

# Why the Manufacturing Sector Still Matters for Growth and Development in Indonesia



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# Policy Note 1

## Why the Manufacturing Sector Still Matters for Growth and Development in Indonesia

### Abstract

**Contributors:** *Sjamsu Rahardja and Deborah Winkler, drawing on contributions from G. Varela and Lili Yan Ing*

*Is Indonesia's manufacturing sector still relevant for growth and development? As a result of the last boom in global commodity prices between 2003 and 2008, resources in Indonesia shifted towards commodities and resource-based manufacturing as these sectors seemed to promise higher returns on investment. In recent quarters, however, the manufacturing sector has exhibited stronger output growth rates and attracted more investment. This note argues that building on the current momentum of manufacturing growth is critical for Indonesia's development (i) to support the creation of higher-productivity jobs, (ii) to sustain higher economic growth and progress in structural change, and (iii) to achieve long-term prosperity. Finally, this note also shows how the Master Plan for the acceleration and expansion of Indonesia's economic development (MP3EI) acknowledges the importance of the manufacturing sector for economic growth.*



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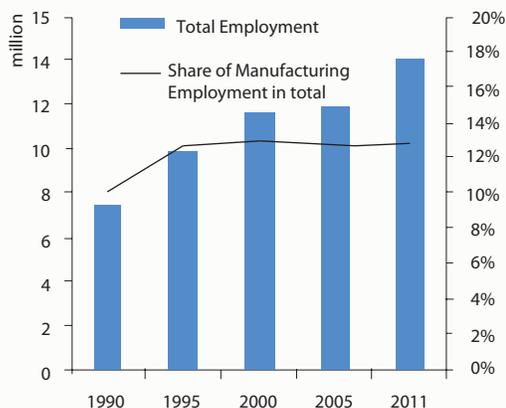
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## 1. A Snapshot of the Indonesian Manufacturing Sector

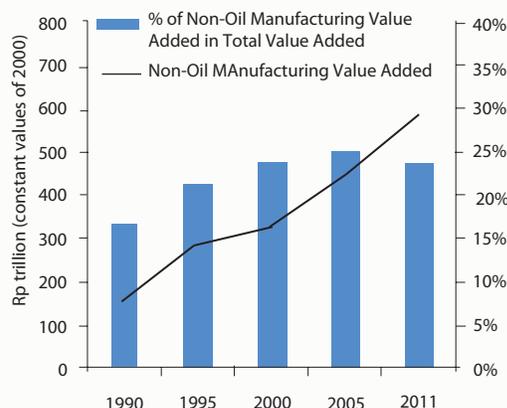
The non-oil and gas manufacturing sector has been a key player in Indonesia's economy. It employs about 14 million Indonesians, accounting for about 13 percent of total employment in the economy. It creates one out of every four rupiahs of added value in the economy, and generates half of the foreign exchange export revenues of the economy.<sup>1</sup> (Figure 1, 2 and 3).

**Figure 1: How many jobs does manufacturing create?**



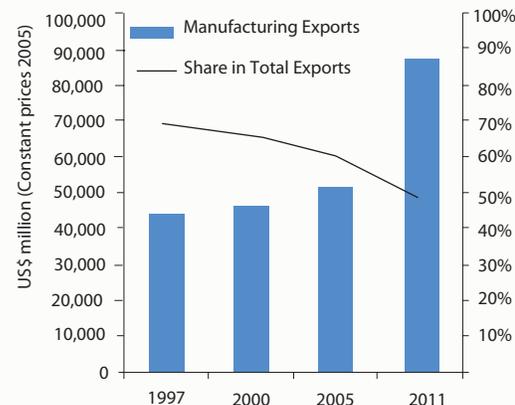
Sources: BPS.

**Figure 2: How much does manufacturing produce? (manufacturing real GDP, 1997=100)**



Sources: BPS.

**Figure 3: How much does manufacturing export?**



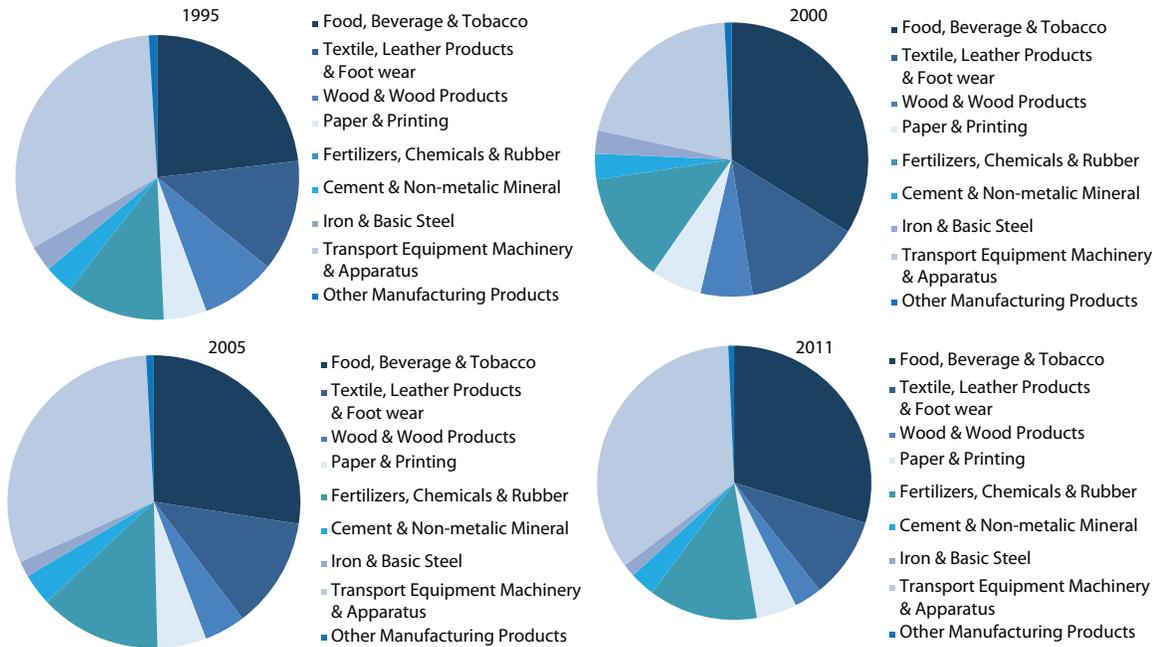
Sources: BPS.

