Policy brief
1/2026

Islands of Innovation

A Comparative Reflection on Industrial Policy, Access to Talent, and Technology Sovereignty

Finland and Taiwan, though geographically distant, share the challenges of small, open economies reliant on global trade, talent, and energy. Taiwan's targeted investments in critical technologies like semiconductors and AI, its institutional clarity, and agile governance offer a useful mirror for Finland's broader but less output-focused innovation strategy. Facing similar demographic shifts, Taiwan has also moved decisively to attract international talent and reconfigure its higher education system, an area where Finland lags in reform.

This brief aims to offer discussion points by sharing key lessons from Taiwan across six domains: critical technologies, industrial policy, talent, energy, regional renewal, and the role of research organizations. Kaohsiung's industrial transformation, ITRI's mission-driven role, and Taiwan's approach to aligning tech ambition with systemic readiness provide practical insights for Finnish policymakers and innovation leaders.

In short, Taiwan demonstrates how strategic focus, systemic coordination, and measurable outcomes can accelerate innovation capacity building. For Finland, adopting a more output-focused, resilient, and ecosystem-driven approach may be essential to sustaining competitiveness in a volatile global landscape.

Key takeaways

- Focus innovation efforts on a tight set of critical technologies and link R&D funding to measurable outcomes like export growth or industry value to sharpen impact.
- Align public and private roles: empower firms to lead in tech deployment while the state ensures critical enablers like infrastructure, talent, and long-term direction.
- Reform higher education to address demographic decline through institutional consolidation, talent attraction, and tighter alignment with future skills needs.
- Integrate critical infrastructure foresight into innovation policy. Stable energy, compute, and logistics are enablers for scaling technologies like AI and semiconductors
- Foster place-based renewal by coupling industrial investment with regional planning and culture. Support RTOs as co-designers of missions rather than contractors.

beyond the obvious

Critical technologies here and there

Critical technologies, while ambiguous as a term, draw significant attention in innovation policy. What is critical, remains subjective and depends on the specific environment. In Taiwan the government has identified five "trusted" industry sectors as strategic priorities: semiconductors, artificial intelligence (AI), defence, security and surveillance, and next-generation Communications[1]. Reflecting these against European Union's critical technologies we see a clear distinction of what is critical as Taiwan has a much narrower scope.

Regardless of the differences in focus, governments are driven by a need to invest in critical technologies. In Taiwan, for the "trusted" technologies, President William Lai, in 2025, proposed increasing the national technology budget by 13% to NT$180 billion (≈€4.95 billion) to support these the sectors[2]. This is ambitious by the size of funding, compared to e.g. European funding levels. Albeit a comparison of e.g. the EU Chips Act to the Taiwanese funding has its challenges, Figure 1 gives an idea about the share of funding provided.

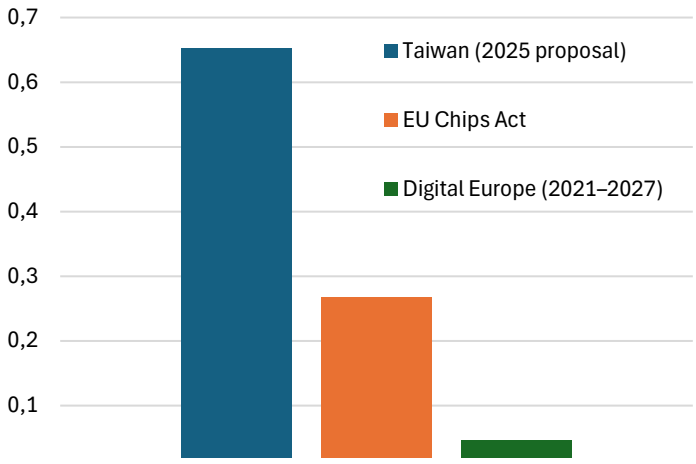

Figure 1 Comparative of Taiwan funding proposal to semiconductor critical technology compared against EU instruments as per share of GDP.

The proposed Taiwanese funding includes ear markings for sovereign AI (developing large language models on Taiwan's own infrastructure)[3], the Taiwan AI Action Plan 2.0, a new "Silicon Valley" hub in southern Taiwan, and a "Chips Team Taiwan" initiative to bolster the domestic semiconductor supply chain[4].

The objectives of Taiwan's funding are linked to concrete output targets: the National Development Council aims to grow Taiwan's AI industry value to over NT$1 trillion by 2026 (about €29 billion)[5], and government plans project semiconductor industry output to increase by NT$2.6 trillion (≈€75 billion) by 2028.[6] Achieving these targets will require a talent surge. A national program is underway to provide professional training for 450,000 people in AI, green technology, and digital fields by 2028[7], alongside efforts to recruit 120,000 foreign professionals to Taiwan in the same period[8].

