Co-funded by the European Union
SATAKUNTALIITTO Regional Council of Satakunta
GPT-Lab
Tampere University

Artificial Intelligence and Generative AI in Satakunta: State of the Art, Strategic Applications, and Regional Roadmap

Chalisa Veesommai Sillberg[a,1], Pekka Abrahamsson[a,2],

[a] Tampere University, Faculty of Information Technology and Communication Sciences, Pori, Finland

July 30, 2024

Notes:

- This work is part of Generative Artificial Intelligence in Business Support (GENT) project
- The final version shall be linked here: in Finnish: https://projects.tuni.fi/gent/julkaisut/ in English: https://projects.tuni.fi/gent-en/publications/

[1]email: chalisa.sillberg@tuni.fi; ORCID iD: [0000-0000-0001-8400-7469]
[2]email: pekka.abrahamsson@tuni.fi; ORCID iD: [0000-0002-4360-2226]

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Chalisa Veesommai Sillberg[a] and Pekka Abrahamsson[a]
[a] Tampere University, Faculty of Information Technology and Communication Sciences, Pori, Finland
{chalisa.sillberg,pekka.abrahamsson}@tuni.fi

1 Introduction

The report aims to update and analyze AI adoption in the Satakunta region, Finland, by mapping the current state of generative AI and its local applications. This includes:

- **Understand the global AI landscape**: Explore how generative AI is evolving worldwide, including key trends, breakthroughs, and challenges.
- **Identify AI solutions for Satakunta**: Assess which AI applications are most relevant to the region's key industries and how mature these technologies are.
- **Develop a regional AI strategy**: Ensure that AI adoption supports local innovation hubs, businesses, and talent development in Satakunta.
- **Spot high-impact AI opportunities**: Pinpoint the most promising AI-driven solutions that can boost the region's economy and competitiveness.

Additionally, national and international collaboration will provide a comparative understanding of AI utilization, ensuring that the strategy benefits from best practices worldwide.

Role in assessing AI Adoption in Satakunta: It plays a crucial role in guiding the strategic adoption of AI in the region by *Providing a Data-Driven Baseline*: current AI Landscape: Understanding the existing AI ecosystem in Satakunta is crucial. Resources like the Satakunta.AI initiative offer insights into AI-focused companies in the region, *Localizing AI for Regional Needs*: Regional Industry Clusters: Tailoring AI applications to Satakunta's specific industries ensures relevance and effectiveness. The

RoboAI Research and Development Center exemplifies this by combining expertise from local universities to serve regional companies, *Strategic Planning and Roadmap Development*: Structured AI Strategy: Developing a roadmap that aligns with regional priorities is vital. The Finnish AI Landscape 2025 report provides a comprehensive overview of AI adoption and development in Finland, offering valuable insights for regional planning, *Benchmarking Against National and International Trends*: Comparative Analysis: Leveraging insights from national initiatives, such as the AI Finland network, helps Satakunta align with broader AI adoption trends and best practices [1, 2].

2 Artificial Intelligence (AI) and Generative AI (Gen)AI

AI and (Gen)AI has seen significant global advancements across various domains, revolutionizing multiple fields and applications. Large language models (LLMs) like GPT-3.5, GPT-4, and PaLM2 have demonstrated remarkable capabilities in natural language processing tasks, generating human-like text and transforming user interactions [3, 4]. The Generative Al's evolution is shown in Figure 1 and it's benefits with challenges for business is shown in Figure 2. These models have applications ranging from personalized education in Intelligent Tutoring Systems to enhancing supply chain management and logistics operations [5, 6].

In the field of computer vision, generative models have shown state-of-the-art performance in image translation and textual imagery fusion [7]. Multimodal learning has emerged as a significant trend, integrating different data types to create more comprehensive AI systems [8]. The integration of quantum computing with AI is also being explored, potentially leading to transformative effects on AI advancements [9].

Interestingly, while generative AI has made substantial progress, it still faces challenges in areas such as reasoning, creativity, and empathy compared to human intelligence [10]. Ethical considerations, including bias mitigation, fairness, and transparency, remain crucial aspects of generative AI development [4, 7]. The field is also grappling with the impact of AI-generated content on academic research and the peer-review process [8].

Generative Artificial Intelligence (AI) has experienced significant global advancements, reshaping various industries and economic landscapes.

In part of *Economic Impact*, recent analyses indicate that generative AI could substantially boost the global economy. Goldman Sachs Research suggests that these AI technologies have the potential to increase global GDP by 7%, approximately $ 7 trillion, over a decade. GOLDMAN SACHS Similarly, McKinsey and Company estimates that generative AI could add between $ 2.6 trillion and $4.4 trillion annually across various sectors. The

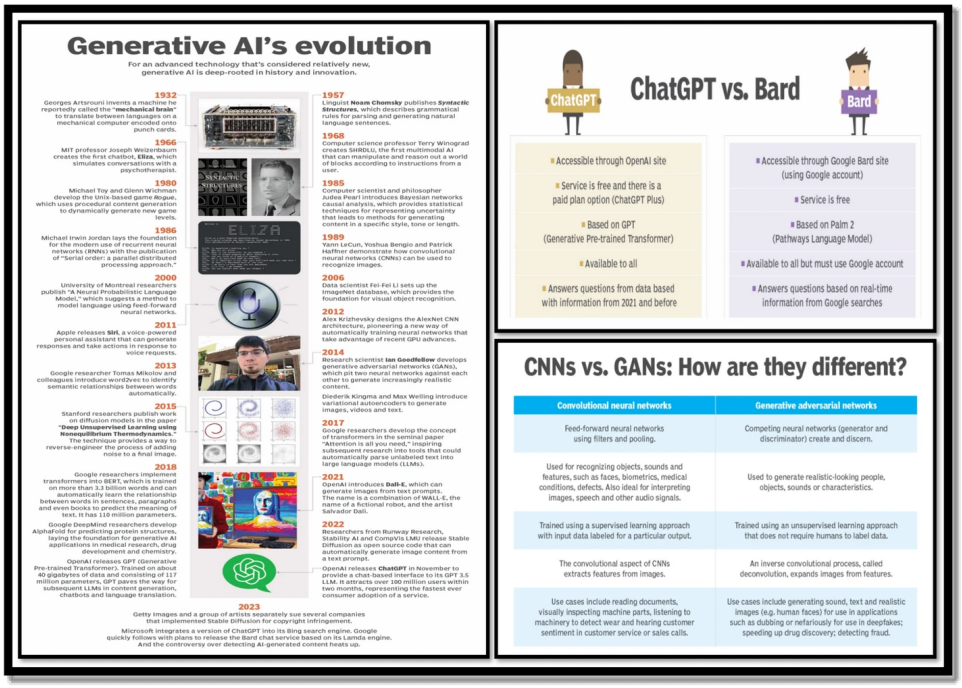

Figure 1: The Generative AI's evolution [3]

Generative AI grow by 2023 is shown in Figure 3.

In part of *Technological Developments*, the field has seen remarkable technological progress. The launch of ChatGPT in 2022 marked a pivotal moment, leading to a surge in AI research and the development of tools like Bard, Stable Diffusion, DALL-E, and Runway ML. These innovations have expanded AI's capabilities in text generation, image creation, and more.

In 2025, OpenAI introduced the o1 model, capable of advanced reasoning beyond traditional prediction-based models. This development signifies a shift towards more sophisticated AI systems.

In part of *Global Adoption*, china has emerged as a leader in generative AI adoption, with 83 % of Chinese respondents utilizing the technology, surpassing the global average of 54 %. Chinese entities have also filed over 38,000 generative AI patents from 2014 to 2023, highlighting significant intellectual property contributions.

In part of *Industry Applications*, generative AI is transforming various industries:

- Gaming: Microsoft's Muse AI model generates game visuals and predicts controller inputs, enhancing game development efficiency.
- Healthcare: Startups like Abridge and Anysphere are leveraging AI to improve healthcare delivery and medical coding.

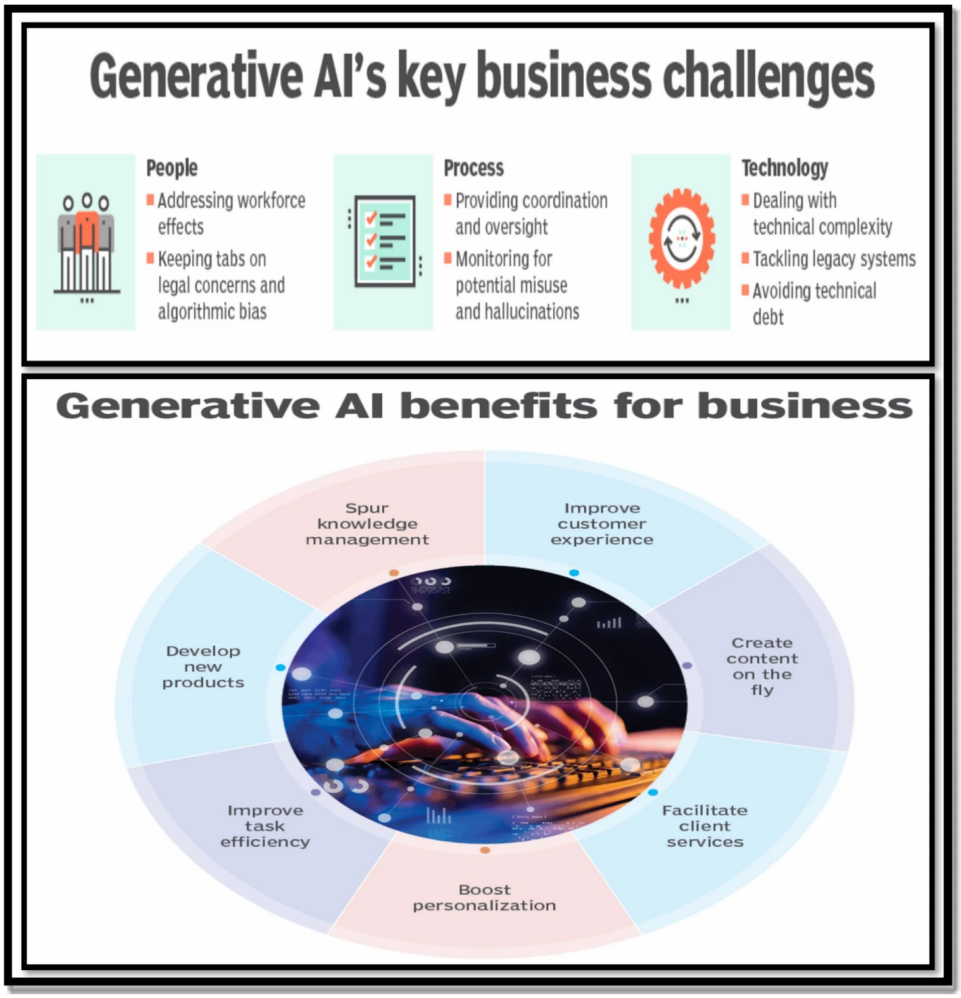

Figure 2: The Generative AI's key business challenges and benefit for business[3]

- Business Operations: Companies are integrating generative AI to enhance customer service, marketing, and software engineering, leading to increased productivity and innovation.