**The structure of the sector has changed over the past 15 years.** This change involves an increase in importance of natural resource-based sectors, such as food, beverages, tobacco, fertilizer, chemicals and rubber, and a decrease in importance of labor-intensive sectors, such as textiles, leather and footwear, and wood and wood products. Other sectors, such as transport equipment, machinery and apparatus have increased their share of total manufacturing value-added over the years (Figure 4)

**These sectoral changes are also reflected in the structure of exports.** Indonesia made a significant progress in exporting natural resource-based commodities. Indonesia has taken advantage of the global commodities boom, and exports of natural resource based commodities increased both in absolute terms, and as a share of total exports (Figure 5 and 6).

<sup>1</sup> Unlike the share in employment or in value added, the share of non-oil manufacturing exports in total exports has declined from about 70 percent in 1997 to 50 percent in 2011. This decline is likely to be related to two factors: (i) a rapidly increasing domestic demand that shifted, to some extent, manufacturing goods to domestic consumers, and (ii) a natural resource price boom after 2005 that contributed to a rapid increase in exports of natural resources relative to other products.

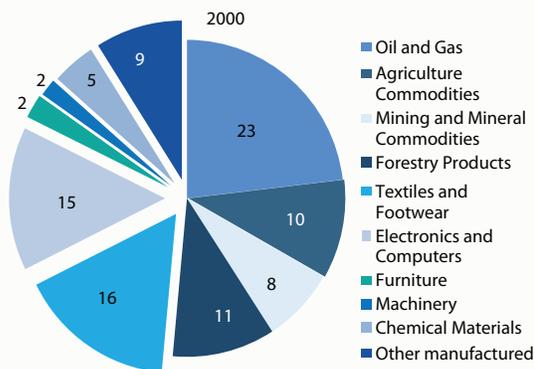
Figure 4: What is the composition of manufacturing value added by sector?



Source: BPS

Figure 5: What was the structure of manufacturing exports in 2000?

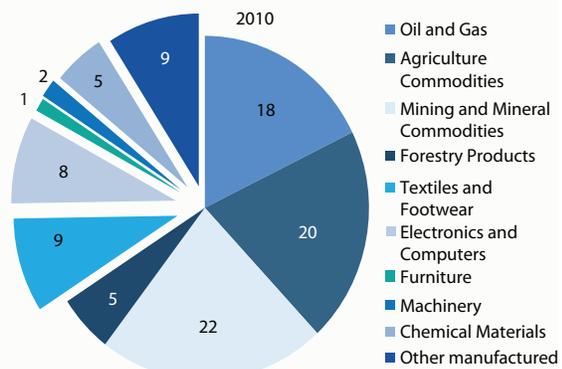
(the share of export by sector, percent)



Sources: BPS.

Figure 6: ...and in 2010?

(the share of export by sector, percent)



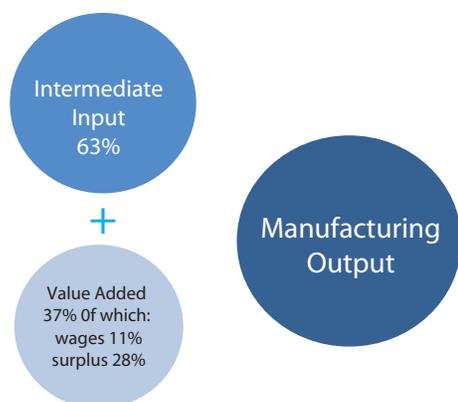
Sources: BPS.

## 2. How is manufacturing linked with the rest of the economy?

More than one third of manufacturing output corresponds to value-added, while about two thirds correspond to intermediate inputs. In turn, about half of those intermediate inputs originate from other manufacturers, 17 percent from agriculture, and 14 percent from mining, while the remaining 22 percent originate from the service sectors (Figure 7 and Figure 8).

**Figure 7: What is the portion of value added in manufacturing?**

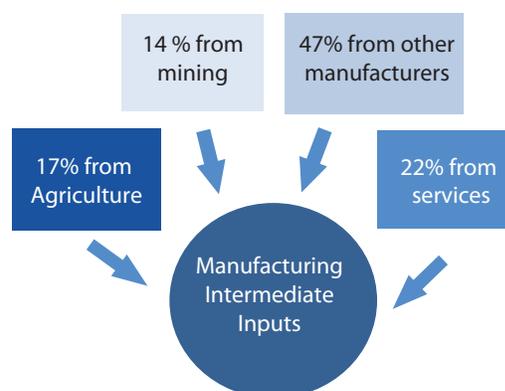
(Output expansion by sector during highest-growth period)



Source: BPS.

**Figure 8: How linked is manufacturing in Indonesia with other sectors in the economy?**

(Formal jobs by sector, August 2010, percent)



Source: BPS.

