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Productivity in the Finnish Service Industries

CAPITAL INTENSITY, LABOR ALLOCATION, DIGITALIZATION, OFFSHORING AND GENERATIVE AI

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Abstract

This report examines the factors shaping productivity in Finland’s private service industries. Specifically, we focus on the link between capital intensity and labor productivity, as well as the allocation of labor. In addition, the report highlights the roles of global megatrends, such as offshoring, digital adoption and generative AI, in productivity development. Using firm- and industry-level data, three broad patterns emerge. First, capital intensity in Finnish service industries is consistently below that of peer countries and is closely associated with weaker productivity. Second, firms systematically employ fewer workers than implied by profit-maximizing conditions, with gaps especially pronounced in knowledge-intensive services. Third, digital adoption is uneven: firms with broader use of digital technologies perform better, while many smaller and traditional providers lag behind. Scenario analysis suggests that generative AI could raise economic growth if paired with capital investment, while the offshoring of services does not appear to improve productivity but may support employment and reshape the composition of the workforce. The findings indicate that Finland’s service productivity challenges are long-standing and structural rather than short-term fluctuations.

Tiivistelmä

Tuottavuus Suomen palvelualoilla: pääomaintensiivisyys, työn kohdentuminen, digitalisaatio, ulkoistaminen ja generatiivinen tekoäly

Tässä raportissa tarkastellaan tuottavuuteen vaikuttavia tekijöitä Suomen yksityisillä palvelualoilla. Keskitymme erityisesti pääomaintensiivisyyden ja työn tuottavuuden väliseen yhteyteen sekä siihen, palkkaavatko yritykset riittävästi työvoimaa. Lisäksi raportissa nostetaan esille globaalien megatrendien, kuten digitalisaation, ulkoistamisen ja generatiivisen tekoälyn, rooleja tuottavuuskehityksessä. Hyödynnämme yritys- ja toimialatason tietoja, ja tulosten perusteella havaitsemme kolme keskeistä kehityskulkua. Ensiksi, Suomen palvelualojen pääomaintensiivisyys on ollut heikompaa kuin verrokkimaissa, mikä liittyy kiinteästi matalampaan tuottavuuteen. Toiseksi, yritykset eivät työllistä niin paljon kuin kilpailullisilla markkinoilla olisi voiton maksimoinnin kannalta optimaalista, ja tämä alityöllistäminen on erityisen suurta tietointensiivisillä palvelualoilla. Kolmanneksi, digitaalisten teknologioiden käyttöönotto jakautuu epätasaisesti: laajasti digitaalisia ratkaisuja hyödyntävät yritykset menestyvät paremmin, kun taas monet pienemmät ja perinteisemmät yritykset jäävät jälkeen. Skenaarioanalyysimme mukaan generatiivinen tekoäly voisi vauhdittaa talouskasvua, mikäli sen rinnalle lisätään pääomasijoituksia. Palvelujen ulkoistaminen ulkomaille ei puolestaan paranna tuottavuutta, mutta se voi tukea työllisyyttä ja muuttaa työvoiman rakennetta. Tulokset osoittavat, että Suomen palvelualojen tuottavuushaasteet ovat pitkäaikaisia ja rakenteellisia eivätkä lyhytaikaisia vaihteluita.

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Keywords: Capital intensity, Digitalization, Offshoring, Productivity, Service industries

Avainsanat: Digitalisaatio, Palvelualat, Palvelujen tuonti, Pääomaintensiivisyys, Tuottavuus

JEL: C23, F14, L80, O14, O30, O33, O47

Contents

Key findings

Labor productivity and capital intensity

- **Productivity and capital investment gaps:** Labor productivity (value added per hour worked) in service industries in Finland, on average, is lower than that in peer countries. The gap in capital intensity (capital stock per hour worked) is even larger. This underinvestment spans key service industries (i.e., trade, transport, ICT, finance, and professional services), indicating a broad capital deficiency behind the productivity lag.

- **A positive link between labor productivity and capital intensity:** Service industries that use more tangible assets (ICT equipment, buildings, machinery) and intangible assets (software, R&D, intellectual property) tend to have higher labor productivity. Capital deepening is also positively correlated with productivity growth, although the strength of this relationship varies by asset and industry type. Traditional fixed assets show the strongest and most consistent link, while ICT and intangible capital yield mixed results. Similarly, higher educational attainment among workers is associated with greater productivity and may amplify the benefits of capital investments.

Policy implication: Addressing gaps in investment and skills may support stronger productivity performance in Finnish service industries over time. Relevant measures could include improving conditions for investment in physical and intangible assets (such as ICT, R&D, and software), supporting skill development to enable effective use of new technologies, and enhancing digital infrastructure and market functioning to raise returns on capital. While these efforts do not guarantee productivity gains, they may help create conditions that enable more effective use of resources across key service industries.

Understaffing of labor

- **Firms systematically employ fewer workers than the profit-maximizing benchmark:** In both manufacturing and services, the value of an additional worker is consistently higher than the cost of hiring them. This indicates persistent deviations from the standard economic condition for full employment of labor.

- **Large differences across sectors:** Traditional services, such as vehicle repair, road transport, warehousing, and accommodation, are relatively close to balance. In contrast, knowledge-intensive services, such as information services, legal and accounting, and scientific research, show much larger gaps, indicating more severe understaffing in high-skill sectors.

- **A persistent pattern:** These gaps have remained largely unchanged from 2000 to 2022, with only temporary fluctuations during major crises. Their persistence points to structural rather than cyclical factors.

