Transfer of Technology, MSMEs and Sustainable Development

The Indonesian Story

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Abstract

Indonesia is committed to working toward achieving 17 sustainable development goals (SDGs) by 2030. One group of business actors who play an important role in this endeavor is micro, small, and medium enterprises (MSMEs) because they are the largest source of job and business opportunities in the country. But to be able to fulfil this role, they need technological assistance and the Indonesian government hopes that foreign direct investment (FDI) can transfer technologies to local MSMEs through measures like subcontracting arrangements. This article discusses the importance of MSMEs in achieving sustainable economic development and the transfer of technology (ToT) through FDI to these enterprises in Indonesia. Although without strong evidence due to the lack of data and empirical research, it assumes that the government's efforts to promote ToT have not been very successful due to various problems in its ToT policy. It also discusses the ecosystem of technology transfer and diffusion in Indonesia.

Introduction

It has been recognized worldwide that micro, small and medium enterprises (MSMEs) play a vital role in economic development. Majority of business firms in developing and least developed countries, including small island developing states (SIDS) in the Asia-Pacific region, are MSMEs. Thus, MSMEs are critically important in this region for job creation, poverty alleviation, the improvement of income distribution, the development of the manufacturing industry, rural economic development, the growth of export especially manufactured goods, and gross domestic product (GDP) growth. Since MSMEs are labour intensive, they provide business opportunities to women and unemployed and less educated youths. In many countries, including Indonesia, MSMEs as a group are the biggest labour absorber (Tambunan, 2021). An International Finance Corporation report (IFC, 2017) extrapolating data from the World Bank Enterprise Surveys shows that there are close to 162 million formal MSMEs in developing and least developed countries, of which 41 million are microenterprises (MIEs) and 21 million are small and medium enterprises (SMEs). Countries like Brazil, China, and Nigeria contribute 67 per cent to the total number of MSMEs, which is equivalent to 109 million enterprises. There are close to 12 million MSMEs in China alone, which represent 56 per cent of all MSMEs in developing countries. China also has 44 million MIEs, which represent 31 per cent of all MIEs in developing countries. There is a large concentration of MSMEs in the East Asia region (64 million), followed by Sub-Saharan Africa, which has 44 million enterprises, the majority of which (97 per cent) are MIEs.

In developing economies in the Asia-Pacific region, more than 98 per cent of companies were considered MSMEs with more than half of the economies, including Indonesia, holding a share of more than 99 per cent (Table 1). This share has remained constant over the past decade for all economies. Based on how each economy defined its MSMEs and the availability of most recent data, nearly 150 million businesses in the region were considered as MSMEs, representing around 99.8 per cent of all businesses in the region. It is important to note that what is considered as MSMEs in one economy may not be considered as MSMEs in other economies given the fact that economies in the region define MSME differently.

Given their vital role discussed above, especially in poverty eradication, mostly amongst women, the United Nations (UN) has assigned a great role to MSMEs to take a lead in achieving most of the economic-related sustainable development goals (SDGs). They include promoting inclusive and sustainable economic growth, increasing productive employment opportunities and decent work especially for the poor and vulnerable, particularly women and youth, advancing sustainable industrialization and innovation, and creating a positive push for a higher quality of life, better education and good health for all (OCED, 2017, cited in Dasaraju et al., 2020). At least theoretically, as they are the greatest generator of employment and business opportunities in developing and least developed countries, MSMEs are the backbone of these countries in achieving the SDGs. But, for MSMEs to be able to play this role, they must be highly competitive and able to grow rapidly in a sustainable manner.

Table 1. Number of MSMEs in selected developing economies in the Asia-Pacific Region*

Economy	Total number (million)	% of total enterprises	Year
Brunei Darussalam	5.90	97.20	2017
China	21,921.10	99.60	2017
Indonesia	64,194.10	99.99	2018
Malaysia	907.10	98.50	2015
Papua New Guinea	49.50	13.00	2016
Philippines	920.70	99.60	2017
Singapore	262.60	99.50	2018
China Taipei	1,466.20	97.60	2018
Thailand	3,077.80	99.80	2018
Viet Nam	507.90	98.10	2017

Note: * The number of MSMEs was rounded up. Source: APEC (2020).

This is where the problem lies. MSMEs, especially micro and small enterprises (MSEs) in Indonesia as probably also in all other developing and least developed countries in Asia and Pacific, have many limitations in becoming a driving force for sustainable economic development. The limitations include a lack of advanced (appropriate) technologies. Unfortunately, for these advanced technologies, Indonesian MSMEs are still much dependent on the transfer of technology (ToT) from outside including foreign direct investments (FDIs).

