



Digital transformation in the informal economy

Opportunities and challenges for technical and vocational education
and training in development cooperation

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PREFACE

The sector project 'Technical and Vocational Education and Training' supports the German Federal Ministry for Economic Cooperation and Development (BMZ) in upgrading strategies and approaches for technical and vocational education and training (TVET) in German and international development policy. By means of TVET, BMZ seeks to increase the supply of qualified labour in order to contribute to improving employment opportunities and economic growth.

At the same time, promoting TVET as a part of lifelong learning constitutes an important contribution to the ability of individuals for social and political participation. Training geared to labour-market needs enhances people's employment prospects and enables them to earn a decent income to escape from poverty.

Currently, the issue of the future of work is very important for the future development of German development cooperation, in particular in TVET. The concern here is on the one hand with how work and employment are changing in developing countries and on the other, with the corresponding consequences for TVET in development cooperation.

- > What kind of employment in which sectors calls for what skills?
- > How must TVET systems be designed to cope with these altered requirements and their continuous change?
- > How can vocational training measures be planned and carried out to prepare for work in the era of the digital transformation, and to harness the opportunities afforded by the digital transformation?

To answer these questions, the sector project TVET issues a publication series. It provides background materials on TVET in development cooperation which are published on an ad hoc basis. Each of these papers examines a specific aspect of the issues described above. The aim is to compile concise, relevant information, to illustrate this with good practices, and then to make practical recommendations for both development advice and implementation based on this.

The intention is to provide decision-makers and practitioners with inspiration for their own tasks so as to help TVET in development cooperation to respond to the challenges of new work and to make use of the opportunities it affords.

- > The background materials are available in both German and English.



Female apprentice in industrial mechanics at Umnugobi Polytechnic College, Mongolia. Many girls plan their career in vocational training.

ABSTRACT

Digitalisation or digital transformation describes first and foremost the technical process of converting analogue values into digital formats. However, it also means all changes that are triggered by these technical processes. 'Informal economy' is the term used to cover activities by workers and companies, who are not properly subject to formal rules. Nearly 70 per cent of all employees in emerging economies and developing countries work in the informal economy.

The digital transformation of labour also has an effect on the extent and quality of employment in the informal economy. However, the forms that these effects take only emerge gradually and in each case depend on the specific country context.

New (digital) technologies have diverse effects on the work of those in the informal economy. Technology-based innovation processes in the informal economy can enhance productivity and the working conditions of those who work in the informal economy. The platform economy creates new employment opportunities for those who work in the informal economy but it can also mean new dependencies and discrimination. Digitalisation requires those who work in the informal economy to have new skills – digital skills but also basic literacy.

At the same time, the new media create new ways for those in the informal economy to acquire skills: these include FabLabs, MOOCs and m-learning. It is important that each of these methods facilitates participation by target groups from the informal economy, in particular when it comes to the basic prerequisites (skills).

There are still a large number of blind spots in research on the effects of digitalisation in the informal economy and in appropriate and effective approaches for TVET in development cooperation. Nonetheless, selected practical examples are sources of inspiration and provide good ideas for the planning and implementation of TVET as part of development cooperation in favour of those working in the informal economy.

In summary, three recommendations for the future can be identified:

- > Measures should be grounded in scientific findings;
- > gaps in knowledge should be closed in order to base future action on better information;
- > and good examples should be extended and transferred to other contexts.

This volume of background material has been compiled on the basis of desk research and document analysis. It is divided into five chapters.

➔ **Chapter 1** offers background information on digital transformation in the informal economy.

➔ **Chapter 2** deals with the opportunities and risks of digitalisation for those working in the informal economy.

➔ **Chapter 3** summarises current findings on skills acquisition and innovation processes in the informal economy.

These are illustrated in ➔ **Chapter 4** using practical examples from development cooperation.

Recommendations for action are derived from these in ➔ **Chapter 5**.

This is rounded off by an ➔ **annotated bibliography**.

BACKGROUND

Digitalisation is a term with many facets. This keyword is not limited to the technical process of converting analogue values into digital formats. **Digitalisation or digital transformation** are the terms used to describe all changes that are triggered by these technical processes, for example in industrial production (Industry 4.0), the world of work (Work 4.0) or TVET (TVET 4.0).

According to the ILO, the term '**informal economy**' encompasses 'all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements'.¹ In emerging economies and developing countries, nearly 70 per cent of workers are in the informal economy. At almost 90 per cent it is even more in sub-Saharan Africa and South Asia.

In these places, the informal economy safeguards employment and income where there are not enough formal jobs, thus allowing young people to enter the labour market. However, with low wages and no social security there is a greater risk of poverty. Working

conditions in the informal economy often do not meet the requirements expected of decent work.

The digital transformation of labour also has an effect on the extent and quality of employment in the informal economy. At this point, however, no definitive answer can be given as to what precise effect the digital change will have on the informal economy: it will depend greatly on the context of the individual country. The **position paper 'New work and its impacts on TVET in development cooperation'** presented **two theses on the opportunities and risks of digital transformation** for the informal economy.²

Thesis 3: There is a close functional interrelationship between TVET and the employment system that will continue with digital transformation. It follows from this that, although digitalisation of TVET promotes digital upskilling of employment structures, this cannot be forced. This applies in particular to countries with a large informal sector where the economy is less developed.

Thesis 9: It is not yet possible to estimate the extent to which the digitalisation of labour will affect developing countries. The groups that are currently the most disadvantaged are at particular risk of being excluded from the opportunities of digitalisation. Special measures must be taken here.

