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**Skills policy instruments for industrial development in
low and middle income countries**

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Introduction

Employment creation lies at the core of industrial strategies geared towards sustainable development. There seems to be consensus that labour markets have to generate more and better jobs to maximize the benefits of industrialization, which in turn increases real income and lifts people out of poverty. Both developed and developing countries are calling for improved skills policies to achieve job generation without compromising growth.

The patterns of skills required to be employed in the manufacturing sector depend not only on the given country's stage of development and industrialization, but also on its technological level and integration in global value chains (GVCs). While employability in low income countries can be correlated with improvements in basic levels of education and the TVET system, together with increased on-the-job training in the formal and informal sector, there is a greater emphasis in higher income countries on specialized high-level training, which stems not only from formal training but also from the close interaction between the industrial private sector and the education system. As industry becomes more sophisticated globally—a result of technological progress—so are the skills required to achieve excellence. Consequently, with the growing pace of technological change, the need for specialized technical skills has become more pressing. Therefore, the state together with the private sector needs to focus on improving and financing skills development programmes to develop or improve industrial competitiveness.

This working paper is divided into four parts. The first section explores the different stages of development and the different skill patterns required to link the process of structural change with skills development. It underlines that technical specialization increases when a shift towards sophisticated industries takes place. Furthermore, important considerations policymakers need to take when designing skills policies as well as youth and the informal sector are addressed. The second section provides insights on a range of skills policy instruments for low- and middle-income countries. The third section highlights some of the main skills policy instruments used by policymakers and describes the experiences of low- and middle income countries with regard to implementation of such instruments. The conclusion summarizes the key findings and gives recommendations for policymakers in the implementation of skills policies in low- and middle income countries.

1. Development and skills

1.1 Structural change and skills formation in low- and middle income countries

Lack of skills is often one of the most challenging obstacles in the labour markets of developing countries. Low income countries in particular face challenges when seeking to shift from agriculture to manufacturing without a solid skills base. Technological upgrading, productivity enhancement and GVC upgrading remain unlikely without the “right” skilled labour. According to a report of Deutsches Investitions- und Entwicklungsgesellschaft (DEG) et al. (2016), the private sector provides nine out of ten jobs in developing countries, whereas 38 per cent of private sector employers report difficulties finding adequately trained employees.

The type of skills required changes with structural transformation. When a low income economy undergoes the process of structural change, moving from a primarily agrarian-based economy to one dominated by industry, a new set of skills is defined. That is, manufacturing requires skills that were not needed in agriculture. Similarly, within the manufacturing sector, a shift away from basic assembly operations into R&D activities requires employees to have more specialized and advanced skills (Trilling and Fadel, 2009). Evidence from the EU shows that industrial sophistication and deepening leads to a growing need for medium- and high-skilled professionals (Table 1). The trend is similar in countries such as Brazil, China and India, where the rapid transition towards knowledge-intensive manufacturing is expected to create shortages of both high-skilled workers (such as engineers and scientists) and medium-skilled workers (such as technicians and factory workers) by 2030 (Manyika et al., 2012).

Table 1 Employment by qualification, EU-25 (2000s)

Skill level	1996	2001	2006	2015	2020
Low qualification	63,339	55,671	55,104	46,516	42,751
Medium qualification	89,127	102,799	102,291	111,752	115,423
High qualification	40,248	47,374	53,261	65,668	72,835

Source: CEDEFOP (2008)

As the patterns of skills required to compete in modern manufacturing have changed, so have the institutions and methods for skill formation. Traditional methods of education and training often prove inadequate today. In the traditional setting—which is often found in low income countries albeit not exclusively—industrial development often only entailed the improvement of the quantity and quality of primary (and secondary) schooling and basic technical skills, as well

as encouraging all forms of in-firm training. However, in middle income countries and in the emerging competitive setting, greater emphasis is placed on high-level, specialized training, with close interaction between education and industry to assess and communicate evolving needs (UNIDO, 2011). As technology requirements become more sophisticated, policies addressing secondary and tertiary education and training become more relevant.

It is clear that structural change triggers a significant shift from unskilled to skilled labour. This raises the question whether it is possible to identify the changes in the skill profile of a country that has moved from low-tech into high-tech production. While this is generally possible, there is a major constraint when classifying sectoral skill profiles: huge sectoral heterogeneity for skill intensity can lead to unrealistic and misleading generalizations. Evidence shows that activities within the same product group may require very different skill intensity. For instance, Bruno et al. argue that at the ISIC two-digit level, eight out of 24 industries cover either unskilled or skilled activities (Bruno et al., 2009). The case of agro-industry, considered in the structural change literature as a low-tech low-skill industry, is worth mentioning. On the one hand, industries such as fish and meat processing, belong to the very low skill intensity group; while on the other hand, the manufacture of wine, liquor and malt belongs to the very high skill intensity group. We find similar evidence at the most sophisticated end of the manufacturing spectrum: for instance, in electronics, skill intensity varies drastically from assembly to design. While structural change may be a useful tool to illustrate broad changes in skill intensity (from unskilled to skilled), sectoral heterogeneity makes generalizations irrelevant when designing skills policies.

The positioning of countries in GVCs is another way to link up structural change with skills development. Skills requirements do not depend on sector specialization as much as on the position of the country in the global value chain. At the entry level of GVCs, firms are likely to engage in low value added assembly operations, usually relying on a large but unskilled workforce; upgrading to mid-level GVCs entails more sophisticated processing activities which require technical competence; and reaching the highest level requires even more specialized skills to perform complex activities (Fernandez-Stark et al., 2012). This approach rightly implies that skill intensity cuts across all manufacturing industry, with each industry having room for skilled and unskilled workers. It is also true, however, that technology intensive industries, such as aircraft production, will have a greater demand for high skill labour, while less sophisticated industries, such as clothing, will require a less qualified workforce. Another general trend is that developing countries, especially low- and lower middle income countries participating in GVCs are more likely to be concentrated on the low- to medium value added

segments of the chain, while upper middle and high income economies tend to have a greater presence at the higher end (OECD, 2013).

How does education and training methods adapt (or change) to meet the demand for new skills as industry evolves? The requirements for skills development change depending on firms' level of industrial deepening within the chain (see Table 2). Each level calls for specific technological capabilities and skills, which can be developed through a combination of formal education and skill formation building on specific technology-based training. Despite the caveats presented earlier, this paper links the level of a country's industrial deepening with the technological capabilities of firms and the demand for skills. While reality is more complex, there is evidence that this categorization is generally accepted and that it makes sense.

Table 2 Linking structural change, skills demand, education and training

Level of industrial deepening	Technological capability	Skills demands	Education and training	In-firm training	Linkages to other players
Low level, simple assembly and processing activity mainly for the domestic market and the informal economy	Ability to master simple assembly technologies, copy simple designs and repair machines, but no capacity to adapt processes	Literacy, numeracy and simple technical and managerial training	Formal primary education, TVET	No formal in-firm training, except informal learning through repetition, trial and error and informal apprentice-ships	No likely links with other economic actors
Intermediate level, including export-oriented activities in light industry	Capability to undertake minor adaptations to processes and products, but little or no design/development capabilities	Low base of engineering and scientific skills. SMEs have low skill levels	Good secondary and technical schooling, TVET, management financial training	Some in-house training, mainly by export-oriented enterprises	Linkages with buyers and suppliers, but links to technology institutions very unlikely
Advanced and deep industrial structure, mainly in technology-intensive industries	Ability to monitor, import, adapt and operate state-of-the-art advanced technologies	Highly specialized manufacturing skills with a focus on technical subjects such as engineering and mathematics	Excellent quality tertiary technical education and specialized industrial training by TVET institutions. High levels of university-trained managers	Large investments in formal and informal in-firm training	Strong linkages with suppliers, buyers, consultants, universities and technology institutions

Source: See UNIDO (2013), adapted from Lall (2001)

Although the three categories introduced above may be present across the industrial spectrum, it is true that industries based on their technology and skill intensity can be overly represented in each one of the three. It is therefore useful to take a broad view on what industries are likely to be present in each category, particularly as structural change implies a shift in the composition of industrial activity.

- *Low level, simple assembly processing activities.* Such industries are often found in low income countries and tend to be simple and labour-intensive, with stable well-diffused technologies primarily embodied in capital equipment, low R&D expenditure and simple skill requirements. Labour costs tend to be a major element in terms of costs, and barriers to entry are relatively low. The market as a whole tends to grow slowly, with income elasticity generally below unity. Certain consumer products with high quality segments exist where brand names, skills, design and technological competence play a very important role. However, products of major interest for developing countries are in the lower quality segments, based on simple technologies and price competition. The most representative industries include textiles, garments, footwear and agro-industry.
- *Intermediate level of industrial structures:* Such industries lie at the core of industrial activity of catching up countries, comprising the bulk of skill and scale-intensive technologies in capital goods and intermediates. They have relatively complex technologies, moderate levels of R&D expenditure and require some scientific skills. The most representative industries include engineering, transport equipment, chemicals and other processing industries.
- *Advanced and deep industrial structure.* Such industries have advanced and fast-changing technologies, with high R&D investments, high levels of skills and place emphasis on product design, often found in upper-middle income and high income countries. The most innovative technologies may also require advanced technology infrastructure and close interactions between firms and between firms and research institutes. The most representative industries include electronic and electrical products, precision instruments, pharmaceuticals and the automobile industry.