Although there are many ways for Indonesian MSMEs to obtain advanced technologies from outside, this paper focuses on the potential role of FDI as the main and more efficient source of technology. The Indonesian government hopes that all foreign companies can partner with local MSMEs through production linkages in the form of subcontracting and the ToT can take place through this form of business partnership.

Development of MSMEs

Data from the State Ministry of Cooperatives and SMEs (Menegkop & UKM) as well as the Central Statistics Agency (BPS) show that in 1997 there were approximately 39.765 million MSMEs representing 99.8 percent of the total business establishments in Indonesia. The number grew every year except in 1998 when the Asian financial crisis in 1997-98 hit Indonesia. However, when the national economy began to recover in 1999, the number of MSMEs started to grow again to 37.9 million enterprises or an increase of 2.98 per cent and the growth continued afterward. As Table 2 shows, the number of MSMEs was nearly 61.7 million units representing approximately 99 per cent of the total companies in Indonesia in 2016 and it increased to more than 64 million in 2018.

Sustainable Development Goals

Indonesia is committed to working toward the successful implementation of the SDGs. In this regard, the Indonesia's Presidential Regulation no. 59/2017 concerning the implementation of SDGs mandated the Ministry of National Development Planning of the Republic of Indonesia to provide the Roadmap of SDGs Indonesia. The roadmap defines issues and projections of main SDGs indicators in each goal, including its forward-looking policies to achieve such targets. From the projection exercises and intervention scenarios of the indicators, it is clear that the achievement of such targets needs strong collaboration among stakeholders and commitments in both activities and financing, as the gaps still remain for achieving the ambitious 2030 agenda (Bappenas, 2019).

Table 2. Number of firms and their workers by sub-category in Indonesia, 2016-2018

Description	unit of measure	2016		2018	
		Total	Share (%)	Total	Share (%)
MSMEs	Unit	61,651,177	99.99	64,194,057	99.99
LEs		5,370	0.01	5,550	0.01
Total companies		61,656,547	100.00	64,199,607	100,00
MSMEs	People	112,828,610	97.04	116,978,631	97.00
LEs		3,444,746	2.96	3.619,507	3.00
Total workers		116,273,356	100.00	120,598.138	100.00

Source: Menegkop & UKM (http://www.depkop.go.id/)