The following questions arise when it comes to opportunities and challenges of digital transformation for the informal economy:

- > How can stakeholders in the informal economy exploit the opportunities offered by digital transformation?
- > What prerequisites are required to prevent the digital divide from becoming wider and to ensure that disadvantaged groups also benefit from the digital transformation (implementation of the principle of 'Leaving no one behind' of the United Nations 2030 Agenda)?
- > How can skills gained in the informal economy be recognised and certified in order to lead to more formal employment?
- > Which approaches and experience already exist in this respect in industrialised, emerging and developing countries? Which approaches are already used in development cooperation (DC)? Which have been proved to be successful?
- > Which recommendations for action in respect of TVET in DC can be derived from literature and current practice?

OPPORTUNITIES AND RISKS OF DIGITALISATION FOR INFORMALLY EMPLOYED WORKERS

2.1 Global impact of digitalisation on labour markets in emerging economies and developing countries

It is not yet possible to make a definitive assessment of the global impact of digitalisation on the labour market in emerging and developing countries, especially for jobs in the informal economy. As a result, various scenarios that are based on different hypotheses can be found in the literature:³

> If processing industries in emerging economies and developing countries grow as a result of new technologies, this may increase the number of formal jobs and cause a corresponding reduction in informality. This trend could be amplified because of the **technology-based relocation of service provision** (e.g. in the field of business process outsourcing or software development). The example of India illustrates the importance of more

vocational education and training courses in technical subjects or in information and communications technologies.⁴

> When **new technologies and/or automation** bring about job losses in the formal economy and production processes are brought back to industrialised countries (re-shoring), it may cause the formal economy in emerging economies and developing countries to shrink. According to estimates by the ILO, up to 56 per cent of jobs in the five ASEAN countries of Cambodia, Indonesia, the Philippines, Thailand and Vietnam are threatened by automation and digitalisation. These are primarily jobs that are mainly carried out by women with low qualifications, e.g. in textiles in Cambodia.⁵

> When new technologies make agriculture in emerging economies and developing countries more productive, more formal jobs can be created there and in processing industries. Depending on the extent to which informal jobs are lost as a result of this and whether a sufficient number of new jobs are created in the formal economy, the result may be an increase or a reduction in informality overall.

A meta study on the influence of the internet on African labour markets comes to the conclusion that the internet overall has and will continue to have a positive effect on job creation and the improvement in working conditions and productivity.⁶ However, parallel to

this the World Bank **highlighted the three most important 'analogue prerequisites' without which it is not possible to obtain a 'digital dividend':**⁷

1. appropriate and binding rules, standards and laws,
2. functioning institutions,
3. vocational education and training for employees on how to use new technologies and on how to cope with the new requirements at the workplace that this entails.



Streetlife with flip chart in Vietnam



Engagement of a social entrepreneur in Senegal

The World Bank succinctly summarised the prerequisites for how to deal with digitalisation positively as regards qualifying employees with the image of the **'race between skills and technology'**.⁸

Digitalisation has the potential yet at the same time carries the risk of automating routine activities. It thus threatens in particular the jobs that are focused on these. The outcome of this is a **trend towards polarisation** which is already clearly emerging, where only those who are better qualified benefit from digitalisation. Many others are forced into precarious working arrangements or completely out of the labour

market. Particularly those countries where the education systems are not well developed are at risk of being excluded from the opportunities of digitalisation.

For example, compared to Asia most African countries find it more difficult to benefit from trends such as business process outsourcing or the platform economy, because the standard of education tends to be lower in Africa.⁹ A more nuanced assessment is applied to this diagnosis in the following sections so that implications for TVET cooperation in favour of those who work in the informal economy can be identified.

2.2 Influences and significance of new technologies on work in the informal economy

New (digital) technologies have diverse effects on the work of those in the informal economy.

Technology-based innovation processes in the informal economy improve productivity and the working conditions of those who work in the informal economy.

A study on the influence of new technologies on the informal economy in urban areas shows that new technologies tend not to create any new jobs there, but they can have a positive effect on working conditions and productivity.¹⁰

However, certain conditions must be fulfilled for this – in particular, a stable environment is required that makes investments in new technologies profitable and minimises risks. In particular, legal certainty and access to resources such as electricity and water or safe space in towns are key prerequisites for small and micro enterprises to buy new technologies.

The greatest effects on the income and working conditions of employees can be seen with technologies that can be adapted to the local context and do not require major investments. It can be ascertained from this that it is support

for local innovation processes rather than technology transfer that should be of primary interest for DC projects in this area. Thus it would be helpful to strengthen the innovation capacity of employees to adapt technologies to the conditions for specific contexts – e.g. through the exchange of knowledge. The employees' self-organisation plays a central role for technology-based innovation processes in the informal economy. Self-organisation promotes the exchange of knowledge which contributes to innovation and diffusion of innovation, strengthens the rights of employees in respect of access to technologies and makes a contribution to safeguarding against negative effects of technological change. Besides self-organised exchange of knowledge, training measures also have a positive effect on productivity and working conditions, which may vary according to the profession and evolve most effectively in combination with other measures.¹¹

The platform economy creates new employment opportunities for those who work in the informal economy, but it can also mean new dependencies and discrimination.

The platform economy is based on online marketplaces where the operators bring together vendors and customers. The function carried out by platform operators is simply in their role as intermediaries and coordinators: they therefore do not bear either the risks or costs of production and they do not provide the goods and services.