When compared to Europe's broader focus on critical technologies, Taiwan's approach appears narrower but also more decisive. The European Union and Finland seem to lack specific output benchmarks. Finland's current innovation strategy, emphasizes raising overall R&D spending to 4% of GDP by 2030[9], which is an important goal but input focused. By contrast, Taiwan's clear, sector-specific targets, like the €29 billion AI output goal, provide a sharp sense of direction and accountability. The lesson for Finland is that a focused portfolio of critical technologies, backed by measurable KPIs, can galvanize public and private sectors alike. Instead of an unfocused agenda, Finland could in a narrow pool of strategic domains tie funding to concrete outcomes. For example, on Quantum, a major Finnish initiative, what could be the **concrete and actionable**

[1] Wang, Lisa (2025). Science council proposes 13% tech budget hike. Taipei Times. Available at https://www.taipeitimes.com/News/biz/archives/2025/01/15/2003830203
[2] ibid
[3] ibid
[4] ibid
[5] Focus Taiwan (2024) NDC aims for AI industry to be valued over NT$1 trillion by 2026. Available at https://focustaiwan.tw/business/202408150015
[6] Executive Yuan (2025) Premier Cho Jung-tai's oral policy report to 4th session of 11th Legislature. Available at https://english.ey.gov.tw/Page/878D1F23A9E61177/492c3353-04fe-460c-bba3-f57e76bb4bb2
[7] National Development Council (2024). National talent competitiveness jumpstart program. Available at https://english.ey.gov.tw/News3/9E5540D592A5FECD/7a6644c2-4f7d-427e-8c62-3deb9653c771
[8] ibid
[9] businessfinland.fi

multi-criteria impact measures that would ensure we are delivering on outcomes in relation to the inputs. Taiwan's example shows that ambitious bets in a few areas, even at a time of budgetary constraints, can yield outsized momentum.

Let the Market Lead, But Don't Forget to Build: Taiwan's Innovation Model in Contrast

Taiwan is reassessing its role in shaping private sector decisions regarding technology investments. Taiwan's Minister of Economic Affairs, J.W. Kuo emphasized that private businesses should make their own decisions on e.g. their technological progress[10]. This marks a potential shift from heavy state involvement towards a more market-driven approach, contrasting with increasing state intervention trends seen in the EU and US. Taiwan's rhetoric of let the market lead is thus a counterpoint: even as Western economies pour public funds into strategic industries, Taiwan is cautiously stepping back from direct dirigisme, even in areas deemed critical to the security of Taiwan.

Figure 2 Kavalan whisky maker is a not often seen as a case for Taiwan's ability to scale and produce yield. Kavalan has adopted knowledge and improved to excel in their field in a relatively short time. Image: Arho Suominen.

At the same time, the strategic importance of Taiwan's semiconductor sector remains front and center. Wu Jieh-min of Academia Sinica described Taiwan's "Silicon Shield" strategy, essentially leveraging its dominance in cutting-edge chips as a geopolitical safeguard[11]. The data bears out Taiwan's near-monopoly in advanced semiconductors: over 60% of the world's semiconductor products are made in Taiwan, including around 90% of the most advanced (2–3 nm) chips used in AI processors[12] . In other words, Taiwan deliberately remains the exclusive producer of the world's highest-end chips, which gives it outsized importance in global tech supply chains and geopolitics. This reality forces a delicate balance: on one hand, officials signal a more market-friendly stance internally; on the other, the state continues to heavily support strategic assets (like semiconductors) to maintain its global edge. This is true even as for example the US has tried to move semiconductor production into the US[13].

In practice, just around the Kaoshiung region TSMC is investing in multiple new fabs[14], whereas investing in only one in the US that is challenged to be completed[15]. Should there be a disruption in Taiwan's ability to export high-end semiconductors, there isn't a replacement of needed supplies nor can e.g. the US build such a capability soon. **The true secret sauce in Taiwan – in reflection – is its ability to scale production and produce superior yields.** When we remember the origins of TSMC, learning the technology from RCA in the US, Taiwanese organizations were able to build, scale and improve production to produce higher yields than RCA

[10] Wang, Lisa (2025). Ministry lifts overseas limits on TSMC. Taipei Times. Available at: https://www.taipeitimes.com/News/biz/archives/2025/01/11/2003829992
[11] Wu, Jieh-min (2024). Silicon Shield 2.0: A Taiwan Perspective. The Diplomat. Available at: https://thediplomat.com/2024/09/silicon-shield-2-0-a-taiwan-perspective/
[12] Schubert, Gunter (2024) Taiwan's Semiconductor Industry in the "Chip wars" Era. The Taiwan Research Hub at the University of Nottingham Available at: https://taiwaninsight.org/2024/08/09/taiwans-semiconductor-industry-in-the-chip-wars-era
[13] To, Michelle (2024). TSMC says its $40 billion chip project in Arizona faces a further delay. Marketplace Asia CNN. Available at: https://edition.cnn.com/2024/01/19/tech/tsmc-taiwan-arizona-project-delay-intl-hnk
[14] Taipei Times (2024). TSMC plans two more Kaohsiung fabs. Taipei Times. Available at: https://www.taipeitimes.com/News/biz/archives/2024/12/30/2003829322
[15] The Economist (2025). TSMC's cautious expansion is frustrating the AI industry. Available at: https://www.economist.com/business/2025/11/13/tsmcs-cautious-expansion-is-frustrating-the-ai-industry

ever could. This tradition of adopt, build, scale and improve is prevalent would be talk about Taiwan's semiconductor industry or something like whisky[16] production.