Policy implication: Persistent understaffing suggests that structural frictions, such as skill shortages, barriers to worker mobility, and institutional constraints, limit firms' ability to expand employment to the profit-maximizing level. Policy efforts should focus on improving the matching of workers to firms, easing retraining and mobility, and enabling high-productivity sectors to attract sufficient labor. Reducing understaffing in knowledge-intensive services, where gaps are widest, would yield the largest productivity gains.

Digitalization of service industries

- **Digital adoption varies across firms and sectors:** The uptake of digital technologies varies widely among Finnish service firms. Larger, foreign-owned, export-oriented firms and those with a more educated workforce tend to be more digitalized. Digital intensity is highest in knowledge-intensive sectors, such as ICT, finance, and professional services, while sectors such as transport, accommodation, and food services lag behind.

- **Higher digital intensity is associated with stronger firm performance:** Firms with higher levels of digital adoption are associated with higher revenue, value added, and labor productivity. These associations are strongest among firms with high digital intensity (i.e., those using multiple digital tools). This pattern suggests that adopting a broader set of digital technologies is linked to stronger performance outcomes, potentially reflecting the complementarities between tools.

- **Complementarity of digital technologies and human capital:** A strong positive association exists between firms' digital adoption and their workforces' educational attainment. This suggests that digitalization requires appropriate skills and highlights the potential complementarity between technology and human capital.

Policy implication: Policies that enable broader and more effective digital adoption may help strengthen productivity in Finland's service sector. Since digitalization is positively associated with both firm performance and workforce education, targeted efforts should aim to address gaps in adoption and digital skills, particularly among lagging firms and industries.

Offshoring of services

- **Productivity effects of offshoring remain unclear:** There is no consistent evidence that increased service offshoring leads to higher firm-level productivity growth. Offshoring appears to influence operations more through cost savings or access to capabilities abroad, rather than direct gains in measured productivity.

- **Offshoring is linked to changes in the employment structure:** An increase in service imports is associated with higher total employment in Finnish service firms. The preferred IV model indicates that a 10% increase in imported services is linked to an approximate 3% increase in employment, particularly among immigrant workers. However, offshoring also tends to reduce the share of managers and technical workers, suggesting shifts in the occupational structure toward more operational roles.

Policy implication: While offshoring does not directly increase productivity, it has measurable effects on firm employment structures, including modest job growth and shifts toward less specialized roles. Policy efforts could focus on enabling workforce adaptation through re-skilling and up-skilling, particularly for occupations most affected. Facilitating digital trade infrastructure and ensuring clear rules for cross-border services may also help firms participate more effectively in global service markets.

Productivity potential

- **Services as a key growth driver:** In GenAI adoption scenarios, the service sector's direct contribution to GDP growth rises from 0.2 percentage points in the benchmark to 0.5–0.7 points, making it the largest single sectoral contributor to growth.
- **Productivity gains hinge on digital adoption and ICT-intensive investment:** The strongest gains occur when resources are reallocated from labor toward ICT intermediates and intangible assets, enabling GenAI-driven productivity improvements to be fully realized.
- **Employment changes are modest: T**he model assumes full employment, with only small shifts in sectoral hours worked. Even in scenarios with a slight decline in total hours, GDP growth remains positive, indicating that gains are driven by higher productivity rather than by large-scale labor reallocation.
- **Economy-wide spillovers amplify gains:** Productivity improvements in services lower intermediate input costs in other sectors, boosting efficiency across the economy, and reinforcing the role of services as a growth engine.

Policy implication: Realizing the productivity potential of services in GenAI adoption scenarios will require long-term support for firm capabilities, digital infrastructure, and workforce skills. This includes helping firms adopt and integrate AI and other digital technologies, improving access to high-speed networks and secure data infrastructure, and promoting continuous learning and re-skilling to adapt to changing task structures. Policy efforts should also reduce barriers to capital reallocation toward ICT intermediates and intangible assets, encourage broad-based innovation across both high-tech and traditional service sectors, and ensure productivity gains are inclusive and widely shared.

1 Introduction

The private service sector is the cornerstone of the Finnish economy, accounting for over half of private sector employment and approximately 40% of GDP (Statistics Finland). Its importance has grown steadily as Finland has become increasingly service-driven (TEM, 2015; Ali-Yrkkö et al., 2020). However, productivity growth in Finnish services has been notably weak. In recent years, service sector productivity has risen much more slowly in Finland than in other Nordic countries (Kaitila, 2025a; OECD, 2025), raising concerns about Finland's long-term growth and prosperity. Therefore, enhancing productivity in services has become a central policy challenge.

Multiple transformative forces are reshaping service industries, both globally and in Finland (Riccioli, 2023; Kuosmanen et al., 2024). Digitalization is perhaps the most pervasive process (Chin et al., 2023). The rapid adoption of digital technologies is changing how businesses operate, deliver services, and create value, enabling firms to streamline operations, improve customer experience, innovate business models, and access new markets (Lang, 2021; Rha and Lee, 2022). Global integration has expanded opportunities for services trade, with Finnish firms increasingly exporting, offshoring, and importing services as part of their production (Ali-Yrkkö and Kuosmanen, 2023). Digital delivery has made it easier to source expertise internationally, creating both efficiency gains and adjustment pressure.

Structural shifts within services are also underway. Digital-native activities are emerging, whereas some traditional services face stagnation. Productivity growth depends on the economy's ability to reallocate labor and capital from less to more productive uses. When resources remain tied up in low-productivity firms, aggregate performance suffers (Dai et al., 2022). Recent evidence suggests that misallocation is a major factor behind Finland's weak service productivity and that improving allocation could yield substantial gains.

This report synthesizes findings from the research project *Boosting Productivity in Services through Digitalization*. Using firm- and industry-level data, it examines the roles of capital intensity, resource allocation, digital adoption,

generative AI (GenAI), and service offshoring in shaping productivity in Finland's private service industries.