Their business can grow exponentially as the service they provide is entirely virtual. Furthermore, they are in possession of all the data and control all the platform's processes. To date, no assessments have been made of the platform economy's share of the labour market but many indicators point towards its increasing significance.¹² In this context, it is possible to differentiate between different types of platform. Differentiating factors are, firstly, the local nature of the business and, secondly, the link to specific individuals. The local nature of the business is a factor where two major types of platforms can be distinguished:

➤ **Location-independent crowdworking platforms**, such as Amazon Mechanical Turk (AMT) or Clickworker, primarily offer small-scale and low-paid tasks to be processed online (microtasks). Others, such as Upworker, are aimed at qualified individuals and offer more complex and better paid contracts. In Germany, work via platforms is a second job for the vast majority of those involved (79 per cent).¹³ By contrast, crowdworking platforms in developing and emerging market countries may be an attractive source of income, especially for people with family obligations, those living in remote regions or where unemployment is high.

There is empirical evidence of this¹⁴ in individual cases and it has prompted governments in countries such as Malaysia and Nigeria to support crowdworking platforms as sources of employment.¹⁵

However, if one looks at this with a critical eye, it reveals the risks of this approach: a high proportion of those who work via microtask platforms are young and well or even very well educated, making them extremely overqualified for the tasks.¹⁶ From a societal perspective, it wastes potential that could be used to develop the local economy. From the individual's perspective, it frequently leads to frustration and to the phenomenon of down-skilling. In contrast, less well-qualified individuals do not have the infrastructure or the basic skills (literacy and simple digital skills) to participate in this system.¹⁷

➤ **Platforms that act as intermediaries at a specific location for jobs** that have to be carried out physically, as is the case with tradesmen's services, driving work, accommodation, housework, etc. (work on demand), are already well established in emerging economies and developing countries and are growing quickly.¹⁸ As they are very efficient in bringing together customers and vendors, they open up new markets and opportunities for self-determination to those employed, for instance in relation to working hours.

A study of work on demand apps in respect of services similar to housework showed that women achieve a higher income for the same work than domestic staff. However, the regulations, such as those that have been asserted in South Africa to protect domestic staff, are undermined on these intermediation platforms, particularly when it comes to social security arrangements. In addition, the assessment systems easily lead to discrimination on the basis of age, gender or appearance.¹⁹

As it is a new phenomenon, the platform economy is still not sufficiently regulated and new forms of trade union organisations are only now beginning to be formed in this area. Consequently, various parties are emphasising the need to create a political structure and here technology-based solutions seem to be particularly promising for adapting the social security systems to these new forms of work.²⁰



Welding trainers are trained in the use of the Augmented Reality welding simulator in Pristina, Kosovo

There are various options to become involved in relation to TVET in order to assist the vendors to gain maximum benefit from the platform economy.

Access to new technologies and the benefits of these vary for individual groups within the informal economy.

The informal economy is heterogeneous and consequently the effects of digitalisation are very different, depending on the target group under review and the context in which they are operating. With the focus on micro enterprises, the literature highlights the following rough differentiating factors on the basis of empirical data:²¹



Digitizing the future through education – the contribution of a software inspector in Ruanda

> **Survival entrepreneurs** do not make much use of new technologies and if so, then primarily to maintain income. In contrast to the top performers and gazelles, expansion is not their aim and they are neither willing nor able to invest in new technologies over and above the minimum level.

> **Gazelles** make active use of the opportunities of digitalisation and thus pursue the goal of maximising profit. They can be divided into two groups (mature and inexperienced). The first group tends to be managed by older entrepreneurs and uses digital technologies for communication

with customers and suppliers. The second group is mainly managed by young and well educated entrepreneurs who are particularly active in social networks.

> **Top performers** exploit the full spectrum of digital technologies.

The differences in the appetite for risk of the four groups, the level of digitalisation already achieved, and the usage behaviour should be taken into account for interventions within the context of development cooperation, as the ways in which the new technologies are dealt with vary greatly.

Gender is another relevant distinguishing feature. Globally, 327 million fewer women than men have access to the internet or a smartphone – in South Asia women are 70 per cent less likely to own a smartphone than men, and the figure for Africa is 34 per cent.²² Beyond access to technology, qualitative studies also reveal gender-specific usage behaviour that tends to magnify the **digital gender gap** and can in part be explained by poorer primary education, perceptions determined by culture, and time limitations as a result of family obligations. At the same time, however, different studies indicate that women can improve their position in society and their income by using mobile phones or the internet.²³

In this way, many technologies such as mobile phones or decentralised energy supply systems help female employees in the informal economy to overcome socio-cultural barriers. For example, this facilitates direct contact with customers without any mobility requirements.²⁴ The choice of media for communication looks significant here: social media allow women to communicate in a more flexible and independent way than with a mobile phone, the use of which may possibly be viewed with suspicion by people in their immediate surroundings.²⁵



Digital Skills

A detailed analysis of the use of new technologies and the distribution of digital skills among the population of emerging economies and developing countries shows further differences, e.g. correlations with formal education, the place where they live (urban vs. rural), age and income.²⁶ Among the many factors that have a negative impact on access, usage behaviour and digital skills is the lack of content on the internet or mobile devices in the local languages of some regions. In sub-Saharan Africa this means, for example, that the poorest population groups, which also make up a significant part of those employed in the informal economy, are excluded.²⁷

Digitalisation creates new opportunities for gradual formalisation.