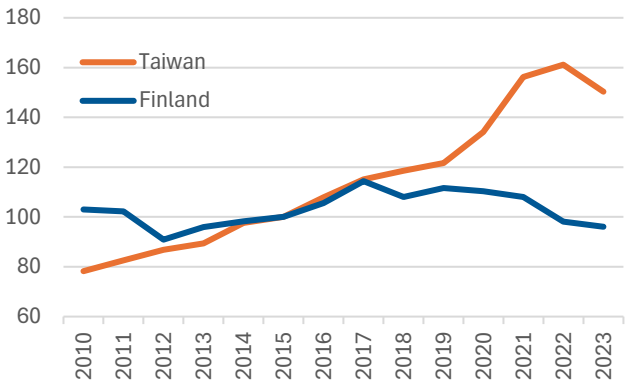

Figure 3 Labour Productivity Index in Manufacturing (2015 = 100) Source: Statistics of Finland, National Statistics Taiwan

Despite strong performance in high-technology R&D and investment in R&D, Finland's manufacturing labour productivity has declined by almost 4 percent since 2015. Over the same period, Taiwan's manufacturing productivity increased by more than 60 percent. This divergence is not simply a matter of sectoral composition, but reflects Taiwan's sustained emphasis on adoption, scaling, process refinement, and organizational learning. Finland's challenge, by contrast, appears less related to the generation of new knowledge than to its systematic conversion into output and value. The widening productivity gap underscores the importance of technology adoption, scaling, and cumulative learning as central determinants of long-term competitiveness.

Race for talent and reshaping higher education

One of the most striking demographic signals in Taiwan is the steady population decline. In one week alone, the island's population fell by about 1,432 people. This daily drip of decline, averaging around 250 fewer people per day leaving or dying than entering or being born, is reshaping the foundations of society in subtle but significant ways. Broader statistics confirm the trend: as of late 2025, Taiwan's population had declined for 22 consecutive months, with the total standing 91,951 people lower than a year prior. The working-age population is forecast to shrink by about 200,000 annually[17], driven by one of the world's lowest fertility rates (0.87 in 2023). Taiwan offers Finland a comparative a magnitude difference in the rate of demographic change. In the 1960s, the nation had a high total fertility rate, which has since plummeted below that of high-income countries. This sharp decline contrasts with Finland's more gradual decrease in birthrates. The impact of Taiwan's demographic shift is also evident on university campuses, with several institutions merging.

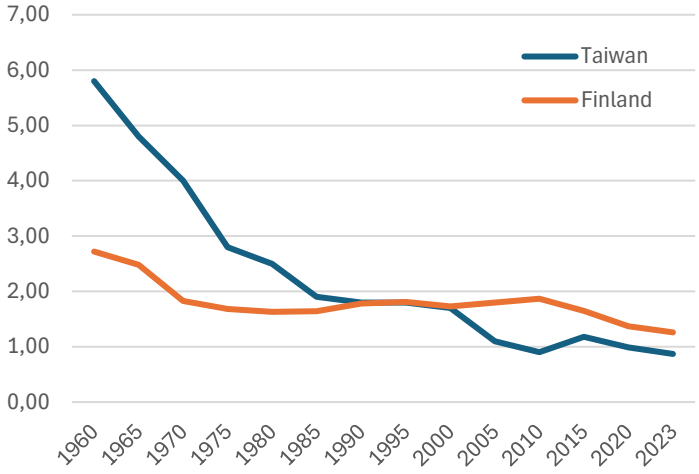

Figure 4 Fertility Rate, Total for Finland and Taiwan. Source: World Bank and Ministry of the Interior (Taiwan).

Taiwan's response has been a suite of immigration and talent-attraction incentives[18]. The government has set a goal of hosting 320,000 international students by 2030, with hopes that 210,000 (65%) of them will remain in Taiwan's workforce after graduation. Generous scholarships, especially for students from

[16] Kavalan is an interesting example of Taiwanese ability to focus on technology adoption, improvement and scaling producing excellence. As a young distillery it has received significant credit on their products, recently producing the best whisky in the world. Refer to Tao, David Thomas (2025) This Is Officially the No. 1 Whisky at the 2025 International Whisky Competition. Available at: https://www.foodandwine.com/kavalan-solist-fino-sherry-single-cask-international-whiskey-competition-2025-11771089

[17] Kao, Chia-he (2025) Taiwan population drops for 21st straight month. Taipei Times. Available at: https://www.taipeitimes.com/News/front/archives/2025/10/19/2003845714

[18] See e.g. Chuang et al (2024) Taiwan to unveil new policies to mitigate talent shortfall with AI and foreign workers. DigiTimes Asia. Available at: https://www.digitimes.com/news/a20240719PD214/taiwan-talent-management-policy-investment.html

Southeast-Asia under the New Southbound Policy, are being paired with streamlined residency and employment pathways. Taiwan has also launched a “gold card” visa for high-skill professionals and is piloting a digital nomad visa to attract remote workers. The underlying certainty is that competition for working-age talent in Asia is fierce and unavoidable and arguable increasing.

