

Country Profile Finland

Stand: 17. Dezember 2015



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

Highlight Profile Finland

Summary

Innovation is highly appreciated and companies are enthusiastic about testing. This combination favors the **piloting of global innovation in local production.** The most competitive area is **data collection and analysis.** Sensor technology is **mature, advanced,** and one of the **core competencies.** **Data privacy concerns are not publicly visible and not limiting** the evaluation of data analysis technologies. Finland is committed to **actively assure its global position in Industrie 4.0 technologies.** Various initiatives are launched with prevalent focus on **using the opportunities of connected devices and collected field data** in industrial products for the manufacturing industry. Finnish approaches concentrate on **value creating services** via use of smart technology. Companies and research organizations **work together** in order to transform innovations to products. Finland has taken the leading position in school education, as **MINT subjects are more popular** than in other nations.

Highlights



Collection and Analysis of Field Data

Sensor technology forerunner. Finland has a strong data collection and analysis competence of several years. **Open standards and accessible interfaces** lead to **bottom-up innovations.**



Importance of »Production«

ICT and data analytics in manufacturing are perceived as **high-technology fields** and are **systematically expand domestically.** Industry is **very export oriented,** most of it **machinery.** Society has **high appreciation of technical risk** which leads to **piloting of global innovation in local production.**



People Overview

Innovation culture exceeds almost all other industry nations. One of the **best education systems** in Europe and **high appreciation of MINT-related subjects** set Finland in **leading position** regarding the educational basis.

Map



Industrie 4.0 in Finland

Drivers/ Challenges	<p>Drivers</p> <ul style="list-style-type: none"> ▪ Will to test the implementation of new technologies and readiness to assume risk push piloting activities in local production ▪ Companies push the development of bottom-up innovations through opening standards and interfaces 	<p>Challenges</p> <ul style="list-style-type: none"> ▪ Finnish companies struggle to access global markets due to cultural and geographical distance ▪ Small domestic market makes Finnish companies dependent on international customers ▪ Up-Scaling of piloting global innovation in local production is shifted to other countries
Key Stakeholder	<ul style="list-style-type: none"> ▪ Finnish Metals and Engineering Competence Cluster (Fimecc) ▪ VTT Technical Research Centre of Finland Ltd. ▪ Digile – Non-profit research organization operating between the public and private sector ▪ Tekes – Finnish Funding Agency for Innovation 	<ul style="list-style-type: none"> ▪ Metso Automation – Metso DNA: Scalable automation platform that synchronizes process, machine and quality data ▪ Finnish Industrial Internet Forum (FIIF) – Company driven activity which evaluates and supports application of Industrial Internet visions in business of Finnish companies
Key Approaches	<p>Fimecc: S-Step Cross-cutting research program involving industry and research institutes (also across the EU) to increase lifecycle efficiency by smart technologies in products and production processes (strategic research themes: service business, user experience, global networks, intelligent solutions, breakthrough materials; ■ ecosystem, digitalization, sustainability, holistic lifecycle approach.</p> <p>Fimecc: MANU Funded program involving major Finnish companies and technical research institutes aiming at enhancing competence in the field of digitalization and its use in manufacturing processes.</p> <p>VTT: Productivity Leap with IoT Research program to evaluate potentials of productivity increases through IoT technologies.</p> <p>Digile: IoT Research program to establish IoT ecosystem, create IoT business enablers and improve Finland's global IoT visibility.</p> <p>Digile: Data to Intelligence (D2I) Research program to develop tools and methods for managing, refining and utilizing data.</p> <p>Tekes: Industrial Internet - Business Revolution Program Program to fund projects which use digitalization for developing new service and business models and encouraging companies to renew their business operations and cooperation through Industrial Internet.</p> <p>Industry Hack Series of interface opening events for start-ups or external coders to build new applications and services for the Industrial Internet. Hacks were already carried out by Konecranes, Fastems, Tekniika & Talous.</p>	

