker in thousand Birr				Growth of value added per worker (%)				Employment share (%)		
	Agri.	Industry	Services	Economy-wide	Agri.	Industry	Services	Economy-wide	Agri.	Industry	Service
2004	4.45	13.19	21.22	7.05					0.82	0.06	0.12
2005	4.93	12.11	21.75	7.61	10.18	-8.53	2.46	7.70	0.80	0.07	0.13
2006	5.31	13.08	23.46	8.25	7.57	7.69	7.54	8.07	0.80	0.07	0.13
2007	5.68	14.05	25.04	8.94	6.68	7.17	6.54	8.00	0.79	0.07	0.14
2008	5.94	15.49	27.27	9.63	4.41	9.76	8.53	7.41	0.79	0.06	0.14
2009	6.15	16.48	29.06	10.24	3.58	6.19	6.34	6.14	0.79	0.06	0.15
2010	6.54	17.73	28.81	10.93	6.04	7.30	-0.85	6.53	0.77	0.06	0.17
2011	7.03	17.40	29.87	11.74	7.34	-1.91	3.60	7.14	0.76	0.07	0.17
2012	7.18	18.63	31.35	12.31	2.12	6.87	4.83	4.77	0.75	0.07	0.18
2013	7.65	21.95	29.41	13.05	6.35	16.40	-6.39	5.80	0.73	0.07	0.20
2014	7.96	23.12	31.03	13.93	3.90	5.19	5.36	6.56	0.71	0.08	0.21
2015	8.39	24.77	32.19	14.91	5.24	6.87	3.69	6.81	0.70	0.09	0.21
2016	8.44	27.88	33.13	15.63	0.67	11.84	2.86	4.67	0.69	0.09	0.22

Source: authors' calculation using data from PDC and WDI.

Annex 4.1 Industry names and description

Industry	Description
Food & beverages	Manufacture of food products and beverages
Tobacco	Manufacture of tobacco products
Textiles	Manufacture of textiles
Garment	Manufacture of wearing apparel, except fur apparel
Leather & footwear	Tanning and dressing of leather; manufacture of footwear, luggage and handbags
Wood	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
Paper	Manufacture of paper, paper products and printing
Publishing & printing	Publishing, printing and reproduction of recorded media
Chemicals	Manufacture of chemicals and chemical products
Rubber & plastics	Manufacture of rubber and plastics products
Non-metallic minerals	Manufacture of other non-metallic mineral products
Basic metals	Manufacture of basic metals
Fabricated metal	Manufacture of fabricated metal products except machinery and equipment
Machinery & equipment	Manufacture of machinery and equipment n.e.c.
Motor vehicles	Manufacture of motor vehicles, trailers and semi-trailers
Furniture	Manufacture of furniture; manufacturing n.e.c.

Annex 4.2 Labor cost by sector in million ETB

Sector	1996		2000		2005		2011		2016	
	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real
Food & beverages	135	469	196	627	313	854	1141	1141	3330	1711
Textiles	105	364	112	357	117	319	222	222	665	341
Garment	12	43	15	49	13	35	55	55	278	143
Leather & footwear	40	137	44	139	56	153	162	162	416	214
Wood	12	40	7	22	11	29	53	53	70	36
Paper	8	27	11	34	19	52	56	56	73	38
Publishing & printing	28	96	32	101	56	153	116	116	398	205
Chemicals	16	55	28	89	56	152	185	185	864	444
Rubber & plastics	13	46	25	79	48	130	200	200	589	302
Non-metallic minerals	32	109	48	154	72	195	277	277	1286	661
Basic metals	8	29	7	23	27	75	96	96	265	136
Fabricated metal	12	41	15	48	34	92	121	121	580	298
Machinery & equipment	2	6	1	4	1	3	12	12	18	9
Motor vehicles	6	20	15	48	18	49	56	56	365	187
Furniture	10	35	21	68	26	72	79	79	329	169
Total	438	1517	575	1841	866	2364	2831	2831	9525	4894

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 4.3 Annual average growth rate of labor cost by sector (%)

Sector	1997-2000		2001-2005		2006-2010		2011-2016		1997-2016	
	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real
Food & beverages	9.23	7.25	9.37	6.17	20.45	3.71	22.37	8.50	16.01	6.47
Textiles	1.53	-0.45	0.93	-2.27	9.76	-6.99	20.84	6.97	9.23	-0.31
Garment	5.44	3.46	-3.26	-6.46	40.61	23.86	17.25	3.37	15.60	6.05
Leather & footwear	2.36	0.38	5.10	1.91	14.05	-2.70	21.64	7.76	11.75	2.21
Wood	-13.36	-15.34	8.91	5.71	26.98	10.23	8.83	-5.05	8.95	-0.59
Paper	7.92	5.94	11.65	8.46	14.82	-1.92	10.10	-3.78	11.23	1.69
Publishing & printing	3.24	1.26	11.57	8.38	10.33	-6.41	24.03	10.15	13.33	3.79
Chemicals	14.21	12.23	13.86	10.66	24.97	8.23	24.91	11.04	20.02	10.48
Rubber & plastics	15.28	13.30	13.25	10.05	26.33	9.58	19.99	6.11	18.95	9.40
Non-metallic minerals	10.49	8.51	7.97	4.77	27.83	11.08	24.97	11.09	18.54	8.99
Basic metals	-3.68	-5.66	26.76	23.57	9.37	-7.37	29.94	16.06	17.28	7.74
Fabricated metal	5.71	3.73	16.22	13.02	33.19	16.44	19.69	5.82	19.40	9.86
Machinery & equipment	-10.51	-12.49	1.55	-1.65	24.78	8.03	24.08	10.20	11.70	2.16
Motor vehicles	24.31	22.33	3.47	0.27	-34.01	-50.75	78.62	64.75	20.81	11.27
Furniture	18.62	16.64	4.37	1.17	19.81	3.06	25.59	11.72	17.44	7.90
Total	6.83	4.85	8.19	4.99	20.44	3.69	22.93	9.05	15.40	5.86