The shift from low industrial deepening to advanced industrial structures entails both changes in technological capabilities as well as skill demand. The general trend is that as countries move from simple assembly technologies to importing, adapting and operating state-of-the-art technologies, the skill profile also evolves from basic production skills to highly specialized

professional ones. This evolutionary course from simple to complex structures also implies changes in the process of skill acquisition through formal education and in-firm learning.

Generally speaking, solid primary and secondary education plays a fundamental role in every country. Low and intermediate levels and certain forms of technical training delivered by TVET are necessary. Emphasis is placed on developing basic literacy and numeracy skills to operate simple technologies. Informal in-firm learning occurs through repetition, trial and error and apprenticeships, but few deliberate efforts by firms to invest in skills development are actually made. Salaries at this level are low and there is a high workforce turnover. Although links with buyers and suppliers at the intermediate level may have been established, the interaction does not generate 'learning' spillovers. Structural change towards advanced industrial structures requires skills to progressively tackle more complex and fast-changing technologies. Countries excelling in technology-intensive industries need a highly qualified labour force with a strong technical background – university enrolment in technical subjects such as science, mathematics, engineering and manufacturing is much higher than in other countries. Romijn and Albaladejo (2002) show that specialized knowledge and experience in science and engineering matter more than general managerial capabilities and intermediate-level technical skills in explaining high-tech firms' innovation excellence. Firms in such countries heavily invest in skills development through in-firm training but also through direct involvement in apprenticeship programmes. Specialized training offered by semi-public TVET institutions helps firms share training costs while guaranteeing the applicability of skills in the workplace. Institutions and firms become more aware of the need to invest in skill formation and training with structural change. The short- and long-term nature of skill investment, the inherent uncertainties and externalities of the process, and the multitude of public-private sector education and training schemes can lead to market failures in human resource formation. While policy support for skills development seems to be accepted worldwide, governments may fail to provide such support.

Indeed, with the growing pace of technological change in manufacturing and the shift from routine manual to more non-routine analytical and interactive activities, companies now put a premium on a workforce that is better prepared to learn and absorb new tasks. Problem solving as well as interpersonal skills such as communication and teamwork have become crucial for on-the-job learning, to the extent that some firms now prioritize these over other technical education when hiring staff due to the transferability of skills across sectors (Fernandez-Stark et al., 2012; Murnane and Levy, 1996; European Commission, 2011). The development of 'soft' transferable skills has become a crucial asset for employability, both in and outside manufacturing.

1.2 Considerations for skills policies

Most governments would agree that human capital is the most important driver of economic growth. Yet many countries, particularly in the developing world, have failed to address the skill challenge with successful interventions. This may be associated with supply-driven factors and the inability of governments to implement the ‘right’ policies. Firms complain about the lack of a qualified workforce, particularly as they move up the technology ladder. But the supply-demand mismatch for skills is also associated with the incapacity of the private sector to communicate the skills that are needed and, most importantly, the unwillingness to become directly involved in the creation of skills through training schemes. The perception that skill shortage is solely a supply failure is obsolete.

Policymakers seeking to design skills policies face challenges that are specific to the country context. Although countries do not face the same skills needs, some guiding principles based on good practices shed light on the factors that play a role in successful skills policies. Policymakers should take the following considerations into account when implementing skills policy instruments to ensure that they select the appropriate policy instruments for their objectives and implement these correctly.

Complexity of industrial skills needs. The reality of skills demand in industry and its individual subsectors is extremely complex and the over-simplification of skill demand based on level of industrial deepening and income is useful as a general guiding principle, but should be interpreted cautiously by policymakers. We do not claim that countries with a low level of industrialization and income do not need high-skilled workers, and that countries with a high level of industrialization and income do not require low-skilled workers. Furthermore, the skills different subsectors within the manufacturing sector require are not clear-cut. A low-tech industry might still require highly sophisticated knowledge to be competitive. In fact, many countries do not fall into one particular category as they have a combination of unsophisticated and highly advanced firms. This means that the demand for skills in a given country can cover a wide range, from very low to high-level specialized skills.

Quality of formal education systems. To ensure a formal education system that provides the foundation for the later acquisition of skills used in manufacturing is crucial. This can be done by enhancing basic transferable skills, such as literacy, numeracy, communications and entrepreneurship at the expense of vocational training at the secondary school level.

Short-term needs versus long-term goals. Policymakers are also confronted with the challenge of creating or strengthening the skills required by industry today while anticipating the demand for future skills. This is the case in particular for countries that want to transform their economies and diversify and compete in more advanced industrial activities. This makes the choice of skill and policy less obvious, especially because skills need time to be created. According to Fernandez-Stark et al. (2012), countries may need to take a more holistic and visionary approach to skill creation and should consider three types of interventions: a) early reactive interventions to tackle immediate skill shortages; b) ongoing proactive interventions to tackle skill demand for upgrading within existing industries; and c) future-oriented interventions to supply the skills for long-term structural change. While early reactive interventions can be addressed fairly quickly through on-the-job training, future-oriented interventions usually call for sweeping and long-term changes in the existing education system. Skills policies have to be realistic and correspond to the given objectives. Changes in models should be gradual and cumulative, there might otherwise be a massive misuse of resources on an education system that does not meet the industrial sector's demands. Furthermore, training for specific skills used in manufacturing should take place closer to the firm by combining on-the-job and classroom training in specialized vocational schools. Central attempts to forecast future skills needs might be resisted, as firms know better than any central planner what their needs are. Given the unforeseen nature of technological change, the basics in training need to be emphasized so that specialization can be more easily acquired on the job.

The cumulative and sequential process of skill creation. Skill creation is a path dependent cumulative process that takes time. The formal education system needs to adjust over time to meet industry demands, other forms of training by private and public suppliers should fill in the gaps, and firms have to adopt a 'skill culture' through innovation and learning to generate demand stimulus. This process does not take place automatically, hence, the need for policy interventions—predominantly in countries with severe market failures—such as information asymmetry between skill demand and supply. The cumulative process of skill creation is also sequential, as specialized technical skills need to be built upon strong foundations of education, mainly primary and secondary education. Major academic skills, namely numeracy and literacy, learnt during school life, and behavioural skills (soft skills) also acquired at an early age through personal interactions and exposure to problem solving situations, constitute the basics in the learning process. Without them, it is difficult to conceive an efficient education system that solely relies on advanced skills. Basic education also remains crucial at a high level of industrialization.

Matching supply and demand. Successful skills policies have to bridge the gap that may exist between demand for and supply of industrial skills. Reconciling the ‘what is needed’ with the ‘what can be provided and how’ is possibly the most important challenge policymakers face when designing skills policies. The interplay between supply and demand is complex. The supply side essentially reacts to signals from the demand side, which entails two major problems. First, by the time the demand for skills emerges in firms, it may be too late to meet this demand, as technical knowledge cannot usually be acquired in a short period of time. Second, the lack of demand for skills may stem from a lack of proactive innovation strategies on the part of firms. Some firms might have reached the threshold of moving up the innovation capability ladder, but fail to realize that they are in need of highly qualified human resources in certain areas of production and marketing simply because they do not have concerted and proactive innovation strategies (UNIDO, 2012).

Alignment of skills policies to the broader economic/social agenda. Skills policies must be aligned to broad economic and social development policies. This requires close coordination and dialogue between stakeholders engaged in the policymaking process, both public and private. Policymakers must bear in mind that skills policies may differ significantly depending on the country’s industrialization goal – the challenge of building human capacities in a resource-rich non-industrialized country varies significantly from those of countries trying to avoid the ‘middle-income trap’.

Prevent coordination failures. Many developing countries experience coordination failures when designing skills policies. There are two main reasons for this. First, the government agency in charge of elaborating the country’s economic development agenda is not necessarily the same agency that is in charge of implementing the action plan. The lack of inter-ministerial coordination and dialogue often results in the design of unrealistic industrial policies, given the human resources available in the country. Second, the private sector in developing countries, if it exists and is organized, is rarely involved in the policymaking process, which again leads to misconceptions of the industrial sector’s skills needs. Thus, skills policies become purely a supply-driven process.