Digitalisation of financial services and other services provided by public administration (e-government) has an effect on the interaction between the informal and the formal economy: it creates new opportunities for interaction between the company and administration, reduces direct and indirect costs of formalities (e.g. by simplifying processes) and dismantles barriers for access to loans.

Further examples of measures to formalise informal companies relate to taxes and duties, registration of and social security for employees, and health and safety at work. Besides an attractive cost-benefit ratio for the target group, a prerequisite for the success of such measures is also empowerment to use these services.

New financial technologies (FinTechs) such as the M-Pesa cashless payment system in Kenya lead to greater structuring and transparency of informal markets. This can provide a basis for formalisation. In addition to this, FinTechs give those working in the informal economy new access to capital and a means of saving. Many in the informal economy will benefit from this. On the other hand, there is a risk that new dynamics will bring about marginalisation for those who, for example, do not have access to this because of a lack of basic education or of technical equipment. Bateman et al. (2019) therefore warn against unrealistic expectations and point out that it will be necessary to plan interventions in a context sensitive manner, and to evaluate such interventions carefully with the potential for unintended consequences in mind.

Example



With its programme '**Tabletas Concanaco**', Mexico provides an example for the use of new technologies with the dual aim of making informal enterprises more productive and facilitating taxation of these enterprises within the framework of a special tax regime for small enterprises. Tablets were equipped with software and free internet access in order to make it easier to do the accounts, issue invoices and carry out electronic transactions. The tablets were distributed to companies operating in the retail sector, services and tourism and thus led to their gradual formalisation. An integral part of the programme, which was implemented by the Mexican tax authorities, the National Institute for Entrepreneurship and the Concanaco Chamber of Commerce, was a training module from the Colegio Nacional de Educación Profesional Técnica (CONALEP).²⁸

CURRENT FINDINGS ON SKILLS ACQUISITION AND INNOVATION PROCESSES IN THE INFORMAL ECONOMY

3.1 Skills requirements in informal employment due to digitalisation

The general trend towards automation by the new technologies of routine tasks means that the knowledge and skills that are required to undertake **nonroutine activities** are valued more highly. According to the World Bank²⁹ these are in particular:

➤ **Nonroutine, higher-order cognitive skills:** These are the skills to understand complex interrelationships, to respond successfully to changes in the working environment, to learn from experience, to overcome obstacles through critical thinking and solve unstructured problems.

➤ **Technical skills, including information and communication technology skills:** What are meant here, besides job-specific knowledge and skills, are also information technology (IT) skills which may range from use and even include the development of new IT solutions.

➤ **Nonroutine interpersonal, socioemotional skills:** This means diverse skills, attitudes and behaviours that empower people to interact with others positively and master situational requirements.

In some cases, these skills build on basic abilities such as reading, writing and arithmetic. It cannot be assumed that these exist, particularly among those who work in the informal economy.

The skills for how to work productively with information and communications technology (**digital skills**) have been defined in various models, but have not been drawn up specifically for the informal economy or in the context of developing countries, as, for instance, the following models that are frequently cited:

➤ The **European Digital Competence Framework (DigComp)** is based on five pillars: handling information and data, communication and cooperation, generation of digital data, security and problem-solving. These five columns are refined further in eight competence levels.³⁰

➤ The **Digital Skills Framework of Van Deursen** from 2016 integrates DigComp and distinguishes between four types of skills: operational skills, content creation skills, information management skills and social skills, each of which works in two directions. Firstly, they empower individuals to solve problems; secondly, they put them in a position to avoid security risks.

The rating of skills from a beginner to expert level illustrates the need to determine skills requirements in their context and derive qualification requirements for specific target groups. The two models listed above provide the tools for empirical surveys and this particularly applies to Van Deursen's model that is operationalised with indicators.

When it comes to digitalisation, there are only a few studies available on qualification requirements or qualification needs for those working in the informal sector. In 2012, the Botswana Training Authority conducted a broad-based study on skills requirements in the informal economy in Botswana. However, the study only identified requirements in the IT sector in individual cases, for example for the sale and repair of mobile phones or the profession of graphic designer.³¹

3.2 Routes to acquire skills for informally employed workers

People working in the informal sector acquire job-related skills in different constellations, which vary according to region or country, gender, urban or rural areas, etc.³² These are primarily:

- > Informal or traditional apprenticeships
- > Courses in the formal TVET or educational system
- > Courses at private training centres (commercial or by non-governmental organisations)
- > On-the-job (learning by doing)



Iraqi youth in the "Innovation Hub The Station" in Bagdad

The following additional sources for acquiring skills have, to date, barely registered in research but are particularly relevant for digital skills:

FabLabs

FabLabs and MakerSpaces are open workshops where private individuals or commercial undertakings can access modern equipment and tools such as 3D printers, CNC machines or laser cutters. Such organisations often cooperate with universities or other institutions and represent a place of informal learning where knowledge is exchanged. Experience from Africa and Latin America illustrate what challenges target groups in the informal economy face during implementation and which solution strategies have been successful to date. For instance, decommissioned production equipment (re-use) can reduce the costs of the initial installation.