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 4.4 Wages and salaries by sector in million ETB

Sectors	1996		2000		2005		2011		2016	
	Nom.	Real	Nom.	Real	Nom	Real	Nom	Real	Nom	Real
Food & beverages	117.00	405.45	173.00	553.85	264.00	720.35	955.00	955.00	2753.24	1414.58
Textiles	97.70	338.56	105.00	336.15	110.00	300.15	201.00	201.00	622.00	319.58
Garment	12.00	41.58	14.00	44.82	12.30	33.56	48.80	48.80	265.00	136.15
Leather & footwear	35.20	121.98	40.30	129.02	50.90	138.89	133.00	133.00	376.00	193.18
Wood	10.20	35.35	6.20	19.86	9.55	26.04	49.00	49.00	67.20	34.53
Paper	6.99	24.22	9.81	31.40	17.40	47.48	49.10	49.10	71.20	36.58
Publishing & printing	25.30	87.67	29.40	94.12	49.60	135.34	105.00	105.00	338.00	173.66
Chemicals	13.90	48.17	25.00	80.04	50.30	137.25	149.00	149.00	707.00	363.25
Rubber & plastics	12.10	41.93	21.30	68.19	42.80	116.78	181.00	181.00	560.75	288.11
Non-metallic minerals	26.10	90.45	42.60	136.38	62.80	171.36	245.00	245.00	1170.00	601.13
Basic metals	7.10	24.61	6.15	19.69	19.60	53.48	79.10	79.10	236.00	121.25
Fabricated metal	11.00	38.12	13.40	42.90	31.50	85.95	111.00	111.00	528.00	271.28
Machinery & equipment	1.70	5.88	1.13	3.63	1.07	2.93	11.40	11.40	17.60	9.04
Motor vehicles	4.73	16.40	12.40	39.70	16.10	43.93	50.40	50.40	324.00	166.47
Furniture	9.09	31.49	19.50	62.43	24.80	67.67	71.80	71.80	288.00	147.97
Total	390.10	1351.85	519.19	1662.17	762.72	2081.16	2439.60	2439.60	8323.98	4276.77

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 4.5 Annual average growth of wages and salaries by sector (%)

Sectors	1997-2000		2001-2005		2006-2010		2011-2016		1997-2016	
	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real	Nom.	Real
Food & beverages	9.78	7.80	8.45	5.26	20.37	3.62	22.10	8.23	15.79	6.25
Textiles	1.80	-0.18	0.93	-2.27	8.35	-8.40	21.92	8.04	9.26	-0.29
Garment	3.85	1.87	-2.59	-5.79	40.20	23.45	17.67	3.79	15.47	5.93
Leather & footwear	3.38	1.40	4.67	1.47	13.90	-2.84	21.74	7.87	11.84	2.30
Wood	-12.44	-14.42	8.62	5.43	25.76	9.01	11.06	-2.81	9.43	-0.12
Paper	8.47	6.49	11.47	8.27	15.30	-1.44	10.73	-3.14	11.61	2.06
Publishing & printing	3.75	1.77	10.46	7.26	10.56	-6.19	23.18	9.31	12.96	3.42
Chemicals	14.67	12.69	13.98	10.79	23.88	7.13	24.15	10.28	19.65	10.10
Rubber & plastics	14.14	12.16	13.96	10.76	25.99	9.25	21.22	7.34	19.18	9.64
Non-metallic minerals	12.25	10.27	7.76	4.57	28.26	11.51	25.20	11.32	19.01	9.47
Basic metals	-3.59	-5.57	23.18	19.98	14.86	-1.89	29.09	15.22	17.52	7.97
Fabricated metal	4.93	2.95	17.09	13.90	32.13	15.38	20.21	6.34	19.36	9.81
Machinery & equipment	-10.09	-12.07	-1.06	-4.26	26.48	9.73	24.54	10.67	11.70	2.15
Motor vehicles	24.08	22.10	5.22	2.03	-32.67	-49.41	77.25	63.38	21.13	11.59
Furniture	19.09	17.11	4.81	1.61	19.52	2.77	24.61	10.73	17.28	7.74
Total	7.15	5.17	7.69	4.50	20.26	3.51	22.95	9.08	15.30	5.76