### 3. Context

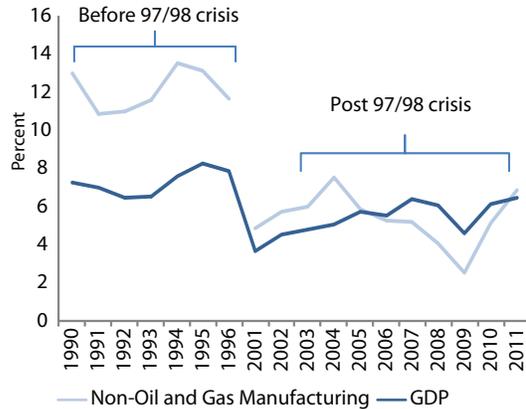
**Manufacturing output has exhibited strong growth in recent quarters, but still lags well behind pre-Asian crisis growth rates.** Non-oil and gas manufacturing output in Indonesia grew by on average 12 percent per year between 1990 and 1996. After the Asian financial crisis of 1997/98, manufacturing activities that once were the major drivers of industrialization in Indonesia fell into a ‘growth recession’ and contributed considerably less to GDP growth (Figure 9). The global financial crisis of 2008 accelerated this downward trend. However, Indonesia’s manufacturing index started to recover in the fourth quarter of 2009 and grew at a rate of 4.5 percent year-on-year (Figure 10). Since the fourth quarter of 2010, output of medium and large manufacturing firms has further increased and reached 5.6 percent year-on-year in the third quarter of 2011. The main drivers of this recent boost in manufacturing output growth were automotive machines and parts (29.8 percent year-on-year), chemicals (19.8 percent year-on-year), and basic metals (14.2 percent year-on-year). Despite this recent upswing, manufacturing output still lags well behind the levels seen in the period before the Asian crisis.

**Resilience in domestic demand has played an important role in the recent pick-up in Indonesia’s manufacturing sector.** The recent boost in manufacturing output growth can be attributed to the importance of domestic demand, which has increased particularly for basic metals, food, chemicals, and automotive parts. Domestic demand has demonstrated remarkable resilience since the start of the global financial crisis. It grew by 5.4 percent in the first three quarters of 2011 year-on-year (Figure 9) due to stable growth in private consumption, contributing 2.7 percentage points to real GDP growth on 2010.<sup>2</sup> Real investment in machinery also recovered quickly despite being more vulnerable to the business cycle, as shown by a contribution of only 0.79 of a percentage point to real GDP growth in 2009 compared with 2.67 percentage points in 2008, and grew by on average 17 percent year-on-year during the first three quarters of 2011 (Figure 10, right scale).

<sup>2</sup> Domestic demand is defined as private consumption, government consumption, and gross fixed capital formulation.

**Figure 9: Growth recession in Indonesia's manufacturing sector**

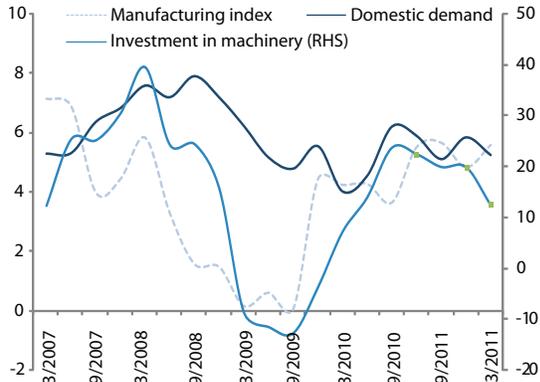
(Real GDP and manufacturing growth, percent)



Source: BPS.

**Figure 10: Manufacturing activities recovered from global financial crisis**

(Real growth in manufacturing, domestic demand, and investment, percent)



Source: BPS.

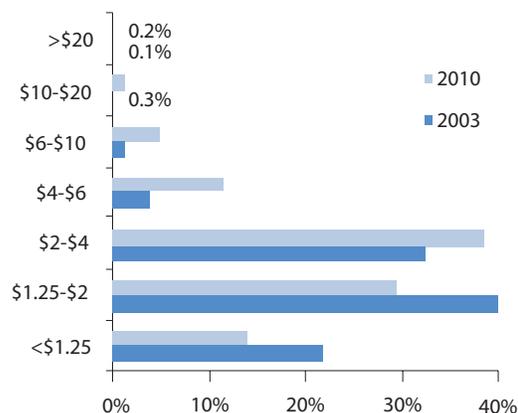
**At the same time, foreign direct investment in Indonesia's manufacturing sector has been increasing.** Recent BKPM data suggest that in the third quarter of 2011 foreign investment realization in manufacturing activities in Indonesia reached US\$5.2 billion, or a 106.8 percent increase year-on-year, the strongest increase over the past five years. BKPM data also reveal that a significant increase in foreign investment realization in manufacturing occurred in textiles, clothing, and footwear (TCF), together with machinery and electronics. Media reports highlighted that increasing wages in China, particularly in its industrial cities, have triggered firms in labor-intensive industries such as TCF to relocate to Cambodia and Indonesia. Once operational, these firms are also likely to play an important role in driving Indonesia's exports of TCF products. Japanese automotive makers are also expected to significantly increase their presence in Indonesia as Japanese manufacturing firms develop new supplier networks (Tier 1).

**Favorable demographics, higher per-capita GDP growth and a rapidly growing middle class are increasingly attracting market-seeking firms.** In 2010, Indonesia's labor force represented 65 percent of Indonesia's total population of 239 million, and average growth of real GDP per capita is expected to reach 6 percent in the next decade. Between 2003 and 2010, Indonesia's share of the middle class, defined as people who spend between US\$2 and US\$20 per day, rose from 37.7 to 56.5 percent. At the same time, the share of people spending less than US\$2 per day declined from 62.2 to 43.3 percent (Figure 11). In addition, Indonesia has a very young population with 56 percent under 30 years of age.<sup>3</sup> All these factors explain the predominance of market-oriented motives, in particular domestic market growth potential, for foreign firms investing in Indonesia (Figure 12). But domestic exporters have also been increasingly considering Indonesia's domestic market potential as an alternative source of demand.

<sup>3</sup> Based on BPS data for 2005.