Observing Taiwan's strategies offers reflection on how Finland can adapt to similar challenges. On higher education for example, **the discussion in Finland still primarily focuses on expanding higher education, but it may be prudent to also consider measures to address potential declines in enrolment and the integration of international talent.** Wang (2025) opens this needed debate in an ETLA blog “Väestökato kohtaa yliopistopolitiikan”[19]. Many universities and universities of applied sciences are in locations experiencing sharp population decline, raising concerns about overcapacity and duplication of effort. While talent attraction remains essential, Wang argues that Finland must also initiate long-overdue reforms to rationalize the higher education landscape, through strategic consolidation, role differentiation, and better coordination across institutions (see also the ETLA led evaluation of the Finnish Innovation System from 2009). As in Taiwan, demographics are beginning to force decisions that had previously been avoided. The second-best option is to do those overdue decisions only when being forced to.

Energy – the case of technological adjacencies

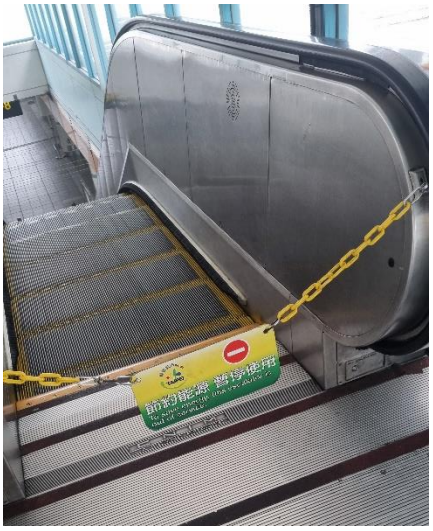

Figure 5 An escalator at a metro station in Taipei with a sign of being shutdown to conserve energy. Image: Arho Suominen

Taiwan’s energy landscape is in flux. The island has long pursued a “nuclear-free homeland”[20] policy aiming to decommission all nuclear power plants by 2025. As of 2025, Taiwan gets the bulk of its electricity from fossil fuels (natural gas and coal) and is trying to boost renewables. However, the rapid expansion of AI computing workloads and new semiconductor fabs is raising urgent questions about power supply. Rolling blackouts in 2021 and 2022 had already jolted public awareness about energy security.

Now, a conversation about nuclear power is resurfacing. Premier Cho Jung-tai has publicly stated that new nuclear energy is “not ruled out” if certain conditions are met[21]. Specifically, he said the government would consider next-generation nuclear options provided there is public consensus, guaranteed safety, and a viable solution for nuclear waste disposal[22]. This is a notable shift essentially reopening a door that was politically sealed after Taiwan’s 2014 anti-nuclear referendum. It mirrors, to some extent, Finland’s own pragmatic approach: Finland has embraced nuclear as a cornerstone of its decarbonization strategy, commissioning the Olkiluoto-3 reactor in 2022 and thereby raising the nuclear share of Finland’s electricity generation.

Taiwan is noticing that trend and is rebuilding its nuclear capability particularly focusing on evaluating the ability to restart existing plants and developing capabilities in small nuclear reactors[23] Taiwan’s current reality is that it imports 95.2% of its energy in the form of coal, LNG,

[19] Wang, M. (2025). “Väestökato kohtaa yliopistopolitiikan**”. ETLA blog** https://www.etla.fi/ajankohtaista/vaestokato-kohtaa-yliopistopolitiikan/
[20] Chung, Jake (2025). New nuclear energy generation can be considered: Cho. Taipei Times. Available at https://www.taipeitimes.com/News/front/archives/2025/06/29/2003839423
[21] ibid
[22] ibid
[23] Taipei Times. (2025) NSC to study modular nuclear reactors. Taipei Times. Available at https://www.taipeitimes.com/News/front/archives/2025/09/15/2003843802

and oil[24] This import dependence, combined with the need for stable power for high-tech fabs, makes energy security a strategic constraint, particularly as the energy demand is expected to increase by 12-13% by 2030[25]. The Premier's hint at nuclear is essentially saying: if the public can be convinced it's safe, we might need it. Interestingly, Taiwanese public opinion on nuclear has been shifting. An 23 August 2025 referendum to restart the closed Maanshan nuclear power plant narrowly failed due to turnout rules. However, it indicated substantial support for re-examining the nuclear question[26]. As everyday trade-offs (like escalators turned off, or periodic power rationing) become visible, people seem more willing to reconsider the issue.