2.1 AI and (Gen)AI in Finland

Finland has demonstrated a robust commitment to artificial intelligence (AI) adoption, with significant investments and widespread utilization across various sectors.

2.1 Investment in AI

(a) Budget Allocation: In 2022, Finnish businesses allocated 17 % of

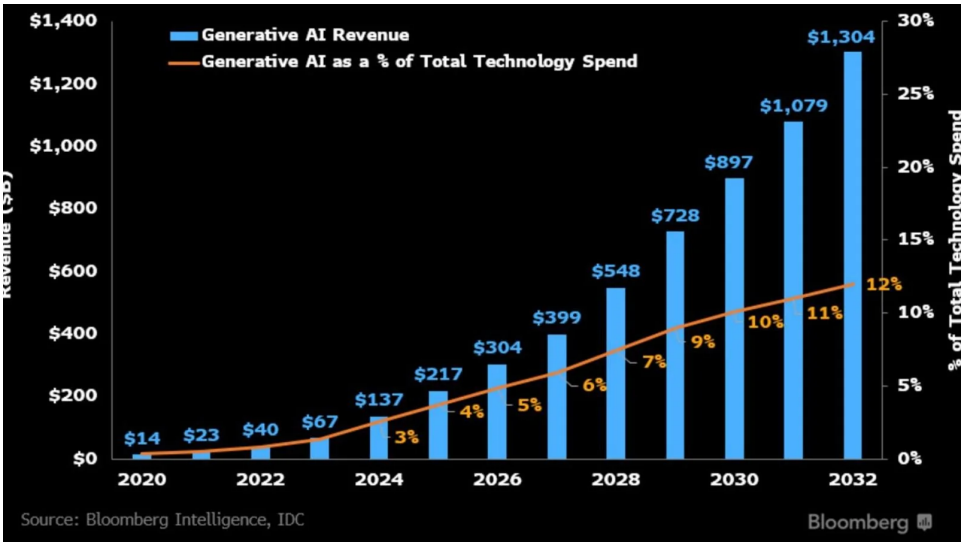

Figure 3: The Generative AI grow by 2023 [11]

their IT budgets to AI, with projections to increase this to 25 % by 2030, aligning with the Nordic average.

(b) Digital Technology Investments: Since September 2022, Finnish companies have boosted their digital technology investments by 58 %, surpassing the Nordic and European average of 51 %. Anticipated growth over the next three years is 68 %, exceeding the Nordic average of 59%.

2.2 AI Adoption Rates

(a) Business Integration: By 2023, 35 % of Finnish enterprises consistently utilized at least one AI tool in daily operations, up from 24 % in 2022. This adoption rate aligns with the European average of 33 %.

(b) Generative AI Usage: A 2024 survey revealed that Finns are more active users of generative AI than Americans, with notable engagement among women.

2.3 Economic Impact

(a) GDP Contribution: McKinsey's 2024 report estimates that generative AI could contribute €13 billion to Finland's GDP by 2045, driven by the country's strong digital infrastructure and skilled workforce.

2.4 Organizational Initiatives

(a) AI Finland Network: Established in March 2024, this network comprises over 200 companies aiming to enhance AI adoption and development nationwide. Initially operating under the Technology Industries of Finland, plans are underway to transition it into an independent entity funded by its members.

2.5 AI Applications

(a) Language Processing: Among Finnish businesses employing AI, 61 % utilize it for interpreting and generating human language, such as through machine translations or chatbots, surpassing the Nordic average of 54 %

(b) Predictive Analytics and Fraud Detection: Other prevalent applications include data-driven predictions and decision-making (39 %) and fraud or anomaly detection (30 %).

These developments underscore Finland's proactive approach to AI integration, positioning the nation as a leader in AI adoption and innovation within the Nordic region.

The Satakunta region in Finland has been actively integrating artificial intelligence (AI) across various sectors, with significant contributions from educational institutions, research centers, and collaborative projects.

I. Educational Initiatives. Satakunta University of Applied Sciences (SAMK): SAMK offers a Bachelor of Engineering program in Artificial Intelligence (Data Engineering), equipping students with practical skills in AI, programming, and data science. This program collaborates closely with local industries, providing students with hands-on experience in applying AI tools in real-world scenarios [12].

II. Research and Development Centers. RoboAI: A joint venture between SAMK and Tampere University, RoboAI serves as a research and development hub focusing on automation, robotics, and AI. It supports local businesses by offering expertise and facilitating projects that enhance technological advancements in the region [13].

III. Collaborative Projects. Modernization of Technology Companies: This initiative aims to upgrade the operations of small and medium-sized enterprises (SMEs) in Satakunta by integrating AI and robotics. Experts and student teams collaborate with local companies to conduct experiments and develop proof-of-concept pilots, fostering innovation and competitiveness [14].

IV. Industry Engagement. Satakunta.AI: This consortium comprises AI-focused technology and research companies in the Satakunta region. It serves as a platform for collaboration, knowledge sharing, and promoting AI adoption among local businesses [15].

Table 1: AI Adoption Trends in Finland and Global Standards[17]

Aspect	Finland	Global Best Practices
AI Policy and Regulation	EU AI Act compliance, Finland's national AI roadmap.	EU AI Act, OECD AI Principles, ISO AI Standards.
Industry Adoption	Strong adoption in manufacturing, healthcare, and education.	Varies by region, USA: finance, China: smart cities.
Investment and Funding	Government grants and private investments support AI startups.	AI investments led by venture capital in the US, China, EU.
Collaboration and Research	AI Finland Network, AI4Cities, RoboAI initiatives.	National AI strategies, e.g., Germany's AI Strategy, Canada's AI clusters.

V. Healthcare Innovations. SAMK and Satasairaala Collaboration: SAMK collaborates with Satasairaala (Satakunta Central Hospital) to develop the "hospital of the future." This partnership focuses on researching and testing AI and robotic solutions in healthcare settings, aiming to enhance patient care and operational efficiency [16].

2.2 Benchmarking Against National and International Trends

The AI Finland Network, launched by Technology Industries of Finland, serves as a national AI collaboration hub connecting companies, research institutions, and policymakers to enhance AI adoption. It focuses on: facilitating knowledge sharing on AI best practices, promoting AI research and development collaborations, supporting industry-specific AI adoption strategies, and aligning AI policies with EU regulations and global AI frameworks [17]. The AI Adoption Trends in Finland and Global Standards is shown in Table 1.

Conducting a comparative benchmarking study of AI applications in Satakunta against leading global AI hubs reveals both unique strengths and areas for growth. The benchmarking study examines how Satakunta's AI ecosystem compares to major AI hubs, focusing on research centers, educational initiatives, investment levels, startup ecosystems, and international collaborations. By understanding these comparative dynamics, Satakunta can enhance its AI strategy, align with national AI initiatives, and integrate best practices from global leaders to strengthen its role in Finland's AI ecosystem as

2.2.1 Strengths of Satakunta's AI Landscape

(a) Specialized Research Centers: Satakunta houses the RoboAI Research and Development Center, a collaboration between Satakunta University of Applied Sciences and Tampere University, focusing on robotics and artificial intelligence. This center supports

companies and public sector entities in the region with testing, product development, and design related to AI and robotics.

(b) Educational Programs: The region offers specialized educational programs, such as the Bachelor of Engineering in Artificial Intelligence (Data Engineering) at Satakunta University of Applied Sciences, preparing students to utilize AI, programming, and data science in practical ways.

2.2.2 Gaps Compared to Leading AI Hubs

(a) Scale of Investment: Leading AI hubs like the United States and China have significantly larger investments in AI research and development. For instance, China's AI industry attracted around $17 billion in investments in 2022, positioning it as a global leader in AI advancements.

(b) Startup Ecosystem: While Satakunta has a growing number of AI-focused companies, regions like Toronto, Canada, have established robust AI startup ecosystems, supported by world-class research institutions like the Vector Institute and the University of Toronto

2.2.3 Opportunities for Satakunta

(a) Leveraging National Initiatives: Finland's national AI strategy aims to position the country as a leader in AI application. Satakunta can align with this strategy by participating in national programs and leveraging resources provided by initiatives like the AI Finland network.

(b) International Collaboration: Engaging in international collaborations can provide Satakunta with access to global best practices, research advancements, and funding opportunities, thereby enhancing its AI capabilities.

The comparative benchmarking analysis highlights Satakunta's key strengths, including specialized AI research centers, strong educational programs, and national AI initiatives. However, gaps remain in areas such as investment scale, AI startup growth, and international collaborations, where leading AI hubs have significant advantages. To bridge these gaps, Satakunta should focus on: *Expanding investment opportunities* by leveraging national AI funding and international partnerships, *Fostering a more robust startup ecosystem* through incubation programs and industry-academia collaborations, *Strengthening global engagement* by participating in AI research networks and joint ventures with international AI hubs. By integrating national AI strategies with global best practices, Satakunta can position itself as a

competitive AI hub in Finland, ensuring long-term growth and innovation in AI applications across industries.

So generative AI is rapidly evolving, with applications spanning healthcare, finance, education, and beyond. The integration of techniques like mixture of experts, multimodal learning, and potential advancements towards Artificial General Intelligence are shaping the future of AI research [8]. As the field progresses, there is an increasing emphasis on responsible AI practices and ethical considerations to ensure that these powerful technologies align with societal norms and welfare [4, 7].

3 GenAI in Industry-Academic collaboration

In the rapidly evolving field of software engineering, the collaboration between industry and academia has emerged as a vital mechanism for driving innovation, enhancing educational experiences, and addressing real-world challenges. Industry-academic collaborations integrate the theoretical and empirical research strengths of academic institutions with the practical, application-oriented expertise of industry partners. This synergy fosters the development of cutting-edge technologies, methodologies, and tools that can effectively address the complex and dynamic demands of modern software systems.

Such collaborations are mutually beneficial. Academic researchers gain access to real-world data, case studies, and industry-specific problems, which enrich their research and provide students with practical learning opportunities. Conversely, industry partners benefit from the fresh perspectives, innovative solutions, and advanced research capabilities available in academic institutions. This partnership accelerates the research and development cycle and ensures that the educational curriculum remains relevant and aligned with current industry needs as shown in Figure 4. Key areas of focus in industry-academic collaboration include:

3.1 Joint Research Projects: Collaborative research initiatives aimed at solving specific technical problems or exploring new areas of technology. The details of joint research projects are following:

(a) Description: Collaborative research to solve specific technical problems.

(b) Benefits to Academia: Access to real-world data and industry-specific problems.

(c) Benefits to Industry: Fresh perspectives and innovative solutions.

(d) Source: Liaison Office for University-Industry Collaboration, University of Tokyo. "Collaborative Research Programs[18].

3.2 Internship and Co-op Programs: Providing students with hands-on experience in industry settings, enhancing their practical skills and employability. The details of internship and co-op programs are following:

(a) Description: Hands-on experience for students in industry settings.