Notes: MSMEs = micro, small and medium enterprises; Les = large enterprises

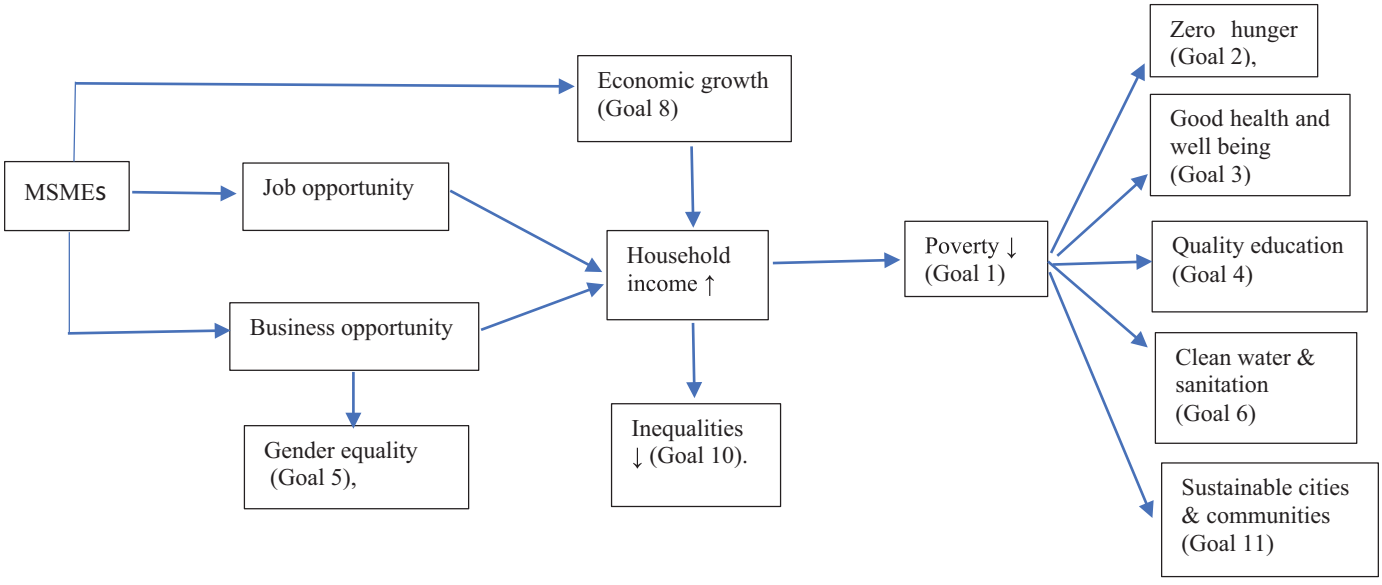

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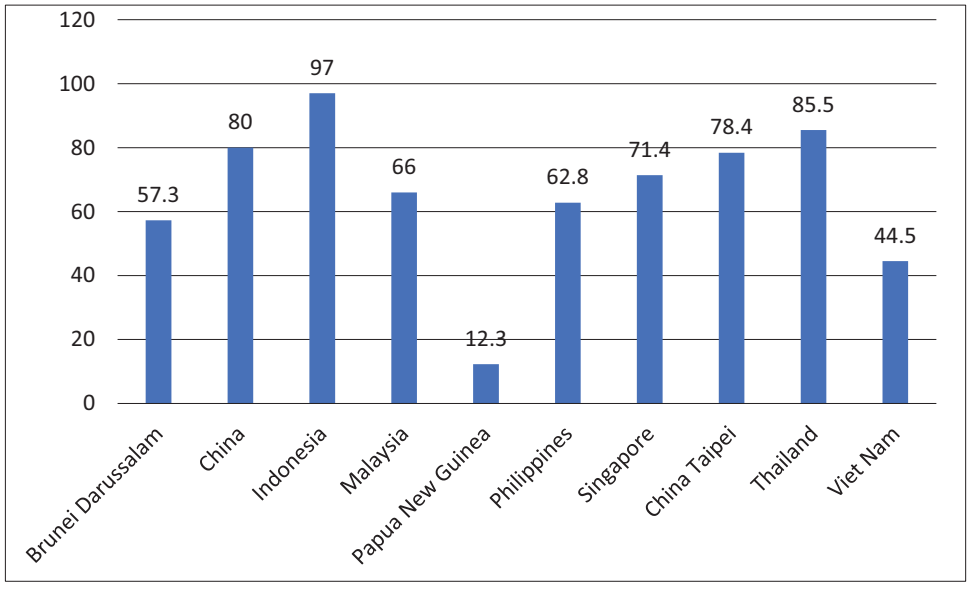
Figure 1. The role of MSMEs in achieving various SDGs

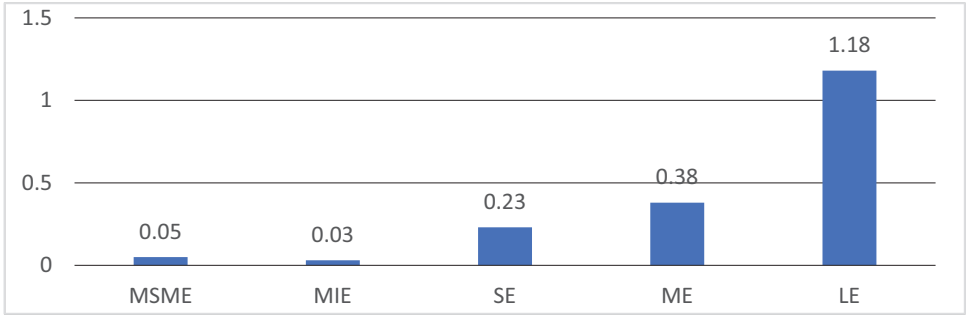
Among the stakeholders are MSMEs, and perhaps their most important role in sustainable development is as the largest source of job and business opportunities. Through the creation of job and business opportunities, MSMEs support the achievement of a number of sustainable development goals (SDGs) as Figure 1 illustrates.

In Asia Pacific, Indonesia is the economy with the largest ratio of workers in MSMEs to the total workforce. However, as shown in Figure 2, there are also many other developing economies in the region in which MSMEs absorb more than 60 per cent of the total workforce, and even a few having more than 80 per cent. It was also discovered that there were more than 950 million people employed by MSMEs across the region, depending on how each economy defines MSMEs and availability of data, and this number accounted for nearly two-thirds of the total employment in the region and remained constant for the past 5-10 years across the economies in the region with only Malaysia and Thailand observed to have experienced a substantial change over the reference period as indicated by an increase of 13.3 and 7.3 percentage points, respectively.