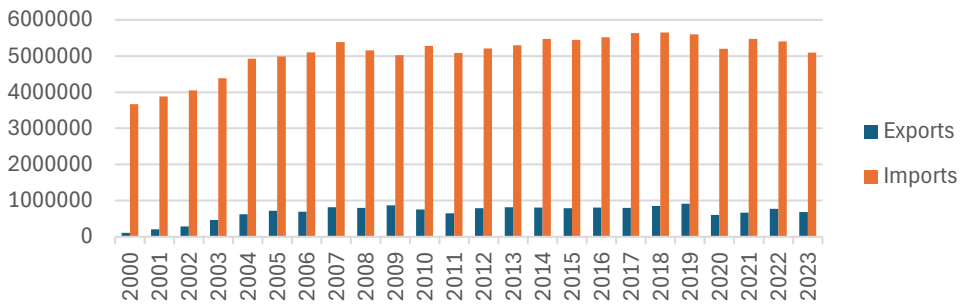

Figure 6 Trade in energy, TJ. Source: International Energy Agency

For Finland, the Taiwanese case reinforces a broader lesson that technological ambition is constrained by systemic readiness. Energy, in this context, is not a support function, it is strategic infrastructure. Taiwan's experience shows how high-stakes tech agendas like AI and semiconductors can falter if the surrounding systems like power, compute, logistics, or workforce, are not scaled in parallel[27]. Finland's multi-stakeholder energy planning model, which brings together government, industry, and citizens to co-create energy scenarios, is a strength. But this coordination must now extend across all critical adjacencies. Every major technology initiative, be it in AI, quantum, robotics, or bioeconomy, should be stress-tested for its reliance potential adjacencies. Embedding such adjacency metrics directly into the KPI framework for critical technologies would prevent future chokepoints. In Taiwan's case, lack of investment in adjacencies can lead to world-class tech ambition becoming derailed by foundational gaps.

Lessons from Kaohsiung's Industrial Transition

Kaohsiung, once known as Taiwan's gritty steel-and-shipbuilding city, has spent the past decade reinventing itself. In 2024, the city's software and digital content sectors grew by 33–35% in revenue, and its "smart applications" industry grew by 70% year-on-year[28]. These numbers illustrate an economy diversifying rapidly into tech and innovation. Global firms like TSMC, Amazon Web Services, and U.S. materials company Entegris have made significant investments into new AI-enabled semiconductor facilities in Kaohsiung. As an example, in 2023 Entegris

[24] IEA (2024). Where does Chinese Taipei get its energy? International Energy Agency. Available at https://www.iea.org/countries/chinese-taipei/energy-mix
[25] Lee, Chermaine. (2025) In Taiwan, AI boom prompts doubts about ditching nuclear power. Al Jazeera. Available at https://www.aljazeera.com/economy/2025/5/15/in-taiwan-ai-boom-prompts-doubts-about-ditching-nuclear-power
[26] World Nuclear News (2025). Taiwan's pro-nuclear vote fails to hit turnout threshold. Available at https://www.world-nuclear-news.org/articles/low-turnout-invalidates-taiwan-referendum-result
[27] See for example Rickards, Jane (2025) Taiwan worsens its vulnerability to a Chinese energy blockade. ASPI – Australian Strategic Policy Institute. Available at: https://www.aspistrategist.org.au/taiwan-lacks-clarity-on-energy-security/
[28] Ministry of Economic Affairs (2024) AI Supercomputer Boosts the Revenue Growth of the Kaohsiung Software Park. Ministry of Economic Affairs. Available at: https://www.moea.gov.tw/MNS/english/news/News.aspx?kind=6&menu_id=176&news_id=115551#:~:text=trend%2C%20Phase%20I%20of%20the,Kaohsiung%20Software%20Park%2C%20promising%20future

opened a US$500 million plant there to produce advanced chip materials[29], and TSMC is investing NT$1.5 trillion (~€45 billion) in a new fab complex in Kaohsiung[30].

At the same time, the city's waterfront district, which once dominated by port warehouses, has transformed into a cultural and tourism hub. The *concert economy* in Kaohsiung is particularly transformative. In 2023 the city hosted 157 concerts, drawing 1.71 million attendees and generating NT$5.7 billion (≈US$175 million) in tourism-related revenue[31]. Major international acts (Bruno Mars, K-pop stars, etc.) now include Kaohsiung on their tour stops, something unheard of a decade ago. As a result, Kaohsiung's overall visitor numbers hit 69.2 million in 2024, the highest of any city in Taiwan[32]. Hotels report occupancy was up 30% in 2023, and a further 13% in 2024 attributable to strong culture industry[33]. Kaohsiung managed to turn itself into an experiential destination even as it scaled up as an industrial powerhouse for chips and AI.