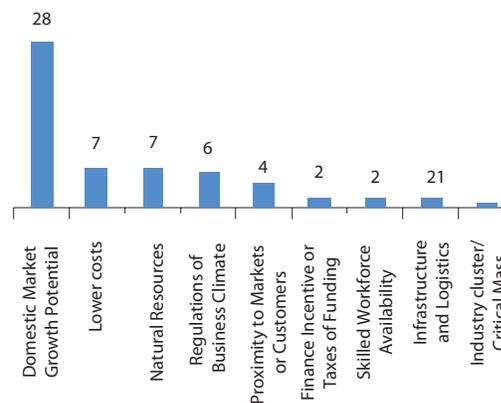
**Figure 11: More Indonesians are entering the “middle class”...**

(Distribution of population by per-capita expenditure per day, US\$ in 2005 PPP)



**Figure 12: ...which affected foreign firms’ decision to invest.**

(Location determinants for FDI in Indonesian manufacturing)



Source: World Bank staff calculations based on Susenas (Figure 3) and The Financial Times 2010 (Figure 4). NB: Location determinants based on 59 projects between January 2003 and October 2011.

## 4. Creating Higher-Productivity Jobs

Turning the positive momentum in Indonesia’s manufacturing sector into a strong and sustainable growth path is essential to create higher-productivity jobs. The manufacturing sector is well equipped to achieve this goal for at least four reasons: (i) it offers great opportunities for job creation and facilitates structural transformation; (ii) it shows higher labor productivity than most other sectors; (iii) it is an important source of formal jobs and social upgrading; and (iv) it promotes more opportunities for closing the gender gap.

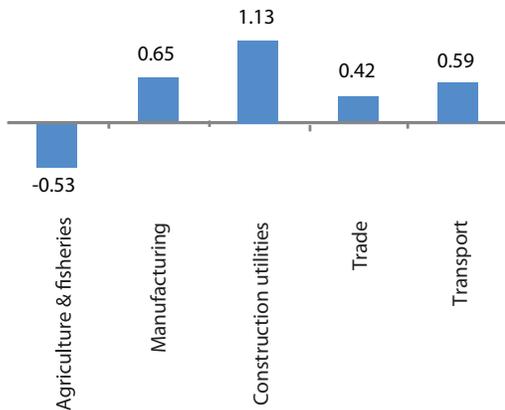
### a. Dynamic Linkages and More Jobs

The manufacturing sector offers an opportunity for economy-wide employment creation because of linkage and spillover effects. Indonesia’s manufacturing sector accounted for 12 percent of total employment in 2009 compared with 10 percent in 1990. Manufacturing sector growth not only generates jobs within its own sector, but also in other sectors. Between 1990 and 2009, Indonesia’s manufacturing sector growth was associated with an increase in services employment, especially in construction and transport and, to a lesser extent, also trade (Figure 13). This is the result of manufacturing receiving 30 percent of all inputs produced by the Indonesian services sector.<sup>4</sup> The opportunity for such linkage and spillover effects is stronger for manufacturing than for agriculture or mining. Although manufacturing growth facilitated labor migration from agriculture and fisheries, these sectors are not exclusively substitutes. The expansion of certain manufacturing sectors, such as food processing, can contribute to employment creation in rural areas. Moreover, selling agricultural products to (global) food processing chains rather than wholesalers tends to result in higher sales prices and longer-term contracts.

<sup>4</sup> Based on input-output data (domestically produced inputs) for 2005.

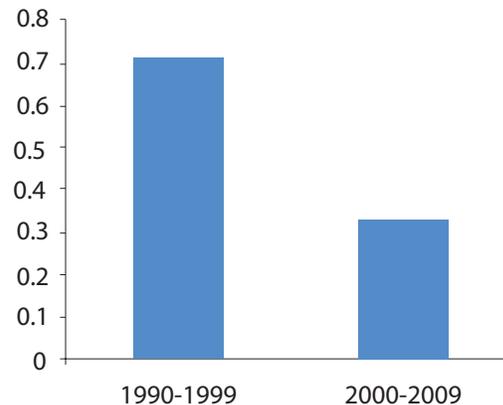
**Figure 13: Growth in Indonesia's manufacturing has an economy-wide impact on employment...**

(Sectoral employment elasticities to manufacturing sector growth, 1990-2009)



**Figure 14: ...but the manufacturing employment-value added elasticity dropped substantially**

(Manufacturing employment-value added elasticity (%), 1990-1999 vs. 2000-2009)



Source: World Bank staff estimates. Note: Elasticity from SUR coefficient of growth in sectoral employment on growth of manufacturing PDB using Sakernas and national account data (Figure 5). Manufacturing census data is used to generate Figure 6.

**Despite the importance of Indonesia's manufacturing sector for job creation, employment-value-added elasticity within its own sector has declined.** While a 1 percent increase in manufacturing value-added led to average manufacturing employment growth of 0.7 percent in the 1990s, employment-value-added elasticity fell to only 0.3 percent in the 2000s (Figure 14). This implies that each 1 percent increase in manufacturing value-added created roughly 46,000 manufacturing jobs during the 1990s compared with 36,000 jobs one decade later. What might explain the decline in employment-value-added elasticity within the manufacturing sector? One explanation may be that the composition of the manufacturing sector shifted away from labor-intensive manufacturing industries to resource-based and capital-intensive sectors, especially between 2005 and 2010. Second, labor intensity within firms declined during the 2000s, especially in the textile, garment, wood-products and furniture industries, which all show higher-than-average value-added-employment elasticities. This finding will be discussed in more detail in Policy Note 5.

## b. Higher Labor Productivity

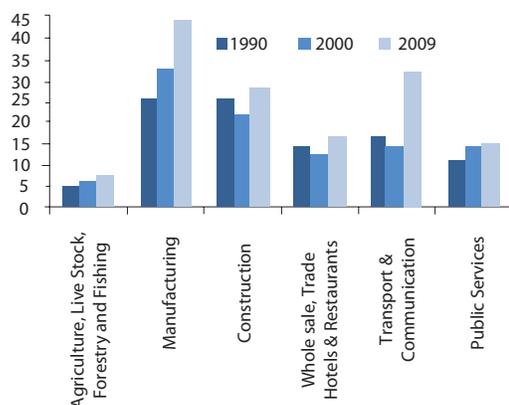
**Indonesia's manufacturing sector exhibits higher labor productivity than the agriculture and traditional services sectors.** In 2009, average labor productivity, measured as GDP per worker, was more than six times higher in Indonesian manufacturing than in agriculture, around three times higher than in the public sector and wholesale and retail, hotels and restaurants, and around 1.5 times higher than in construction, transport and communications (Figure 15). This is important, because higher labor productivity relates to better pay and higher-value jobs, as well as productivity enhancing structural change. The latter requires that labor shifts from low-productivity to high-productivity activities, but is constrained by the number of workers it can additionally absorb from agriculture in the process of the transformation.<sup>5</sup> Although labor productivity levels were three times higher in finance and mining and almost twice as high in utilities as in manufacturing (not shown), these three sectors combined employed less than 3 percent of the Indonesian workforce in 2009,

<sup>5</sup> McMillan and Rodrik (2011).