Source: APEC (2020)

Figure 2. Share of employment in MSMEs in selected developing economies in the Asia-Pacific region



Source: Menegkop & UKM/BPS

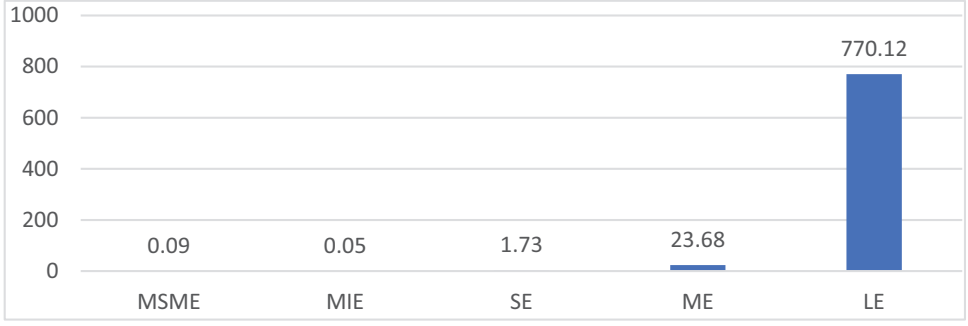
Figure 3. Labor productivity by business size in Indonesia, 2018 (IDR billion)

However, Indonesian MSMEs, particularly MIEs, have a serious problem, namely low productivity and competitiveness, and this threatens their sustainable development, which may also limit their contribution to the achievement of the country's sustainable economic growth and hence the various SDGs shown in Figure 1. Figure 3 shows that the value-added ratio (based on constant market prices) to the number of labors in the LE group (including FDI-based companies) is greater than that in the MSME group. Within the MSME group itself there are also striking differences. As can be seen in the figure, MIEs that mostly use family members as unpaid workers found to have the lowest ratio while the highest was recorded in MEs.

Figure 4 shows that there is a much greater difference in terms of productivity of firms (i.e., the ratio of output to the number of firms) between MSMEs and LEs when compared to the productivity of labor. Here too, MIEs have the lowest level of productivity within the MSME group.

Takii and Ramstetter (2005) attempted to measure the current technological capacity of Indonesian firms by comparing their levels of labour productivity with that of foreign firms. They compared the average levels of labour productivity, as determined by value-added labour ratio, of foreign-owned and domestic medium and large enterprises within the manufacturing sector in Indonesia. Their study shows that compared to fully locally owned enterprises, the average level of labour productivity was 388-745 per cent higher in minority foreign-owned firms, 436-594 per cent higher in majority foreign-owned firms, and 164-542 per cent higher in firms with foreign shares of 90 per cent or more. According to their finding, higher levels of labour productivity in local firms than in foreign firms were extremely rare. Since the productivity level is determined, among others, by technology, the difference in productivity can be considered as indirect evidence of Indonesian companies in general lacking technology compared to FDI-based companies.

Their finding supports the general assumption that in a developing country like Indonesia, foreign firms are more productive than local firms because they have relatively large endowments of firm-specific, generally intangible assets. One of the greatest of these intangible assets is assumed to be technological capacity. That minority foreign-owned enterprises appear to be less productive than majorly or heavily foreign firms supports the assumption that these enterprises restrict the access of minority-foreign affiliates to these firm-specific assets to avoid losing control of them.



Source: Menegkop & UKM/BPS

Figure 4. Productivity of firm by business size in Indonesia, 2018 (IDR billion)

With respect to competitiveness of MSMEs, one way to measure it is by estimating their share in total export. Based on the finding from the World Bank Enterprises Surveys, in the Asia-Pacific region, Indonesian MSMEs have a recorded share of around 13.2 per cent (Table 3). Only in Papua New Guinea, the share of MSMEs that exported directly was higher than that of LEs. In terms of the share of total sales that were exported directly by the company, this ranged from an average of 2.8 per cent for MSMEs in Thailand to 9.8 per cent for MSMEs in Malaysia. Again, apart from Papua New Guinea, LEs exported a higher share of their total sales than MSMEs did. This evidence strongly confirms that doing direct export is much more difficult than indirect export for MSMEs, especially MSEs.

Based on the above evidence, it can be argued that MSMEs in Indonesia, like in other developing and least developed countries, need to be empowered in, among others, technology. Since MSMEs, especially MSEs, have not generally been able to develop the technology they need by themselves, the ToT from outside, especially from FDIs, is very much needed.

Table 3. Exporters as a share of firms and exports as a share of total sales by size in several developing economies in the Asia-Pacific region (%)

Economy	Share of Firms Exported Directly			Share of Total Sales Exported Directly			Year
	MSEs	MEs	LEs	MSEs	MEs	LEs	
China	4.6	12.5	29.4	3.3	5.7	13.9	2012
Indonesia	5.3	7.9	25.2	2.9	5.0	11.7	2015
Malaysia	4.3	19.2	69.0	2.2	7.6	30.3	2015
Papua New Guinea	11.5	4.9	0.0	1.2	2.1	0.2	2015
Philippines	3.9	9.0	23.6	1.8	6.1	16.6	2015
Thailand	2.2	3.4	28.1	0.8	2.0	18.9	2016
Viet Nam	4.0	11.5	36.1	2.2	6.6	21.6	2015

Source: The World Bank Enterprise Surveys (www.enterprisesurveys.org.).