(b) Benefits to Academia: Enhanced practical skills and employability for students.

(c) Benefits to Industry: Well-prepared workforce with practical experience.

(d) Source: National Academies of Sciences, Engineering, and Medicine. Enhancing the Effectiveness of Team Science [19].

3.3 Technology Transfer and Commercialization: Facilitating the movement of new technologies from academic research labs to commercial applications. The details of technology transfer and commercialization are following:

(a) Description: Movement of technologies from academic labs to commercial applications.

(b) Benefits to Academia: Commercialization of research outputs.

(c) Benefits to Industry: Access to cutting-edge technologies.

(d) Source: Association of University Technology Managers (AUTM). Technology Transfer Overview [20].

3.4 Professional Development: Focusing on practical applications of AI in business, helping professionals understand and implement AI technologies effectively. The details of professional development are following:

(a) Description: Among the programs listed, the AI-TIE Program (AI Technology Innovation Ecosystems for Competitiveness of SMEs) has significant components focused on professional development. These initiatives provide tailored support for SMEs and foster collaboration with academic institutions, making them key contributors to professional growth in AI.

(b) Benefits to Academia: i) industry-Relevant Research as collaboration with SMEs provides data and real-world problems for academic research, ii) enhanced Curriculum: Academic institutions receive feedback from industry, ensuring their programs remain practical and aligned with market needs, and iii) increased Funding Opportunities: Partnerships often come with funding for joint projects and research.

(c) Benefits to Industry: i) workforce Skill Enhancement: SME employees gain AI-related expertise, boosting organizational capabilities, ii) tailored Business Solutions: practical training helps SMEs adopt AI solutions to address specific business challenges, iii) improved competitiveness: employees' improved skills help SMEs innovate and maintain a competitive edge.

(d) Source: Haaga-Helia. Empowering SMEs with Artificial Interlligence [21].

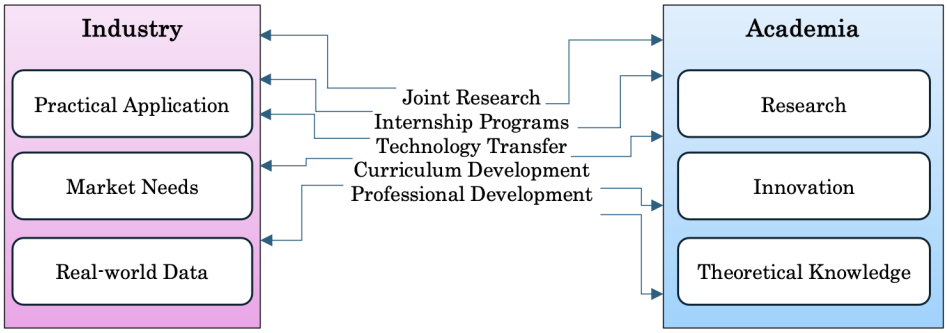

Figure 4: The diagram illustrates how these collaborations bring together the strengths of both sectors

The successful implementation of industry-academic collaborations in software engineering requires careful planning, clear communication, and a shared vision. It involves navigating challenges such as intellectual property rights, aligning objectives, and managing different organizational cultures. However, when executed effectively, these collaborations can lead to significant advancements in software engineering, contributing to economic growth, technological progress, and the preparation of a highly skilled workforce.

Below summarizing the key aspects and benefits of industry-academic collaboration in software engineering, and a diagram visually representing the collaboration areas between academia and industry. The table outlines different types of collaborations, their descriptions, and the respective benefits for both academia and industry. The diagram illustrates how these collaborations bring together the strengths of both sectors.

EX 3.1 Joint Research

I. Enhancing Software Requirements Engineering with CASCRE[22]

(a.) Description: This research focuses on improving software requirements engineering(RE) by integrating agent-oriented RE (AORE) and service-oriented RE(SORE) methodologies

into a hybrid framework called CASCRE. The aim is to enhance RE processes by leveraging the strengths of both paradigms and incorporating crowd-based information from social media platforms. The framework addresses challenges such as gathering adequate requirements, aligning business requirements with software products, prioritizing requirements, and recommending innovative ideas. The empirical research involved expert groups from academia and industry, validating CASCRE's effectiveness compared to AORE and SORE independently.

(b.) Benefits-Industry: *Innovative Solutions and Fresh Perspectives* Industry partners benefited from innovative approaches and fresh perspectives brought by academic researchers. CASCRE's integration of agent and service paradigms demonstrated significant improvements in RE processes. *Improved Software Development Practices* The CASCRE framework led to better quality software with improved alignment to business needs, reducing the likelihood of project failure due to poor requirements management. *Access to Cutting-Edge Research* Industry partners gained access to the latest research and technological advancements, which could be directly applied to their projects, fostering innovation and efficiency.

(c.) Benefits-Academia: *Access to Real-World Data and Challenges* The research provided academic participants with real-world data and practical challenges in RE, enriching their research and offering empirical validation of theoretical models. *Enhanced Educational Experiences* Collaboration with industry offered students and researchers practical insights and hands-on experience, improving their skills and employability. *Empirical Research Opportunities* The project allowed academic researchers to apply empirical research methodologies in real-world settings, advancing the field with validated, practical insights.

II. MEDICOR Africa Pharmaceuticals and Medical Supplies PLC [22]

(a.) Description: MEDICOR Africa, a pharmaceutical company in Ethiopia, collaborated with a software development company to integrate its system with major hospital systems. The goal was to track drug demand, prevent wastage, and address counterfeit drug issues by providing genuine expiration dates to customers via a mobile application. The project applied the CASCRE framework to gather and prioritize requirements efficiently.

(b.) Benefits-Industry: *Enhanced Requirements Management*: The CASCRE framework helped in accurately gathering and prioritizing requirements, leading to a better aligned and more reliable software system. *Improved Operational Efficiency*: By integrating with hospital systems and tracking drug demand accurately,MEDICOR Africa could prevent drug wastage and address counterfeit issues more effectively.

(c.) Benefits-Academia: *Practical Application of Theories*: The case study provided a practical application of the CASCRE framework, validating its effectiveness in a real-world scenario. *Research and Development*: Academic researchers could observe and analyze the practical challenges and outcomes of implementing the framework in an industry setting.

EX 3.2 Internship and Co-op Programs

I. Certus Model in Software Engineering: Bridging Academia and Industry[23]

(a.) Description: The Certus Model is a structured approach to industry-academia collaboration in software engineering, developed through an eight-year collaborative research project. It focuses on participative knowledge generation between industry and academia, including clear roles, principles of interaction, and strategies for maintaining continuous commitment and alignment. The model integrates context-driven research and industry champions to ensure relevance and impact.

(b.) Benefits-Industry: *Enhanced Innovation Capacity*: Companies gain access to cutting-edge research and innovative solutions tailored to their specific needs, improving their competitive edge. *Risk Mitigation*: Collaborative projects allow for the sharing of resources and risks associated with research and development. *Talent Pipeline*: Collaboration with academia provides companies with early access to skilled graduates, aiding in talent acquisition and retention.

(c.) Benefits-Academia: *Practical Application of Research*: Academic researchers can apply their theoretical models to real-world problems, validating and refining their work. *Funding and Resources*: Partnerships with industry provide additional funding and resources, enhancing research capabilities and facilities. *Enhanced Curriculum*: Industry feedback helps in updating academic programs to ensure they are aligned with current industry needs, improving the employability of graduates.

EX 3.3 Technology Transfer and Commercialization [24]

I. Technology Transfer and Commercialization at Michigan State University[24]

(a.) Description: Michigan State University (MSU) dedicated to technology transfer to benefit farming communities and society through research results and innovations. MSU transfers technology through two primary methods: the Extension Service and Intellectual Property Rights (IPR)-led technology transfer facilitated by MSU Technologies. The university manages its intellectual property and technology transfer through MSU Technologies, which provides services such as acquiring, protecting, and licensing IP.

(b.) Benefits-Industry: *Access to Cutting-Edge Research*: Industry partners gain access to the latest research and innovations developed at MSU, which can be commercialized to enhance their product offerings and competitiveness. *Innovation and Product Development*: Companies benefit from the advanced technologies and innovations resulting from MSU's research, enabling them to develop new products and improve existing ones. *Risk Mitigation*: Licensing technologies from MSU allows companies to mitigate the risks associated with in-house research and development, as they can leverage proven technologies. *Economic Growth*: The commercialization of MSU technologies contributes to regional and national economic growth by fostering new businesses and enhancing existing ones.

(c.) Benefits-Academia: *Commercialization of Research*: MSU benefits from the commercialization of its research through licensing agreements, which provide financial returns in the form of royalties and enhance the practical impact of academic research. *Practical Application of Knowledge*: The transfer of technology allows MSU to see its theoretical research applied in real-world settings, validating and potentially inspiring further academic inquiries. *Strengthened Industry Relationships*: Collaborations with industry enhance MSU's reputation, attract additional funding for future research, and provide valuable feedback to shape academic programs to better meet industry needs.*Support for Start-Ups*: MSU supports the creation of start-ups based on university technologies, fostering innovation and entrepreneurship among faculty and students.

EX 3.4 Professional Development

I. Increasing the Impact of Industry–Academia Collaboration through Co-Production [25].

(a.) Description: This case study explores the co-production model of industry-academia collaboration, focusing on six research project cases conducted over five years in Sweden. The projects involved universities and global companies in the automotive and pharmaceutical industries. The study highlights how co-production can enhance the impact of research by involving both academic and industrial perspectives in the research process. It emphasizes the importance of managing phases such as problem formulation, methodology, and results to achieve successful collaboration and impact.

(b.) Benefits-Industry: *Enhanced Innovation*: Companies benefit from access to cutting-edge research and innovative solutions tailored to their specific needs, improving their competitive edge and operational efficiency. *Risk Mitigation*: Collaborative projects share resources and risks associated with research and development, reducing the burden on individual companies. *Talent Pipeline*: Companies gain early access to skilled graduates and doctoral students, aiding in talent acquisition and retention. *Practical Solutions*: Industry partners receive actionable and practical solutions to their problems, often leading to improved processes and new product developments.

(c.) Benefits-Academia: *Commercialization of Research*: Universities benefit from the practical application and commercialization of their research, which can provide financial returns and enhance the societal impact of academic work. *Enhanced Curriculum*: Collaboration with industry provides valuable feedback that helps shape academic programs to better meet current industry needs and trends. *Research Opportunities*: Academic researchers gain access to real-world data and practical challenges that inspire new research directions and collaborative projects. *Strengthened Relationships*: Building strong ties with industry enhances the university's reputation and attracts additional funding for future research.

In conclusion, industry-academic collaborations in software engineering represent a strategic partnership that leverages the strengths of both sectors to drive innovation and address complex challenges. As the field continues to evolve, fostering these collaborations will be crucial for staying at the forefront of technological advancements and preparing the next generation of software engineers.

4 Industry-Academia Collaboration for SMEs

The industry-academic collaboration in software engineering has promising and functioning in the larger company mainly.

