# Quality Assurance and Industry 4.0 – the case of Viet Nam

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TVET Quality Breakthrough

# Outline

1. Impacts of Industry 4.0 on labour market and TVET

2. Change processes and related requirements for TVET adjustments in selected sectors

3. Challenges and solutions for demand-oriented TVET

4. Quality assurance in demand-oriented TVET

5. Principles of Vietnamese-German Development Cooperation

# 1. Impacts of Industry 4.0 on labour market and TVET

**What is Industry 4.0?**

**The interconnection of industrial production and modern information technology**

(based on digitalisation, robotics, sensor technology, cyber-physical systems and Big Data)

- Objectives:
  - Development of **highly automated, interconnected and smart production processes**
  - Optimization of **all phases of a product life cycle**
- What is new?
  - The possibilities that **digital interconnection** offers (e.g. man-machine interaction)
  - large-scale use of computers and ICT in **all** production processes

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# 1. Impacts of Industry 4.0 on labour market and TVET



**Implications on the Labour Market**

Key question: How will the **interaction of humans and machines** look like?

- Will technology guide the human ("autonomous automation") or will the human guide the technology ("hybrid collaboration")?

- The higher the potential automation of tasks performed within a profession, the higher the risk for job losses or vice versa!?

→ In either case: Employees need to have or need to be able to acquire **the competencies and skills needed by the industry** to ensure employability

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# 1. Impacts of Industry 4.0 on labour market and TVET

**Implications on the Labour Market in ASEAN-5 and Viet Nam**

ILO: *ASEAN in transformation: the future of jobs at risk of automation* (2016)

- Around **56% of all employment** in **ASEAN-5** (Cambodia, Indonesia, the Philippines, Thailand and Viet Nam) has a **high risk of automation**

- Viet Nam has the highest probability for automation (70%)

- Also due to the labour market structures: in Viet Nam the share of low-skilled elementary occupations in total employment is highest → higher risk of automation

→ ILO conclusion: **a higher skill level is necessary**

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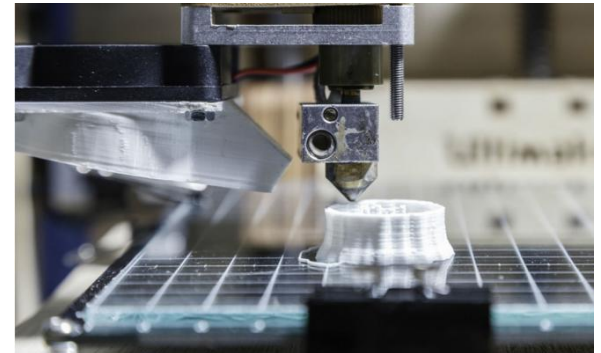für Internationale
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# 2. Change processes and related requirements for TVET adjustments in selected sectors

**Implications for TVET - relevant drivers for adjustments in TVET**

Main specific **technological** Industry 4.0 **related tendencies**  as drivers for adjustments in TVET:

- Cyber-Physical-Systems  / Internet of Things
- Additive processes / 3D printing
- Robotics
- Web 2.0 / mobile devices
- Wearables / augmentation

Main **cross-cutting technological**  Industry 4.0  **related tendencies**  as drivers for adjustments in TVET:

- Data protection & security  / privacy
-  Big data
- Interdisciplinary cooperation
- Innovation / flexibility / mobility

# 2. Change processes and related requirements for TVET adjustments in selected sectors

**Metal and Electrical Industry in Germany: Categories of occupations related to their relevance to Industry 4.0**

| Close proximity | Medium proximity | Low proximity |
|---|---|---|
| • Electronics technician for automation technology<br>• Mechatronics<br>• Industrial mechanics<br>• Specialist for Informatics | • Electronics in operation and maintenance<br>• Machining mechanics<br>• Electronics for systems and devices<br>• Electronics for IT systems | • Production technologist<br>• System mechanics<br>• Tool mechanics |

Source:  Spöttl (2016) bayme vbm studie – Industrie 4.0 – Auswirkungen auf Aus- und Weiterbildung in der M+E Industrie

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# 2. Change processes and related requirements for TVET adjustments in selected sectors