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 4.6 Non-wage payments by sector in million ETB

Sector	1996		2000		2005		2011		2016	
	Nom	Real	Nom	Real	Nom	Real	Nom	Real	Nom	Real
Food & beverages	18.40	63.76	22.90	73.31	48.90	133.43	185.69	185.69	577.00	296.46
Textiles	7.20	24.96	6.51	20.85	6.82	18.60	21.48	21.48	42.50	21.84
Garment	0.29	1.01	1.28	4.10	0.68	1.85	5.84	5.84	13.20	6.78
Leather & footwear	4.43	15.35	3.26	10.42	5.32	14.52	29.26	29.26	39.70	20.40
Wood	1.41	4.88	0.60	1.92	1.08	2.93	4.43	4.43	2.31	1.19
Paper	0.77	2.66	0.84	2.69	1.67	4.55	6.61	6.61	2.15	1.10
Publishing & printing	2.37	8.21	2.10	6.73	6.59	17.98	10.59	10.59	60.20	30.93
Chemicals	1.86	6.43	2.81	9.00	5.30	14.47	36.05	36.05	157.00	80.66
Rubber & plastics	1.21	4.18	3.22	10.31	4.76	12.99	18.84	18.84	27.80	14.28
Non-metallic minerals	5.46	18.92	5.42	17.34	8.71	23.78	31.82	31.82	116.00	59.60
Basic metals	1.25	4.32	1.05	3.37	7.86	21.46	16.84	16.84	28.50	14.64
Fabricated metal	0.98	3.38	1.65	5.28	2.36	6.44	10.21	10.21	52.20	26.82
Machinery & equipment	0.06	0.21	0.02	0.07	0.17	0.47	1.00	1.00	0.65	0.33
Motor vehicles	0.95	3.28	2.62	8.37	1.76	4.80	5.31	5.31	40.80	20.96
Furniture	0.96	3.32	1.65	5.29	1.51	4.13	7.39	7.39	41.00	21.07
Total	47.58	164.88	55.93	179.07	103.49	282.39	391.36	391.36	1201.01	617.06

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 4.7 Annual average growth of non-wage payments by sector (%)

Sector	1997-2000		2001-2005		2006-2010		2011-2016		1997-2016	
	Nom	Real	Nom	Real	Nom	Real	Nom	Real	Nom	Real
Food & beverages	5.47	3.49	15.17	11.98	20.89	4.15	23.72	9.85	17.23	7.68
Textiles	-2.52	-4.50	0.91	-2.28	24.58	7.84	10.02	-3.86	8.87	-0.67
Garment	36.96	34.98	-12.69	-15.88	46.80	30.05	10.45	-3.42	19.06	9.51
Leather & footwear	-7.70	-9.68	9.82	6.62	15.42	-1.33	20.65	6.78	10.96	1.42
Wood	-21.33	-23.32	11.68	8.48	35.44	18.70	-16.79	-30.66	2.48	-7.07
Paper	2.26	0.28	13.69	10.49	8.99	-7.75	-3.30	-17.18	5.13	-4.41
Publishing & printing	-2.98	-4.96	22.84	19.64	8.54	-8.20	29.75	15.88	16.17	6.63
Chemicals	10.38	8.40	12.70	9.50	33.14	16.39	28.85	14.98	22.19	12.65
Rubber & plastics	24.53	22.55	7.80	4.60	29.11	12.36	5.16	-8.72	15.68	6.14
Non-metallic minerals	-0.20	-2.18	9.51	6.32	24.39	7.64	22.82	8.95	15.28	5.74
Basic metals	-4.18	-6.16	40.20	37.00	-21.49	-38.23	39.37	25.49	15.65	6.11
Fabricated metal	13.12	11.14	7.18	3.98	43.70	26.96	15.18	1.30	19.90	10.35
Machinery & equipment	-26.32	-28.30	41.91	38.71	8.74	-8.01	14.81	0.93	11.84	2.30
Motor vehicles	25.43	23.44	-7.95	-11.15	-54.24	-70.99	97.61	83.74	18.82	9.28
Furniture	13.61	11.63	-1.75	-4.95	24.07	7.33	34.91	21.04	18.78	9.23
Total	4.04	3.49	12.31	11.98	21.73	4.15	22.75	9.85	16.14	7.68

Source: authors' calculation using data from CSA's LMSMI Survey.

Annex 5.1 Number of firms reporting line efficiency and labor productivity by product

Product type	Number of firms reporting
Women's dress	1
Woven bottom	2
Denim bottom	1
Baseball pants	1
Jogger's pants	1
Cargo pants	1
Short pants	3
Knitted jacket	1
Ladies trousers	1
Tricot shirts	1
Carter bodysuit	1
Carter pants	1
GCI onesies	1
TCP T-shirt	1
H&M tank top	1
Men's underwear	1
Pack out	1
Pyjama	1
Leggings	1
Apron	1