Figure 7 Kaohsiung waterfront district art. The area has been redeveloped from industrial to house high-tech R&D centres and an art district. Image: Arho Suominen

The industrial transition in Kaoshiung seem to be driven by three factors. **First**, there is a **whole-of-ecosystem coordination**. The city government, local firms, universities, and central agencies all worked in concert. The Asia New Bay Area development in Kaohsiung is a great example. They co-located the software park, a 5G AIoT innovation center, the MWC exhibition hall, and startup accelerators in one zone, *and* aligned it with urban renewal (e.g. waterfront parks, light rail corporate R&D centers are nestled in with cultural attractions). This clustering plus public support attracted private investment, like, NVIDIA set up an AI supercomputer center there, boosting Kaohsiung Software Park revenues by one-third in a year[34]. In addition to larger efforts, the city leverages police and fire departments to get people out of the concerts as fast as possible as any hour spent in the city is an opportunity for the local retailers and restaurants to gain revenue. It seems that coordination across sectors, big and small, amplifies results.

Second, rather than bailing out declining industries, Kaohsiung encouraged legacy companies to **digitize or pivot**. Steel mills were incentivized to adopt smart energy management; petrochemical firms got help to implement AI for process optimization[35]. The city's economic development office and partners have also hosted events promoting smart manufacturing, automation, and IoT adoption among legacy sectors. Kaohsiung's industrial ecosystem strategy includes maritime and offshore wind technology development, linking traditional port and fabrication capabilities with emerging clean-energy supply chains.

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[29] Chang, Jackson (2024) Entegris looks beyond geopolitical tensions, opens largest global manufacturing facility in Kaohsiung. Central News Agency. Available at: https://www.entegris.com/content/dam/web/about-us/news/in-the-news/entg-cna-article-ksp-facility-may-10-2023-11950.pdf#:~:text=,filters%2C%20high%20purity%20chemical%20drums

[30] CNA (2025) TSMC to invest over NT$1.5 trillion in Kaohsiung complex. Focus Taiwan. Available at: https://focustaiwan.tw/business/202503310011

[31] CAN (2025) Concerts boost Kaohsiung's tourism revenues. Taipei Times: Available at: https://www.taipeitimes.com/News/taiwan/archives/2025/04/21/2003835540

[32] Formosa News (2025) Concerts boost Kaohsiung to Taiwan's top travel destination. Formosa News. Available at: https://english.ftvnews.com.tw/news/2025416W04EA

[33] ibid

[34] Ministry of Economic Affairs (2024) AI Supercomputer Boosts the Revenue Growth of the Kaohsiung Software Park. Ministry of Economic Affairs. Available at: https://www.moea.gov.tw/MNS/english/news/News.aspx?kind=6&menu_id=176&news_id=115551#:~:text=trend%2C%20Phase%20I%20of%20the,Kaohsiung%20Software%20Park%2C%20promising%20future

[35] Kaohsiung City (2025) Gao City Government's introduction of AI to assist in the transformation of production was recognized by the Commonwealth Urban Governance Excellence Award!. Kaoshiung City Press Release. Available at: https://edbkcg.kcg.gov.tw/News_Content.aspx?n=FA86438944BB37E5&s=88627BC97B6A551B&sms=4773608F226124D4 (NOTE: automatically translated)

Third, Kaohsiung launched large-scale **retraining programs** to marry its traditional industrial know-how with new skills in AI, green tech, and tourism. For example, Kaohsiung's Asia New Bay initiatives and partners helped train thousands of AI-related talents, including workforce courses in AI-driven predictive maintenance. It also partnered vocational schools with tech companies to create curricula for semiconductor fabrication technicians. For example, TSMC's Kaohsiung expansion is expected to create thousands of jobs (around 8,000 reported for the five-fab buildout)[36]. The city didn't assume displaced workers would simply adapt; it actively facilitated the transition[37]. Additionally, a Taiwan-based program "Coding for Career" explicitly targets women's reskilling into coding/tech roles, including job matching; it supports the existence of women-to-tech short-course pathways[38].

This playbook offers a compelling model for Finnish regions, where historic manufacturing bases are seeking new growth pathways. The key is a **holistic approach**: link the city's identity with new tech initiatives) and urban cultural vibrancy. This can be done while ensuring local people are participants in the new economy via training. Kaohsiung showed that industrial transition is not just about tech; it's also about making a city *attractive to live in*. The 69 million visitors didn't just drop from the sky. They came because Kaohsiung made itself a fun, creative, liveable place, which in turn helps attract talent and companies in a virtuous cycle.

The Role of Research & Technology Organisations – ITRI

Figure 8 The first breakfast, regarded as the founding decision of ITRI over a traditional Taiwanese breakfast. The idea was to develop a research organization increasing Taiwan's ability to adopt and scale new technology. Image: Arho Suominen

Impact-centered research organizations drive a country's innovation ecosystem. Taiwan's Industrial Technology Research Institute (ITRI) is famously the birthplace of TSMC, but its influence extends far beyond that one success. Over the decades, ITRI has formally spun off 270 companies and has played a formative role in hundreds more[39]. Many of Taiwan's tech leaders in networking, electronics, and materials trace their roots to ITRI initiatives. Its patent portfolio consistently ranks among the Top 100 Global Innovators according to Clarivate[40]. Most importantly, ITRI excels at the last mile of innovation, actively licensing technologies to industry, embedding them into supply chains, and incubating startups that scale.