Note: The share of firms that exported directly included only companies with direct exports of at least 10 per cent of total annual sales.

FDI and transfer of technology

A company can obtain technology through internal and external sources—internal by doing own research and development (R&D), and external by getting technology from outside the company, either from other domestic companies, universities, R&D institutions or other agencies or through ToT from abroad.

By definition, ToT is the transfer of capabilities from technology producers to technology users or from technology owners to technology recipients. The most important thing in the ToT is know how a technology can be mastered by the users themselves. There are many channels through which the ToT can take place directly or indirectly. Among these, the most frequently mentioned in the literature are the following (e.g., Sarah Y. T., 2001; Thee Kian Wie, 2005; Egbu and Lee, 2007; Mahmoud et al., 2012; Tambunan, 2016):

i) Imported intermediate, capital or consumption goods that embody the technological know-how involved in their production. The reverse engineering of these imported goods promotes the ToT from the exporting companies to the importing companies. It can be assumed that this is also a very important channel for the ToT to Indonesia, as the country is heavily dependent on imports of many intermediate, capital and consumption goods.

ii) Attending trainings, workshops, seminars, or study abroad. This way is also effective for developing countries to get advanced technologies from developed countries. This was proven by Japan during the Meiji era when many engineers were sent abroad by the government mainly to the United Kingdom, Germany, and the United States to learn their advanced technologies. The Ministry of Education and the military selected the best graduates from educational or training institutes for continued study abroad (Oqubay and Ohno, 2019).

iii) Learning from the internet. The presence of the internet and Google makes it easy for people in developing countries to get knowledge or know-how in all areas from developed countries. This is probably the cheapest or most efficient mode of the ToT. The coverage of the ToT through this channel can be assumed to be much wider than the ToT through FDI, depending on internet conditions (ICT infrastructure and facilities) and the number of people who have access to the internet in a particular.

iv) Franchising. The ToT may also take place in connection with the system of franchising as it relates to the selling of goods and services. This form of marketing and distribution in which the owner of a business (the franchisor) grants to an individual or group of individuals (the franchisee) the right to run a business selling a product or providing a service directly to consumers using the franchisor's business system also provides knowledge or know-how to the franchisee. It is a business arrangement in which the reputation, technical information, and expertise of one party are combined with the investment of another

party for the purpose of selling goods or rendering services.

v) Licensing agreement. It is an arrangement by which a company, as the holder of the technology right, authorizes or permits another company to execute the rights of the relevant technology based on a licensing contract. When that permission is given, a "licence" has been granted. This enables the latter company to have access to the technology for commercial usage.

vi) Technical assistance. For instance, the Republic of Korea and Taiwan were able to build up production capabilities through the simple assembly of mature products for exports, often developed through technical assistance provided by foreign buyers. This process of coupling exports with technology development is called "export-led technology development" (Hobday 1994; cited in Tambunan, 2006).

vii) Turnkey project. A company entrusts the planning, construction, and operation of a factory to a single technology supplier or to a very limited number of technology suppliers. Thus, the turnkey project may involve a comprehensive arrangement in which a company undertakes to hand over to another company as the technology recipient an entire industrial plant that is capable of operating in accordance with agreed performance standards.

viii) Management contract. It is an arrangement under which the operational control of a company is vested by contract in another company that performs the necessary managerial functions in return for a fee. A management contract involves not just selling a method of doing things but also actually doing it.

ix) Foreign direct investment (FDI). A company from a country that owns advanced technology makes investment in another country and at same time its local affiliates or local suppliers can gain access to its new technology and know-how directly and effectively.

Although other channels, especially the import of equipment and other capital goods (e.g., machinery and tools needed for the manufacture of products or the application of a process) and the internet, are important ToT channels, the Indonesian government relies on FDI more than any other channel for ToT. However, so far there is no strong evidence that foreign firms in Indonesia have indeed transferred their technologies to their local partners.

Because of the resources it brings and the attributes embedded in it, FDI is expected to bolster technology capabilities of local industries through the ToT and spillover effects. Foreign companies that own advanced technologies and have production linkages through subcontracting arrangements with local domestic suppliers of components and parts, for instance, may bring new opportunities and challenges to them to improve their technology capability or to innovate. The foreign companies as the buyers provide direct training to their domestic suppliers to meet technical standards for their components and parts. They may also provide direct training to the domestic retailers of their products. Thee and Pangestu (1994, cited by Tambunan, 2006), for instance, found that in an effort to increase their technological capability, Indonesian textile and garment manufacturers established strategic alliances with their Japanese counterparts to open up a vital channel of technology transfer. Similarly, business linkages with foreign firms have been a very important technology transfer channel for electronics firms, especially for consumer electronics and electronic components.

