Highlight Profile Taiwan

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Präambel:

Wir schreiben im Folgenden in der maskulinen Form, und zwar ausschließlich wegen der einfacheren Lesbarkeit: Wenn beispielsweise von Mitarbeitern die Rede ist, meinen wir selbstredend auch Mitarbeiterinnen.

Empfohlene Zitierweise:

GAUSEMEIER, J.; KLOCKE, F.: Industrie 4.0 – Internationaler Benchmark, Zukunftsoption und Handlungsempfehlungen für die Produktionsforschung. Paderborn, Aachen, 2016

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Summary

»**Speed to market**« **and** »**speed to volume**« **are key.** Taiwan has large competencies and strong industries in the field of ICT and semiconductors. **Highly flexible supply chains** and a **strong vertical integration** enable a **production ramp-up within one week for new products**, especially in the field of consumer electronics (e.g. smartphones). Industrie 4.0 concepts are seen as a **possibility to change the product-portfolio from mainly low-cost to high-quality and -value products, and to re-shore production lost to the mainland**. Focus is on increasing productivity in production. Local suppliers of Industrie 4.0 solutions focus on offering infrastructure for horizontal and vertical integration of production data.

Highlights

Corporate Culture & Flexibility

Supply chains are extremely **flexible** and **quickly** adapted to the demands of new products. **Production ramp-up within one week is possible in mass production**. **Technology-transfer** from research to industry is common and very successfully implemented by **spin-offs**.

Standards, Migration & Interoperability

Highly compatible and adaptable **platforms for horizontal and vertical integration** of IT systems with various interfaces are developed and commercially available.

Technological Basis

Strong semiconductors industry and the headquarters and competence centers of huge mass production companies result in a **profound technological basis**.

Map

Industrie 4.0 in Taiwan

Drivers/ Challenges

Drivers

- **Rising labor costs in the mainland** demands higher automation rates to stay competitive (for companies producing in the mainland) and enables reshoring factories at competitive prices
- **The need to upgrade the manufacturing sector** in order to compete with neighbors: Korea, Japan
- **Lack of resources and rising energy costs** demands increasing efficiency in production
- **Shortage of skilled workers**, due to demographic change

Challenges

- Strong **dependency on the mainland**
- **Lack of national brands** to directly provide Industrie 4.0 solutions
- **High share of very small SMEs** hinder the implementation of Industrie 4.0 due to limited resources

Key Stakeholder

- **Ministry of Economic Affairs (MOEA)**
- **Foxconn**
- **The Industrial Technology Research Institute (ITRI)** – Competence center for industrial research
- **Institute for Information Industry (III)** – Major research institute for ICT
- **Taiwan Automation Intelligence and Robotics Association** – Industry alliance in the field of intelligent automation industry

Key Approaches

Productivity 4.0
Strategy by MOEA focused on productivity improvements in manufacturing to reshore production from the mainland.

White Paper on Taiwan Industrial Technology
Annual published report by MOEA about current developments and governmental strategy for industrial technologies in Taiwan.

Foxconn Automation Strategy
Corporate strategy to increase automation rate by implementing one million robots.

Highlights

Corporate Culture and Flexibility

Speed in production ramp-up is key. Supply chains are highly flexible. Companies are deeply integrated into the supply chain. Business processes between suppliers are optimized and inter-company processes efficiently managed. Thus production ramp-ups of new products within a week are enabled. **Technology-transfer from research to industry is common and very successful trough spin-offs.** Especially ▸*ITRI* is the origin of many successful companies. One of the best practices is TMSC the world's largest semiconductor foundry. Organizational and **corporate structures are still very hierarchical**. Most of Taiwanese companies are **SMEs**, specialized in ICT or manufacturing. Compared to Japanese and Korean companies, Taiwanese SMEs are seen as **more pragmatic and operate more flexibly,** which is mostly caused by their very small size. Organizational **structure changes are rather rare** and the **growth of companies is mostly organic**.