The results highlight five main channels. First, a persistent capital intensity gap is a key factor behind Finland's lower productivity, as service firms invest less in both tangible and intangible assets than their peers do. Second, firms systematically employ fewer workers than implied by profit-maximizing conditions, indicating durable understaffing and structural frictions in labor use. Third, digitalization is strongly associated with better firm performance, although adoption remains uneven across sectors and firms. Fourth, GenAI has the potential to transform services from a productivity laggard to a growth engine if supported by complementary investments and skills. Finally, offshoring has mainly reshaped employment structures and supported job growth rather than directly raising productivity.

Taken together, these findings underscore that Finland's service productivity challenge is structural rather than cyclical. Closing the gaps in investment and skills, fostering effective digital adoption, reducing barriers to labor mobility, and ensuring labor market conditions that allow high-productivity sectors to attract sufficient workers. Each section of the report develops these themes in greater depth and discusses policy-relevant insights.

2 Capital intensity and productivity

Recent analyses of Finland's service industries using EU KLEMS, INTANProd, and Eurostat data (1995–2023) reveal a substantial productivity gap relative to peer countries (Kaitila, 2025a; 2025b). In five key service industries, Finland's labor productivity (value added per hour worked) is below the peer-country average, while the gap in capital intensity (capital stock per hour worked) is even larger. Notably, the Finnish service workforce is well-educated, so human capital alone does not explain the productivity lag.

As illustrated in **Figure 1**, labor productivity and capital intensity are strongly linked across European service industries, but Finland lies systematically to the left of the trend lines, reflecting its relatively low capital intensity (Kaitila, 2025a).

Service industries that invest more in capital, whether tangible assets (machinery, buildings, ICT equipment) or intangible assets (software, R&D, intellectual property), tend to achieve higher labor productivity levels. In Finland and other European countries, differences in capital intensity account for a significant portion of productivity differences.

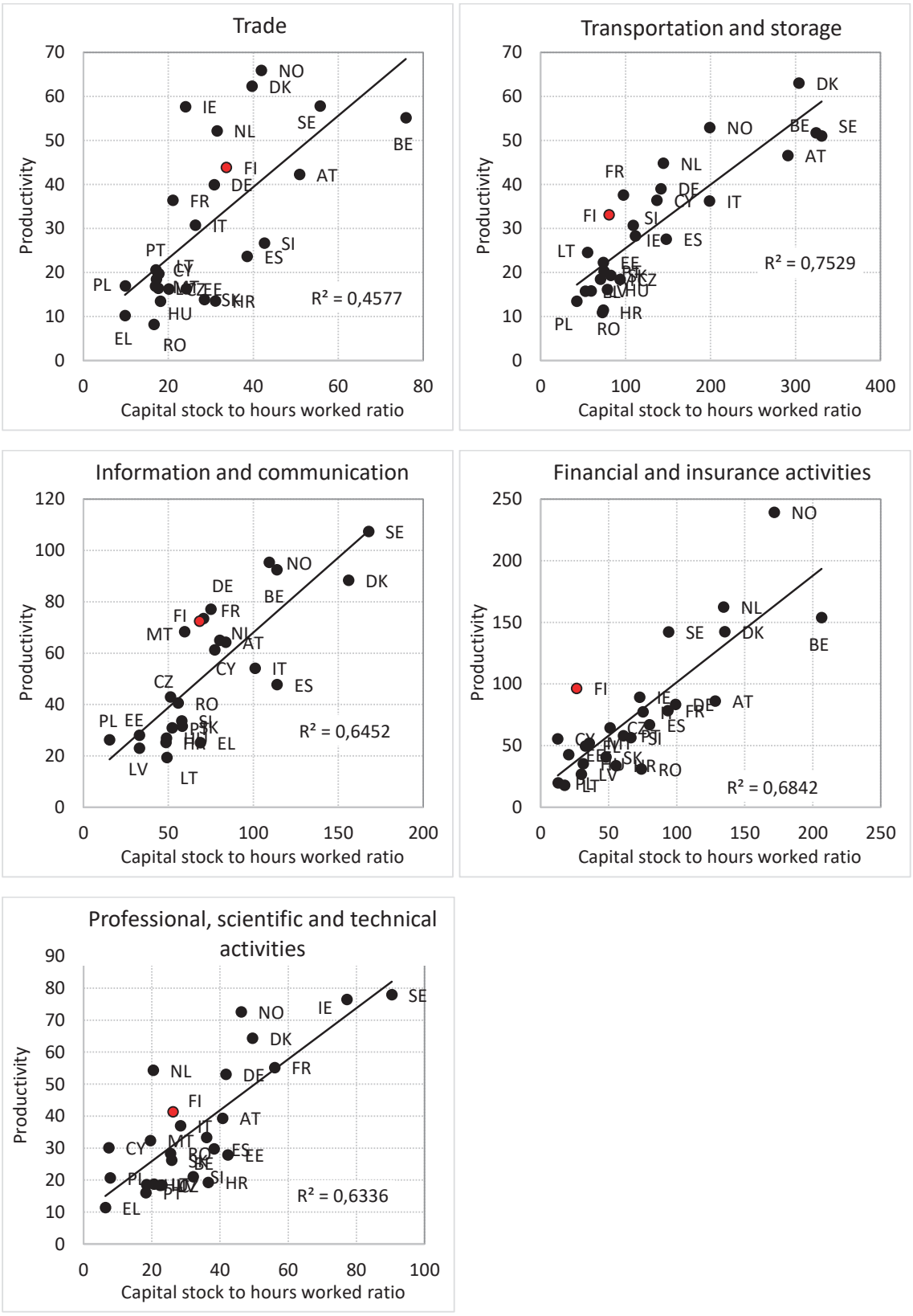
Capital deepening (raising the capital-labor ratio) is a well-established driver of productivity growth (Inklaar et al., 2005; Acemoglu and Guerrieri, 2008; Corrado et al., 2009). Consistent with the growth theory, the period 1995–2023 saw capital deepening to be positively associated with labor productivity improvements in service industries (Kaitila, 2025a). Finland's sluggish capital accumulation in services has contributed to its weaker productivity performance compared with its peers.