When it comes to reaching disadvantaged target groups such as women or people with very little basic education, easily accessible and informal activities are in some cases preferable to formal workshops, because they minimise the psychological barrier.³³

Internet cafés and other public areas

Apart from the necessary infrastructure, internet cafés also offer people who do not have private access to the internet the opportunity to share knowledge and learn in an informal context. The skills required to use the internet are often acquired through exchanges with staff in the internet café itself, as the study by Furuholt and Kristiansen (2007) in Tanzania and Indonesia shows. Over and above this, internet cafés are used to obtain information, download software for professional purposes or manage businesses. In spite of the fact that they are in different stages of development, the authors identified great similarities between the two countries and suggest that support be given to internet cafés to develop the training and skills of employees to a greater extent, so that they can share knowledge and reach new target groups. Furthermore, it is important to pay attention to gender aspects so that it is easier for women and girls to gain access in spite of the cultural barriers.

The expansion of the internet on mobile devices tends to reduce the number of internet cafés, even if these continue to play a significant role for those who do not have

smartphones. However, other public spaces equipped with computers such as libraries and community centres are also suitable for sharing simple digital skills.³⁴

MOOCs

Digital training courses are made accessible to new target groups through Massive Open Online Courses (MOOCs). Universities, in particular, have been offering these solely online courses since 2008. They are free to attend and (as a rule) can be certified if a fee is paid. The tremendous optimism that was initially engendered by this approach, particularly for tertiary education, needs to be relativised in the light of comparatively low participation rates from Africa and Asia and high drop-out rates of over 90 per cent.³⁵

Apart from quality problems, the high demands placed on the learners are listed as a reason for these results. For instance, intrinsic motivation, learning skills, good knowledge of English and digital skills are required for successful participation. In spite of this, efforts are being made to include MOOCs in the field of TVET as well.



Example

Since 2012, the Technical Education and Skills Development Authority (TESDA) of the Philippines is offering free access to vocational MOOCs in the form of the **TESDA Online Programme**. In February 2018, there were 59 courses on offer in different vocational fields (ICT, electronics, agriculture, tourism, air conditioning and refrigeration technology, entrepreneurship, home economics, etc.). The courses are developed on the basis of nationally

recognised standards. Learners can obtain a certificate after taking an examination (for which a fee is payable). It is estimated that approximately 30 per cent of participants make use of this option.

The target group for the programme is very wide and includes those who work as well as students who have dropped out of school, returning migrants, the unemployed, and people with disabilities who cannot attend a mainstream school. Those who work in the informal economy explicitly belong to the target group.

Over a million people have taken part in the TESDA Online Program since 2012. By far the most popular courses are in the fields of ICT (51 per cent) and tourism (20.7 per cent). A survey of learners who were enrolled in January 2018 shows that 65 per cent of them are women.

The majority of learners graduated from college, 16 per cent attended school up to the 10th class at the most, and a further

12 per cent had already completed a TVET course. Around 19 per cent live in a region that is classified as poor or very poor. Unfortunately, it cannot be ascertained from the data collected how many participants work in the informal economy or how many change over to the informal sector after the course.³⁶

A prerequisite for the success of the programme is greater access to the internet among the population. In 2016, 63.58 per cent of Filipinos had access to the internet. The courses do not reach people without access to the appropriate infrastructure and without sufficient basic education. This could be an explanation for the very low rate of participation for courses on agriculture. Unfortunately, there is no data for a detailed empirical analysis of the target groups reached and the impact of the courses on working conditions, income, etc.

M-Learning

Learning via mobile phones or smartphones (m-learning) is considered to have considerable potential for developing countries, in particular for population groups that are disadvantaged or difficult to reach.³⁷

This can primarily be attributed to the wider use of this technology, which allows far more people access to the internet than have access via computers. However, here, too, there is still very little literature about the learning results of m-learning and the impact it has on its users. In agriculture, in particular, m-learning is comparatively widely used in the informal economy. An overview of established learning applications for small farmers in Kenya shows various approaches for acquiring skills, ranging from the provision of information to audio lessons and text message services, which also offer structured forms of learning with tests and interactive formats.³⁸ In addition to the wider use of the technology, which is a (financial) challenge for developers even in the case of free-of-charge services, evaluations also show the significance of the social and organisational context of learning and the application in practice of what has been learned that is crucial for success.³⁹



Virtual Reality to promote innovative agriculture

LESSONS LEARNT AND PRACTICAL EXAMPLES FROM DEVELOPMENT COOPERATION

In recent years, numerous initiatives on TVET for those working in the informal economy have been created under the digitalisation banner. **In the case of many of these initiatives, it is still largely unclear what effects they have**

in relation to income, employability, living and working conditions or social participation of the target groups. When it comes to sources of inspiration and fresh ideas, however, they highlight options for exploiting and taking into account the opportunities and risks of digitalisation in the field of TVET cooperation for those working in the informal sector.

Table 1 provides an overview of instruments and supporting measures for TVET cooperation benefiting those working in the informal economy as a function of the targets pursued. Below is a brief description of relevant projects and programmes.