1.3 The informal sector and youth

The informal¹ economy makes up a major part of the economy, particularly in developing and least developed countries, and is a crucial job provider. According to UNIDO statistics, the informal manufacturing sector is responsible for nearly half of the jobs in the sector. While the number of informal industry jobs accounted for 130 million (equal to 40 per cent of the total) in 1995, this figure increased to 187 million informal manufacturing jobs (equal to a share of 48 per cent of the total) by 2009 (UNIDO, 2013). Moreover, according to figures from AFDB, the informal sector contributes around 55 per cent of GDP and 80 per cent of the labour force in sub-Saharan Africa (ADB, 2013). The development of skills in the informal sector is therefore key for developing countries. Policymakers can make use of a variety of instruments, for instance, public and private TVET programmes, traditional apprenticeships, training funds and vouchers for workers as well as certification and qualification systems to improve and finance skills acquisition and development in this segment of the economy.

Although the informal sector has largely been ignored in the past, awareness of the importance of taking this sector into consideration has grown in the last decade. For instance, a number of successful, or partly successful, initiatives to include the informal sector in technical and vocational education and training have been taken in sub-Saharan Africa and West Africa, in particular. Benin, Côte d'Ivoire, Ethiopia, Ghana, Kenya and Tanzania are only a few of the countries that have attempted to introduce education and training schemes for the informal economy. The different experiences seem to illustrate that in order to establish education and training programmes that suit the informal sector's needs, flexible programmes and time schedules are necessary to be able to offer different schemes that fit the sector's heterogeneity, that ensure national certification and standards compliance as well as immediate pay-offs to the participants of the programmes. To be most effective, it is recommended to complement technical and vocational training with entrepreneurship skills and other services, such as improving access to credits. Nevertheless, skills development programmes for the informal sector should not be considered as a replacement of high-quality skills programmes in the formal sector (Johanson and Adams, 2004).

Focusing on the employment of young people is furthermore crucial, as they are often the most vulnerable group among the working population. Youth unemployment in developed countries is expected to remain at 14.5 per cent in 2016, the highest level in global terms. In emerging countries, the unemployment rate among youth according to the ILO (2016) is expected to reach

¹ The informal economy is considered that part of the economy that is operated outside of the control of the government (no taxation and not included in statistics).

13.6 per cent in 2016. The lower unemployment rate in developing compared with developed countries reflects the fact that the labour conditions of youth are often very poor. ILO estimates that in 2016, more than 40 per cent of the world's active youth population is expected to be either jobless or living in poverty despite being employed (ILO, 2016). This is not a very rosy picture and highlights the importance of supporting youth, regardless whether the focus is on increasing industrial competitiveness through skills or placing a stronger emphasis on social policies. The majority of education and training programmes for manufacturing employment and the policy instruments suggested in this paper are directed towards youth, particularly programmes such as TVET systems, apprenticeship schemes and voucher schemes for students. Subsidies to finance training for youth and programmes to promote entrepreneurship are crucial instruments, but are not discussed in this paper. Most of these instruments are supply-driven and indicate the need for state intervention, although private sector participation is indispensable to make them work (see next section). These may not always be sufficient to cater to the specific needs of many. In developing countries, where the level of general education tends to be lower, and students are more likely to have fewer years of education, a scheme such as a second-chance initiative may be particularly beneficial. Recognizing the high share of low-income youth and the above-average share of youth working in the informal sector, such programmes could help youth who are considered to be in a vulnerable situation.

2 Skills policy instruments for developing countries

The rationale behind skills policies is to correct market failures in the labour market. These policy instruments can be divided into market-based interventions (impact on prices and taxes, i.e. they operate through pricing links), also referred to as 'demand-driven', 'public inputs' (provision of public goods as well as organizational change), or 'supply-driven'. In other words, demand-driven policy instruments can create skills within a manufacturing firm while supply-driven instruments aim to create skills outside manufacturing firms. The relationship between demand-driven instruments (those related to firms) and supply-driven instruments (those provided by the state) can be characterized as cooperative and participative in nature and seeks to make skills policies work and to avoid skills mismatches.

In this section, a variety of skills policies are presented for low- and middle income countries (including corresponding industrial deepening categories). Nevertheless, it must be taken into account that the categorization of countries by income stage and level of industrial deepening with 'corresponding' policy instruments (see Table 3) is an oversimplification. This oversimplification of the real world carries the risk of being misleading, and there is an urgent need by policymakers to take account of their own country's reality in terms of industrial

deepening, skills demands, education and training possibilities as well as their capacity for implementation of industrial policy instruments. A country's classification as a low income country does not necessarily imply that the country does not have highly specialized manufacturing firms or demands for a skilled labour force in engineering, for instance. No "one size fits all" methods or success recipes exist in industrial policymaking, as each country differs significantly, regardless of income level. Bearing this factor in mind, the categorizations and various policy instruments are presented as follows.

Policy instruments such as technical and vocational education and training (TVET) and on-the-job training, focus on more specialized practical technical skills training, higher education and apprenticeships, and may be crucial for skills development in manufacturing and for effectively addressing labour market failures in developing countries. These measures, together with financial instruments, will be discussed in detail in the next section and some of them linked with the experiences of low and middle income countries. In low income countries, cheap unskilled labour is typically widely available; hence, subsidies (e.g. tax credits for training costs and, where funds are available, training grants) need to be linked with a training commitment by employers. Wage subsidies, offsetting a proportion of the payroll costs against tax, could be introduced. Public inputs such as the establishment of training institutes for industry-specific skills (in addition to the basic education system) in collaboration with the productive sector and skills councils can further enhance skills development. Moreover, training levies can be imposed on firms' payroll costs to finance sector training bodies (Weiss, 2015). While skills training in middle income countries is usually more demanding due to a more sophisticated structure of production, instruments for higher levels of training with a focus on IT skills need to be added to early stage instruments. Moreover, public-private collaboration, partnerships with universities, industry associations, training centres and R&D institutes need to be strengthened (Weiss, 2015).

As lack of financing is the main constraint for the supply of high quality technical education and training, both the government and the private sector need to intervene. However, governments cannot be expected to carry the entire burden of specialized technical training when private returns surpass social ones, and firms, on the other hand, even where aware of the benefits of training, may not be able to bear the costs and risks associated with training. This is particularly the case of smaller firms in developing countries. Consequently, governments must introduce measures to make financing efficient and equitable, and evidence shows that the best way to do so is through partnering with the private sector. While general education can be financed and delivered by the state, specialized technical training calls for public-private partnerships.

Table 3 presents possible demand- and supply-driven policy instruments to address labour market failures, divided into low, middle and high income level and the corresponding level of the country's industrial deepening.

Table 3 Skills policy instruments by income level and industrial deepening

Income level	Level of industrial deepening ²	Skills policy instruments	
		Demand-driven	Supply-driven
Low-income stage	Low level, simple assembly and processing activity, mainly for domestic market	<ul style="list-style-type: none"> • Wage/tax credits/subsidies • Training grants • On-the-job training • Apprenticeships • Targeted voucher schemes 	<ul style="list-style-type: none"> • Training institutes • Skills councils • Technology transfer support programmes • TVET • Levy schemes (national training funds) • Certification schemes • Targeted voucher schemes
Middle income to high income stage	Intermediate to advanced level of industrial structure, may vary from export-oriented activities in light industry to technology-intensive industries	<ul style="list-style-type: none"> • Policy instruments from low income stages • R&D subsidies/grants 	<ul style="list-style-type: none"> • Policy instruments from low income stages • Public-private research consortia • Public research institutes

Source: Adapted from Lall (2001) and Weiss (2015)

Typically, low income countries are characterized by a lower level of industrial deepening and skills demand. Education and TVET remain at the basic level, complemented with informal learning through repetition, trial and error and informal apprenticeships (see also Table 2). At this stage, there are only very few links with other economic actors. Nevertheless, a broad range of policy instruments can already be implemented at low stages of industrial development to address skills deficits and financial constraints. For instance, instruments such as wage and tax credits, subsidies, training grants, training institutes, skills councils, TVET, on-the-job training, apprenticeships, targeted voucher schemes, levy schemes, certification schemes and the establishment of training centres, among others, can be introduced by policymakers (see Table 3).

² See section 1 and Table 2 for further details.

Middle- and high income countries can vary between intermediate to high levels of industrial deepening and may be characterized by various levels of engineering and scientific skills demands, depending on the country and industry context. These countries usually have solid secondary and technical schooling, as well as management financial training and in-house training and are furthermore characterized by strong linkages with suppliers and buyers. The strength of the linkages with universities and technology institutions also varies depending on country context. Instruments may range from public goods interventions, such as the set-up of public-private research consortia and public research institutes, to the implementation of demand-driven instruments such as R&D subsidies and grants to enhance knowledge and skills levels in addition to existing policy instruments mentioned for low income countries.

The next section discusses several of the skills policy instruments listed here and describes different low- and middle income country experiences.

3 Skills policy instruments and experiences of low- and middle income countries

This section explores various low- and middle income countries' experiences with the aim of illustrating a range of possible policy instruments that foster skills development and structural change. Many developing countries prioritize the manufacturing sector as the vehicle that will move them up the ladder to become a middle income country and beyond. The shift to the next income class, together with poverty reduction and overcoming inequalities as well as the empowerment of vulnerable groups are frequently prioritized in national development agendas, and policymakers therefore often identify human capital as the key resource to achieving these objectives.