Asset composition matters for how strongly capital deepening translates into productivity gains. Disaggregating the capital stock into ICT, R&D, software, and other capital shows that all categories generally support higher productivity, but the magnitude varies by asset type and industry (Kaitila, 2025a). Traditional fixed capital (e.g., structures, machinery, vehicles) exhibits the most robust and consistent relationship with productivity growth in services.

In contrast, the role of digital and intangible capital, such as ICT equipment or knowledge assets, is more heterogeneous. In some service industries, ICT and intangible investments yield large productivity benefits, whereas in others, their effects are weaker or require longer lead-times. This pattern aligns with broader findings that intangibles can have high payoffs when complemented by other factors; for example, intangible capital deepening contributes more to growth in sectors that effectively exploit ICT, whereas without the right conditions, its impact may be mixed (Chen et al., 2016).

As economies become more knowledge-intensive over time, intangible investments have emerged as critical drivers of productivity growth alongside tangibles (Corrado et al., 2009). Studies in the U.S. show that when a broad set of intangibles (software, R&D, organizational

Figure 1 Total-capital-stock-to-labor ratios and labor productivity in 2021



Source: Kaitila (2025a).

capital, etc.) are counted as capital, capital deepening becomes the dominant source of labor productivity growth, eclipsing total factor productivity as the main contributor. This underscores that intangible assets, while sometimes harder to measure, are as vital as tangible capital in modern production. However, capturing their benefits often requires complementary innovation and effective use of new technologies (Chen et al., 2016).

The human capital dimension is also crucial. Empirical analysis finds that service industries with a more educated and skilled workforce tend to be more productive, even after accounting for their capital intensity (Kaitila, 2025a). In other words, higher labor quality reinforces productivity gains from capital. A skilled workforce can utilize, maintain, and adapt new capital and technologies more efficiently, thereby amplifying returns on investment (Autor et al., 2003; Duffy et al., 2004). This complementarity between skills and capital has been well-documented in the literature. For instance, firms that adopt advanced IT and organizational innovations see greater performance improvements when their employees have stronger skills (Bresnahan et al., 2002; Erjavec et al., 2023; Cammeraat et al., 2024).

Finland's case reflects this dynamic: its relatively high education levels are an asset, but fully leveraging new investments will require continuous upskilling and effective organizational practices. Notably, Finland's average educational attainment remains above that of its many peers; however, some indicators suggest that the country has lost ground in recent years. The relative decline in the share of the highly educated in the Finnish workforce vis-à-vis other OECD countries is a concern for future economic growth and should be addressed. Maintaining leadership in human capital is important to ensure that capital investments translate into productivity gains.

These findings indicate that supporting investment and skills can play a central role in improving Finland's service sector's productivity. Finland's capital intensity gap, especially in ICT and other intangibles, suggests room for capital deepening to spur higher output per hour. At the same time, simply investing more is not a panacea; the efficiency of investment and the enabling market and competitive environment determine how well capital is turned into productivity.

3 Persistent understaffing

A core question in labor economics is whether firms hire workers up to the point where the marginal revenue product of labor (MRP) equals its marginal cost (MC). Standard theory predicts that profit-maximizing firms in competitive markets should employ labor until this condition holds. However, recent evidence shows that Finnish firms systematically fall short of this benchmark. Using register-based firm-level data from 2000 to 2022, Kuosmanen et al. (2025a) analyze eight manufacturing and eight service industries. They apply both parametric and nonparametric methods, including convex expectile regression with a control function, to estimate MRPs and compare them with alternative measures of labor cost. Across nearly all industries, MRPs exceed labor costs, indicating that firms employ fewer workers than profit maximization would require.

Figure 2 illustrates this pattern for eight service industries using the relative pay gap (RPG), defined as the ratio of labor cost (measured as industry-level MC) to the median firm-level MRP. A value of one indicates full alignment, while values below one reveal understaffing, meaning that firms hire fewer workers than implied by marginal productivity.

In services, RPGs are consistently below unity. Traditional services such as road transport, vehicle repair, warehousing, and accommodation exhibit ratios around 0.7–0.8, suggesting employment levels relatively close to the profit-maximizing benchmark. Computer programming also falls within this range. In contrast, knowledge-intensive services such as information services, legal and accounting, and scientific R&D typically show ratios below 0.6, indicating more pronounced understaffing.

Over the entire period 2000–2022, the average RPG is about 0.6 in services and around 0.4 in manufacturing. Thus, firms in both sectors are systematically understaffed, although the gap is less severe in services. These industry averages mask considerable within-industry variation. Some firms employ close to or above the profit-maximizing level, while others fall substantially short. This dispersion shows that even with strong sectoral institutions and collective bargaining, substantial firm-level differences in staffing relative to marginal productivity remain.

The analysis also shows that the RPG has remained largely unchanged over the past two decades, with little evidence of convergence toward full alignment. This persistence indicates that understaffing is not just a temporary fluctuation but appears to be a durable feature of the Finnish economy. While the study does not identify the precise causes, the results point to structural factors such as labor supply constraints, institutional wage setting, and market power, which may help explain why firms do not expand employment to the profit-maximizing level.