However, the evidence from their study suggests that the nature and extent of the transferred technology was limited to improvements in production capability, while more sophisticated activities that might help local firms upgrade their technological capabilities, including activities related to pre-investment, project implementation and technical changes in production or the product, were conducted by Japanese counterparts.

On the other hand, the ToT to developing and least developed countries tends primarily to impact only certain domestic, mainly larger and predominantly urban-based firms. Therefore, for the ToT to improve performance, especially productivity and competitiveness of all other companies, including MSMEs throughout the recipient countries, an effective mechanism is needed for the domestic diffusion of technical knowledge from the first recipient firm to other domestic firms, or from a local university as the first recipient to local firms. The diffusion of technology ("spillover" effects) can occur in various ways. It can occur when the domestic suppliers as the first recipient firms also have business linkages with other domestic firms or by means of magazines and newspapers, education programs and documentaries on television, seminars, workshops, training, plant visiting, and exhibitions. It can also occur if, for instance, an Indonesian manager or senior technician in a foreign firm leaves this firm to work in an Indonesian firm. The knowledge and experience this employee gained while working for the foreign firm is then deployed in the new job in the national firm (Tambunan, 2006).

Unfortunately, empirical studies on FDI as a channel for the ToT in Indonesia fail to provide strong evidence to support the general view that there is a significant degree of the ToT and spillover effect from foreign firms located in Indonesia to Indonesian firms. Moreover, whether the ToT will have a positive effect on the recipient Indonesian firms and hence the country's economic development depends on the absorptive capacity of Indonesian firms; that is, their ability to understand, assimilate, and make effective use of the transferred technology (Tambunan, 2006).

Referring to the importance of the ability of domestic companies to absorb technologies from abroad, the Law Number 18 of 2002 on the National System of Research, Development and Application of Science states that the ToT through FDI from developed countries has the potential to generate significant economic impacts on Indonesia if the business activities of the foreign companies in the country can be linked to a network of domestic firms in the production value-added chain. However, the ToT through this channel cannot run effectively if domestic firms are not ready yet or unable to meet international

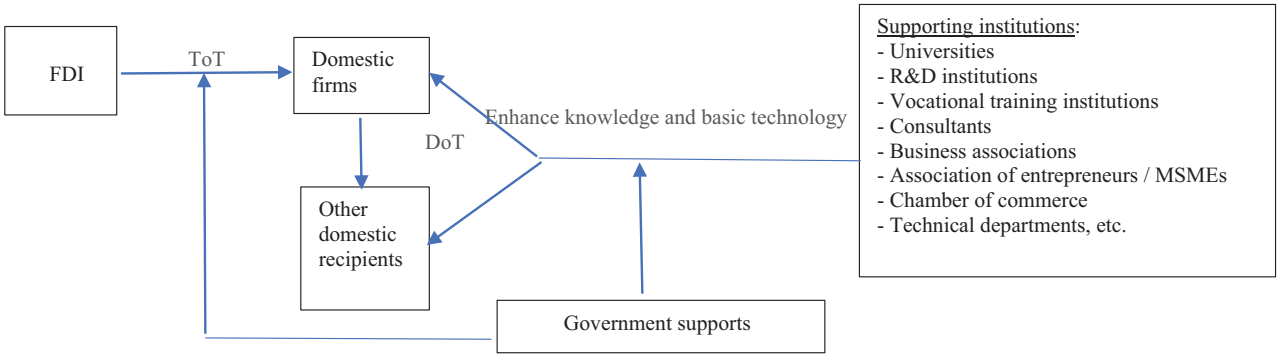
standards of quality, performance, and technology costs so that they do not have the eligibility to act as suppliers of these foreign companies (Sulastri, 2014).