This turns attention to the European innovation system. While Brussels continues to debate and pilot the creation of a European DARPA as a mission-driven, high-risk innovation agency modelled on the U.S. Advanced Research Projects Agency[41], Research and Technology Organisations (RTOs) such as VTT in Finland, Fraunhofer in Germany, and CEA in France are central actors in Europe's innovation system, translating scientific knowledge into industrial applications, deep-tech spin-offs, and

[36] CAN (2024) TSMC plans two more Kaohsiung fabs. Taipei Times. Available at: https://www.taipeitimes.com/News/biz/archives/2024/12/30/2003829322

[37] See for example Ministry of Economic Affairs (2025) The Ministry of Economic Affairs promotes the ICT industry to settle in southern Taiwan, shaping Kaohsiung Yawan into a new AI center. Ministry of Economic Affairs. Available at: https://www.moea.gov.tw/mns/populace/news/EpaperDetail.aspx?volume=20250725; Kaohsiung City Government (2025) Planting the flag in Kaohsiung! Pegatron Yawan Research and Training Base opens to build the first R&D center in southern Taiwan. Kaohsiung City Government. Available at: https://www.kcg.gov.tw/News_Content.aspx?n=F29A02A9D36C47F0&s=C1243A627E66AB98&sms=19902EF36D6B551D; NKUST (2025) NKUST launches Semiconductor Process Equipment Talent Development Base to meet 14K annual professional demands. National Kaohsiung University of Science and Technology. Available at: https://eng.nkust.edu.tw/p/406-1131-95492%2Cr11.php?Lang=en

[38] Jiehuei Social Welfare and Charity Foundation. (2025). Tech Women Power: Coding for Career program registration guide (Coding for Career). Jiehuei Social Welfare and Charity Foundation

[39] ITRI (2025) World-changing research, applied. ITRI Webpage. Available at https://itic.com.tw/itri/ Accessed: 18.12.2025

[40] Clarivate (2025) Top 100 Global Innovators 2025, Clarivate Report. Available at: https://ir.clarivate.com/news-events/press-releases/news-details/2025/Clarivate-Reveals-Top-100-Global-Innovators-2025/default.aspx

[41] Greenacre, Martin (2025) EIC to pilot ARPA-style challenges in 2026. Science|Business. Availabel at: https://sciencebusiness.net/news/european-innovation-council/eic-pilot-arpa-style-challenges-2026

technological solutions that address real-world challenges.[42]. Across Europe, RTOs employ large research workforces, manage extensive patent portfolios, and support the creation of technology-based companies, acting as hidden engines of innovation comparable to the impact mission-oriented agencies like DARPA aim to achieve. However, despite their breadth and depth of impact, RTOs are often under-recognized or under-utilized in high-level strategic research and innovation policy debates in Brussels and beyond[43].

The contrast is not about institutional capability, it is about policy positioning. Taiwan positions ITRI not as an auxiliary actor but as a core driver of national innovation strategy. In Europe, by contrast, RTOs are often treated as contractors rather than strategic co-designers. A European DARPA may well have merit, but if it is built in parallel to existing RTO infrastructure, it risks fragmentation rather than focus. The better path may be to re-center RTOs within Europe's innovation agenda, giving them mission mandates, agile funding instruments, and a clear seat at the table when defining national and EU-level tech priorities. At ITRI, a mission-driven, low-hierarchy research culture combined with a relentless focus on real-world deployment delivers a national innovation engine. Europe already has the institutions. The challenge is to recognize their potential and enable them to drive impact accordingly.

The "Next TSMC/Nokia" Narrative

The Finnish media still often asks, *"Where is the new Nokia?[44]"*, while Taiwan's officials and press speculate whether a new startup, perhaps in AI or electric vehicles, could ever grow to TSMC-like stature[45]. The pursuit of a lone champion may be more about political storytelling and national psyche than about strategic economic necessity. There is no doubt that having an anchor firm can be transformative. Consider that at its peak around 2000, Nokia accounted for approximately 20% of Finnish exports[46]. Similarly, TSMC today makes up roughly 12% of Taiwan's total exports by value[47]. In Finland, the top 5 firms account for 85.8% of Business R&D and Nokia's cumulative share of national R&D (2004-2020) and profits (2004-2020) are 77.6% and 19.0% respectively. Similarly in Taiwan TSMC accounts for 12.6 of cumulative R&D (2004-2020) and 29.1% of profits (2004-2020)[48]. These companies cast long shadows. But betting on finding "the next one" may be misguided in a different global context. The tech industry now is far more fragmented into ecosystems than in Nokia's heyday. It might be healthier for an innovation system to nurture a diverse set of midsize companies that collectively provide resilience, rather than to put all eggs in one champion's basket.