4 Digitalization

Digitalization plays an increasingly central role in the transformation of service industries. In Finland, the adoption of digital technologies among firms ranges from basic to more advanced tools and solutions (Kuosmanen et al., 2024; 2025b). These technologies are widely viewed as drivers of productivity, innovation, and competitiveness (Gaglio et al., 2022; Nucci et al., 2023; Oduro et al., 2023).

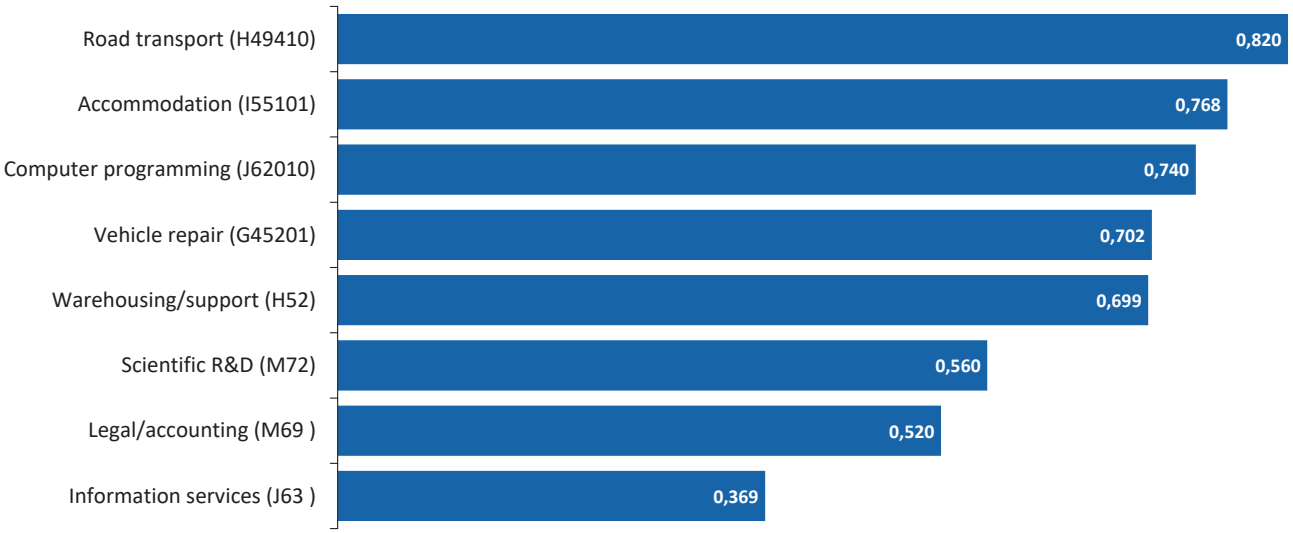
Drawing on firm-level data from the *Use of Information Technology in Enterprises* survey (2015–2021), Kuosmanen et al. (2024; 2025b) compute the Digital Intensity Index (DII), which captures the extent to which firms adopt 12 core digital technologies. Based on the number of technologies in use, firms are classified into four levels of digitalization: very low, low, high, and very high. By linking the DII with firm-level administrative records on financial performance and employment, patterns of digital adoption and their associations with economic outcomes are examined.

Figure 3 illustrates the distribution of digital technology adoption among the Finnish service firms in 2021. Adoption tends to occur in bundles, with most firms using four to eight technologies. Only a small share of firms is found at either end of the distribution, adopting none or all 12 technologies.

Clear differences in digital intensity are observed across firm types. Larger, more productive, and younger firms tend to exhibit higher levels of digitalization. In particular, firm size is strongly associated with digital intensity, likely reflecting a greater internal capacity for investment and economies of scale. In contrast, smaller and older firms are more frequently found in the low digital adoption categories, possibly due to resource constraints or longer-established routines.

Firms that are foreign-owned or active in international markets also display higher digital intensity. Subsidiaries of multinational enterprises may benefit from access

Figure 2 Relative pay gap (RPG) by service industry, 2000–2022



Source: Kuosmanen et al. (2025a).

to global digital infrastructure and practices. Similarly, firms engaged in international trade show greater digital adoption, potentially reflecting the role of digital tools in reaching customers, managing logistics, and scaling operations. Digital intensity is also positively associated with market leadership; firms with larger market shares are more likely to invest in digital tools, possibly reinforcing competitive advantages.

Sectoral differences in digitalization are also pronounced. **Figure 4** illustrates the distribution of firms across DII levels by service industry in 2021.

Knowledge-intensive industries, such as ICT, professional services, and real estate, are more heavily represented in the high and very high DII categories.