The skills policy instruments presented in this section are mostly supply-driven instruments that target the labour market. However, policymakers need to take into account that the private sector needs to be closely involved to achieve successful policy implementation and outcome. Without the engagement of the private sector, government skills programmes risk failing to meet the skills demands of enterprises and potentially increase the skills mismatch even further. Yet most of the case studies illustrate that the private sector continues to play a marginal role only. This needs to be taken into account if national skills development efforts are to succeed.

The following case studies focus on common instruments, such as technical and vocational training, apprenticeships, national certification systems and financial instruments as voucher and levy schemes. Policymakers need to pay special attention to skills development in the informal sector as well as for youth and female workers, in particular, as they are usually the most

vulnerable group in working societies. For instance, technical and vocational training, together with on-the-job training and apprenticeships, might represent a good learning mix to gain the necessary professional experience and improve employability in the formal and informal sector. In TVET systems, the involvement of the industrial sector is crucial to align training schemes to the needs of industry and to consolidate valuable skills. To guarantee uniform standards and quality in the formal economy at national level, but also to formalize the acquired informal skills, national certification systems represent another crucial policy instrument. Financing instruments such as voucher systems and levy schemes (national training funds) play a significant role in financing TVET and other skills programmes, especially in developing countries where resources are scarce. Here again, the participation and collaboration of the private sector is indispensable, and the demand-driven side should be strengthened in order for the implemented skills policies to be successful.

3.1 Technical and vocational training

Technical and vocational training (TVET) has received a lot of attention recently as a practical and cost effective way to meet the demand for industrial skills. TVET comprises education, training and skills development related to a wide range of occupational fields, production, services and livelihoods (UNESCO 2015).

Furthermore, *“TVET is defined by UNESCO as “those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life”. TVET thus equips people not only with vocational skills, but with a broad range of knowledge, skills and attitudes that are now recognized as indispensable for meaningful participation in work and life. Examples of the benefits include self-awareness and self-esteem, and strengthened interpersonal, citizenship, communication and entrepreneurial skills (UNESCO n.d.)”*. Nevertheless, TVET is not a substitute for formal education; rather, it builds on it and complements it to deliver specialized technical training. Although TVET covers the entire spectrum of manufacturing skills, from low to very high levels, the shift from simple assembly and processing activities to technology-intensive industries calls for a skilled workforce that is capable of operating state-of-the-art technologies. Tertiary enrolment in technical subjects, including engineering and mathematics, is usually seen as a useful indicator for the availability of skilled labour for highly advanced industry. However, university education has often proven insufficient to supply the skills needed by industry for two main reasons: a) the rigidity of the university curriculum in times where demand for skills in industry is constantly changing; and b) lack of private sector participation

in the development of the university curriculum. There seems to be consensus that TVET is generally more adaptable to industrial needs as the private sector is typically engaged in its design and even execution (although this is not always the case). A review of the data and different studies by CEDEFOP (2011) suggest that vocational and educational training has a stronger positive effect on firms in the manufacturing sector than in other sectors. Studying the effects of vocational education in Ghana, Jones (2001 cited in CEDEFOP, 2011) finds that in addition to TVET increasing productivity in the manufacturing sector, those employees who have undergone vocational education have higher productivity levels than graduates with only secondary education, even if the former have had less years of formal education. Furthermore, the combination of TVET with apprenticeships and financing instruments as vouchers can be essential to achieving improved quality, a better skills match for industry needs and more equitable access. TVET combined with apprenticeships might represent a first entry point for youth to work, to gain the necessary practical experience to complement the theoretical knowledge acquired, which might lead to a stronger involvement of companies in the skills development process. Voucher schemes could have a major impact on the poorer population by facilitating access to TVET programmes and could drastically increase the population's TVET participation. Although these three policy instruments are discussed separately in this section, a policy mix of these may be essential for the design of successful holistic TVET systems. Many countries already include apprenticeships as an obligatory part of the TVET system (referred to as dual education system) (see also next subsection on apprenticeship schemes).

TVET does not work automatically. In many instances, the suppliers of TVET are unable to keep up with the skills needs of industries due to sudden changes in demand. If the private sector does not provide the information on a continuous basis, it is very unlikely that TVET suppliers can anticipate changes in demand and hence adjust the training curriculum accordingly. Governments at times incorrectly assume they have more and better information about training programmes than the private sector. Finally, TVET may also fail due to enrolment shortages as families in developing countries may not be aware of the longer term benefits of technical education (Almeida et al., 2012).

For TVET to become mainstream within the education system in developing countries and in many developed ones, TVET has to address the following serious challenges:

- TVET programmes still do not enjoy a good reputation among the general public. It is considered an alternative for those who do not perform well at school instead of a mechanism that enhances future employability through the acquisition of industrial skills;

- TVET programmes are offered by a variety of public and private organizations. This usually results in a large number of uncoordinated efforts and a myriad of certifications that may confuse both prospective students and employers. Most countries lack a body that is responsible for setting the standards of TVET programmes, not only in terms of design but also in the execution and monitoring phase;
- TVET programmes lack monitoring and evaluation. They do not have a tracking system in place to observe whether their participants have found employment in the related fields, which means there is no form of feedback to the institutions on how relevant their courses are and how useful the programmes were for graduates.

The involvement of the private sector in TVET is crucial for its success because this is the most efficient way of linking skills to the labour market (DFID, 2011). The private sector is not only important because it provides relevant information on skills needs, but also because it takes an active role in shaping training programmes to ensure they match skills demand more accurately as well as in financing skills development programmes. In countries where the private sector is weaker, it is still possible to develop successful TVET programmes through the involvement of relevant stakeholders, as is the case for instance for India's Skills Development Initiative, which resembles a public-private partnership and aims to provide one million workers with employable skills over a period of five years, with an additional million workers each year thereafter. In the case of Ethiopia, the government provides most of the investment while the private sector and NGOs participate in delivering TVET programmes, as the case study section below demonstrates. The case of Malaysia, however, shows that although the government has placed emphasis on the TVET system for decades, the lack of private sector engagement has been an obstacle for the policy strategies to effectively meet the industrial sector's needs. TVET also plays an important role for youth and women, especially in developing countries where the quality of general education and the number of graduates is lower. The case of Viet Nam shows that gender-sensitive policies can have a positive impact on the integration of women in the education system and labour market.

3.2 Improving the image and impact of TVET in Malaysia

Malaysia is pursuing the ambitious goal of becoming a high income country by 2020 and is targeting human capital as one of the main pillars of economic transformation towards a knowledge-intensive, high income economy. The currently implemented Eleventh Malaysia Plan (2016-2020) formulates ambitious objectives to achieve Malaysia's transition to a high income country by 2020, such as improvements in labour productivity, reduced dependency on low-skilled foreign workers and the creation of 2.5 million jobs by 2020. Sixty per cent of these

jobs will depend on TVET-related skills, according to the government (FGM EPU, 2015). Therefore, the alignment of TVET with industry demand is one of the priorities, as Malaysia's TVET system is still fragmented (with similar programmes having different standards), the loose collaboration between industry and TVET providers results in skills mismatches and the image of TVET institutions is unattractive for students. To overcome these hurdles, the government has announced closer collaboration with industry to increase participation in the TVET system and improve the quality of its programmes and institutions. To achieve this objective, the Malaysian government is implementing the following three strategies: first, it will strengthen the governance of TVET for better management by streamlining the national qualification framework and harmonizing rating systems across private and public TVET institutions; second, it will enhance the quality and delivery of TVET programmes to improve graduate employability by collaboration with industry players to identify relevant competences for each industry and subsector, eliminating the duplication of programmes and resources and increasing enrolment; and third, it will rebrand TVET to increase awareness among the population through promotional activities presenting TVET as an attractive career choice (FGM EPU, 2015).

TVET can be traced back to the late 1890s in Malaysia, when Malaysian youth were trained in mechanic and fitter work for the national railways. Since then, technical schools have been established, secondary schools with academic and vocational training have been set up, a National Vocational Training Council has been established (to promote and coordinate skills and training strategies with Malaysian industry's technological and economic development demands), National Occupational Skill Standards (NOSS) (1992) have been introduced and in 2006, a National Skill Development Act was introduced. In 2011, the government introduced *SkillsMalaysia* (a unit responsible for TVET promotion), established a TVET taskforce in 2012 (a platform for collaboration and coordination among TVET institutions) as well as 22 industry-led bodies (to develop the NOSS) together with several policy strategies (UNESCO-UNEVOC, 2013b; FGM EPU, n.d.). In 2013, the annual rate of participation in TVET was 164,000 students (in comparison to 113,000 in 2010) (FGM EPU, 2015).