To find out the extent to which Indonesian MSMEs are able to absorb advanced technologies brought by FDI, Tambunan has investigated production activities in a metalworking industry cluster in Tegal District located near the north coast of Central Java in Indonesia. There were several large-sized private companies that subcontracted work to Tegal metal workshops including *PT Komatsu Indonesia Tbk*, *PT Daihatsu*, and some divisions of the Astra Group such as *PT Sanwa* and *PT Katshusiro*. These companies often source metal components from several parts of the country, mostly in West Java. Among these companies, the most prominent was *PT Komatsu Indonesia Tbk*, which was a subsidiary of a Japanese company that established subcontracting production linkages with Tegal metal workshops in 1998. This company produced various types of equipment for construction and mining activities under the global trademark of Komatsu, such as hydraulic excavators, bulldozers, motor graders, frames and related components, cast steel products as well as dump tracks. The finding suggests that within the MSME group, MEs derived more benefits from the presence of FDI than their smaller counterparts, as they are better able to meet requirements to become subcontractors to various affiliates of Japanese companies technologically and managerially. In other words, MEs are more ready than MSEs to absorb advanced technologies, whereas most MSEs, especially MIEs in the cluster, lack the technical ability to produce complicated components with the precision required by *PT Komatsu*, making it unlikely that they will receive subcontracting orders. MSEs often use second-hand or homemade equipment. They hire low-skilled, low-wage workers with little or no experience and rely on the shop-owner's technical knowledge. Since many plasma owners built their expertise through working in small shops and rarely have a formal academic training, they have difficulty reading technical drawings and instead rely on copying samples, leading to less accurate output (Tambunan, 2016). And if the diffusion of technology (DoT) from MEs to MSEs across the country does not run smoothly, the spillover effect will not materialize or the ToT will be limited to MEs; hence the presence of FDI will widen the technology gap between MEs and MSEs. As a further consequence, inequality will widen and poverty will aggravate, which will, in the end, make sustainable development efforts in Indonesia fail.

Therefore, for the ToT and DoT process to run smoothly with optimal results, it requires a well-designed ToT and DoT ecosystem that involves all key stakeholders, not only FDI as a technology provider and domestic companies as the first or direct recipient (ToT) and the second or indirect recipient (DoT) (Figure 6). Other key stakeholders are institutions that provide supports or assistance to recipient companies at the first layer (ToT) and the second layer (DoT) in enhancing their knowledge and basic technology to make them able to absorb new technologies. The government also has a crucial role to play to ensure that the ToT and the DoT actually occur and the process runs smoothly without any problems by, for instance, enforcing a law that requires foreign companies licensed to operate in the country to transfer their technology or knowledge to their local workers and/or partner (e.g., domestic suppliers of components) in any form; giving a fiscal incentive for foreign companies that transfer their technology; providing a special credit scheme for domestic companies that are candidates for technology recipients; and facilitating the implementation of the ToT such as (i) creating a special website that contains ToT-related information, for instance, on foreign companies seeking local partners (e.g., component suppliers), the preconditions for partnering, the forms of incentive available for foreign companies doing the ToT, and forms of assistance available for local companies that will partner with foreign companies; and (ii) organizing business matching between foreign companies and potential local partners.

ToT policies and barriers

In the mid-1960s, foreign capital inflows into Indonesia were practically non-existent. Foreign involvement was limited to



Source: Created by the author

Figure 6. Ecosystem of ToT from FDI and DoT

oil and gas and a small number of other sectors and joint production sharing with countries from the socialist bloc. However, since the issuance of the investment law in 1967, FDI inflows into Indonesia began to enter mainly from Japan and The United States of America (USA). At that time, the Indonesian government began to realize that Indonesia could not carry out its economic development by its own strength because of constraints related to factors such as technology, skilled labour force, and capital. Indonesia desperately needs the presence of FDI especially from the West (i.e., including the USA) and Japan with the hope that it will bring advanced technologies and management know-how into the country.

Although the Indonesian government is aware of the importance of the ToT from FDI and has made some regulations to promote it, there have been a number of weaknesses so far. First, as a member country of the World Trade Organization (WTO) Indonesia has ratified the WTO convention through Law Number 7 of 1994. One of the attachments to the WTO is the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs Agreement). Consequently, Indonesia has adapted various intellectual property rights (IPR) laws to the provisions of the TRIPs Agreement. Article 7 of the agreement aims that the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations. Although one of the objectives of the TRIPs Agreement is to facilitate the spread of technology and ToT in the world, the Indonesian Intellectual Property Rights Act and other relevant laws do not regulate this matter clearly in their articles (Irawan, 2019).

Second, Indonesia already has the Government Regulation (PP) Number 20 of 2005 concerning the transfer of intellectual property technology of the and the of research and development results. But this PP does not cover technology transfer through foreign capital (FDI) or domestic investment by national companies while more than 80 per cent of technologies used in Indonesia originated from foreign countries, through either FDI or other sources.