## Metal and Electrical Industry in Germany: Recommendations on adjustments of qualifications

| Close proximity | Medium proximity | Low proximity |
|---|---|---|
| Adjustments on short notice: | Mid-term adjustments: | Basic adjustments: |

| | |
|---|---|
| • Revision of **occupational profiles** based on demand of industry<br>• Formulation of modification in **occupational standards**<br>• Elaboration of **curricula**<br>• Pre- and in-service training for **TVET teachers and in-company trainers**<br>• Modes of **school- and company based training**<br>• Development of **teaching and learning media** and environments | • Adjustement in terms of **basic competences / generic qualifcations** in occupational profiles<br>• Focus on the use of **digitally connected components** |

## 2. Change processes and related requirements for TVET adjustments in selected sectors

- Generally **increasing importance** of **IT knowledge**

- **Control and problem-solving competence** in demand

➢ In automated processes, vocational learning needs to be structured differently (errors/stoppages pose too much of risk)

➢ More of the learning must be organised in separate locations, e.g. in virtual learning environments

➢ Corresponding learning opportunities need to be kept in mind at an early stage when production facilities are being designed

## 2. Change processes and related requirements for TVET adjustments in selected sectors

- **Companies** are **cooperating** more with partners in **higher education sector** to train next generation of skilled workers

- ➢ TVET 4.0 must develop its new concepts – including new partnerships between learning venues and hybrid qualification routes in collaboration with higher education, e.g. in context of advanced vocational qualifications

# 3. Challenges and solutions for demand-oriented TVET

**Key to ensure quality: a very close cooperation with the business sector in TVET and higher education**

The business sector needs to have a decisive say in defining

- (occupational and training) standards and training programmes (regular adjustments)

- the process of testing/assessment and certification

    → **Employment relevant training offers - accepted by the business sector and closely related to technological developments**

- Additionally: close cooperation between TVET institutes and companies in training provision (cooperative training)

    → **Learning in the real world of work during well-defined practice-oriented training phases in the company**

**Cornerstones for quality assurance**

| | |
|---|---|
| 1 Consensus principle | Government, employers, and employees cooperate in shaping the dual system based on the consensus principle. |
| 2 Reporting | The planning of vocational education and training is predicated upon indicator-based reporting. |
| 3 Continuous improvement | Continuous improvement of the system is achieved through modernisation mechanisms, research and development programmes, pilot projects, and projects with the practice. |
| 4 Occupation principle | The shaping of training regulations is based on the occupation principle. |
| 5 Practical orientation | The state-recognised training occupations are conceptualised and modernised with practical orientation. |
| 6 Vocational guidance | Young people are supported in choosing a training by institutions and programmes of vocational guidance as well as databases. |
| 7 Trainer aptitude | The trainers have the required personal and professional competences for imparting the training contents. |
| 8 Suitability of training venues | The training venues are suitable for vocational education and training according to their kind and equipment. |
| 9 Training relationship | Rights and obligations in the apprenticeship are regulated. |
| 10 Examination procedures | The occupational proficiency of the trainees is assessed through a valid procedure in front of an examination board of the competent body. |
| 11 Cooperation between learning venues | Companies and vocational schools cooperate in the performance of vocational education and training. |

Source: own representation

# 4. QA in demand-oriented TVET in Germany

Source: BIBB, Quality assurance of company-based training in the dual system in Germany: An overview for practitioners and VET experts, Bonn 2017

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# 4. Quality assurance in demand-oriented TVET