Virtual Reality in the Making at Technical University Al Hussein in Jordan

Table 1: Overview of instruments for those working in the informal economy as a function of the targets pursued

Objective	Skills addressed	Instruments and supporting measures
Providing skills in and for the platform economy	> Knowledge of own rights > Specialist knowledge and expertise > Soft skills and (English) language knowledge	> Coupling training with the use of the platform and certification (impact sourcing) > Targeted training in training centres
Supporting (urban) entrepreneurs for innovation processes	> Specialist knowledge and expertise > Digital skills > Business skills	> MakerSpaces/FabLabs > Training courses with sector associations (trade associations) and other forms of self-organisation
Facilitating access to digital services for everyone	> Computer literacy > Digital skills	> Use of existing infrastructure and learning environments (e.g. internet cafés, libraries, Community centres) > Peer-instruction, e.g. in clubs
Promoting the exchange of knowledge in agriculture	> Specialist knowledge and expertise	> m-learning > Learning apps
Opening TVET institutions for workers in the informal economy	> Specialist knowledge and expertise > Digital and business skills	> Creation of blended-learning activities
Making visible and recognising skills	> All skills acquired via informal and non-formal means	> E-portfolios > Blockchain
Improving the quality and relevance of the informal apprenticeship	> Specialist knowledge and expertise	> Participative innovation processes > Provision of simulator (virtual/augmented reality) and other learning materials online

Brief description of relevant projects and programmes

Providing skills in and for the platform economy

The platform economy provides various possibilities for small enterprises to market their products or services more effectively. Self-employed workers are able to earn a living by undertaking microtasks thanks to the platform economy. In this context, both target groups can benefit from **targeted training measures** in different areas: they can improve their basic skills such as reading and writing, acquire specific vocational skills in the case of local services platforms or develop cross-cutting competences such as time management and self-marketing.⁴⁰



Playfully learning with the Habi Gaming App in Mongolia

Some platforms that act as intermediaries for location-based services offer training courses and in some cases also certification for those providing the service with the aim of enhancing customer satisfaction. Particularly attractive forms here are partnerships with educational institutions that can also offer **nationally valid certification**. Examples of such platforms in India⁴¹ are supported by the Michael and Susan Dell Foundation.⁴²

In Kenya, an example like this is provided by the Lynk platform. A similar approach is adapted in the field of business process outsourcing under the title 'impact sourcing'. Here, social criteria are applied when recruiting and qualifying employees. The Rockefeller Foundation supports this approach with the 'Digital Jobs Africa' programme initiated in 2013, which led to the foundation of the Global Impact Sourcing Coalition. Examples of good practice for implementing training measures are summarised in a 'Demand Driven Training Toolkit'.⁴³ The results of such approaches have been evaluated and in some cases empirical evidence is available.

For instance, industry-related sources report that young people are benefiting from an increase in income of between 40 and 200 per cent. At the same time, platforms are experiencing a reduction in costs of up to 40 per cent thanks to lower employee fluctuation.⁴⁴ Evaluations of results show, however, that such programmes do not reach the most disadvantaged young people, as certain prerequisites such as in relation to language skills are required to participate in the training.

Supporting (urban) entrepreneurs for innovation processes

Both Casey (2016) and the World Bank⁴⁵ advise against approaches that envisage a pure transfer of technologies without taking account of the special conditions in the informal economy. Indeed, they say it is much more effective to support entrepreneurs or founders of start-ups with innovation processes that **build on existing technologies or adapt new technologies to the users' context in a targeted way**.

TVET measures with the focus on both technical knowledge and skills and also on entrepreneurship or business skills look particularly appropriate here, as in GIZ's 'eSkills4Girls Ghana' project. In this project, 150 women from the informal economy receive training in basic digital skills for use in their microenterprises in cooperation with 'Developers in Vogue'.⁴⁶

MakerSpaces or FabLabs represent a promising approach for supporting the technological change in the informal economy. Appropriate experience as for the Intermediate Technology Transfer Unit (ITTU) and the Ghana Regional Appropriate Technology Industrial Service that evolved from it, which was active in the 1980s and 1990s, show the potential for creating new jobs and increasing productivity. Considerations for the creation of new MakerSpaces are based on more recent experience in Latin America⁴⁷ and can also link up with GIZ's project experience in Iraq. If MakerSpaces cannot be established permanently, time-limited events provide an opportunity for stimulating innovation or raising awareness of local innovation products.⁴⁸



Discussions on youth-oriented website 'Femina Hip' in Tanzania

Facilitating access to digital services for everyone

If digital offers, whether it is for the purpose of learning or for (informal) work (e.g. FinTechs, e-government services, platforms), are to be used, basic skills are required in addition to the physical infrastructure. There are many approaches and examples for teaching digital skills that either focus on certain target groups such as young girls and women, as is the case of the EQUALS Digital Skills Fund supported by GIZ,⁴⁹ or are aimed at a broader group, as for the PMGDISHA

programme in India, which aims to train one person per household in rural areas in digital skills.⁵⁰ The Digital Skills Toolkit⁵¹ from the International Telecommunication Union (ITU) offers a systematic guide and numerous good practical examples for developing large-scale programmes. Here, particular attention is paid to the use of existing infrastructures for achieving the largest possible target group, for example through offering computer courses in public libraries, schools, community centres and internet cafés. In addition to conventional training settings with lecturers, peer instruc-

tion models are introduced which involves learners supporting each other, for example in clubs.⁵²

Promoting the exchange of knowledge in agriculture

New technologies are deployed in many projects for small farmers. Learning using mobile phones (m-learning) is generally a component of a more complex offering here in which personal interactions with advisors and forms of self-organisation play an important role in exchanging knowledge. A well-documented and successful example is the UshauriKilimo information service in Tanzania, which was implemented from 2011 to 2016.⁵³ The participative approach selected for developing the offers, the involvement of both men and women and the integration of different media (mobile phone, internet and radio) were cited among the success factors. Further practical examples were collected, including by the Food and Agriculture Organization of the United Nations (FAO) as part of its e-agriculture initiative.⁵⁴

A further project in which GIZ is also involved is the Sustainable Smallholder Agri-Business Programme. Learning videos produced locally on a participative basis are distributed via methods such as WhatsApp. They represent one component of a broader offering that combines advice, information systems and face-to-face events together within the framework of Farmer Business Schools aiming at modernising production chains.⁵⁵

Opening TVET institutions for workers in the informal economy

As a means of reforming TVET systems in countries with a significant informal economy, it is often recommended to open TVET institutions for those in informal employment and to direct training offers more effectively to the qualification requirements of the informal economy.⁵⁶ New technologies can make a contribution here by developing blended learning offers that offer informally employed workers greater flexibility compared to traditional courses.