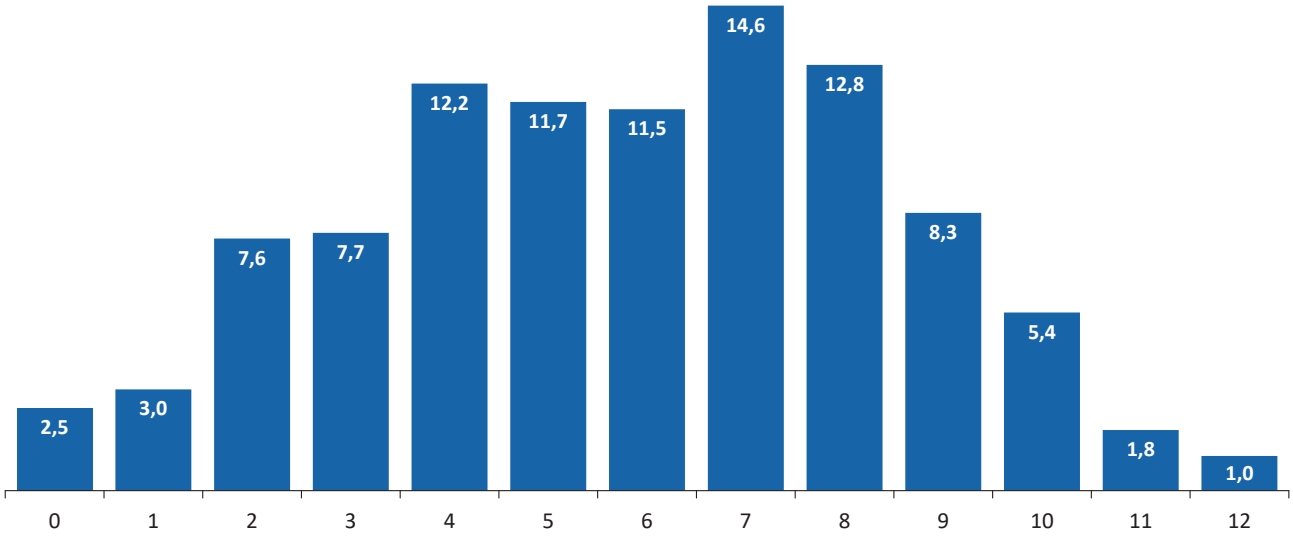
In contrast, more traditional service sectors, including transport, accommodation, and support services, are concentrated in the lower categories. These patterns reflect both structural and functional differences. In knowledge-based sectors, digital tools are often integral to core activities, whereas in physical or transaction-based sectors, digital adoption may occur more gradually or focus on specific business functions.

A strong association is also found between digital intensity and human capital. Firms with a larger proportion of university-educated employees are more likely to adopt digital tools. This is consistent with prior research indicating that skilled employees play a key role in enabling digital transformation, both in implementation and usage (Blanka et al., 2022; Seppänen et al., 2025). The presence of a digitally capable workforce appears to support more extensive adoption of technology.

Regarding firm performance, higher digital intensity is consistently associated with stronger economic outcomes. Firms in the high and very high digitalization groups report better average performance, particularly in terms of revenue and value added. The most notable gains in labor productivity (value added per worker) are observed among firms with very high digital intensity. In contrast, firms with moderate levels of digital adoption often show increased revenue without immediate productivity improvements, possibly reflecting transitional inefficiencies, such as learning curves or incomplete integration of digital tools.

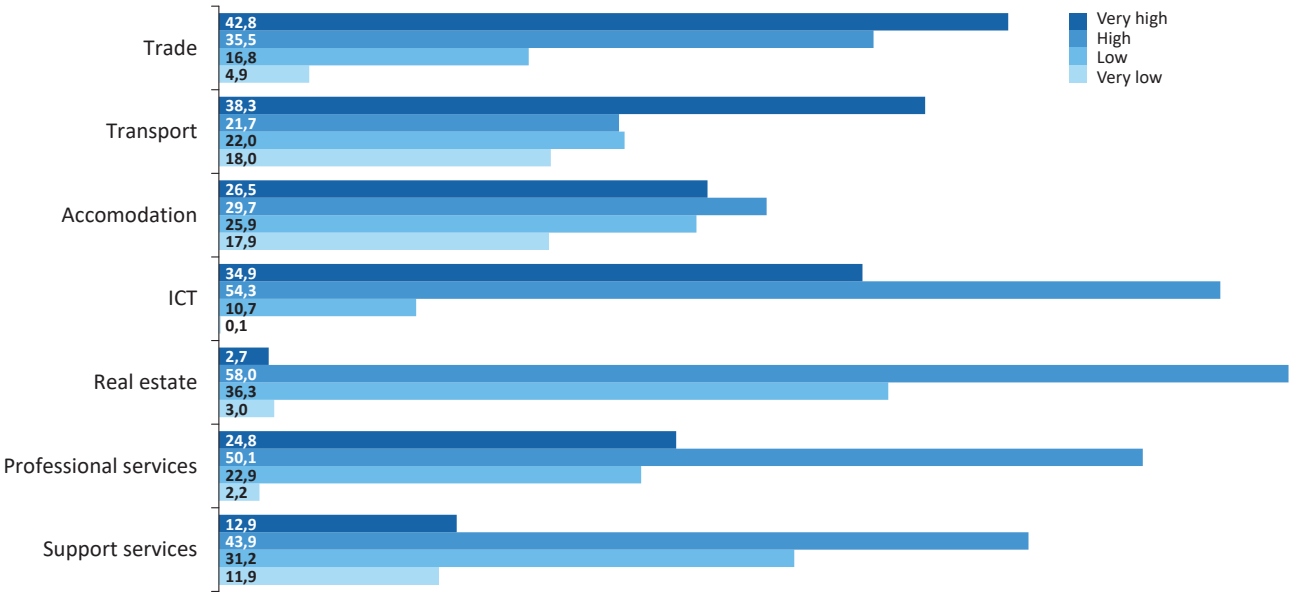
Any productivity effects of digital investments may take time to materialize. While revenue gains can appear relatively soon after adoption, improvements in productivity may require deeper integration of digital tools alongside complementary changes in skills, workflows, and organizational processes. Lagged digital intensity is positively associated with current revenue, but its re-

Figure 3 Share of service firms by the number of digital technologies adopted, 2021, %



Source: Kuosmanen et al. (2025b).

Figure 4 Share of firms by Digital Intensity Index (DII) across selected service industries, 2021, %



Source: Kuosmanen et al. (2025b).

lationship with productivity appears to be weaker and less consistent.

It is important to note that these results are correlational, and unobserved factors or reverse causality cannot be ruled out. For instance, more successful firms may be better positioned to invest in digital tools rather than digitalization, directly improving performance. However, the findings align with broader international evidence, suggesting that digital technologies often form a part of the toolkit of high-performing firms (Oduro et al., 2023). Digital tools can support scaling, enhance decision-making, and open new channels for customer engagement.