Figure 3: Quality assurance in company-based learning
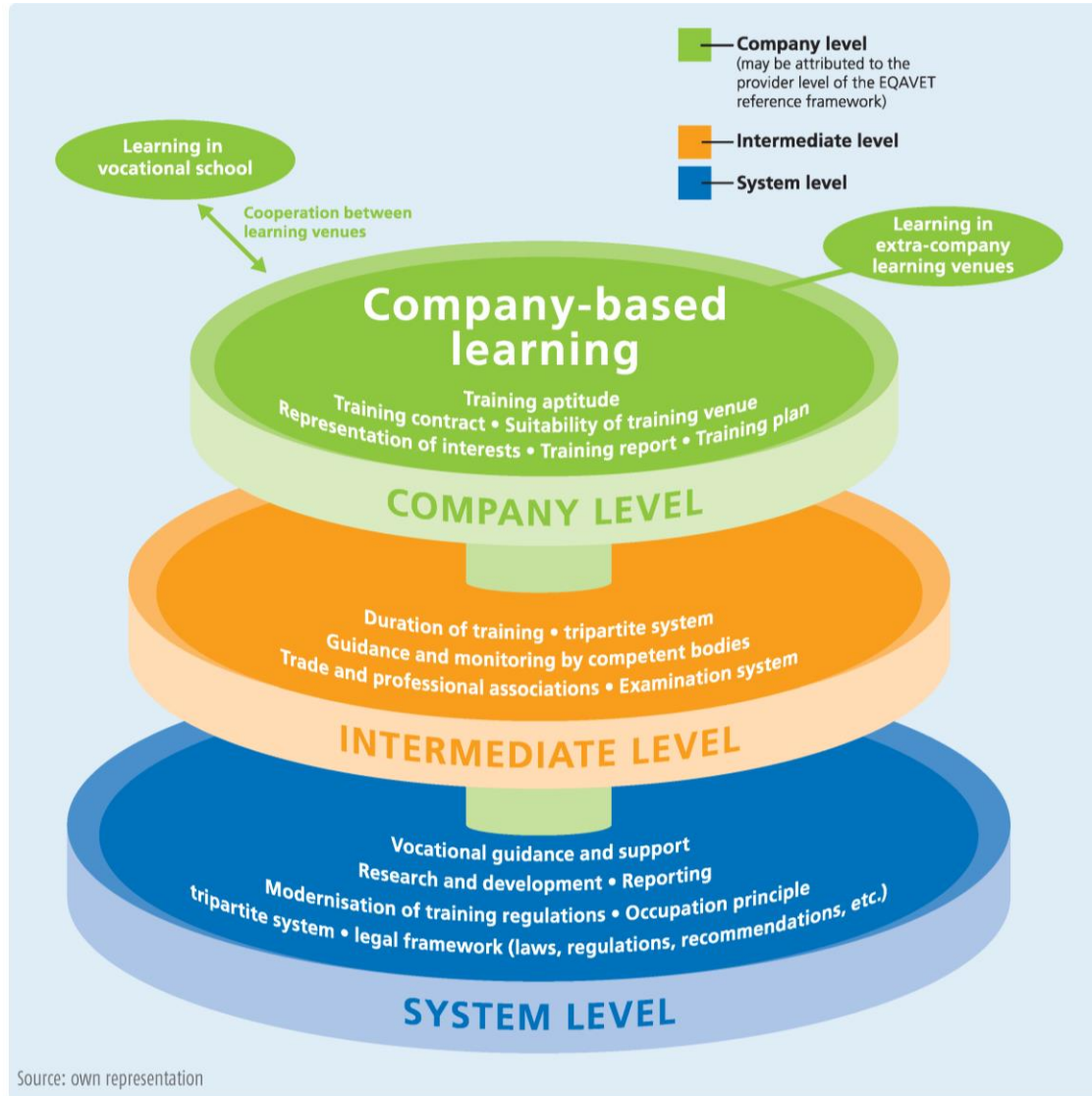
Source: BIBB own illustration, Quality assurance of company-based training in the dual system in Germany: An overview for practitioners and VET experts, Bonn 2017

# 5. Principles of Vietnamese-German Development Cooperation for a green economic development – based on German key success factors/quality features of TVET

1.  **Cooperation of government, business community and social partners**
    Proportional funding, joint development of occupational and training standards (occupational analysis and job profiles; learning outcomes), joint update and implementation of curricula, assessment and certification of competences (according to standards)

2.  **Phases of structured learning within the work process (on-the-job training)**
    In-company training as part of cooperative training with two learning venues (TVET institute, enterprises) with coordinated training regulations

3.  **Broad acceptance of national standards**
    Occupational standards (occupational analysis and job profiles) as well as training standards (learning outcomes) and testing/assessment standards, certificates recognized by business sector as well as government and the society at large

4.  **Qualified TVET staff – the key of successful implementation**
    Competent in-company instructors and teaching staff at TVET institutes with relevant, demand-oriented practical and pedagogical/didactical skills/competencies,

5.  **Institutionalized research and advisory**
    Labour market and TVET research in terms of trend and tendency research providing data for policy decisions, also monitoring of pilots and models (NIVET)

# Thank you for your attention.

More Information:   www.tvet-vietnam.org