4.1 Brief Overview

Industry-academic collaborations in software engineering for SMEs aim to bridge the gap between theoretical research and practical application. These partnerships enhance innovation and competitiveness by leveraging academic expertise to solve real-world problems faced by SMEs.

Key benefits include access to cutting-edge research, cost-effective R&D, a skilled talent pool, and customized technological solutions. Academics benefit through practical application of theories, enhanced research funding, industry-relevant curricula, and increased research impact. Successful collaborations lead to mutual growth and technological advancement for both SMEs and academic institutions. SMEs can leverage industry-academic collaborations to enhance their technological capabilities, reduce costs, access skilled talent, and drive innovation for example.

- Access to Cutting-Edge Research and Technologies. Example: An SME in the cybersecurity sector collaborates with a university to develop advanced encryption algorithms, gaining access to the latest research which significantly enhances their product offerings and market competitiveness[26].
- Cost-Effective R&D. Example: A small biotech firm partners with a university to conduct research on new drug formulations. The collaboration allows the SME to undertake extensive R&D without bearing the full cost, leveraging university resources and expertise [27].
- Skilled Talent Pool. Example: A software development SME collaborates with a technical university, providing internship opportunities for students. This not only helps the company address immediate workforce needs but also serves as a pipeline for recruiting highly skilled future employees [28]
- Customized Solutions. Example: An SME in the manufacturing industry partners with an engineering school to develop bespoke automation solutions. The academic researchers tailor their theoretical knowledge to solve specific operational challenges, resulting in increased efficiency and reduced production costs [29].
- Enhanced Innovation Capacity. Example: An agricultural technology SME collaborates with a university to implement machine learning techniques for crop monitoring. This partnership drives innovation,

allowing the SME to offer state-of-the-art solutions that significantly improve crop yield predictions and resource management [29].

Finland has emerged as a leading hub for artificial intelligence (AI) innovation, with a growing ecosystem of AI startups driving advancements across industries. The country's strong digital infrastructure, government support, and AI-friendly policies have fostered a thriving AI startup scene, attracting investments and international collaborations.

Finnish AI startups are at the forefront of cutting-edge applications, from healthcare and manufacturing to sustainable technology and automation. Supported by initiatives such as AI Finland Network, Business Finland, and the Finnish Center for Artificial Intelligence (FCAI), these startups benefit from a well-connected ecosystem that bridges academic research, corporate partnerships, and government incentives.

This section explores the landscape of Finnish AI startups, highlighting key players, industry focus areas, funding trends, and opportunities for growth, positioning Finland as a competitive AI innovation hub in the global market. Finnish AI Startup Listing is shown in Table 2.

Table 2: List of the Finnish AI Startups [17]

Company	Category	Website	Founded	Description
Aiforia	Healthtech	aiforia.com	2014	Provider of an AI and cloud-based platform for deep learning image analysis in clinical solutions.
Aibidia	Fintech and Legal Tech	aibidia.com	2018	Cloud-based software platform for transfer pricing and analytics solutions.
AILiveSim	Productivity	ailivesim.com	2018	Developer of a scalable simulation platform to accelerate business. Algorithmiq Quantum algorithmiq.fi 2020 Developing quantum algorithms that unlock the power of quantum computing.
Awake.ai	Other	awake.ai	2018	Optimization platform improving cargo flow and reducing emissions at ports.
Betolar	Scaleups and Listed	betolar.com	2016	Material technology company with a mission to reduce CO2 emissions and the use of virgin resources Bitmagic Other bitmagic.ai 2021 Developer of casual games.
Blidz	Retail and Ecom	blidz.com	2017	AI-based shopping platform for multicategory products. Cadentia Technologies Sales, marketing, customer service cadentia.ai 2023 Relationship technology company enabling hyper-personalized AI-powered conversational services.
Caidio	Proptech	caidio.io	2018	Uses AI to improve concrete quality and reduce CO2 emissions in sustainable construction.
Capalo	AI Other	capaloai.com	2022	Sustainable tech company optimizing energy storage systems with AI.
Cerenion	Healthtech	cerenion.com	2017	Provider of AI tools for brain function analysis in intensive care.
CHAOS	Proptech	chaosarchitects.com	2017	Democratizing data for sustainable urban development with AI-powered insights.
Clevenio	Sales, marketing, customer service	clevenio.com	2022	Sales intelligence company automating B2B sales tasks with AI.
Collective Crunch	Other	collectivecrunch.com	2016	Leader in AI for forestry, improving forest inventory and carbon capture predictions.
Combinostics	Acquired/majority of ownership outside Finland	combinostics.com	2014	AI-powered solutions for the detection and management of neurological disorders.
Cosmic Lounge	Other	cosmiclounge.com	2022	Developer of free-to-play puzzle games for mobile.
ConfidentialMind	Enablers	confidentialmind.com	2023	Generative AI platform for deploying AI models on various infrastructures.
CubiCasa	Acquired/majority of ownership outside Finland	cubi.casa	2013	Scalable solution for acquiring property interior data.

Table 2: (continued)

Company	Category	Website	Founded	Description
DataCrunch	Enablers	datacrunch.io	2020	Cloud provider specializing in machine learning services and GPU instances.
Digital	Workforce Scaleups and Listed	digitalworkforce.com	2015	Leader in automation and AI solutions for healthcare and beyond.
Double Point	Other	doublepoint.com	2020	Creates gesture control technology for wearables and IoT.
Ellie.ai	Productivity	ellie.ai	2019	SaaS for product design and collaboration in data-intensive industries.
Epicbrief	Sales, marketing, customer service	epicbrief.com	2022	AI based platform offering sales enablement solutions.
FabricAI	Acquired/majority of ownership outside Finland	fabricai.fi	2018	Automating financial management with Vertical AI Agent solutions.
Finata.ai	Fintech and Legal Tech	finata.ai	2024	Transforms business data into a structured warehouse, automating reporting and forecasting for advanced growth companies flowrite.com 2020 AI-enabled platform for writing assistance.
Flowrite	Acquired/majority of ownership outside Finland Forte AI HR Tech	forteai.com	2022	Provider of AI assistant for managing job applications.
Front AI	Sales, marketing, customer service	front.ai	2019	Customer service automation using conversational AI and chatbots.
Futures Platform	Productivity	futuresplatform.com	2016	Visualization and forecasting tool to mange team and business performance.
Generic Intelligent	Machines/ GIM Robotics Enablers	gimltd.fi	2014	Developer of robots and enabling technologies.
GostaLabs	Healthtech	gostalabs.com	2023	Builds healthcare-specialized machine learning models for efficiency and outcomes.
HeadAI	Enablers	headai.com	2016	AI-based expert systems for various tasks.
Iceye	Scaleups and Listed	iceye.com	2014	Developer of AI and microsatellite-based imaging solutions.
Innopipe	Productivity	innopipe.ai	2020	Cloud-based data discovery solution provider.
Inscripta	Healthtech	inscripta.io	2015	AI-powered dictation and transcription for medical data.
Inven	Productivity	inven.ai	2022	Develops B2B SaaS solutions for M&A and private equity professionals.
In Parallel	Productivity	in-parallel.com	2023	AI-driven enterprise software company helping organizations align strategy with execution through its Intelligent Operating Model.
IPRally	Fintech & Legal Tech	iprally.com	2018	AI for patent analytics and search solutions.
Klinik	Healthcare Solutions & Healthtech	klinikhealthcaresolutions.com	2013	AI-based decision support platform for healthcare professionals.
Klevu	Acquired/majority of ownership outside Finland	klevu.com	2013	Provider of on-site search and navigation for ecommerce industries.
Kuva Space	Other	kuvaspace.com	2016	Smarter data for a stronger planet.
Labra AI	Other	www.labra.ai	2016	Automates visual inspection in manufacturing for better quality at lower costs.
Louhe	Other	louhe.fi	2020	Security culture solutions using explainable AI.
Lumoa	Acquired/majority of ownership outside Finland	lumoa.me	2016	Makes customer feedback actionable with AI-powered analysis.
Linear	Acquired/majority of ownership outside Finland	linear.app	2019	Purpose-built tool for planning and building products.
Mvision AI	Healthtech	mvision.ai	2017	SaaS-based AI solution for radiotherapy treatment planning.
Master English	Other	masterenglish.fi	2009	Language learning app using AI technologies and a personalized learning experience
Neuro Event Labs	Healthtech	neuroeventlabs.com	2015	Smart solution for seizure detection, combining AI and human expertise.
Nightingale	Scaleups and Listed	nightingalehealth.com	2013	Biotech company transforming chronic disease prevention.
Nosto	Retail & Ecom	nosto.com	2011	SaaS-based personalized product recommendation solution for online retailers.
NROC Security	Enablers	nrocsecurity.com	2023	Safely leverage the advantages of GenAI apps for maximum productivity.
Nuuka	Proptech	nuuka.com	2012	Building SaaS for diagnosing and optimizing HVAC systems.
ONEiO	Enablers	oneio.cloud	2011	Cloud-based integration service for IT providers with AI automation.
Optomed	Healthtech	optomed.com	2017	Automated screening for diabetic retinopathy.

Table 2: (continued)

Company	Category	Website	Founded	Description
Pandatron	HR Tech	pandatron.ai	2020	Personalized change management at scale with AI coaching.
Qmill	Quantum computing	qmill.com	2024	Develops quantum-advantage algorithms for solving complex problems.
Quanscient	Quantum computing	quanscient.com	2021	Fast, scalable, and flexible multiphysics simulation software.
QuantrolOx	Quantum computing	quantrolox.com	2021	Provider of AI-enabled quantum computing software.
Quva	Other	quva.fi	2017	Industrial big data analytics company boosting productivity.
Realm	Productivity	withrealm.com	2023	AI assistant for sales teams to access knowledge and insights instantly.
RELEX	Scaleups and Listed	relexsolutions.com	2005	Cloud-based platform for ERP software in retail.
Refamo	Other	refamo.fi	2020	Steel structure fatigue assessment technology provider.
Revieve	Other	revieve.com	2016	AI-powered beauty product recommendation platform.
Root Signals	Enablers	rootsignals.ai	2023	Control platform for scalable LLM automation.
Saidot	Enablers	saidot.ai	2018	SaaS platform for AI governance and transparency.
SEO AI	Sales, marketing, customer service	wpseoai.com	2021	AI-driven SEO tools for websites.
Shook	Digital Sales, marketing, customer service	shook.digital	2021	Unifies the short-video production workflow,enabling brands to scale content creation with AI and data.
SkenarioLabs	Proptech	skenariolabs.com	2015	AI-powered analytics for real estate properties.
Skyfora	Other	skyfora.com	2019	Provides AI-based weather forecasting systems.
Smartly	Scaleups and Listed	smartly.io	2013	AI advertising platform.
Snowfox	Fintech & Legal Tech	snowfox.ai	2018	AI invoicing and accounting solutions.
Sniffie	Retail & Ecom	sniffie.io	2015	E-commerce pricing and market activity monitoring with AI.
Speechly	Acquired	speechly.com	2016	Cloud-based voice API integration platform.
Starcart	Retail & Ecom	starcart.com	2022	AI-powered shopping platform.
Taito	HR Tech	taito.ai	2024	AI based platform offering solutions for employee performance management.
TalentAdore	HR Tech	talentadore.com	2014	AI-powered recruitment software for personalized hiring.
Upsy	Retail & Ecom	upsyshopping.com	2021	Provider of AI shopping assistant solutions for e-commerce.
Utopia	Analytics Productivity	utopiaanalytics.com	2014	Machine learning company offering text mining and analytics services.
Valohai	Enablers	valohai.com	2016	MLOps platform for machine learning pioneers.
Valossa	Productivity	valossa.com	2015	AI-powered video analytics and automation solutions.
Varjo	Scaleup	varjo.com	2016	Advanced VR/XR hardware and software for industrial use.
VEIL.AI	Healthtech	www.veil.ai	2019	Privacy-enhancing AI solutions for sensitive data anonymization.
VersoVision	Healthtech	versovision.com	2020	AI solutions for fall prevention and detection in healthcare.
Vuo AI	Enablers	vuo.ai	2023	Developer of advanced building blocks for AI applications.
Younite AI Oy	Enablers	younite.ai	2018	Develops technology solutions related to AI & XR.
Zefort Fintech	Legal Tech	zefort.com	2017	AI-based cloud service for contract management.
Zefram	Sales, marketing, customer service	zefram.com	2020	Developer of AI solutions for negotiation automation.