The programme 'Innovation in Vocational Education and Skills Training (INVEST Africa)' run by the Commonwealth of Learning provides an interesting example in which the development of flexible courses that are directed towards the informal economy is embedded in a comprehensive process of organisational development for 13 institutions. Relevant lessons can be learned for similar projects on the basis of the evaluation report which is available to the general public.⁵⁷

Making visible and recognising skills

Skills Passport is a keyword used to describe various initiatives which pursue the goal of raising the visibility and recognition of skills gained formally or informally through digital solutions. **E-portfolios** use a technology that is comparatively widespread and tried and tested: they are a digitalised version of conventional portfolios in which learners can collect and present the certificates, letters of recommendation, work samples, etc. that they have gained. India adopts this approach in the National Skills Network project, especially for employees in the informal economy.⁵⁸

According to the ILO, the main advantage of an e-portfolio compared to the paper version is that it is more user friendly. The disadvantage is that technical aspects may force into the background the impetus for learners

to scrutinise their goals and skills that the compilation of a portfolio is meant to encourage.⁵⁹ A further development of the e-portfolio approach with blockchain technologies offers different options for raising the credibility of the skills documented and accessibility to the data for learners and employers or training institutions.

Such approaches have considerable potential in countries with very fragmented TVET and educational systems where a large number of education providers and training programmes exist. However, to date there are still no good practical examples and evaluations outside the university sector and industrialised countries. In contrast, various studies on the institutional and technical prerequisites already exist.⁶⁰

Improving the quality and relevance of the informal apprenticeship

Digital media can play an important role in the dual educational system based on the German model and also purely company-organised apprenticeship models.⁶¹ There are hardly any available sources for the use of digital media as part of traditional apprenticeship training, in the form in which it occurs in the informal economy in developing countries.



Augmented Reality in Kosovo – using the welding simulator during a training course

However, examples exist for innovative teaching and learning media which could also be made available to apprentices (in addition to other target groups such as the unemployed or those working in the informal economy) in order to develop their specialist skills in areas that go beyond the skills taught in the company where they are serving their apprenticeship.

An example for this is provided in the application of virtual reality (VR) and augmented reality (AR) in the field of welding. Looking at the special context of developing and emerging market countries, the example of SkillVeri,

a simulation platform for training as a welder, shows how a VR application developed locally at comparatively low cost can also be made available to disadvantaged groups.

The Indian start-up is supported by the Michael and Susan Dell Foundation.⁶² However, the question arises here of how didactic integration of the openly accessible teaching and learning material into informal education can best be achieved, and to what extent new technologies can also be deployed to provide trainers with further training. As yet, there are hardly any research results and reports on experience on this subject.⁶³

RECOMMENDATIONS FOR ACTION FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING IN DEVELOPMENT COOPERATION

5.1 Building on scientific findings

The results of research conducted to date suggest consideration of the following aspects when planning interventions:

Differentiation according to target groups:

Within the group of those who work in the informal economy, there are subgroups whose goals, usage behaviour and skills as regards new technologies may differ fundamentally (e.g. women and men, survival entrepreneurs and gazelles, depending on the sector or professional environment). These differences should be taken into account by carrying out in-depth preliminary studies and participative approaches for the development and evaluation of measures.

Holistic approach: TVET measures can often only demonstrate their full effect on the living and working conditions of those employed in the informal economy, if they are coordinated with other support measures and offers, such as better access to capital for investments or an improvement in the security situation.

Contextualisation: Accessible technologies should as a rule be given preference, and the target group should be offered opportunities to learn the technologies and adapt to current needs. Local innovation is often more effective

than technology transfer. Adaptation of the content of new media to the local languages and dealing consciously with stereotypes and gender issues are also part of contextualisation.

5.2 Closing knowledge gaps

There are still a large number of blind spots in research on the effects of digitalisation in the informal economy and in effective approaches for TVET in development cooperation. Many questions remain unanswered. Research work is carried out in different specialist disciplines but research into TVET is barely represented. The following measures could make a contribution to a more evidence-based course of action:

Self-organisation: Organisations in the informal economy (e.g. trade associations) can play an important role when it comes to exchanging knowledge and disseminating innovations and should therefore be included and supported as far as possible.

- > **Creating bodies for an exchange between experts**, such as a specialist conference or the organisation of a symposium as part of an existing event, e.g. in the context of ICT for development (ICT4D)⁶⁴
- > **Call for Papers** in connection with a relevant journal or study application request
- > **Supporting thorough evaluations**, as often the unintended results of interventions have a detrimental effect on the long-term impact or create new disadvantages

5.3 Rolling out and transferring good examples

Even if the empirical basis for verifying the effects is patchy, the practical examples described above are inspirational and provide ideas for professional training in development cooperation that favour those who work in the informal sector. The following approaches are considered to be particularly interesting. In accordance with academic findings, it is advisable to carry out thorough preliminary studies and, if necessary, to make adjustments to the respective context before replication or upscaling.