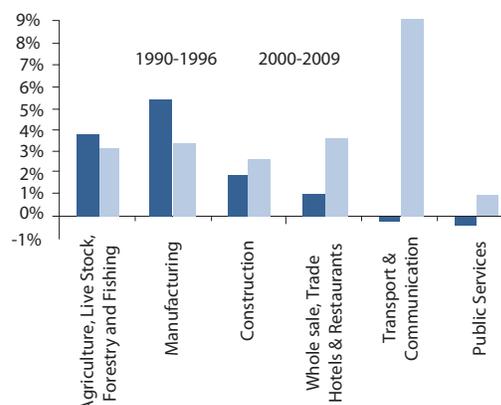
less than a quarter of the workforce employed in manufacturing. Regardless of the high productivity levels, labor productivity growth in manufacturing was lower in 2000-09 compared with 1990-96 (Figure 16). This may account for the 'growth recession' experienced in the years after the 1997/98 Asian financial crisis (Figure 9).

**Figure 15: Higher labor productivity in manufacturing than in other sectors...**

Labor productivity by broad sector, Rp million per person employed (2000 prices)



**Figure 16: ... but labor productivity growth has declined**



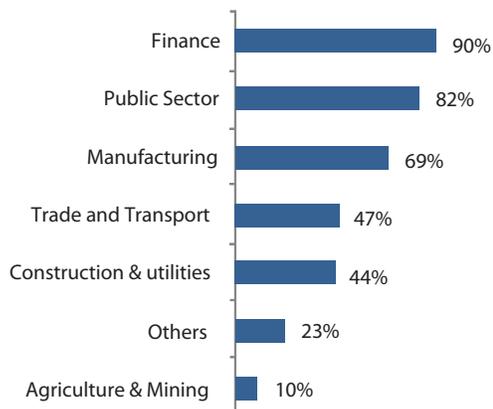
Source: World Bank staff calculations based on BPS data. NB: Labor productivity is defined as output per person employed. The analysis excludes mining and quarrying; utilities; and finance because of extremely high labor productivity levels.

### c. Social Upgrading

**Higher productivity in manufacturing helps Indonesia create more formal and high-value jobs, providing opportunities to move out of subsistence activities and raise living standards.** With about 1.5 million new entrants into the labor force every year, a robust and expanding manufacturing sector is an essential source of formal jobs. Only finance and the public sector offer more formal jobs relative to total number of employees. In comparison, less than half of the jobs in the services sectors and only one tenth of the jobs in agriculture and mining are formal (Figure 17). In addition, the manufacturing sector experienced relatively stable wage increases. Real monthly wages in the manufacturing sector rose from Rp 154,000 in 1995 to Rp 469,000 in 2009. Relative to other sectors, manufacturing also offers the highest level of real wages for secondary school graduates with wages doubling from Rp 193,000 in 1995 to Rp 376,000 in 2009 (Figure 18). This is particularly important as the number of secondary school graduates expanded faster than the number of graduates with primary or tertiary education. Between 1995 and 2009, the share of the labor force with secondary education almost doubled from 12 to 22 percent, whereas the share with primary education dropped from 64 to 55 percent. It is expected that the labor force with secondary education could overtake those with primary education and dominate Indonesia's labor force in the coming decades.

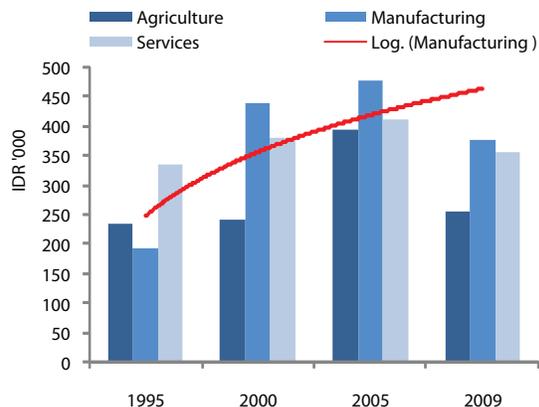
**Figure 17: Manufacturing offers additional sources for formal jobs...**

(Formal jobs by sector, August 2010, percent)



**Figure 18: ...with higher average wages even for those without a college degree**

(Real monthly wages for secondary graduates by sector, Rp '000)



Sources: World Bank staff calculations based on Sakernas Data (Figure 17) and Employment Census (Figure 18).

#### d. Improving the Gender Gap

**Manufacturing industries promote more opportunities for female employment and a relatively lower gender gap in wages.** Labor-intensive manufacturing industries such as TCF employ largely female workers.<sup>6</sup> Our interviews and factory visits across Indonesia confirm that at least 80 percent of workers in those sectors are female. One reason for the higher employment opportunities in manufacturing could be that physical strength matters less in these manufacturing sectors. Moreover, the manufacturing sector is not only a means to create employment for women; it could also be a source to bolster household incomes. Analysis based on the Employment Census from 1995 to 2009 also illustrates that wages of male workers relative to female workers in the manufacturing sector were relatively less discriminatory compared with those in the services sector.