3.3 The expansion of TVET in Ethiopia

Ethiopia's TVET system is considered a success story on the African continent. With the aim of transforming the country's economy from a largely agrarian towards an industry-led economy, workforce development became a priority for the government. The country has made considerable improvements in ensuring universal education and is still working on improving the quality of education and the effectiveness of the TVET programme. To make TVET more

demand-driven, flexible and of a higher quality, the Ministry of Education (which is responsible for the TVET system) decided to involve more stakeholders in the planning and policymaking process as well as in training delivery and in the measuring and evaluation process of the TVET system (Kingombe, 2012). Industry is furthermore expected to take a stronger lead role in TVET and in the improvement of occupational standards. The capacity of trainers in TVET should be enhanced and they should be directly recruited from industry. According to the current Education and Sector Development Programme (ESDP V), industry extension services should be provided to all new and existing MSEs to improve productivity, their relevance and competitiveness. Support to MSEs should be provided so they can produce export-standard manufactured goods and incorporate higher level technologies. Furthermore, with the ESDP V, the government aims to foster linkages between TVET and universities, research institutes and industry through a memorandum of understanding (Federal Ministry of Education, 2015).

At present, Ethiopia has the second highest number of training institutes in Africa. Between 1999 and 2007, enrolment in TVET increased from 24,000 students to 235,000 students. This increase is attributable to massive public and private investments in TVET. Roughly 30 per cent of TVET providers are private, although NGOs also contribute a considerable share (Kingombe, 2012). According to the Federal Ministry of Education (2015), total enrolment amounted to 276,105 students (excluding the 1,955,826 short-term trainees), there were 1,348 TVET institutions in 2013/14, and the number of trainers jumped from 11,153 in 2010/11 to 17,322 in 2013/4 (although only 17 per cent are female trainers). Ethiopia's annual competence rate increased from 20 per cent in 2009/10 to 60 per cent in 2013/14, according to the Federal Ministry of Education (2015).

3.4 Viet Nam's improvements in educational and vocational training systems

The Asian Development Bank has found a direct link between TVET participation and income, as participation in Viet Nam's TVET system by wealthier segments of the population is seven times higher than that of the poorest segments. As completion of upper secondary school is a prerequisite for attending TVET, the poorer segments of the population are less likely to participate, as they often leave school prior to completion (ADB, 2014). Therefore, policymakers need to pay special attention to vulnerable groups (which often include women, youth and the rural population) if they are to design an inclusive TVET system. The Government of Viet Nam has made considerable efforts in achieving gender equality and female (rural) inclusion in education and job equality. Skills upgrading of the female workforce was identified as a priority by the government, particularly in low-tech manufacturing industries (ADB, 2012).

Female participation in TVET accounted for 37.8 per cent in urban and 24.5 per cent in rural areas in 2007 (compared to male participation at 51.4 per cent in urban and 30.3 per cent in rural areas) (ADB, 2014). In primary and secondary education, nearly half of all students are females (48,5 per cent in primary, 48.2 per cent in lower and 49.3 per cent in upper secondary education). These developments were supported by policymakers through various policy strategies, including:

- The National Strategy for Advancement of Women in Viet Nam to 2010 (2001) to increase the share of trained women to 40 per cent;
- The Social and Economic Development Plan (2005-2010), which includes a policy to develop vocational training and job centres for women;
- The Law on Gender Equality (2006) to ensure equality between men and women in education, training, fostering of professional skills, quotas for men and women in training (and a preference for women in case of equal qualifications between men and women), assisting female labourers who live in rural areas in vocational training and supporting female public servants who have children under the age of three to participate in training;
- Implementation decrees and regulations in 2008 and 2009, for instance, Resolution 57 (2009), National Target Programme on Gender Equality (2011-2015), among others;
- Establishment of the Department of Gender Equality in MOLISA in 2007 and movement of the National Commission for Women's Advancements to MOLISA in 2008;
- National Strategy on Gender Equality for the 2011-2020 period (approved in 2012).

(ADB, 2014, <http://www.chinhphu.vn/portal/page/portal/English/strategies/strategiesdetails?categoryId=30&articleId=10050924>)

The current National Strategy on Gender Equality for 2011-2020 aims, among other things, to “(...) narrow the gender gap in the economic, labor and employment domains; to increase access of rural poor women and ethnic minority women to economic resources and labor market”. To monitor the progress, the government has defined quantitative targets to increase the rate of vocationally trained female rural labourers (under the age of 45) by up to 25 per cent by 2015 and by up to 50 per cent by 2020. Furthermore, the focus remains on rural areas and ethnic minority regions to attract more female labourers and to improve their job skills, especially in low-tech manufacturing industries. To support these developments, corresponding policies were designed and implemented, for instance, policies to support vocational training institutes targeting the rural female labour force, policies aiming at increasing efficiency and

fairness in vocational training as well as improvements in social insurance, labour protection and retirement regimes. Additionally, the government has implemented gender-based databases for the labour market and vocational training (Socialist Republic of Vietnam, n.d.).

3.5 Apprenticeships

Apprenticeship schemes have become increasingly popular as an efficient public-private partnership to bring hard and soft skills³ onto the shop floor. These schemes are not only responsible for the development of skills that are very specific to individual firms and industries, they are thought to be one of the main reasons for low youth unemployment in some developed countries.

Apprenticeship schemes are essential for gaining practical work experience in the firm. A combination of an apprenticeship with classroom vocational training (dual education system) can be an effective tool, as is the case in countries such as Germany, Austria and Switzerland. The strong link with the private sector enables the TVET curriculum to quickly adapt to changing skills demands in industry. Firms are usually required to pay apprentices a salary at a reduced amount, and once the apprenticeship contract between the individual and the employer expires, the employer can permanently hire the apprentice as a regular employee. Well-designed apprenticeship schemes can play a key role in smoothing school-to-work transitions by providing relevant work experience in a real labour-market environment, by equipping youth with skills companies request, by being an effective training methodology for transferring complex skill sets, by combining work and training opportunities in return for a salary, by enabling companies to better prepare for immediate and future staff needs and by making TVET systems more responsive to skills shortages and mismatches (UNESCO-UNEVOC, 2015). Evidence shows that young people who participate in apprenticeship schemes have a smoother and faster transition from education to their first employment. This may be crucial in ensuring that youth are not discouraged right at the start of their careers, especially since participants in apprenticeship schemes are more likely to have had lower educational records at an earlier stage (Biavaschi et al., 2012). Traditional apprenticeships are furthermore a common form of skills acquisition in the informal sector, as they are self-financing, self-regulating and cost effective. However, they often lack technology transfer, standards and quality assurance (Johanson and Adams, 2004). They are considered the most important training system in the informal manufacturing sector and have a long history, especially in Africa and in parts of Asia (ILO,

³ Hard skills are defined as “the technical and analytical competencies and know-how that allow the worker to perform the mechanical aspects of a job (OECD/KRIVET, 2012 in UNESCO-UNEVOC, n.d.)”, whereas soft skills refer to “non-job specific skills that are related to individual ability to operate effectively in the workplace (EU Commission, 2011 in UNESCO-UNEVOC, n.d.)”.

2015). The master craftsperson often plays a strategic role in skills transfer to the apprentice (ILO, 2015).

Nevertheless, apprenticeships or dual training systems do not enjoy a good reputation in some countries. They are viewed more as a burden for companies and policymakers need to therefore launch positive image campaigns and sensibilization programmes that highlight the benefits and opportunities of apprenticeships. In the following section, some examples of apprenticeships (and dual education systems) in various low- and middle income countries are presented, indicating that apprenticeships can play a very important role not only in the formal, but in the informal sector of the economy as well.

Benin: Benin implemented a dual apprenticeship programme in 2006 with the primary aim of meeting the demands of the economy. The programme provided graduates with a certificate of qualification. Furthermore, the Benin National Federation of Craftsmen organized approximately 50,000 crafts persons and actively promoted the involvement of craftsmen as both practical and theoretical trainers of apprentices. According to the ILO, around 150,000 youth were trained in informal apprenticeships, and agreements between local municipalities and local crafts associations were concluded to hold end of apprenticeship exams in Benin (Hofman, 2013; AFD, 2008).

Brazil: Brazil's apprenticeship agreements were concluded between schools and companies for youth between the ages of 14 and 24 years in secondary and high school education. Apprentices who have not completed high school are not allowed to work more than 6 hours; once they have completed their schooling, apprentices can work up to 8 hours a day for a maximum of two years to acquire professional experience (UNESCO-UNEVOC, 2013a). However, apprenticeships are not mandatory for TVET students in Brazil to complete their technical education, but in 2000, the government introduced the Lei de Aprendizagem, which requires medium and large companies to hire students, which must make up between 5 per cent and 15 per cent of the total professional workforce, with at least minimum wage remuneration. Almeida et al. highlight that these possibilities are neither accessible for all technical education students nor in all regions or municipalities, as industry is weak or non-existent in some areas of Brazil, or employers' engagement is low. For this reason, many institutions within the National Service for Apprenticeship, called *Sistema S* (established in the 1940s to engage the private sector and industry associations to train the professionals they needed), removed the apprenticeship as a required component of technical education (Almeida et al., 2016).