4.2 Overview of the industry-academic collaboration-based SE in Satakunta region

The collaboration between SMEs and academic institutions in the Satakunta region has been a key driver of regional development and innovation. Historically, these partnerships began modestly with local universities and polytechnics offering support to small businesses through student projects and internships. These early efforts laid the groundwork for more structured and

impactful collaborations. There are 3 key milestones as Knowledge Transfer Partnerships, Regional Innovation Programs, and EU-Funded Projects.

Knowledge Transfer Partnerships (KTPs): Initiated in the early 2000s, KTPs have been instrumental in formalizing collaborations. These partnerships enable SMEs to leverage the research capabilities of academic institutions to solve practical business challenges. For example, SMEs in the manufacturing and technology sectors have benefited from KTPs by adopting new technologies and improving their processes [30].

Regional Innovation Programs: Programs such as the "Need for Speed" (N4S) initiative have played a significant role. Launched to foster agile software development practices, N4S brought together multiple SMEs and academic partners to work on cutting-edge projects. This collaboration enhanced the innovation capabilities of SMEs and also provided valuable real-world applications for academic research [29].

Those key milestones are benefit to SMEs in part of innovation and competitiveness, innovation and competitiveness, and resource efficiency. For innovation and competitiveness: collaborations with academia have allowed SMEs to stay at the forefront of technological advancements. By accessing cutting-edge research, SMEs can innovate more effectively and maintain a competitive edge in their respective markets. Access to talent: partnering with universities provides SMEs with a pipeline of skilled graduates who bring fresh perspectives and up-to-date knowledge. This is particularly beneficial for SMEs that may not have extensive resources for training new employees. And resource efficiency: SMEs benefit from the shared resources and expertise available through academic partnerships, which can lead to cost savings and more efficient R&D processes.

As the same time, those key milestones also benefic to academia part as real-world applications, enhanced curriculum, and research funding and opportunities. Academic researchers gain opportunities to apply their theoretical knowledge to practical problems, enhancing the relevance and impact of their work. For feedback from industry collaborations helps shape academic programs to better meet the needs of the job market, improving the employability of graduates. In addition, the collaborations often attract funding from both private and public sectors, supporting further research initiatives and enhancing the research capabilities of academic institutions.

From report of 2022 medium-size enterprise monitor represented that the SMEs in the Satakunta region of Finland face a dynamic environment with both opportunities and challenges. The region is characterized by a diverse mix of industries, including manufacturing, technology, and services, which provide a solid foundation for economic activities. However, like many other regions, Satakunta's SMEs are navigating several common issues such as access to financing, internationalization, and technological adoption. The key challenge of the current situation is 1) access to financing: one of the primary challenges for SMEs in Satakunta, as in many other regions, is securing

adequate financing. SMEs often struggle with cash flow issues and obtaining credit, which can limit their ability to invest in growth and innovation, 2) technological adoption: there is a need for increased adoption of digital tools and advanced manufacturing technologies to remain competitive. The integration of new technologies requires significant investment and skilled personnel, which can be a hurdle for smaller enterprises, and 3) internationalization: expanding into international markets presents both opportunities and challenges. SMEs in the Satakunta region need to navigate different regulatory environments, cultural differences, and logistical complexities to succeed abroa.

The SMEs in the Satakunta region are pivotal to the local economy, contributing significantly to employment and economic activity. While they face challenges such as access to finance and the need for technological advancement, there are substantial opportunities through collaboration with academic institutions and support from government programs. By leveraging these resources, SMEs in Satakunta can enhance their competitiveness and drive regional economic growth. According to Statistics Finland, SMEs are defined as enterprises with fewer than 250 employees and either an annual turnover not exceeding EUR 50 million or a balance sheet total not exceeding EUR 43 million. Total Number of Enterprises: As of 2022, Finland had approximately 443,731 enterprises, excluding those in agriculture, forestry, and fishing. Micro-Enterprises: Enterprises with fewer than 10 employees constitute about 95% of all Finnish businesses. Small Enterprises: Those with 10 to 49 employees represent around 4% of the total. Medium-Sized Enterprises: Companies with 50 to 249 employees account for approximately 1% of businesses. Large Enterprises: Firms with 250 or more employees make up less than 0.2% of the total [31].

4.3 GenAI for Business Growth

Artificial Intelligence (AI) offers Small and Medium-sized Enterprises (SMEs) numerous opportunities to enhance efficiency, reduce costs, and drive growth. Prioritizing AI applications that align with business objectives is crucial for maximizing benefits. Here are key AI applications SMEs should consider:

4.3.1 Customer Service Enhancement

(a) AI Chatbots and Virtual Assistants: Implementing AI-driven chatbots can provide 24/7 customer support, handle common inquiries, and resolve issues promptly, leading to improved customer satisfaction and reduced workload on human agents.

4.3.2 Marketing and Sales Optimization

(a) Personalized Marketing Campaigns: AI can analyze customer

data to create targeted marketing strategies, increasing engagement and conversion rates.

(b) Sales Forecasting: Utilizing AI to predict sales trends enables better inventory management and strategic planning.

4.3.3 Process Automation

(a) Automating Repetitive Tasks: AI can handle routine tasks such as data entry, invoicing, and scheduling, freeing up employees to focus on more strategic activities.

4.3.4 Inventory and Supply Chain Management

(a) Demand Forecasting: AI algorithms can predict product demand, helping to optimize inventory levels and reduce storage costs.

(b) Supply Chain Optimization: AI can identify inefficiencies in the supply chain, leading to cost reductions and improved delivery times.

4.3.5 Financial Management

(a) Automated Bookkeeping: AI-powered tools can manage financial records, track expenses, and generate reports, enhancing accuracy and saving time.

(b) Fraud Detection: AI systems can monitor transactions in real-time to detect and prevent fraudulent activities.

4.3.6 Human Resources Management

(a) Recruitment: AI can screen resumes and identify suitable candidates, streamlining the hiring process.

(b) Employee Engagement: AI tools can analyze employee feedback to improve workplace satisfaction and retention.

4.3.7 Product and Service Development

(a) Data-Driven Insights: AI can analyze market trends and customer feedback to inform product development and innovation.

4.3.8 Cybersecurity

(a) Threat Detection: AI can identify unusual network activities, enhancing protection against cyber threats.

4.3.9 Predictive Maintenance

(a) Equipment Monitoring: AI can predict equipment failures, allowing for proactive maintenance and reducing downtime.

4.3.10 Decision Support Systems

(a) Data Analysis: AI can process large datasets to provide actionable insights, supporting informed decision-making [32].

4.4 Stakeholder Insights for AI Used in SMEs

Artificial Intelligence (AI) is revolutionizing the way businesses operate, providing Small and Medium-sized Enterprises (SMEs) with opportunities to enhance efficiency, reduce costs, and improve decision-making. However, the adoption of AI in SMEs is not solely a technological shift—it requires input from various stakeholders who influence its success. Business owners must ensure AI aligns with strategic goals, employees need to adapt to new workflows, customers expect ethical and transparent AI usage, and policymakers establish the regulatory landscape.

Understanding stakeholder perspectives is essential for SMEs to navigate challenges such as data privacy, cost constraints, and skill gaps. Engaging technology providers, investors, and academic institutions can further drive successful AI integration. This section explores the critical insights from each stakeholder group, highlighting their roles, concerns, and contributions in shaping AI adoption for SMEs.

4.4.1 Business Owners and Management

(a) Strategic Vision: Leaders must align AI initiatives with business objectives, identifying areas where AI can enhance operations, customer engagement, or product development

(b) Resource Allocation: Decision-makers need to assess the financial and human resources required for AI projects, considering potential returns on investment.

(c) Risk Management: Addressing concerns about data security, privacy, and ethical implications is vital to mitigate risks associated with AI adoption.

4.4.2 Employees

(a) Skill Development: AI adoption necessitates upskilling staff to work effectively with new technologies, fostering a culture of continuous learning.

(b) Job Evolution: Employees may experience shifts in roles, with AI automating routine tasks and allowing focus on more strategic activities.

(c) Change Management: Engaging employees in the AI integration process can reduce resistance and promote a smoother transition.

4.4.3 Customers

(a) Enhanced Experience: AI can personalize customer interactions, improving satisfaction through tailored recommendations and support.

(b) Data Privacy: Maintaining transparency about data usage and implementing robust security measures are essential to build and retain customer trust.

4.4.4 Technology Providers

(a) Solution Customization: Vendors should offer AI tools tailored to the specific needs and scales of SMEs, ensuring relevance and usability.

(b) Support Services: Providing training, maintenance, and continuous support is crucial for the effective implementation of AI solutions.

4.4.5 Policymakers and Industry Bodies

(a) Regulatory Frameworks: Establishing clear guidelines on AI usage helps SMEs navigate legal and ethical considerations.

(b) Incentive Programs: Offering grants, tax incentives, or subsidies can encourage AI adoption among SMEs, offsetting initial costs.

(c) Awareness Campaigns: Educating SMEs about the benefits and challenges of AI fosters informed decision-making and dispels misconceptions.

4.4.6 Investors and Financial Institutions

(a) Funding Opportunities: Investors play a pivotal role in providing capital for AI initiatives, assessing the potential for growth and profitability.

(b) Risk Assessment: Evaluating the viability and sustainability of AI projects ensures that investments are sound and aligned with market trends.

4.4.7 Academic and Research Institutions

(a) Knowledge Transfer: Collaborations with universities and research centers can facilitate access to cutting-edge AI developments and expertise.

(b) Talent Pipeline: Educational institutions contribute to a skilled workforce, essential for the development and maintenance of AI systems [33, 14, 34, 35, 36, 37].