### 5. Sustaining Higher Economic Growth and Progress in Structural Change

*Besides the creation of higher-productivity jobs, manufacturing growth sustains higher economic growth and progress in structural transformation in at least three ways. The manufacturing sector: (i) is associated with a higher growth contribution due to its relative size and linkage effects; (ii) attracts more capital accumulation; and (iii) is less prone to demand shocks and price volatility.*

#### a. Higher Growth Contribution

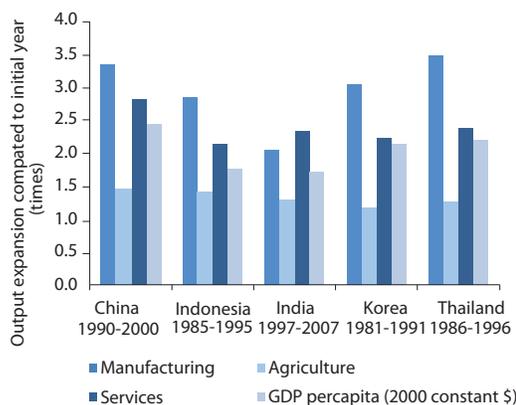
**The manufacturing sector is associated with a higher growth contribution compared with traditional sectors due to its relative size and linkage effects.** A country's GDP growth is positively related to the growth of its manufacturing sector, as has been famously formulated in Kaldor's (1966) first growth law.<sup>7</sup> As a result, a growing manufacturing share in GDP is expected to lead to faster GDP growth. Indonesia's manufacturing sector contributed 25.7 percent to GDP in 2010, compared with 20.6 percent in 1990. In addition, a growing manufacturing sector can lead to additional growth in related activities outside of subsistence agriculture due to positive linkage effects (Figure 13). The fastest growth period in major Asian economies was also associated with a rapid expansion of their

<sup>6</sup> Hallward-Driemeier, Rijkers, and Waxman (2011).

<sup>7</sup> Kaldor, N. (1966).

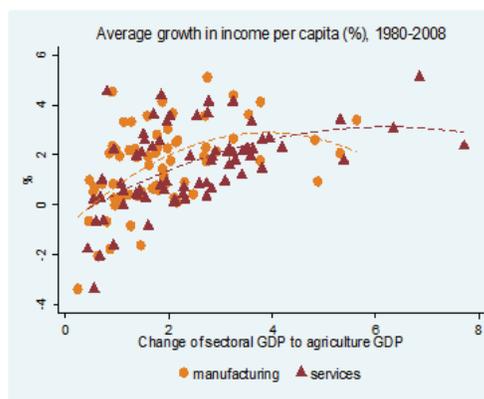
manufacturing sectors (Figure 19), which was typically accompanied by high growth in services. While some of these countries, especially China, Indonesia, South Korea and Thailand, followed export-led growth strategies, countries emulating an export structure more similar to that of rich countries also tended to grow faster.<sup>8</sup> Moreover, evidence across 70 countries for the period 1980-2008 suggests that a rapid increase in the share of manufacturing and services activities relative to agriculture is associated with higher increases in income per-capita (Figure 20).

**Figure 19: Rapid transformation of East Asian countries is associated with high growth in manufacturing...**  
(Output expansion by sector during highest-growth period)



Source: World Bank staff estimates based on WDI data.

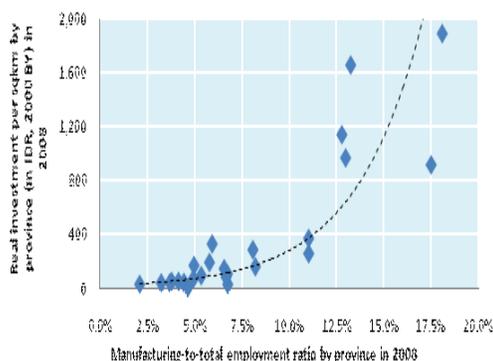
**Figure 20: ...and is also consistent with patterns of development across countries**  
(Structural transformation and increase in income per capita)



Source: World Bank staff estimates based on WDI data.

## b. More Capital Accumulation

**Figure 21: A higher proportion of manufacturing activities tends to attract more investment**  
(Investment per sq km vs. manufacturing-to-total employment ratio by province, 2008)



Source: World Bank staff calculations based on data from the Indonesia Statistical Office. NB: Excluding Jakarta DKI.

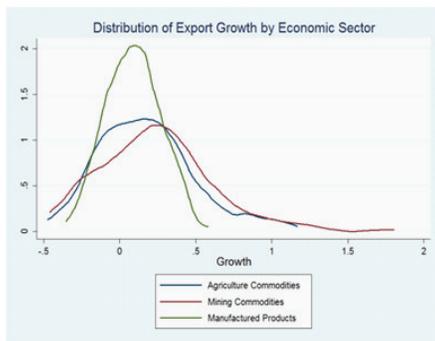
**Higher capital accumulation in the manufacturing sector helps to raise productivity and facilitate overall growth and structural transformation.** Capital accumulation is considered a key determinant of productivity growth. Manufacturing activities tend to attract more capital accumulation that can accelerate the transformation from low-productivity to high-productivity activities. In addition, the manufacturing sector, unlike agriculture, is characterized by scale and agglomeration economies. As a result, capital accumulation can be realized more easily in spatially concentrated manufacturing compared with spatially dispersed agriculture. Figure 21 confirms that real investment per square km tends to be higher in Indonesian provinces that show a higher percentage of manufacturing workers in total employment. Provinces with the highest investment per sq km are West Java, Yogyakarta, East Java, Bali, and Central Java.<sup>9</sup>

<sup>8</sup> Hausmann, Hwang and Rodrik (2007).

<sup>9</sup> The analysis excludes Jakarta DKI which has the highest investment per sq km.

### c. Lower Volatility

**Figure 22: The manufacturing sector has exhibited less volatile export growth.**  
(Density function for export growth (1998-2011))



Source: World Bank, based on BPS.