Kenya: Apprenticeships in Kenya's informal sector, *jua kali*, are an important way of skills acquisition for informal workers. The *jua kali* sector employs around 80 per cent of Kenya's workforce and creates approximately 93 per cent of all new jobs. Public and private support for skills upgrading and transfer in this sector is therefore crucial. Informal apprenticeships are the main instrument used for this purpose, and although they were historically restricted to artisans only, they have been expanded to the manufacturing sector and other industries such as services and construction work over time (OECD IDRC, 2010).

Ethiopia: Apprenticeships and job training remain an important component of Ethiopia's TVET programmes. TVET students must spend 70 per cent of their time in an apprenticeship to acquire professional training. Nevertheless, Ethiopia is still faced with the challenge of weak private sector engagement in apprenticeships, as most employers participating in the apprenticeship programmes are government owned. Ethiopia's private sector often considers apprenticeships more of a burden, resulting in a lack of training spots for TVET students. Furthermore, companies are concerned that TVET students will leave the company after concluding the training and consequently often prefer to hire non-TVET students who tend to be less mobile. Currently, the government is working on positive image campaigns for stronger private sector engagement in the TVET system (Krishnan and Shaorshadze, 2013).

3.6 Targeted voucher schemes

Voucher schemes have traditionally been used to make education more equitable by targeting underserved groups like women and youth. Vouchers are usually given to enterprises, workers or students in exchange for a small fee for general education or selective skills training either in public or private institutions. Depending on the voucher scheme, consumers can either choose a school or training institute they would like to attend or they are chosen by an institution or firm. Free consumer choice can lead to more efficiency, competition, quality improvement and cost reduction as the schools and training institutions are dependent on the revenue collected from tuition. On the other hand, voucher schemes may already fail in the implementation process due to a lack of consumer choice, transparency and competition. Evidence shows that the best way to implement a voucher scheme, for instance in a TVET system, is through partnering with the private sector. While general education can be financed and delivered by the state, specialized technical training calls for public-private partnerships. Indirect financing, that is, the state co-finances training schemes but the private sector assumes responsibility for delivering services has proven a successful initiative. The justification of this policy instrument is based on the expected efficiency and equity gains in the economy, especially for manufacturing firms that require a pool of highly skilled professionals. Targeted voucher programmes have become

increasingly popular as a means to co-share the financing of skills formation and to provide access to education to vulnerable and poor groups. Kenya and Ghana's experience with voucher schemes are presented below.

3.6.1 Kenya

Kenya aims to transform the nation into a newly industrializing, middle income country by pursuing the national long-term policy *The Kenya Vision 2030*. The policy plan builds on economic, social and political pillars and defines human resource development as one of the key objectives. To strengthen the manufacturing sector, the focus is on increasing skills competences of engineers and technicians. Vocational training was identified as an effective tool to address skill gaps, youth unemployment and SME support (Kenya Vision 2030, n.d.). Skills development in Kenya is mostly financed by the supply side through voucher schemes in collaboration with the private sector (for instance, the private sector pays a certain percentage of the vouchers' total amount) or by incentivizing the demand side to offer better quality and lower prices, adapted to the needs of students and firms (by creating competition through consumers' direct choice).

In 1994, Kenya implemented a successful voucher programme as a pilot project targeting skills upgrading at micro and small enterprises in the informal manufacturing sector. Training vouchers were distributed, and participants paid only 10 per cent of the voucher costs while the remaining 90 per cent was subsidized by the government. With these vouchers, participants could select a training provider that best fulfilled their needs for skills upgrading. This resulted in stronger competition between public and private institutions and led to reduced prices for training providers as well as the implementation of new training programmes designed to the needs of the voucher recipient enterprises (OECD/IDRC, 2010).

In 2008, Kenya developed another technical and vocational vouchers programme in the western part of the country, which served as a special initiative to evaluate demand for vocational training and the impact of training on job seekers. Evaluation results showed that offering young adults vouchers to cover programme costs led to a dramatic increase in demand for vocational training. Around 2,150 youth who had finished school were invited to apply for vocational education tuition vouchers, with around half being awarded a voucher through a lottery system. Of the voucher winners, around half (approx. 530 students) had vouchers for participation in public vocational institutions and the other half for attendance in public and private schools. Seventy-four per cent of those receiving vouchers enrol in some type of training programme. Unrestricted vouchers that could be used for either public or private training programmes were

10 per cent more likely to encourage enrolment than restricted vouchers, and reduced the dropout rate by 16 per cent. Each voucher had a value of around USD 460, which fully or nearly fully covered the programme's tuition costs. Males preferred courses in auto mechanics, while females preferred courses such as hairdressing (Hicks et al., 2011; World Bank, 2012). Only 15 per cent of women preferred male-dominated courses while 15 per cent of men preferred female-dominated courses. The availability of well-targeted information also changed women's training choices: those who were shown videos of women working in traditionally male jobs, such as auto repair, and were told that wages were higher in such fields, were more likely to express interest in or enrol in a male-dominated course (Hamory et al., 2015). According to a follow-up study by Hicks et al. (2011), 79 per cent of unrestricted voucher winners attended vocational training after 2009, while only 69 per cent of the public-only voucher winners attended the programme for at least one term. Furthermore, among the voucher winners, costs not covered such as transportation, room and board as well as maternity, pregnancy or child care were often cited as a constraint to enrolment. Of the 91 per cent non-voucher winners, less than 4 per cent enrolled in vocational training, 2 per cent attended a secondary school or other academic institution, 19 per cent started working and the remaining 67 per cent indicated that they were engaged in "farming" or were "just at home" (Hicks et al., 2011).

The programme has shown that both young women and men take advantage of job training opportunities when costs do not represent an obstacle (World Bank, 2012; Hamory et al., 2015). Although only preliminary information is available on the labour market results of the training, there are some indications that the vocational training has paid off in terms of duration of job search and remuneration, especially for women (World Bank, 2014).

TVET institutions have also been adapted to the Vision 2030 to improve the technical skills of young Kenyans, and the number of TVET institutions had increased by 6.7 per cent by 2013 (Kenya Vision 2030, 2014). Currently, the government plans to establish a voucher system as part of the Vision 2030 policy strategy to increase school enrolment of vulnerable children, targeting the five poorest districts of Kenya. The funds will be provided to children identified by the schools, and the vouchers amount to KSHS 1,500 per month (Kenya Vision 2030, n.d.b).

3.6.2 Ghana

Ghana has also implemented a voucher scheme, which however has not been successful according to the World Bank (Johanson and Adams, 2004). Vouchers for apprenticeship training were to be distributed to apprentices through trade associations, but implementation was never completed. Trade associations issued vouchers to their member master craftsmen who then gave them to selected workers who were able to attend pre-approved private or public

training institutions. The voucher scheme was replaced by direct trainee recruitment by both the trade associations and training institutions. Ghana only had a limited number of training providers and consequently, limited consumer choice (with an impact on costs, efficiency and quality) as well as lacking incentives and competition for the institutions to improve their services (Ziderman, 2002; Johanson and Adams, 2004).

3.7 Taxation schemes (National Training Funds)

National Training Funds (NTF) are typically used to finance employee training within or outside the enterprise. Financing is usually achieved via payroll-training levies as *“they can provide a steady and protected source of funding for training, particularly in the context of unstable public budgets”* (Johanson, 2009). Generally, NTF serve to provide *“an institutional framework for collecting and allocating funding to training providers.... in accordance with national policies and priorities”* (ibid, 2009). They are becoming an increasingly common engine for financing in-firm training and constitute the nucleus of many countries’ emerging educational systems, which aim to secure lifelong learning (Unni, 2011). The majority of such schemes are found in Latin America and Africa. Countries that lack funding for skills development and where funding is fragmented and/or the government is attempting to attract financing, a National Training Fund can be a potential financing instrument. However, transparency, clear objectives and procedures as well as constant monitoring and evaluation and the strong involvement of the private sector are key to making National Training Funds work (Dunbar, 2013).

The most common and effective method for NTF collection is through taxation. The Government of Malaysia, for example, has adopted a 1 per cent compulsory payroll tax through the Human Resources Development Fund (HRDF) for all enterprises with over 50 employees (World Bank Institute, 2002). Usually, the tax rate is set between 0.3 per cent and 3 per cent, although the average tax rate for tax-financed training funds across the world is approximately 1 per cent (Johanson, 2009). The Tunisian Training Levy (TFP) is an example of a NTF, which differentiates between sectors: it applies a lower tax rate to manufacturing enterprises (1 per cent) compared to non-manufacturing enterprises (2 per cent), and exempts enterprises with a strong export base from the tax (DFID & WB, 2005). As an alternative to the centralized funding model, some countries have established sectoral or industry-specific training funds based on training taxes. This includes Peru (Servicio Nacional de Adiestramiento en Trabajo Industrial, SENATI) and South Africa (23 Sector Education and Training Authorities, SETAs.) In South Africa, the government, which has adopted a 1 per cent compulsory payroll tax for all

non-government enterprises with an annual payroll above ZAR 500,000, allocates 80 per cent of the tax proceeds through the Department of Labour to the various SETAs (Johanson, 2009).