The COVID-19 pandemic has further highlighted the importance of digital readiness. Firms that had already adopted digital technologies before the crisis experienced stronger productivity growth during their early stages, particularly in the service sector (Koski and Fornaro, 2024; Calvino et al., 2024).

Despite Finland's strong position in international digitalization rankings, firm-level data reveal substantial heterogeneity in adoption. While some service firms operate at the digital frontier, others remain in the earlier stages of transformation. These differences contribute to performance disparities and may help explain persistent productivity dispersion across sectors. Although no causal claims can be made, the observed associations underscore the relevance of digitalization in understanding firm dynamics in Finland's service economy.

5 Impact of GenAI

Generative AI (GenAI) is emerging as a general-purpose technology with potentially far-reaching economic implications. Kuusi (2025) examines its macroeconomic impact on the Finnish economy using a dynamic multi-sector general equilibrium model calibrated to Finnish data. The model incorporates empirical estimates of task-level performance gains, sectoral exposure, and adoption rates, along with forward-looking investment behavior and an input–output structure that captures inter-sectoral linkages. Special attention is paid to the service sector, which plays a central role in the projected adjustment path.

Table 1 summarizes the projected effects of GenAI on GDP and labor productivity under the four alternative scenarios and the benchmark for 2023–2033.

Table 1 Estimated impact of GenAI, 2023–2033

	Real GDP growth	Labor productivity growth	Contributions of domestic sectors		
			ICT	NIT	Services
Benchmark					
	1,86	1,41	1,2	0,5	0,2
1. Baseline exposure, only labor					
	2,00	1,55	1,2	0,5	0,3
Difference	0,14	0,14	0,0	0,0	0,1
2. Baseline exposure, labor and capital					
	2,08	1,63	1,2	0,5	0,3
Difference	0,22	0,22	0,0	0,0	0,1
3. AI, extended capacities, only labor					
	2,30	1,84	1,2	0,6	0,5
Difference	0,44	0,43	0,0	0,1	0,3
4. Baseline exposure, only labor, 1pp increase in ICT factor share / decline in labor share					
	3,14	2,64	1,6	0,9	0,7
Difference	1,28	1,23	0,4	0,4	0,5

Source: Kuusi (2025).

In the benchmark scenario (no GenAI impact), real GDP grew by 1.86% annually, with labor productivity rising by 1.41%. A baseline GenAI scenario, based on current task-level estimates and adoption rates affecting only labor, increases annual GDP growth to 2% and labor productivity to 1.55%. When GenAI enhances both labor and capital inputs, GDP growth rises to 2.08%, with labor productivity of 1.63%. A scenario reflecting extended GenAI capabilities and broader adoption increases GDP growth to 2.30% and labor productivity by 1.84%. In the most optimistic case, assuming a 1 percentage point shift in the production structure from labor to ICT intermediates, GDP growth reaches 3.14% per year, with a labor productivity of 2.64%.

These scenarios highlight the potential scale of the impact of GenAI and underscore the importance of both adoption depth and complementary changes in production inputs. Although the baseline effects are modest, larger gains are achievable with deeper automation and capital deepening. Changes in factor shares, such as greater use of ICT intermediates and reduced reliance on routine labor, substantially improve long-run growth prospects.

The model identifies two main multiplier mechanisms that amplify the productivity shocks. First, the capital multiplier (the ratio of labor productivity growth to total factor productivity (TFP) growth) ranges from 1.75 to 1.94 across scenarios. This is higher than in earlier studies and suggests that GenAI-driven TFP gains can yield disproportionately large labor productivity improvements when paired with capital investment. Second, the model's input–output structure creates spillovers: productivity improvements in one sector lower intermediate input costs in others, boosting overall efficiency. These effects are particularly significant in Finland, where services are widely used.

The service sector plays a pivotal role in these dynamics. In the benchmark, its direct contribution to GDP growth was 0.2 percentage points. Under GenAI scenarios, this rises to 0.5–0.7 percentage points, reflecting both its high exposure to GenAI, especially in ICT, finance, and professional services, and its role in transmitting productivity gains across the economy. Thus, GenAI may help mitigate the long-standing drag of low service productivity (Baumol's cost disease), potentially transforming services from a laggard to a growth engine.

GenAI adoption also supports structural change, accelerating the reallocation of resources toward more productive uses. The model assumes full employment throughout the transition, indicating that productivity gains are not driven by reductions in hours worked. Even in alternative scenarios with a modest 1% cumulative decline in total hours, the growth remains positive. This suggests that GenAI can raise productivity without reducing employment, provided the workforce adapts to a changing task structure.

Overall, the findings indicate that GenAI has a significant potential to enhance productivity and growth in Finland, particularly through its effects on services. Realizing these gains will depend on the pace of adoption, degree of complementary investment, and firms' ability to adapt production structures. Policy support to promote digital readiness, innovation, and workforce capabilities is essential to unlock GenAI's long-term productivity benefits.

6 Offshoring and employment

Globalization has increasingly extended beyond goods into services. Firms may outsource or offshore service activities by purchasing them from external providers, either domestically or from abroad. In Finland, many service firms have begun sourcing functions internationally, such as IT support, customer service, or professional services, to access cost advantages or specialized expertise.