Standards, Migration and Interoperability

Compatibility and pragmatic adaption are key. Instead of waiting for the final standard, **highly compatible and adaptable platforms for ➨*horizontal and vertical integration* of IT systems with various interfaces** are developed in Taiwan and commercially available. **Due to its small regional market and export-orientation, international standards like ISO are widely accepted in Taiwan** and adopted as regional standards. **Standardization is mainly driven by universities and research institutes**, which also participate in international standardization committees. Taiwanese companies are less active in standardization. Strong economic and industrial connections between Taiwan and the mainland lead to joint standardization activities. **Migration and upgrading existing facilities are expected to be the main approach of implementing Industrie 4.0 technologies.** However, large companies are **reshoring their factories to the island, due to rising labor costs in the mainland and financial support of the government.** In this context, greenfield-projects for highly automated factories are also important.

Technological Basis

Taiwan is headquarters and competence hub of the world's extended workbench. Most of the **large contract manufacturers** producing in the mainland (e.g. ▸*Foxconn*) are **headquartered in Taiwan** and accumulate large **production competencies in the country**. **Taiwanese main technological competencies are in the ICT and semiconductors industry.** The production is mainly **characterized by very short lifecycles and large lot sizes.** Industrial applied research and development is done by large companies or research institutes like ▸*ITRI*. Focus of applied research institutes is to transfer new technologies to industry thus filling the gap between universities and high-tech companies.

Overview

Technology

Due to its strong semiconductors and ICT industries, **Taiwan has a profound technological basis**. A large share of factories is located in the mainland and **industry is still dominated by mass production**. Taiwan's **research-efforts are also very focused on ICT** with the **globally highest ratio of research in ICT to the overall research budget**. ➨***Data security*** **concerns of companies are high.** Society has little concerns for security, and accepts new technologies. Thereby large companies prefer their independent and closed systems (e.g. own ➨*cloud systems*), while SMEs are dependent on common and open solutions. Due to their limited financial resources**, integration of software systems (e.g. PLM and ERP) in SMEs is very low.** The high share of small SMEs leads to a **scattered technological competence** and **hampers Taiwan to become globally perceived as a strong Industrie 4.0 solution-provider.**

People Overview

Engineering sciences are strong in Taiwan and heavily supported by the government. Nevertheless companies often criticize the **lack of practical relevance** in trainings and studies. Yet, there is a **sufficient amount of highly educated personnel** in Taiwan. But demographic changes and attractive job offers from the mainland and Hong Kong are already hindering the recruitment of new talents. Thus, labor costs are rising and w**orking conditions must be improved**. Loyalty of Taiwanese employees **is low and frequent job changes are the norm. Due to the aging society and frequent job changes, active IT-supported knowledge management becomes important for Taiwanese companies.**

Organization

Taiwan is traditionally technology oriented. Thus **innovation in the field of services or** ➨***business models*** are **not seen as equal to technological innovation** and are not funded by government. Taiwanese **companies are mostly very small family-owned SMEs.** Similar to large companies, they are mainly specialized in ICT or manufacturing. In Taiwanese companies **strict hierarchical corporate structures** are still the norm and **flexible working models are not common**. Due to its small regional market, Taiwanese **economy is traditionally export-oriented**. Nevertheless**, English is not very common as corporate language.** Recruitment of international high-skilled workers is difficult for Taiwanese companies. Innovation competence, especially in ICT, is high and the **number of patents registered by Taiwanese companies** in international IP institutions is large compared to its population size.

Business Environment

The Taiwanese government is aware of the opportunities offered by Industrie 4.0 and is setting up own strategies to support the implementation like the ▸*Productivity 4.0* strategy by ▸*MOEA*. Besides the **preservation of economic competitiveness**, **the reindustrialization** is one of the main objectives. Thus **reshoring of factories back to Taiwan is funded and supported by government**. A**ccess to venture capital** is still seen as **insufficient** in Taiwan and a start-up scene is just developing.