In Finland's case, the focus on a new Nokia sometimes distracts from the successes we are achieving, for example, in gaming (Supercell), in industrial automation (Vaisala, Kone's digital twin work), and in the emerging quantum tech scene[49]. None of these alone will be "the next Nokia," but together they weave a strong fabric. Taiwan similarly has a plethora of innovative

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[42] Braito et al. (2024) EARTO Economic Footprint Study: Impact of 15 European RTOs in 2024. Idea Consult. Available at: https://www.earto.eu/wp-content/uploads/EARTO-Economic-footprint-final-report-2024.pdf

[43] Arnold, Eric et al. (2010) Impacts of European RTOs: A Study of Social and Economic Impacts of Research and Technology Organisations. Technopolis. Available at: https://ris.utwente.nl/ws/files/5140746/1336_EARTO_final_report_101110.pdf

[44] See for example Pennanen, Jussi (2023) Uusi Nokia voi löytyä tältä alalta: Arvo paisuu biljoonaan, Suomella hyvät mahdollisuudet. Talouselämä. Available at: https://www.talouselama.fi/uutiset/a/3a208bfd-7c7b-46a4-8a87-4e130ed24caa

[45] See for example CAN (2025) Taiwan planning robotics startup based on TSMC model: NSTC head. Focus Taiwan. Available at: https://focustaiwan.tw/business/202505170011

[46] Schwartz, Herman Mark (2023) The Nokia Risk. Phenomenal world. Available at: https://www.phenomenalworld.org/analysis/nokia-risk/

[47] Brown, Kerry (2025) How did semiconductors become so central to Taiwan's economic progress? Economics Observatory. Available at: https://www.economicsobservatory.com/how-did-semiconductors-become-so-central-to-taiwans-economic-progress

[48] Schwartz, Herman Mark (2023) The Nokia Risk. Phenomenal world. Available at: https://www.phenomenalworld.org/analysis/nokia-risk/

[49] E.g. https://ecipe.org/wp-content/uploads/2025/12/ECI_OccasionalPaper_15-2025_Quantum_LY03.pdf and https://www.ess.fi/uutissuomalainen/9082116

firms (in EVs, biotech, ICT) that, while not as globally dominant as TSMC, give it breadth beyond semiconductors. While narratives often embrace lone superstars, as it is simpler to boast about one big winner, robust strategy should focus on **systemic capacity such as talent pipelines, research capabilities, and supply chain depth. Those** factors enable the rise of many companies, any one of which might become a major success if conditions are right.

Instead of asking "Who will be the next TSMC/Nokia?", we should ask "How do we create the conditions for many next-generation tech firms to thrive?". That involves ensuring financing is available for scale-ups, ensuring there are mechanisms for startups to integrate into global value chains, and cultivating an entrepreneurial culture that tolerates failure. The risk of the current debate around critical technologies, technological sovereignty and strategic capitalism is that we focus more narrowly on seeking the next success story and forget about the holistic condition of the innovation system – laissez-faire innovation policy still has its place. A resilient innovation ecosystem is better served by nurturing a network of firms, From these some will be global leaders in niche fields, others will be unicorns, and yes, one or two might become the next household name. But even if they don't, the country can prosper through the collective output. This diversified approach also guards against the "all or nothing" risk. Finland felt a shock when Nokia declined, and Taiwan worries about overreliance on chips. By building the framework conditions for innovation we won't be as vulnerable to one pillar crumbling.

About the report:
This report is an output of the Future-Proofing Finland's Strategic Competitiveness and Innovation System for a New Geopolitical Era initiative, a programme funded by Business Finland. The project is carried out through a close collaboration between VTT Technical Research Centre of Finland and the Finnish Institute of International Affairs, combining expertise in technology research, policy analysis, and international cooperation.

A pivotal component of the project was a research exchange conducted in Taiwan, hosted by National Tsing Hua University. The exchange took place over two separate periods, during which the author engaged extensively with the Taiwanese innovation ecosystem. The activities included:

- In-depth interviews with a wide range of local innovation-system stakeholders—academics, policymakers, venture-capital representatives, and industry leaders—to gather diverse perspectives on the strengths, challenges, and emerging trends within Taiwan's R&D and commercialization landscape.
- Four guest-lecture sessions, each followed by interactive Q&A, where the author presented findings on Finland's innovation strategies and solicited feedback on how these could be adapted to the Taiwanese context.
- Industry site visits to technology firms, research laboratories, and innovation intermediaries, providing first-hand observation of production processes, collaborative practices, and the regulatory environment shaping innovation in Taiwan.

These activities yielded valuable comparative insights that support the broader objectives of the project: identifying pathways for Finland to sustain its competitive edge and to adapt its innovation system to the evolving geopolitical realities.

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In preparing this manuscript, the author used AI (ChatGPT 5.1. and 5.2.) to improve language and search for cross-reference data. Any revisions and data were verified by the author prior to including it to the document

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