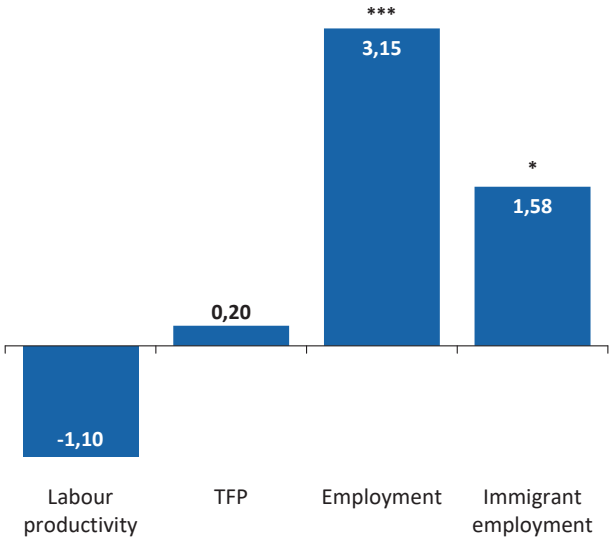
To examine the implications of this trend in the Finnish context, Maczulskij and Kässi (2024) conducted econometric analysis using firm-level data from 2002 to 2016. To address potential endogeneity in offshoring decisions, this study employs an instrumental variable approach based on global service export demand shocks at the firm level. These shocks reflect external changes in the cost or availability of offshoring but are unrelated to firm-level productivity or employment, enabling stronger causal inference.

The key finding is that service offshoring did not improve productivity. Whether measured as labor productivity or total factor productivity, increased offshoring (in euros) in firms showed no significant performance gains. Previous studies have reported mixed evidence on the productivity effects of services offshoring (Tabrizy, 2016; Tang and Livramenton, 2010; Castellani and Pieri, 2013; Olsen, 2006). A likely explanation for our finding is that cost savings were offset by coordination challenges or redirected toward expanding operations rather than improving efficiency.

In contrast, employment has increased notably. A 10% rise in service imports was associated with a 3% increase in total employment, indicating that offshoring complemented rather than substituted domestic labor. By outsourcing certain functions, firms may have been able to scale their output and reallocate domestic workers to other tasks. **Figure 5** summarizes the estimated effects of service offshoring on productivity and employment outcomes, with the statistical significance marked with stars.

A particularly notable aspect of this employment growth was its diversification. A 10% increase in offshoring was associated with a 1.6% increase in the number of immigrant employees. This suggests that international sourcing and immigrant hiring often go hand-in-hand. Firms might recruit individuals with relevant language skills or cultural familiarity to help manage global service relationships, supporting the broader patterns observed in international trade research (Ghani et al., 2014; Tambe and Hitt, 2012).

Figure 5 Estimated effects of a 10% increase in service offshoring on firm-level outcomes (IV Model, 2002–2016), %



Source: Maczulskij & Kässi (2024).

Offshoring is also associated with changes in the workforce composition. Firms that increased service imports saw a decline in the share of managers and technical workers, alongside a rise in operative and production workers. Rather than reducing overall employment, offshoring appeared to shift internal roles, reallocating some skilled functions externally while concentrating domestic hiring on service delivery tasks.

Overall, the evidence indicates that service offshoring in Finland has functioned more as a growth strategy than as a cost-cutting measure. This enabled firms to expand their operations and hire more staff without necessarily improving the output per worker. Offshoring may have allowed access to external capabilities that helped firms take on more projects or clients, indirectly driving domestic job creation.

These findings challenge the common view, often associated with manufacturing offshoring, that international sourcing leads to domestic job losses. In the case of services, offshoring appears to be employment-enhancing, especially when outsourced tasks support growth rather than replacing existing functions. The effects likely depend on the type of services offshored; if they serve as inputs for expansion, both foreign and domestic employment can grow.

In summary, service offshoring has had a tangible impact on Finnish firms. While it did not raise productivity, it did not harm it, and it clearly contributed to employment growth and a shift in workforce structure. By enabling firms to scale and diversify, offshoring has become a defining feature of Finland's evolving service economy.

7 Conclusions

This report highlights the structural weaknesses and opportunities that shape productivity performance in Finland's private service industries. Evidence indicates that Finnish services continue to lag behind peer countries, with patterns linked to gaps in capital intensity, persistent understaffing of labor, and uneven adoption of digital technologies. These challenges have proven to be persistent over time and appear more consistent with structural dynamics than with short-term fluctuations.

Three crosscutting insights have emerged. *First*, firms' employment levels remain below profit-maximizing benchmarks. In many industries, companies hire systematically fewer workers than the value of labor would justify, with the gap particularly wide in knowledge-intensive services. This persistent understaffing of labor relative to profit-maximizing conditions reflects structural frictions in labor markets and indicates that market forces alone have not been sufficient to close it.

Second, investment and digital adoption are central levers for improving performance. Capital deepening, both in tangible assets and intangibles, such as software and R&D, is strongly associated with higher productivity. However, Finland continues to underinvest relative to peers. Digital adoption also varies widely across firms; larger, more international, and knowledge-intensive firms tend to be more advanced, while many smaller and traditional providers lag behind. This uneven uptake reinforces performance disparities and highlights the need for policies that promote broader and more effective adoption.

Third, new technologies, such as generative AI, present both opportunities and challenges. Scenario analysis indicates that GenAI can transform services from a drag on productivity into a growth engine, provided that firms integrate these tools with capital investment and organizational adaptation. Offshoring, while not directly raising productivity, has contributed to job creation and reshaped workforce structures, indicating that global linkages can support expansion when managed effectively.

Boosting productivity in Finnish services requires addressing these structural barriers. Closing capital and digital investment gaps, strengthening competition and mobility in labor markets, and ensuring that high-productivity sectors attract sufficient workers are key priorities. Realizing the potential of GenAI and other digital tools will demand long-term commitments to infrastructure, innovation, and effective diffusion of new technologies across firms.

In summary, Finland's service industries face a dual challenge: overcoming structural weaknesses while seizing opportunities for digital and AI-driven transformation. If these conditions are met, services can shift from being a drag on aggregate productivity to acting as the primary engine of Finland's growth in the decade ahead.

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