Highlights

 <p>Collection and Analysis of Field Data</p>	<p>Data analysis and sensor technology are core competencies in Finland. Companies develop and sell advanced sensor technology for various applications (e.g. cargo, cranes, engines, forestry, machine monitoring). Government is supporting application oriented activities by funding projects such as ▶»Productivity Leap with IoT« (VTT), ▶»Industrial Internet« (Tekes) and ▶»Data to Intelligence« (DIGILE). Not only large enterprises but also SMEs and start-ups successfully specialize on data analysis and sensor technology. Cooperation between universities and industry are common and led to new companies. There is criticism that expertise in technologies is too rarely transferred into profitable products. Data privacy aspects are not publicly visible. Companies see this lack of public discussion more as a chance to apply data analysis and test new opportunities. Finnish companies are willing to open data sources and cooperate with external development groups.</p>
 <p>Importance of » Production«</p>	<p>The manufacturing sector is seen as core industry as Finland is highly export oriented with an export share of 40%, most of it machinery. Manufacturing jobs are valued in society, but increasingly competing with east European countries like Poland. Extensive research programs are initiated by ▶VTT, ▶Tekes and ▶Fimecc to strengthen competences and obtain competitiveness in production through using opportunities of digitalization and data analytics in manufacturing processes. Among the countries where GDP per capita is highest in Europe, Finland has the largest proportion of employees in technology and knowledge intensive sectors. The industry's high share on GDP suffered a sharp decline due to Nokia's collapse and the related slump of the electronics industry. But high innovative strength and ICT competence enabled Finland to reach a leading position in ICT-controlled production networks (see for example Metso DNA scalable automation platform). The high level of ICT and sensor technology competence and high value of testing and innovation is seen as a differentiating factor for local production. The cooperation between universities and industry is very good and students are involved in work experiences during their studies.</p>
 <p>People Overview</p>	<p>Innovation is highly appreciated. Finland's R&D-expenditure is the second highest in the world as a proportion of GDP. The nation in general is enthusiastic about testing. Employees are expected to show initiative, participation, and self-reliance which require a good understanding of the »big picture« and willingness to develop their own working style. The pioneering spirit of SMEs is strengthened by good support through government and companies. The Finnish education system is one of the best in Europe and a big advantage for the industry. Technological relevant school subjects, like mathematics, information technology, natural sciences, and technology, are more valued than in most other European countries. Studying subjects in the area of technology and transport is very popular. Finland has a greater percentage of engineering graduates than in most nations.</p>

Overview

 <p>Technology</p>	<p>Finland is considered one of the most competitive countries in ICT. Nokia's collapse led to multiple innovative start-ups in the ICT sector, run by former Nokia specialists. Companies use state of the art manufacturing processes and exhibit a high degree of automation. Finland's capabilities to create innovation are advanced. The sector »production and technology« benefits most from R&D expenditure, which is the highest in Europe compared to the GDP. Various extensive research programs are initiated by ▶VTT, ▶Tekes and ▶Fimecc with wide governmental support and large participation of universities and industry. Finnish companies see high benefits in opening interfaces and having open standards to push innovation in their products (see ▶Industry Hack). Standards are seen as a bottleneck for national companies. Finland is participating in international standardization committees, but more as a follower and not actively pushing standardization processes. Migration is mainly done by applying sensors in production processes to enable data collection and analysis. Companies are very willingly to invest in sensor technology to increase performance and efficiency of processes.</p>
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 <p>Organization</p>	<p>Business in Finland is based on trust. Finnish companies are reputed to be reliable and contractually loyal. The basis for cooperation is personal meeting and building trust in each other, whereas legal safeguards are not as important as in other European countries. This is also why Finnish companies do little patenting. The legal framework is overall beneficial to the business economy: There is high trust in jurisdiction, low corruption perception and the ease of doing business is rated well. The service industry has increasing significance, especially in cross-cutting applications of industrial internet. Overall objective is enhancing flexibility and lifecycle efficiency by smart technologies in products and production processes. Cross-cutting research programs like ▶S-Step and best practice solutions like the ▶Metso DNA automation platform focusing on business model innovation and digitalization of supply chain processes in fields of manufacturing industry. High English skills among the society and English as corporate language are standard. Due to Finland's less favorable geographical location, the attractiveness for international top talents is low. However, studying abroad is very popular for Finnish students and sponsored by the state.</p>
 <p>Business Environment</p>	<p>Politics and industry are closely cooperating and have launched various initiatives in the field of Industrial Internet with major focus on ICT integration. The main projects are public-private partnerships run by FIMECC (Finnish Metals and Engineering Competence Cluster), VTT (public research and technology company), Digile (non-profit research organization), and Tekes (Finnish Funding Agency for Innovation) with major focus on using the opportunities of connected devices and collected field data in industrial products for the manufacturing industry. The most important markets, Sweden and Germany, are close by. But Finnish companies struggle to access global markets. Major issues are absence of international employees and talents as well as geographical and cultural distance to big markets. As a consequence, Finland has difficulties to entirely profit from its huge ICT competence in global trade. Especially SMEs are dependent on support by networking organization like Finpro to access global markets.</p>