One common feature of many taxation schemes is the reimbursement of training expenses to firms (so-called tax rebates). Companies are usually reimbursed if they provide training to job seekers at acceptable standards (Johanson and Adams, 2004). In Malaysia, employers can claim up to 60 per cent in reimbursements from the Ministry of Human Resources Development Fund (HRF) (Martinez-Fernandez and Powell, 2009). The Industrial Training Fund in Nigeria also reimburses up to 50 per cent of taxes paid to employers, as the following case study demonstrates. Similarly, employers in Zimbabwe can claim reimbursement from ZIMDEF if they release their employees to participate in part-time training at Ministry of Higher and Tertiary Education training institutions (ZIMDEF, 2010). Other financial incentives to foster enterprise training are tax exemptions that allow firms to reduce payroll tax obligations by the amount of training provided or purchased (World Bank Institute, 2002). South Africa has a tax grant scheme under which the SETAs return half of the amount a firm spends on training costs in so far as it prepares an annual work skills training plan (Johanson, 2009).

Dar et al. (2003) highlight that the scattered evidence suggests that these schemes have generally had a positive impact on increasing training. Training increases when an effective system (characterized by efficiency in terms of processing and reimbursement as well as transparency and clarity of the application procedures) is in place for administering taxation – both for tax collection and the administration of grants. Furthermore, governments need to ensure that employers are consulted at an early stage and are involved in the design, implementation and evaluation of funds (Dar et al., 2003).

One of the main criticisms of the taxation scheme is that it is far from equitable, as larger firms tend to benefit more than smaller ones. Smaller firms view this scheme more of a tax burden, while larger companies tend to view them as a subsidy. Small and medium-sized companies are usually either non-compliant when it comes to paying the tax or when they actually pay it, do not even claim reimbursement for training their workers (for instance, because of the amount of bureaucracy involved). Furthermore, non-participation of smaller firms is often attributable to the fact that the costs for training are too high or if training is contracted out, it might not meet the firm's skill needs (Dar et al., 2003). In developing countries taxation schemes are particularly difficult to implement, as the system relies on an effective tax collection scheme. The high rate of non-compliance is related to the low administrative capacity of governments and ineffective tax collection mechanisms that are not able to target smaller employers.

Additionally, the procedures for receiving training grants can be burdensome, which represents a major limitation for smaller firms (Dar et al., 2003).

3.8 Nigeria's Industrial Training Fund

The Industrial Training Fund (ITF) is a parastatal organization and was established in 1971 in Nigeria with the aim *“to promote and encourage the acquisition of skills in industry or commerce with a view to generating a pool of indigenously trained manpower sufficient to meet the needs of the economy”* (Law Nigeria, n.d.). The taxation scheme aims to increase employee skills through quality approved training in line with the demand of the manufacturing sector (Aroge, 2012).

The fund is managed by a governing council of 13 members from the public and private sector. It provides direct and vocational training, apprenticeships, research and consultancy services and manages the Students Industrial Work Experience Scheme (Industrial Training Fund, 2016). During the planning period of 1970-74, the Government of Nigeria invested NGN 1,000,000 in the fund, and in 1973, the ITF set up a reimbursement scheme to encourage contributing employers to train and retrain their employees. ITF reimbursed up to 60 per cent of taxes paid by employers. The reimbursement scheme was established to ensure that training activities are spread to all levels of workers in the firm, that the employer's training programmes are relevant, effective, properly implemented and evaluated and that training activities in general are encouraged in accordance with employers' and the economy's needs as a whole (Industrial Training Fund, 2016; Aroge, 2012).

In June 2011, the Government of Nigeria amended the Industrial Training Fund Act by introducing two fundamental changes affecting the taxation scheme and small enterprises in particular (among other changes): previously, every employer with 25 or more employees was required to contribute 1⁴ per cent of its annual payroll to the ITF annually. Now, every firm with a minimum of 5 employees and more must contribute. Furthermore, the reimbursement rate claimable by an employer was reduced from 60 per cent to 50 per cent and in order to receive reimbursement, the employer's training programme must be in line with the fund's reimbursement schemes (KPMG, 2012).

⁴ In 1971, employers were expected to contribute 3 per cent of their turnover, which was modified in 1973 to a taxation rate of 2 per cent in 1973. In 1975, this was further reduced to 1 per cent of annual payroll (KPMG, 2012).

3.9 Nationwide certification systems

A large number of uncoordinated efforts to build industrial skills results in duplicity, waste of resources and confusion among both prospective students and employers. A unified nationwide certification scheme, ideally under the auspices of a specific body, for instance, a national skills development council, prevents duplication and informs industries about the qualification level of individuals. Skills certification can be organized in a national qualification framework, where a single set of criteria for specified levels of learning is defined for individuals, which increases transparency and the qualifications of labour market participants can be identified more easily. Individuals who hold such a certificate give potential employers an indication of the types of skills they have acquired through training. For a firm, such certification of potential employees is a form of quality assurance and allows them to measure and compare the skills of different individuals (World Bank, 2010). This can be particularly advantageous for youth who do not have a lot of professional experience or personal contacts and therefore have difficulties presenting themselves to potential employers. Furthermore, it facilitates labour mobility and creates competition within the labour market. In manufacturing, where technological change is continuous and the way tasks are carried out in different jobs changes constantly, and such certification schemes—if certifications are recognized nationally and even internationally, and are nationally unified—are particularly important for employers and employees alike. In developing countries, certification schemes can play a crucial role, especially in the informal sector of the economy. The formal assessment and certification of informally acquired knowledge and skills can have a huge impact on the employability of the informal workforce and in the formal sector as well. They are furthermore useful in identifying and better addressing the skills gaps in the informal sector through formal training.

Not only the certification of individuals, but also of trainers and of training centres within the national skills certification system is crucial in ensuring high quality education for students and the expected skill transfer required by industry. For instance, Bangladesh within its National Technical and Vocational Qualifications Framework (NTVQF) implemented not only a qualification scheme for students, but a certified “Competency-Based Training” scheme for trainers as well. The qualifications of trainers are assessed by a designated panel of the Bangladesh Technical Education Board and certified if their technical skills are either equal or higher than the level they are instructing, and are awarded a certification indicating their ability to deliver and assess trainings (certificate in competency-based trainings and assessments in TVET) and if they have a certain number of relevant years of industry experience (ILO, 2015b).

India's case is a good example for successful implementation of a nationwide certification scheme and is illustrated below.

3.10 India's skills certification experience

India has identified skills and knowledge as driving forces of economic growth and social development, and has set the ambitious target of training 500 million people by 2022⁵ (Government of India, 2009). To reach this goal, India has introduced various policies and initiatives in the last years, including several skills quality assurances and standardization and certification schemes to guarantee a unified quality and standard level across the entire country.

In 2008, the Skills Development Initiative was introduced, making skills development one of India's main priorities in its socioeconomic development agenda. The government aimed to provide one million workers with employable skills over the next five years with this policy and one million workers each year thereafter. Under this policy, a strategic training framework, Modular Employment Skills (MES), was implemented to provide vocational training to early school leavers and workers, especially in the informal sector. In addition to offering short-term training courses, MES focuses on nationally and internationally recognized certification and on the certification of individuals who have acquired their skills informally (this usually takes place in an unorganized and unstructured way without any responsibility of any agency), for instance, through traditional apprenticeships or learning by working alongside experienced colleagues in the informal sector (Tan et al., 2010). Certification takes place through a mechanism of third-party assessment of trainees under the MES framework and is recognized nationwide (ILO, 2008; SDI, 2010). In 2009, the first National Skills Development Policy was introduced and the National Skills Development Corporation was established to promote private sector participation. The National Skills Development Initiative seeks to *“empower all individuals through improved skills, knowledge, nationally and internationally recognized qualifications to gain access to decent employment and ensure India's competitiveness in the global market”* and also emphasized the importance of quality and standards assurance (Government of India, 2009). In 2013, the National Skills Development Agency was created and the National Skills Qualification Framework implemented (MoSDE India, 2015). Furthermore, the national skills certification and monetary reward scheme was proposed by the finance minister in a speech in 2013 to encourage skills development of youth by providing monetary rewards (skills training by authorized institutions for approximately INR 10,000 per candidate) for successful completion of approved training programmes (NSCMRS, n.d). The objective was to promote

⁵ The capacity of the skills development programme in 2009 was 3.1 million people (Government of India, 2009).

standardization and certification processes and to create a registry of skills. The productivity and employability of the existing workforce increased and training and certifications were aligned to the demands of industry and the nation. At present, the scheme only applies to jobs for which there is high market demand and to certified Indian nationals who undergo skills training in eligible industries by eligible training providers and have not received this monetary award before. India is further focusing on strengthening industrial skills among youth and awards manufacturing courses with higher monetary funds than other sectors (NSCMRS, n.d.).