AI adoption in SMEs is a multi-faceted process that requires collaboration among various stakeholders. Business leaders play a crucial role in aligning AI strategies with company objectives, employees must be equipped with the necessary skills, and customers need confidence in ethical AI practices. Additionally, technology providers, investors, policymakers, and academic institutions contribute significantly to the sustainable growth of AI applications in SMEs.

For SMEs to fully leverage AI's potential, a structured approach that considers stakeholder insights is essential. Businesses must invest in workforce training, choose AI solutions tailored to their scale, and ensure compliance with regulatory frameworks. By fostering collaboration and addressing concerns proactively, SMEs can successfully integrate AI, driving innovation, competitiveness, and long-term growth in the digital era.

5 Key technology of the industry-academic collaboration-based SE for SMEs in Satakunta region

5.1 The technology and tools of the industry-academic collaboration-based SE for SMEs

Industry-Academic Collaboration: These collaborations aim to bridge the gap between theoretical research and practical applications, often resulting in innovative solutions and advancements in technology. One of the most powerful technology and tools is Generative AI and Large Language Models (LLMs). By leveraging generative AI, SMEs can enhance productivity, reduce costs, and maintain a competitive edge in the market. This allows them to operate more efficiently and effectively in various business aspects. And, the capabilities of LLMs, SMEs can significantly enhance their operations, improve customer engagement, and maintain a competitive edge in the market.

5.2 AI Strategy- process to develop an AI strategy

Developing a structured AI strategy is essential for organizations aiming to integrate artificial intelligence effectively into their operations. A well-defined AI strategy aligns with business objectives, ensures efficient resource utilization, and fosters innovation. Below are six key components and steps to consider when formulating such a strategy [38, 39]

5.2.1 Define Clear Objectives

(a) Align with Business Goals: Identify specific areas where AI can add value, such as enhancing customer experience, optimizing

operations, or creating new revenue streams. This alignment ensures that AI initiatives support the overall mission and objectives of the organization.

(b) Set Measurable Targets: Establish clear metrics to assess the impact of AI initiatives. For example, setting targets for reducing operational costs by a certain percentage or improving customer satisfaction scores. Measurable targets provide a benchmark to evaluate the success of AI projects.

5.2.2 Data Management and Infrastructure

(a) Data Collection and Quality: Develop robust processes for gathering, cleaning, and maintaining data. High-quality, relevant data is the foundation of effective AI systems. Implement data governance policies to ensure data accuracy, consistency, and privacy compliance.

(b) Scalable Infrastructure: Invest in scalable and secure infrastructure, considering options like cloud services or on-premises solutions. Scalability ensures that the infrastructure can handle increasing data volumes and computational demands as AI initiatives grow

5.2.3 Technology and Tools

(a) Algorithm Selection: Choose appropriate AI models and algorithms that align with your specific use cases. Consider factors such as the complexity of the problem, the nature of the data, and the desired outcomes.

(b) Integration Capabilities: Ensure selected AI tools can seamlessly integrate with existing systems and workflows. This integration facilitates smooth adoption and minimizes disruptions to current operations.

5.2.4 Talent and Training

(a) Skill Development: Invest in training programs to upskill existing employees in AI competencies. Encourage continuous learning through workshops, courses, and certifications to keep the team updated with the latest AI advancements.

(b) Cross-Functional Teams: Foster collaboration between departments such as IT, data science, and business units. Cross-functional teams bring diverse perspectives, enhancing the innovation and effectiveness of AI solutions.

5.2.5 Governance and Ethics

(a) Ethical Framework: Establish guidelines to ensure AI applications adhere to ethical standards. Address issues like bias, transparency, and accountability to build trust with stakeholders and customers.

(b) Regulatory Compliance: Stay informed about evolving AI regulations and ensure all AI initiatives comply with relevant laws and standards. Regular audits and assessments can help maintain compliance and adapt to new regulatory requirements.

5.2.6 Continuous Monitoring and Improvement

(a) Performance Evaluation: Regularly assess AI systems against predefined metrics to ensure they meet desired outcomes. Use performance data to identify areas for improvement and make necessary adjustments.

(b) Scalability Planning: Design AI solutions with scalability in mind. Plan for future growth by ensuring that AI systems can handle increased workloads and adapt to changing business needs.

Following the systematically addressing these components, organizations can develop a structured AI strategy that aligns with their business objectives and positions them for sustainable growth and innovation in the AI landscape. There is some of example AI strategy, it's shown in Figure 5.

AI use case	Goals	Objectives	Success metrics	AI approach	Microsoft solution	Data needs	Skill needs	Cost factors	AI data strategy	Responsible AI strategy
E-commerce web application chat feature	Automate business process	Improve customer satisfaction	Increased customer retention rate	PaaS, generative AI, RAG	Azure AI Foundry	Item descriptions and pairings	RAG and cloud app development	Usage	Establish data governance for customer data and implement AI fairness controls.	Assign AI accountability to AI CoE and align with Responsible AI principles.
Internal app document-processing workflow	Automate business process	Reduce costs	Increased completion rate	Analytical AI, fine-tuning	Azure AI services - Document Intelligence	Standard documents	App development	Estimated usage	Define data governance for internal documents and plan data lifecycle policies.	Assign AI accountability and ensure compliance with data handling policies.
Inventory management and product purchasing	Automate business process	Reduce costs	Shorter shelf life of inventory	Machine learning, training models	Azure Machine Learning	Historical inventory and sales data	Machine learning and app development	Estimated usage	Establish governance for sales data and detect and address biases in data.	Assign AI accountability and comply with financial regulations.
Daily work across company	Enhance individual productivity	Improve employee experience	Increased employee satisfaction	SaaS generative AI	Microsoft 365 Copilot	OneDrive data	General IT	Subscription costs	Implement data governance for employee data and ensure data privacy.	Assign AI accountability and utilize built-in responsible AI features.
E-commerce app for regulated industry chat feature	Automate business process	Increase sales	Increased sales	IaaS generative AI model training	Azure Virtual Machines	Domain-specific training data	Cloud infrastructure and app development	Infrastructure and software	Define governance for regulated data and plan lifecycle with compliance measures.	Assign AI accountability and adhere to industry regulations.

Figure 5: The example AI strategy based on a fictional company[39]

5.3 Generative AI

GenAI refers to artificial intelligence systems capable of creating new content, such as text, images, music, or code, by learning patterns and structures from existing data. Unlike traditional AI, which performs tasks based on predefined rules, generative AI can produce original, human-like outputs. Examples include GPT-3 for text generation, DALL-E for image creation,

and OpenAI's Codex for generating programming code. These technologies are widely used for applications like chatbots, content creation, and design, offering powerful tools for innovation and efficiency in various industries.

GenAI can play a significant role in Small and Medium-sized Enterprises (SMEs) by enhancing various aspects of their operations and strategies. Here are some key areas where generative AI can be particularly impactful:

5.3.1 Content Creation and Marketing

(a) Automated Content Generation: Generative AI can create high-quality content for blogs, social media, and marketing campaigns, saving time and resources for SMEs.

(b) Personalized Marketing: AI can generate personalized marketing messages and advertisements tailored to individual customer preferences, increasing engagement and conversion rates.

5.3.2 Product Development and Design

(a) Prototyping and Design: AI can assist in generating design prototypes and product variations quickly, allowing SMEs to experiment with different ideas without extensive manual effort.

(b) Custom Product Suggestions: Generative AI can analyze customer data to suggest new product features or entirely new products that meet emerging market demands.

5.3.3 Customer Service

(a) Chatbots and Virtual Assistants: AI-powered chatbots can handle customer inquiries 24/7, providing immediate responses and freeing up human staff for more complex issues.

(b) Automated Customer Feedback Analysis: AI can analyze customer feedback and reviews to generate insights into customer satisfaction and areas for improvement.

5.3.4 Data Analysis and Insights

(a) Predictive Analytics: Generative AI can analyze historical data to forecast trends, helping SMEs make data-driven decisions in areas like inventory management, sales strategies, and financial planning.

(b) Automated Reports: AI can generate detailed business reports and analytics, providing SMEs with actionable insights without needing a dedicated data team.

5.3.5 Human Resources and Recruitment

(a) Resume Screening and Matching: AI can streamline the hiring process by generating shortlists of qualified candidates based on job requirements and applicant data.

(b) Employee Training: AI can create personalized training programs and materials, ensuring employees receive relevant and effective training.

5.3.6 Supply Chain and Operations

(a) Demand Forecasting: AI can generate accurate demand forecasts, helping SMEs optimize their supply chain and reduce inventory costs.

(b) Process Automation: Generative AI can automate routine operational tasks, improving efficiency and reducing the likelihood of human error.

5.3.7 Creative Industries

(a) Graphic Design and Media Production: AI can assist in generating graphics, videos, and other media content, providing SMEs with high-quality visual materials without needing extensive in-house expertise.

(b) Music and Art Creation: For SMEs in the creative industries, AI can generate music, artwork, and other creative content, serving as a tool for inspiration and production.

5.3.8 Customer Experience and Personalization

(a) Tailored Recommendations: AI can generate personalized product recommendations based on customer behavior and preferences, enhancing the shopping experience.

(b) Customized Interactions: Generative AI can create personalized interactions and communications, improving customer satisfaction and loyalty.

5.3.9 Innovation and Competitive Advantage

(a) New Business Models: AI can help SMEs innovate by generating ideas for new business models and strategies that leverage emerging technologies and market trends.

(b) Competitor Analysis: AI can generate insights from competitor data, helping SMEs understand market positioning and identify opportunities for differentiation.

By leveraging generative AI, SMEs can enhance efficiency, creativity, and customer engagement, ultimately driving growth and competitiveness in their respective markets. There are some specific examples illustrating how generative AI can be leveraged in SMEs across different sectors:

5.3.10 E-commerce

(a) Product Descriptions: An SME running an online store can use generative AI to automatically generate compelling and SEO-optimized product descriptions. For instance, instead of writing descriptions for each product manually, the AI can generate unique descriptions based on product features, saving time and ensuring consistency.

(b) Customer Reviews Analysis: An AI system can analyze customer reviews and generate summaries or insights about common customer sentiments and feedback trends, helping the SME to understand customer preferences and improve products or services.

5.3.11 Marketing and Advertising

(a) Content Creation: A small digital marketing agency can use generative AI tools to create social media posts, blog articles, and email newsletters. For example, an AI tool can generate a series of engaging posts for a month-long campaign, including text, hashtags, and even suggested images.

(b) Ad Copy Generation: For SMEs focusing on advertising, generative AI can create multiple variations of ad copy for A/B testing, ensuring the most effective messages are used to attract customers.

5.3.12 Healthcare

(a) Medical Report Generation: A small medical clinic can use AI to generate patient reports from raw data. For example, after a patient visit, the AI can compile the doctor's notes, lab results, and diagnosis into a comprehensive report for the patient.

(b) Appointment Scheduling: AI can generate personalized reminders and follow-up messages for patients, improving appointment adherence and patient engagement.