ITC perspectives for a modern youth in Bagdad

- > **Maximising the potential of digital teaching and learning media within the framework of established initiatives for those working in the informal sector.**
M-learning is suitable, for example, as a follow-up to consolidate or refresh content that has been learnt, or to transfer it to new practical applications, and thus to enhance the long-term effects of conventional training measures.
- > **Involving local developers in the concept design and production of teaching and learning media,** whether this is, for example, through awarding contracts in the conventional way or through competitions and support programmes for start-ups. If applicable, targeted further training for developers is helpful here and makes a contribution to strengthening the ICT sector in the field.
- > **Supporting innovation processes in the informal economy,** for example through (mobile) MakerSpaces or MakerFairs and holistic offers of training and finance or equipment. When doing this, informal companies and entrepreneurs should, if possible, not be seen in isolation but as an integral part of a production chain

or a local cluster. This includes the involvement of forms of self-organisation and informal exchange of knowledge in the programme.

- > **Using available technologies as a basis and using existing infrastructures,** e.g. according to the principle of 'Bring-Your-Own-Device' and by using libraries, schools, and other learning environments so that accessible offers are available cheaply to a wide range of users.
- > **Assisting women and girls to use new technologies by teaching them digital skills and boosting their self-confidence,** e.g. through positive role models. The aim is to thus allow them to improve their living and working conditions and to overcome the digital gap.
- > **Getting (global) companies on board as donors and/or cooperation partners,** in particular to introduce further education and fair working conditions in the platform economy.



Using Virtual Reality during a hackathon in Bagdad

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- ¹⁷ ILO (2018)
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- ²² OECD (2018), p. 13
- ²³ Melia 2019, p. 21 ff.
- ²⁴ Casey and Hughes (2016)
- ²⁵ Melia (2019), p. 23
- ²⁶ ITU (2018)
- ²⁷ Kende and Quast (2016)
- ²⁸ Chacaltana et al. (2018), p. 19
- ²⁹ World Bank (2016), p. 123
- ³⁰ Cf. <https://digcomp.enterra.de/>, checked most recently on 24 June 2020
- ³¹ BOTA (2012)
- ³² cf. Adams et al. 2013, p. 25 ff.
- ³³ Cf. Waldman-Brown et al. (2013) and Hosny (2018)
- ³⁴ ITU (2018)
- ³⁵ Liyanagunawardena and Adams (2014), p. 39

³⁶ According to the 2015 “Labour Force Survey” approx. 38 per cent of workers are employed in the informal economy.

³⁷ UNESCO (2012)

³⁸ Henze and Ulrichs (2016)

³⁹ Nampijja and Birevu (2016)

⁴⁰ Aneja et al. (2019)

⁴¹ E.g. Housejoy, Zimmer, Mr. Right, UrbanClap

⁴² See <https://www.msdf.org/blog/2015/09/skill-development-digital-age/>, checked most recently on 24 June 2020.

⁴³ See <https://www.r4d.org/wp-content/uploads/R4D-ICT-TrainingModels.pdf>, checked most recently on 24 June 2020.

⁴⁴ Bellagio Centre (2017), p. 16

⁴⁵ World Bank (2016), p. 120 ff.

⁴⁶ See https://www.eskills4girls.org/wp-content/uploads/2019/01/Karte-1_Print.pdf, checked most recently on 24 June 2020.

⁴⁷ Waldman-Brown (2013)

⁴⁸ See implementation examples taking <http://makerfaireafrica.com/> as an example, checked most recently on 24 June 2020.

⁴⁹ See <https://webfoundation.org/2019/04/meet-the-equals-digital-skills-fund-grantees/>, checked most recently on 24 June 2020.

⁵⁰ See <https://www.pmgdisha.in/about-pmgdisha/>, checked most recently on 24 June 2020.

⁵¹ <https://www.itu.int/en/ITU-D/Digital-Inclusion/Documents/ITU%20Digital%20Skills%20Toolkit.pdf>

⁵² See <https://www.itu.int/en/ITU-D/Digital-Inclusion/Documents/ITU%20Digital%20Skills%20Toolkit.pdf>, checked most recently on 24 June 2020.

⁵³ Sanga et al. (2016). Also see <http://www.fao.org/3/i9032en/i9032EN.pdf>, checked most recently on 24 June 2020.

⁵⁴ See <http://www.fao.org/e-agriculture/home>, checked most recently on 24 June 2020.

⁵⁵ See <https://www.ssab-africa.net>, checked most recently on 24 June 2020.

⁵⁶ Cf. e.g. OECD (2008)

⁵⁷ Isaacs (2015)

⁵⁸ See <https://www.nationalskillsnetwork.in/skills-passport/>, checked most recently on 24 June 2020.

⁵⁹ ILO (2018)

⁶⁰ Cf. for example GIZ (2019); Grech and Camilleri (2017); Mikroyannidis et al. (2018)

⁶¹ On this subject, see the selected bibliography of the BIBB (German Federal Institute for Vocational Education and Training) on media competence and media usage in TVET dated January 2019 available online at https://www.bibb.de/dokumente/pdf/a1bud_auswahlbibliografie-mediennutzung-berufsausbildung.pdf, checked most recently on 24 June 2020.

⁶² See <https://www.msdf.org/blog/2017/01/skillveri-gaming-skilling-india/>, checked most recently on 24 June 2020.

⁶³ Koh (2014)

⁶⁴ For example <https://www.elearning-africa.com/index.php> or <https://www.ict4dconference.org/>, checked most recently on 24 June 2020.



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