In addition to this PP, Indonesia has several laws and regulations related to ToT issues, including laws on investment (no. 25, 2007), trade secret (no. 30, 2000), industrial design (no.31, 2000), patents (no.14, 2001), trademarks (no.15, 2001), copyrights (no.19, 2002), and the national system of research, development and application of science and technology (no. 18, 2002) (Tampubolon, 2013). In the law on patents, there are two channels for the ToT to occur, namely licensing contracts and the implementation of patents by the government (government use principle) related to the interests of defence and security as well as urgent needs for the benefit of the community. ToT is regulated in Article 10 Paragraph (4) of Law no. 25 (2007), which states that investment companies that employ foreign workers are required to organize training and carry out technology transfer to Indonesian workers in accordance with the provisions of the legislation applicable (Irawan, 2019).

Researchers usually refer to the definition of technology transfer provided in the *Transnational Corporations and Technology Transfer: Effects and Policy Issues*:

The word "technology" itself is used in at least two senses. In the first, it means technical knowledge related or know-how, i.e., knowledge related to the methods and techniques of production of goods and services. In this sense it may include the human skills required for the application of these techniques, since it is difficult to separate such application from a knowledge of the techniques themselves. In the second, broader sense, "technology" also encompasses capital goods – tools, machinery, equipment, and entire production systems – that are themselves the embodiment of technical knowledge. In some instances, the term "embodied technology" is used to distinguish capital goods from technical knowledge proper (UNCTC, 1987, page 1).

By referring to this definition, some researchers in Indonesia have tried to estimate the extent of the ToT process in the country, and although data practically does not exist, they doubt it. Of course, this is not saying that the ToT does not happen at all, but perhaps only a handful of foreign companies in Indonesia transfer their technology. In his research on the role of FDI in the ToT from a legal perspective, Irawan (2019) concludes that due to the aforementioned weaknesses, the presence of foreign companies in Indonesia are not followed by a fairly significant ToT to the country while in foreign companies in the country got a lot of investment facilities such as tax breaks, duty exemptions, land, repatriation of profits. Therefore, according to him, Indonesia needs to make a clearer rule for the ToT, and it can be done in two ways, namely through amendments or revisions of various existing laws and regulations and by making special laws on technology transfer. Some of the important things to be regulated include (i) the rules for investment contracts or technology licenses that do not limit the occurrence of ToT, (ii) the obligation to transfer technology from foreign investment companies to national companies, and (iii) the obligation of foreign investment companies that have strategic technology or which are of great importance to Indonesia to cooperate with national companies (state-owned or private companies) and transfer technology.

Sulastri (2014) also shares the same opinion that although Indonesia has a law on investment, which also requires foreign firms operating in the country to transfer their technology or know-how to their domestic partners, the foreign investment destination related to the ToT has not been seen in real terms, especially in the area of human resource development. She identifies one obstacle at the root of Indonesia's ToT problem, namely the law that regulates ToT. The ToT through FDI in Indonesia does not yet have a clear set of regulations, so here, as she explained, the term "ToT" is only seen as an option for foreign investors, not as an obligation for all foreign companies in the country.

Other main constraints that hinder the ToT from FDI to Indonesian MSMEs, especially MSEs, include (*a*) low skilled workers, (*b*) minimal amount of capital, (*c*) low mastery of basic technology, (*d*) poor management practices and no clear organizational structure, and (*e*) no innovation culture inside the company.

Conclusion

The success of developing and least developed countries in Asia-Pacific and beyond in achieving the SDGs depends not only on appropriate government policies but also on the ability of business actors including MSMEs to achieve certain SDG-related targets such as high and sustainable economic growth, increased employment with higher average income per worker, more women involved as owners or managers of MSMEs, and higher competitiveness. However, to achieve all these, MSMEs and in particular MSEs should be empowered especially in the field of technology.

For technology, the Indonesian government has long hoped for the role of FDI. Even though data is not available, it is assumed that the ToT from foreign companies in Indonesia to local MSMEs has not occurred as expected, especially because the subcontracting arrangements between FDI and local MSMEs in Indonesia are relatively weak. Apart from subcontracting production linkages, the ToT or transfer of knowledge can also occur if local employees after working for many years in foreign companies come back to work in a national company or open their own businesses. But this is even more difficult to trace.

The conclusion of this paper is that the obstacles that hinder the smooth process of the ToT come from two sources, the first being government policies or regulations that have not been very supportive so far. There is no regulation that requires every foreign company in Indonesia to do the ToT to local MSMEs and imposes a penalty if they fail to do so. The second source of obstacles is the fact that that MSMEs, especially MSEs in the manufacturing industry, agriculture and mining, are not yet technologically and managerially ready to partner with foreign companies in the country. Therefore, the government, in collaboration with the private sector, including universities, business associations, and chambers of commerce, must fully support the preparation of MSMEs as potential suppliers to FDI, especially in technology and management. Prospective suppliers must have already mastered basic technology and good management.

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