In Indonesia, the manufacturing sector has been less prone to volatility than the commodity sectors, suggesting that a growing manufacturing sector will contribute to more stable growth. Developing countries generally face a higher aggregate volatility than developed countries because exogenous shocks are bigger, they experience more domestic shocks, and they have weaker shock absorbers. Excessive concentration on commodities and resource-based manufacturing sectors can further increase growth volatility because such countries are more exposed to the costly boom-and-bust cycles associated with commodities. Indonesia is more prone to growth volatility with exports again being largely dominated by natural resource-based commodities, particularly agriculture commodities, and mining and minerals.

In fact, in Indonesia, manufacturing export growth has been less volatile than agriculture or mining export growth records (Figure 22).<sup>10</sup>

## 6. Positioning Indonesia to Achieve Long-term Prosperity

Finally, manufacturing growth is critical for Indonesia to achieve long-term prosperity through technological progress and quality upgrading. The manufacturing sector offers many opportunities for knowledge spillovers through foreign direct investment and international trade. Integration into global production networks (GPNs) allows Indonesian firms to absorb such knowledge spillovers strengthening local innovation capacities. In order to climb up the value chain, Indonesian firms have to internalize foreign knowledge and develop their own capabilities for technological progress and innovation.

### a. Learning Spillovers from Integration with the Global Economy

The opportunity to absorb learning spillovers through integration with the global economy is stronger in more knowledge-intensive industries such as manufacturing. Channels through which knowledge spillovers can be generated are linked to foreign direct investment, imports of intermediate products and capital equipment embodying foreign knowledge, and learning-by-exporting as exporting firms absorb from international buyers and competitors. Greater integration with the world economy thus gives Indonesia the possibility to benefit from the worldwide stock of available knowledge. Data for manufacturing firms located in Indonesia confirm that average spending on research and development (R&D) as a percentage of output is higher for firms that are integrated into the world economy. In 2006, foreign firms and exporters located in Indonesia showed R&D intensities that were around twice as high as those of the average manufacturing firm.<sup>11</sup> The opportunity to absorb learning spillovers through these channels is higher in more knowledge-intensive sectors such as manufacturing. Whether such learning spillovers can be

<sup>10</sup> Interestingly, recent research shows that the volatility of commodity prices is not necessarily higher than the volatility of manufactured goods (Arezki, R., d. Lederman and H. Zhao, 2011). One explanation for the lower volatility of value added or export growth in the sector is related to greater possibilities of diversification in manufacturing production bundles than in agriculture or mining.

<sup>11</sup> This analysis is based on the Indonesia manufacturing census covering firms with more than 20 employees only.

successfully absorbed by firms depends on various internal factors, such as firm age, experience, share of skilled workers, research intensity, and international integration, and external factors, such as a country's openness, geographic proximity to foreign firms, competition, learning and innovation in infrastructure, local institutions, and government policies.

## b. Global Production Networks

**Indonesia can facilitate technological progress by integrating more into global production networks.** Declining unit costs for transport and information technology reduce the cost of managing distant activities. As a consequence, multinational manufacturing companies have fragmented their value chains and perform production stages in different countries depending on their endowment and comparative advantage. The increasing fragmentation of production has resulted in a manufacturing sector that is now characterized “by the geographical fragmentation of productive processes and the offshoring of industrial tasks,”<sup>12</sup> but increasingly also services inputs. From a static point of view, participation in global production networks reduced opportunities for the backward linkages of manufacturing with other domestic sectors, as import leakages increase. However, in the long run, participation in global production networks facilitates technology transfers. Technology transfers, in turn will likely lead to increased productivity and growth, and to an increase in demand for domestic inputs as well.<sup>13</sup> Indonesia is still less integrated than most of its neighbors in the region. In 2010, components trade made up more than half of total manufacturing trade in the Philippines and Malaysia, and almost one third in Thailand (Figure 23). Indonesia, however, seems to be much less integrated into GPNs with the share of components in manufacturing trade reaching only 23 percent.

**Integration of Indonesian suppliers into global production networks increases the opportunity for knowledge spillovers.** Global production networks (GPNs) offer an opportunity for supplying firms in Indonesia to produce intermediate inputs and components that are low- to medium-skill intensive. Foreign entry of multinationals can lead to increased competition of local firms who seek to become their suppliers and, thus, increase productivity. International buyers generally also require their suppliers to produce inputs that are more knowledge-intensive and therefore often assist them with the upgrading their technological capabilities (e.g. through sharing of production techniques and product design). However, multinational firms may also prefer to rely on imported inputs from established suppliers abroad or require them to co-locate in the host country both limiting the FDI spillover potential.

**Integration of final producers into global production networks can also help Indonesia to accelerate industrialization.** Instead of building a complete array of supply chains through import substitution, Indonesian manufacturing producers can join existing supply chains of multinationals through cross-border trade of manufacturing intermediates and components.<sup>14</sup> Nevertheless, intermediate goods tend to be more sensitive to changing trade costs than final goods which may limit the possibility for domestic producers to rely on remote suppliers.<sup>15</sup> Stronger reliance on regional supply chains, however, can help Indonesian manufacturers to benefit from existing suppliers nearby, while reducing the risk of changing trade costs. Investments in infrastructure and improving the business climate are key factors for Indonesia to increase participation in global or regional production networks. But to advance the technological capacity of local firms, Indonesia needs to invest heavily in human development and innovation.

<sup>12</sup> WTO-IDE-JETRO (2011).

<sup>13</sup> Evidence for Indonesia suggests that sectors with higher import content in their exports (an indicator of how internationally integrated their production processes are) have grown faster, resulting in increased demand for domestic inputs as well.

<sup>14</sup> Baldwin (2012).

<sup>15</sup> Mirodout, Lanz, and Ragoussis (2009).