5.3.13 Real Estate

(a) Property Listings: A real estate agency can use AI to generate detailed property listings, including descriptions, features, and market comparisons. For instance, AI can take basic information

about a property and generate a comprehensive listing that highlights its best features and compares it to similar properties in the area.

(b) Market Analysis Reports: AI can generate market analysis reports, providing insights into trends, pricing, and demographics, which can be shared with clients to help them make informed decisions.

5.3.14 Manufacturing

(a) Design Prototyping: A small manufacturing firm can use AI to generate design prototypes for new products. For example, generative design tools can create multiple iterations of a product design based on specified parameters, helping the company to explore a wide range of design possibilities quickly.

(b) Predictive Maintenance: AI can generate maintenance schedules and alerts based on equipment data, predicting when machinery is likely to need maintenance and reducing downtime.

5.3.15 Hospitality

(a) Personalized Guest Experiences: A small hotel or bed-and-breakfast can use AI to generate personalized recommendations for guests, such as local attractions, dining options, and activities based on their preferences and past behavior.

(b) Automated Guest Communication: AI can handle guest inquiries and bookings through chatbots, providing instant responses and generating personalized messages that enhance the guest experience.

5.3.16 Finance

(a) Financial Reports: A small accounting firm can use AI to generate financial reports for clients. For example, AI can take raw financial data and produce comprehensive reports that include income statements, balance sheets, and cash flow statements.

(b) Expense Analysis: AI can analyze company expenses and generate insights on where costs can be reduced, helping SMEs manage their finances more efficiently.

5.3.17 Education and Training

(a) Course Content Creation: An SME offering online courses can use AI to generate educational content, quizzes, and assignments. For instance, AI can create diverse sets of questions and interactive materials based on the course syllabus.

(b) Personalized Learning Paths: AI can analyze student performance and generate personalized learning paths and recommendations, helping each student to progress at their own pace.

5.3.18 Customer Service

(a) Automated Support Responses: An SME can deploy AI chatbots to handle common customer service queries, generate appropriate responses, and escalate more complex issues to human agents. This can significantly reduce response times and improve customer satisfaction.

(b) Feedback Analysis: AI can analyze customer feedback from multiple channels and generate reports on customer sentiment, identifying key areas for improvement.

5.3.19 Creative Industries

(a) Graphic Design: A small graphic design studio can use AI to generate logo concepts or design templates, speeding up the initial design phase and providing a broader range of options to clients.

(b) Music and Art Generation: For a small business in the creative sector, AI can generate music tracks or artwork based on specific themes or styles, providing unique content that can be used in various projects or sold to clients.

5.4 Large Language Models (LLMs)

These examples illustrate the versatility of generative AI in enhancing efficiency, creativity, and customer engagement across various industries within the SME sector.

Large Language Models (LLMs) are a type of artificial intelligence designed to understand and generate human-like text based on vast amounts of data. They use deep learning techniques, particularly neural networks, to process and predict language patterns. LLMs are trained on diverse datasets, enabling them to perform various language-related tasks such as translation, summarization, question answering, and content generation.

Large Language Models (LLMs) like GPT-4 play a significant role in Small and Medium-sized Enterprises (SMEs) by enabling a variety of applications that enhance productivity, streamline operations, and provide competitive advantages. Here are some specific roles LLMs can play in SMEs:

5.4.1. Customer Support and Interaction

(a) Automated Customer Service: LLMs can power chatbots and virtual assistants to handle customer queries, provide product information, and resolve issues efficiently. This ensures 24/7 customer support without the need for constant human intervention.

(b) Personalized Responses: These models can generate personalized and context-aware responses to customer emails, improving customer satisfaction and engagement.

5.4.2. Content Creation and Marketing

(a) Content Generation: LLMs can produce high-quality content for blogs, social media posts, newsletters, and marketing campaigns, saving time and resources for content teams.

(b) SEO Optimization: They can assist in generating SEO-optimized content by suggesting keywords, meta descriptions, and improving readability, helping SMEs rank higher in search engines.

(c) Ad Copywriting: LLMs can create compelling ad copy for various advertising platforms, enabling SMEs to run effective marketing campaigns.

5.4.3. Internal Communication and Documentation

(a) Report Generation: LLMs can automate the creation of business reports, summaries, and analytics, providing insights and saving time for employees.

(b) Meeting Summaries: They can transcribe and summarize meetings, ensuring that important points and action items are captured accurately.

5.4.4. Human Resources and Recruitment

(a) Resume Screening: LLMs can analyze resumes and cover letters to identify the most suitable candidates based on job descriptions and requirements, streamlining the hiring process.

(b) Employee Training Materials: They can generate training materials, FAQs, and onboarding documents tailored to specific roles within the company.

5.4.5. Sales and Customer Relationship Management (CRM)

(a) Lead Generation: LLMs can help identify potential leads by analyzing customer data and generating targeted outreach messages.

(b) Customer Insights: They can analyze customer interactions and feedback to provide insights into customer needs and preferences, helping SMEs tailor their sales strategies.

5.4.6. Product Development and Innovation

(a) Idea Generation: LLMs can assist in brainstorming sessions by generating new ideas for products, features, or improvements based on current market trends and customer feedback.

(b) Technical Documentation: They can create technical documents, user manuals, and product descriptions, ensuring clear and consistent communication about product functionalities.

5.4.7. Financial Management

(a) Expense Reporting: LLMs can automate the creation of expense reports and financial summaries, providing SMEs with accurate financial insights.

(b) Forecasting and Analysis: They can generate financial forecasts and perform trend analysis, helping SMEs make informed financial decisions.

5.4.8. Legal and Compliance

(a) Contract Drafting: LLMs can assist in drafting and reviewing contracts, ensuring they meet legal requirements and reduce the risk of errors.

(b) Regulatory Compliance: They can help SMEs stay updated with industry regulations by generating summaries of relevant legal updates and compliance requirements.

5.4.9. Customer Feedback and Sentiment Analysis

(a) Feedback Analysis: LLMs can analyze customer feedback from various channels, such as surveys and social media, to gauge customer sentiment and identify areas for improvement.

(b) Survey Creation: They can generate well-structured and relevant survey questions to gather valuable customer insights.

5.4.10. Knowledge Management

(a) Document Retrieval: LLMs can help employees quickly find relevant documents and information within the company's knowledge base.

(b) Knowledge Base Creation: They can assist in creating and maintaining an up-to-date knowledge base, ensuring that employees have access to the information they need.

5.4.11. Language Translation and Localization

(a) Multilingual Support: LLMs can provide translation services, enabling SMEs to interact with customers and partners in multiple languages.

(b) Content Localization: They can adapt marketing content and product information to different cultural contexts, improving global reach and customer relevance.

5.4.12. Creative Industries

(a) Script Writing: For SMEs in media and entertainment, LLMs can assist in writing scripts for videos, podcasts, and other media content.

(b) Creative Writing: They can generate story ideas, character descriptions, and plot outlines for authors and content creators.

By leveraging LLMs, SMEs can improve operational efficiency, enhance customer experiences, and drive innovation, ultimately leading to growth and success in their respective markets. They are some specific examples illustrating how Large Language Models (LLMs) can be utilized in SMEs across various sectors:

5.4.13. Retail and E-commerce

(a) Customer Support Automation: Example: An online clothing store uses an LLM-powered chatbot on their website to handle customer inquiries about order status, return policies, and product availability. This chatbot can provide instant responses, freeing up human agents to handle more complex queries.

(b) Product Descriptions: Example: An SME selling handmade crafts uses LLMs to generate detailed and appealing product descriptions for each item in their online store, ensuring consistency and improving SEO.

5.4.14. Marketing and Advertising

(a) Content Creation: Example: A small digital marketing agency leverages LLMs to create blog posts, social media updates, and email newsletters for their clients. The AI generates content ideas and drafts, which the human team then fine-tunes, significantly speeding up the content creation process.

(b) Ad Copywriting: Example: An SME specializing in eco-friendly products uses LLMs to generate variations of ad copy for their Google and Facebook ads, enabling them to perform A/B testing and identify the most effective messages.

5.4.15. Healthcare

(a) Patient Communication: Example: A small medical clinic employs an LLM to automate appointment reminders and follow-up messages for patients. The AI generates personalized messages based on patient data, improving appointment adherence and patient engagement.

(b) Medical Documentation: Example: Doctors at a clinic use LLMs to assist in writing detailed medical reports and patient notes after consultations, ensuring thorough and accurate documentation.

5.4.16. Real Estate

(a) Property Listings: Example: A small real estate agency uses LLMs to automatically generate engaging property descriptions for listings on their website, highlighting key features and amenities, and optimizing for search engines.

(b) Client Communication: Example: The agency also uses LLMs to draft personalized follow-up emails to clients after property viewings, summarizing the visit and suggesting similar properties.

5.4.17. Manufacturing

(a) Technical Documentation: Example: An SME manufacturing industrial equipment uses LLMs to create user manuals and maintenance guides. The AI ensures the documents are clear, comprehensive, and consistent, reducing the burden on technical writers.

(b) Customer Support: Example: The company also employs an LLM-powered chatbot to assist customers with troubleshooting common issues and providing maintenance tips.

5.4.18. Education and Training

(a) Course Content Development: Example: A small online education platform uses LLMs to generate course materials, including lecture notes, quizzes, and assignments, for various subjects. This helps educators save time and focus on interactive teaching.

(b) Student Support: Example: The platform also offers an AI-driven virtual tutor that helps students with homework questions and provides explanations for difficult concepts.

5.4.19. Financial Services

(a) Financial Reports: Example: A small accounting firm uses LLMs to automate the creation of financial reports for their clients. The AI processes raw financial data and generates detailed reports, including insights and trend analysis.

(b) Expense Analysis: Example: The firm also uses LLMs to analyze clients' expense data and generate recommendations for cost savings and budget optimization.

5.4.20. Legal Services

(a) Contract Drafting: Example: A small legal practice uses LLMs to draft standard contracts and legal documents. The AI ensures that documents are correctly formatted and include all necessary clauses, reducing the time spent on routine paperwork.

(b) Legal Research: Example: The practice also uses LLMs to conduct legal research, generating summaries of relevant case law and statutes to support their legal arguments.

5.4.21. Hospitality

(a) Guest Communication: Example: A boutique hotel uses LLMs to manage guest communications, from booking confirmations to personalized recommendations for local attractions and dining options.

(b) Review Analysis: Example: The hotel also employs LLMs to analyze online reviews, extracting key themes and sentiments to improve guest experiences and address any recurring issues.

5.4.22. Consulting

(a) Proposal Writing: Example: A small consulting firm uses LLMs to draft detailed project proposals and reports for their clients, ensuring that each document is tailored to the client's specific needs and challenges.

(b) Market Research: Example: The firm also uses LLMs to analyze industry reports and generate market insights, helping them provide well-informed advice to their clients.

These examples demonstrate how LLMs can be applied across various functions in SMEs, enhancing efficiency, improving customer experiences, and driving innovation.