The National Skills and Qualification Framework (NSQF) was introduced in December 2013 and represents a *“competency-based framework that organizes all qualifications according to a series of levels of knowledge, skills and aptitude. These levels, graded from one to ten, are defined in terms of learning outcomes which the learner must possess regardless of whether they are obtained through formal, non-formal or informal learning. (...) Under NSQF, the learner can acquire the certification for competency needed at any level through formal, non-formal or informal learning”* (MoSDE India, n.d.). The NSQF supersedes all other frameworks, including the National Vocational Educational Qualification Framework, and aims to ensure quality. Its functions range from approving National Occupational Standards⁶, qualification packs⁷ and accreditation norms to publishing guidelines that address the demands of disadvantaged segments, reviewing inter-agency disputes and guaranteeing alignment of NSQF with international qualification frameworks. After three years of implementation, the government will no longer fund any training or educational programme that is not NSQF compliant, and after the fifth year (December 2018), compliance with NSQF shall be mandatory for all training and educational programmes (MoSDE India, n.d.).

Skill India, another government initiative, was implemented in 2015 to empower youth (who represent 65 per cent of the working age group) of the country with skills that seek to increase their employability. Certification and assessment is one of the five main pillars of the policy framework and aims to align existing norms and frameworks and promote the quality of trainings at three levels:

1. Alignment of formal qualifications with the NSQF
2. Quality assessment and certification and the establishment of the Recognition of Prior Learning (RPL) framework to upskill individuals

⁶ National Occupational Standards (NOSs) specify the standard of performance, knowledge and understanding when carrying out a particular activity in the workplace.

⁷ Qualification packs (QPs) is a set of NOSs that are aligned to job roles and are available for every job role in each industry.

3. Creation of centres of excellence and restructuring of institutional arrangements at the Ministry of Skills Development and Entrepreneurship in collaboration with business and the industrial sector.

Under the *Skill India* initiative, the government published a new policy, the National Policy on Skills Development and Entrepreneurship 2015, superseding the National Policy on Skills Development from 2009, with the aim “*to meet the challenge of skilling at scale with speed, standard (quality) and sustainability*” (MoSDE India, 2015). The focus lies on providing an umbrella framework of all skilling activities in India to align them to common standards and to link them with demand centres. Quality is one of the eleven paradigms and enablers of the policy to enhance skills in India based on the maxim “*one nation, one standard*”. Quality assurance itself will be embedded in the NSQF and aims to improve the consistency of outcomes connected to certification and to improve the status of skills training. The Sector Skills Councils as industry-led bodies will be strengthened and remain responsible for the development of national occupational standards and qualification packages to improve the market-led standards in India and will be examined and reviewed under NSQF. Recognition of Prior Learning (RPL) is another key instrument and will be used to map the existing skills of the informal sector and to align them with the formal skilling landscape. RPL assesses and certifies prior learning and provides skills gap training (also in line with the NSQF). Additionally, the National Council for Vocational Training issues standards for equipment, scale of space, duration of courses and training methods, and conducts All India Trade Tests and awards National Trade Certificates (MoSDE India, 2015).

The policy initiatives show that the Government of India is undertaking intense efforts to improve national skills development and the certification system of the country’s formal and informal economy and to increase the employability and quality of the national workforce, especially of the younger generations.

4. Conclusion and some policy recommendations

Human resource development takes centre stage in countries’ development agenda, as prosperous development, productivity and economic growth depend highly on a nation’s human capital resources. This working paper presents a conceptual framework for understanding skills acquisition in manufacturing, its link to structural change, some important policy instruments and relevant country cases (these policy instruments only reflect a select variety of existing instruments). Generally, low income countries tend to have lower industrial deepening and therefore need lower qualifications than middle- and higher income countries, where

technological deepening and skills requirements are more sophisticated. The higher the level of technological deepening and the more complex the structures, the higher the dependency on high skilled labour and R&D infrastructure. Nevertheless, this generalization simplifies reality, as manufacturing skills are very heterogeneous, even in a specific industrial sector.

The paper emphasizes the crucial importance of private sector involvement, not only in the policy design process, but also in the implementation of skills development programmes. Continuous monitoring and evaluation is essential for remaining flexible and to be able to constantly adapt to the demands and needs of the private sector, otherwise, government programmes run the risk of producing or widening already existing skills gaps and mismatches. Most of the policy instruments presented in this paper are supply-driven, though the case studies prove that lack of private sector engagement compromises the success of programmes. Furthermore, the integration of financial instruments for skills development is necessary, particularly in developing countries, as they usually have a scarcity of resources. These instruments do not only aim to match government financial support but often aim at equitable distribution. The informal sector, the main employer of the poor in developing countries, is the main employer in developing countries and is often strongly correlated with poverty. Therefore, policymakers need to prioritize vulnerable groups and connect the informal sector with the formal one and skills development programmes. Formal certification assessment systems of informally acquired knowledge and skills and formal skills development programmes for the informal sector can be an important way of integrating the informal into the formal part of the countries' economies.

Some policy recommendations can be drawn to improve skills development in manufacturing. First and foremost, due to countries' heterogeneity and the different industries within countries, there is no one-size fits all policy mix, even for countries at the same level of income or development. Each country has unique needs, capacities and resources as well as a socio-cultural and historical background that defines the skills and policies that country needs. When policymakers design skills policies, they need to be fully aware of existing and future skills gaps in industry to generate jobs and growth. Furthermore, they also need to be aware of the cumulative process, the time dimension and path dependency that particular skills policies entail. On the other hand, policymakers need to look at successful cases elsewhere, and learn from countries that have undergone similar challenges. However, research results on successful skills policies are weak or mixed, so it is impossible to arrive at any normative conclusion on successful policies and their potential for replicability. The policy recommendations offered below have worked in a specific context, and focus more on manufacturing-specific policies

rather than on broad education policies. The list below is not exhaustive; yet the policies have an intuitive logic, have worked for the countries mentioned in this study and have mostly been acknowledged by stakeholders.

- ***Support the development of soft transferable skills for manufacturing:*** With the shift from routine manual to more non-routine analytical and interactive activities, companies now place a premium on a workforce that is better prepared to learn and absorb new tasks. Problem solving as well as interpersonal skills such as communication and teamwork have become crucial for on-the-job learning, to the extent that some firms have now prioritized these over other technical education when hiring staff due to transferability of skills across sectors (Fernandez-Stark et al., 2012; Murnane and Levy, 1996; European Commission, 2011). “Soft” transferable skills have become a crucial asset for employability, both inside and outside the manufacturing sector.
- ***Complement formal education with technical and vocational education and training:*** TVET can be a strong asset to meet the demand for industrial skills and covers the entire spectrum of manufacturing skills. Nevertheless, TVET cannot be a substitute for formal education.
- ***Engage the private sector in the design of TVET and skills policies in general:*** The involvement of the private sector in skills development programmes is crucial for its success because it is the most efficient way to link skills with the labour market and the private sector can take an active role in shaping training programmes, offering apprenticeships, matching skills funds, providing useful insider information about the skills needed at present and in the near future, etc.
- ***Encourage on-the-job training:*** On-the-job enterprise training is possibly one of the most important sources of skills development in manufacturing. Training in enterprises, normally provided to employees after completing formal education and vocational training, is a very effective way of developing the workforce’s industrial skills. The reason for this is that manufacturing firms bear the costs of training only to the extent they expect to reap certain benefits from it, and training is usually linked to greater job satisfaction and increased productivity (Boeckerman and Ilmakunnas, 2010).
- ***Making financing for training available, efficient and equitable:*** Lack of financing is the main constraint for the supply of high quality technical education and training. Governments have to take measures to make financing efficient and equitable, and evidence shows that the best way to do so is by partnering with the private sector. While general education can be financed and delivered by the state, specialized technical training calls for public-private partnerships.

- ***Support collaborations to smooth the transition from university to innovative industries***
Universities can play a crucial role in skills development for highly sophisticated activities within manufacturing.
- ***Focus on vulnerable groups (youth, female, informal workers) and the informal sector:***
Focusing on vulnerable groups and the informal sector is crucial in order to support the most disadvantaged groups within the economy and to offer opportunities to overcome unemployment, support the working poor, etc. through formal skills development.

Supporting skills development through inter-firm linkages and through university-private sector collaboration can be crucial tools, although they are not discussed in this paper. For instance, international trade has led to skills creation simply due to greater exposure to new technologies, products, strategies, etc. Moreover, forming clusters of manufacturing subsectors has become very common and companies have started benefiting from their geographic proximity by providing collective training activities. The government needs to facilitate such knowledge exchange through national and regional training authorities, R&D centres, among others, and needs to place emphasis on collaboration with universities, as they can play a crucial role in skills development for highly sophisticated activities within manufacturing, such as R&D and innovation.

To conclude, the design of skills policies for the manufacturing sector requires a profound understanding of the individual country's context, the existing structures, industrial deepening, the resources and the implementation capacity available to make them work.

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