### c. Technological Progress and Innovation

**Building up local capabilities allows the manufacturing sector to take advantage of many opportunities for technological progress and innovation.** Industrial upgrading is associated with the production of higher value-added activities and, in the catching-up process, increasingly requires local innovation capabilities. The manufacturing sector has a large potential for innovation and industrial upgrading. Average data for the G7 countries confirm that R&D intensity<sup>16</sup> in 2005 was 2.8 percent in manufacturing compared with only 0.3 percent in services. Within manufacturing, R&D intensities in G7 countries were highest in electrical and optical equipment (8.8 percent) and chemicals (6.1 percent). Indonesia’s product basket has a comparative advantage in sectors with a low R&D intensity, such as food, TCF or metals, but also contains important sectors with a medium to high R&D intensity, such as chemicals, transport equipment, rubber and plastics. An expanding manufacturing sector in Indonesia would be beneficial to generate technological progress and innovation, especially against the background that Indonesia’s overall R&D expenditures as a percentage of GDP were only 0.05 percent in 2004-06 (Figure 23). They were substantially lower than in China (1.33 percent) and India (0.79 percent), and also the lowest in the region compared with Thailand (0.25 percent) and the Philippines (0.12 percent).

Figure 23: Indonesia has room to increase its participation in global manufacturing production networks...

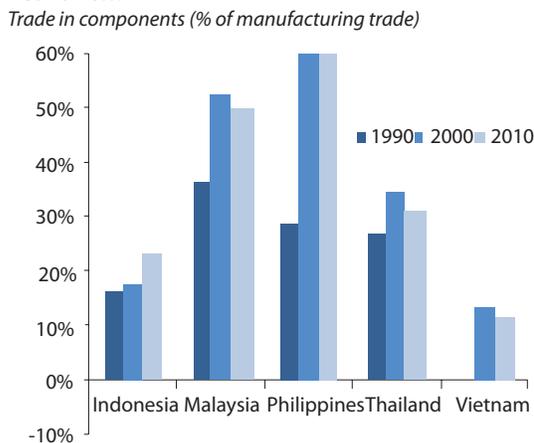
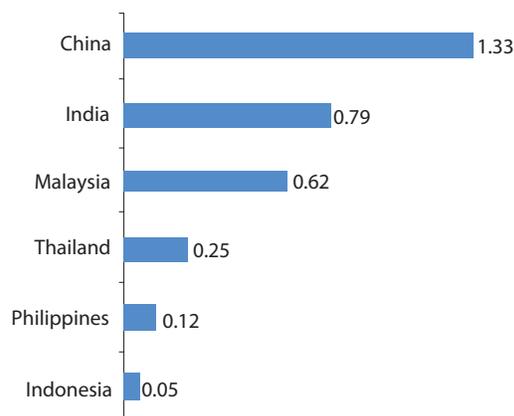


Figure 24: ... but also a large potential to increase R&D spending that facilitates innovation (R&D expenditures (% of GDP), 2004-06)



Source: World Bank staff calculations based on Comtrade (Figure 14) and WDI (Figure 15) data.

## 7. Conclusion

**This policy note argues that building on the current momentum of manufacturing growth is critical for Indonesia’s development.** Indonesia’s manufacturing sector supports the creation of higher-productivity jobs because it offers great opportunities for job creation and dynamic linkage effects, exhibits higher labor productivity, is an important source for formal jobs and social upgrading, and promotes more ways to close the gender gap. Manufacturing growth in Indonesia also sustains higher economic growth and progress in structural transformation, not only because the manufacturing sector is associated with a higher growth contribution, but also because it attracts more capital accumulation and is less prone to volatility. Finally, manufacturing growth is critical for

<sup>16</sup> R&D intensity is measured as business R&D spending as percentage of output. R&D expenditures data are drawn from the OECD STAN, R&D Expenditure in Industry (ANBERD) which covers business R&D and excludes government, public administration R&D expenditures, etc.

Indonesia to achieve long-term prosperity through technological progress and quality upgrading, e.g. via foreign direct investment and international trade. Building up local capabilities, in addition to stronger integration into GPNs, would allow the manufacturing sector to take advantage of many opportunities for technological progress and innovation.

**The recent government Master Plan for the acceleration and expansion of Indonesia's economic development (MP3EI) acknowledges the importance of the manufacturing sector for economic growth.** If Indonesia is to be among the top 10 economies by 2025, then this will require accelerating and sustaining real growth rates of between 7 and 9 percent per year. A key goal of MP3EI is therefore to raise manufacturing value-added, foster industrial upgrading, make distribution networks more efficient, and increase the capability of the manufacturing sector to access and utilize natural and human resources. This is to be achieved through large-scale investment in 22 main economic activities across six economic corridors<sup>17</sup> aiming to exploit Indonesia's local comparative advantages. The main range of traditional manufacturing activities will be based in the Java Economic Corridor, while natural-resource-intensive manufacturing activities will mainly be based in other economic corridors.

**But MP3EI's success in accelerating manufacturing growth will also depend on Indonesia's ability to provide the necessary "soft infrastructure".** The Master Plan emphasizes investment in hard infrastructure to strengthen national connectivity such as roads, seaports, airports, railways, power plants, and information and communication technologies. In order to attract more investment in labor-intensive or resource-based manufacturing sectors this will also require better policy coordination that provides certainty in regulations and lower transaction costs. The availability and accessibility of modern and competitive services will further accelerate the development of a modern manufacturing industry. Moreover, if Indonesia wishes to move up the value chain and beyond manufacturing activities directed by foreign firms with imported technologies, it needs to prepare to reach the next stage of industrial development based on knowledge. Following the examples of Taiwan and South Korea, which have successfully become industrialized economies, Indonesia would need to invest heavily in human resources and skills to improve its capacity to absorb foreign knowledge.<sup>18</sup> Maintaining openness to foreign trade and investment, while facilitating the development of local capabilities and internal competition, would be a step in the right direction.

<sup>17</sup> Sumatra Economic Corridor, Java Economic Corridor, Kalimantan Economic Corridor, Sulawesi Economic Corridor, Bali-Nusa Tenggara Economic Corridor, and Papua-Kepulauan Maluku Economic Corridor.

<sup>18</sup> Ohno (2009).

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