5.5 The integration of regulatory Artificial Intelligent (AI) based SE for SMEs in Satakunta region

The AI Act refers to the proposed regulatory framework by the European Union to ensure the safe and trustworthy development, deployment, and use of Artificial Intelligence (AI) across the EU. AI Act-based Software Engineering involves designing, developing, and maintaining software systems that comply with the requirements outlined in the AI Act. Here's an overview of what AI Act-based Software Engineering entails:

5.5.1. Key Components of the AI Act as Risk-based Classification.

(a) Unacceptable Risk: AI systems that pose a threat to safety, livelihoods, or rights are banned.

(b) High Risk: AI systems used in critical areas such as healthcare, transport, law enforcement, and employment are subject to strict obligations.

(c) Limited Risk: AI systems with specific transparency obligations, such as chatbots, need to inform users they are interacting with an AI system.

(d) Minimal Risk: AI systems with minimal or no risk, such as AI-enabled video games or spam filters, have minimal regulatory requirements.

5.5.2. AI Act-Based Software Engineering Practices

(a) Risk Assessment and Management:
   i. Risk Identification: Identifying potential risks associated with the AI system based on the AI Act's classification.
   ii. Risk Mitigation: Implementing measures to mitigate identified risks, especially for high-risk AI systems.

(b) Compliance by Design:
   i. Requirement Analysis: Integrating
   ii. Documentation: Maintaining detailed documentation to demonstrate compliance with the AI Act, including design choices, data sources, risk management processes, and testing protocols.

(c) Data Governance:
   i. Data Quality: Ensuring that data used for training AI systems is of high quality, accurate, and representative.
   ii. Data Privacy: Complying with GDPR and other relevant data protection laws to ensure the privacy and security of personal data used by AI systems.

(d) Transparency and Accountability:
   i. User Information: Providing users with clear information about the AI system's capabilities and limitations.
   ii. Auditability: Implementing mechanisms to allow for the auditing of AI systems to verify compliance with regulatory requirements.

(e) Human Oversight:
   i. Human-in-the-loop (HITL): Ensuring that high-risk AI systems include mechanisms for human oversight to intervene and override decisions made by the AI.
   ii. User Training: Providing adequate training to users and operators of AI systems to understand and manage the AI's outputs effectively.

(f) Robustness and Safety:

i. Testing and Validation: Conducting rigorous testing and validation to ensure the AI system operates reliably and safely under expected conditions.

ii. Monitoring: Implementing continuous monitoring to detect and address any deviations or failures in the AI system's performance.

(g) Example Applications

i. Healthcare:

- Diagnostic Tools: Ensuring AI-based diagnostic tools comply with high-risk requirements, including data quality, transparency, and human oversight to make safe and accurate medical diagnoses.
- Medical Devices: Developing AI-powered medical devices that meet strict safety and performance standards mandated by the AI Act.

ii. Transportation:

- Autonomous Vehicles: Implementing robust safety measures and real-time monitoring systems to ensure autonomous vehicles comply with high-risk regulations.
- Traffic Management: Designing AI systems for traffic management that incorporate transparency and human oversight to manage urban traffic flows safely and efficiently.

iii. Employment:

- Recruitment Systems: Ensuring AI-based recruitment systems are fair, transparent, and do not discriminate, complying with high-risk requirements.
- Performance Monitoring: Developing AI tools for employee performance monitoring that respect privacy and transparency obligations.

iv. Law Enforcement:

- Facial Recognition: Implementing strict safeguards and accountability measures for AI-based facial recognition systems used by law enforcement agencies.
- Predictive Policing: Ensuring that AI systems used for predictive policing are transparent, unbiased, and subject to human oversight.

v. Benefits of AI Act-Based Software Engineering

- Legal Compliance: Ensures that AI systems comply with European regulatory standards, reducing the risk of legal penalties and reputational damage.

- User Trust: Enhances user trust by ensuring transparency, fairness, and accountability in AI systems.
- Safety and Reliability: Promotes the development of safe and reliable AI systems that can be effectively monitored and managed.
- Market Access: Facilitates access to the European market by ensuring that AI products and services meet regulatory requirements.

In summary, AI Act-based Software Engineering involves integrating the regulatory requirements of the EU AI Act into the software development process, ensuring that AI systems are safe, transparent, accountable, and compliant with legal standards. This approach not only helps in mitigating risks but also builds trust and fosters innovation in the AI landscape.

5.6 The initial situation of AI and Generative AI of SMEs in Satakunta region

The Satakunta region in Finland has experienced significant growth in AI adoption, with an increasing number of companies incorporating artificial intelligence into their business operations. According to Satakunta Yrityshakemistot (`www.satakunta.yrityshakemistot.fi`), there are currently 3,818 companies classified as SMEs (Small and Medium-sized Enterprises) in the region. Figure 6 presents the distribution of businesses in Satakunta based on staff size, categorized as follows:

Type B, C, D, E, F, G, H, I, Ingen uppgift, and J, representing companies with 0–4, 5–9, 10–19, 20–49, 100–249, 250–499, 500–999, 3,570, and 4 employees, respectively.

These businesses span across key sectors, including manufacturing, automation, healthcare, and digital services, reflecting the region's diverse industrial landscape.

Despite the growing AI adoption trend, the number of AI-specific companies remains relatively low, with only 10 companies directly involved in AI-related activities as disclosed information. This highlights both an emerging opportunity and a gap in AI business development within the region, indicating the potential for further investment and innovation in the sector.

5.6.1 Elinar Oy Ltd

Location: Pori, Finland

Application: Specializes in AI-assisted content and information management, leveraging generative AI to automate document processing and enhance data management solutions.

5.6.2 HeadAI

Location: Pori and Espoo, Finland

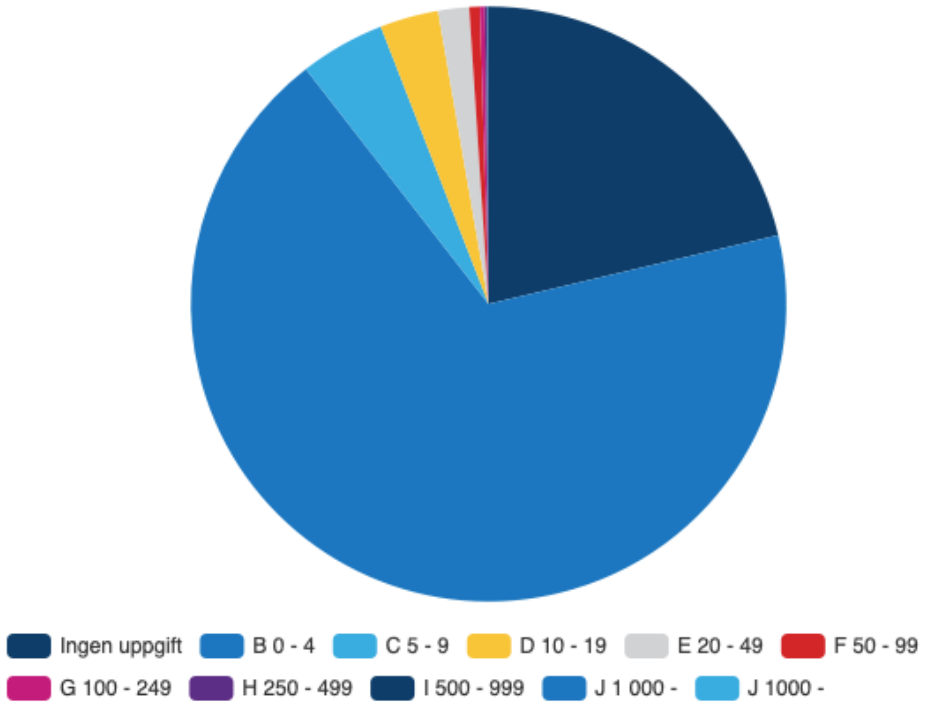

Figure 6: The amount of business in Satakunta araes based on staff number `https://satakunta.yrityshakemistot.fi/en/summary`

Application: Develops General Semantic AI to enable explainable and transparent decision-making, utilizing generative AI to process and generate insights from complex data sets.

5.6.3 Bluugo
Location: Pori & Vantaa, Finland
Application: Develops award-winning machine learning and IoT solutions with their Tracking Cloud platform, utilizing AI to enhance tracking and data analytics capabilities.

5.6.4 CI Computational Intelligence
Location: Pori, Finland
Application: Specializes in computational intelligence to optimize staff rostering, shift generation, and other scheduling tasks, employing AI to improve operational efficiency.

5.6.5 Hubble
Location: Pori, Finland
Application: An agile software developer with a mission to humanize artificial intelligence and technology, focusing on creating user-friendly AI applications.

5.6.6 Koivu Solutions
Location: Ulvila, Finland; Nashville, TN, USA
Application: Assists businesses in digitalization initiatives, leveraging AI to enhance business processes and drive digital transformation.

5.6.7 Satakunta University of Applied Sciences (SAMK)
Location: Pori, Finland
Application: Engages in research projects employing generative AI in medical research, focusing on data analysis and predictive modeling to advance healthcare solutions

5.6.8 Caverion Suomi Oy (Pori Aittaluoto)
Location: Pori, Finland
Application: its partnership with Telia by implementing artificial intelligence (AI) solutions to enhance the maintenance of Telia's data centers. These AI-driven systems improve environmental monitoring and operational efficiency.

5.6.9 Fonecta Media Oy
Location: Pori, Finland
Application: Fonecta has further embraced artificial intelligence (AI) across its operations. Fonecta initiated internal pilot projects, such as developing an AI-powered chatbot for employee inquiries and implementing AI-driven analysis of customer call recordings to extract valuable insights. These initiatives demonstrate Fonecta's commitment to integrating AI into its processes to improve efficiency and service quality.

5.6.10 Nakkila Works Oy,
Location: Nakkila, Finland
Application: Company works in the ReBoot Satakunta project, focusing on advancing digitalization through robotics.

6 Conclusion

Through industry-academic partnerships, the Satakunta region's small and medium-sized businesses' (SMEs) adoption of artificial intelligence (AI) is revolutionizing the software engineering sector. These collaborations have been crucial in promoting innovation, increasing SMEs' competitiveness, and bridging the gap between theoretical research and real-world implementation.

SMEs have been able to acquire cutting-edge AI technologies, optimize operations, and fortify their market positions thanks to important cooperation mechanisms such joint research projects, internship programs, technology transfer, and professional development efforts. Large language models

(LLMs) and generative AI have been adopted, which has further facilitated automation, improved customer interactions, and expedited business processes. As a result, AI is now a crucial driver of growth and efficiency.

However, by creating an ecosystem that supports AI-driven digital transformation, structured knowledge transfer programs, regional innovation initiatives, and EU-funded projects have played a critical role in mitigating these barriers. Going forward, it will be essential to maintain a strong synergy between academia and industry to ensure that SMEs continue to benefit from AI advancements.

By utilizing AI Act-based software engineering principles, businesses in the Satakunta region can ensure compliance, enhance transparency, and build user trust, ultimately positioning themselves as leaders in AI adoption. Strengthening these partnerships will not only propel technological advancements but also contribute to the region's long-term economic resilience.

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