Interreg
Baltic Sea Region

Co-funded by
the European Union

RESPONSIVE PUBLIC SERVICES
3I solutions for PS

Innovations in Small cities: toward the handbook for life changers

Katriin Vannik

LUT University, Yliopistonkatu 34, Lappeenranta, Finland, FI-53851 Lappeenranta, Finland

E-mail: Katriin.Vannik@lut.fi

Bikram Sunar

LUT University, Kouvola Unit, Kauppalankatu 13, 45100 Kouvola, Finland

E-mail: Bikram.Sunar@lut.fi

Anna Kruzenshtern

LUT University, Yliopistonkatu 34, Lappeenranta, Finland, FI-53851 Lappeenranta, Finland

E-mail: Anna.Kruzenshtern@lut.fi

Leonid Chechurin

LUT University, Yliopistonkatu 34, Lappeenranta, Finland, FI-53851 Lappeenranta, Finland

E-mail: Leonid.Chechurin@lut.fi

Abstract: This study explores public service innovation (PSI) in small municipalities across Finland, Estonia, Latvia, and Lithuania in the Baltic Sea Region (BSR), focusing on the unique challenges within Functional Urban Areas (FUAs). As part of the INTERREG BSR project, our mixed-method research contains a systematic literature review, a survey of Public Service Providers and Authorities, a proposed solution, and the analysis of two case studies. We investigate the primary basic strategies that should support PSI to integrate innovative solutions in public services and identify effective planning and implementation strategies for PSI. Our findings highlight major difficulties in PSI, such as resource limitations, conservative operational tendencies, and leadership absence. Strategic collaboration, strong leadership, and clear communication with the community are crucial facilitators of innovation in small cities and municipalities. We proposed Building Blocks of PSI for improved planning and implementation in FUAs, thereby enhancing public service delivery through targeted technological advancements.

Keywords: BSR, INTERREG BSR project, small cities, public sector innovation, digital transformation

1 Introduction

The Baltic Sea Region, encompassing a significant 21% of the European Union's population with 105 million residents (ESPON, 2019), offers a unique landscape for urban innovation, particularly in small cities and municipalities. Unlike densely populated global urban centers, most of this region's inhabitants reside in smaller cities and Functional Urban Areas (FUAs), as shown in Figure 1. These areas present distinct challenges and opportunities for implementing innovative solutions due to their size and resource constraints (Smith, 2020; Johnson et al., 2021).
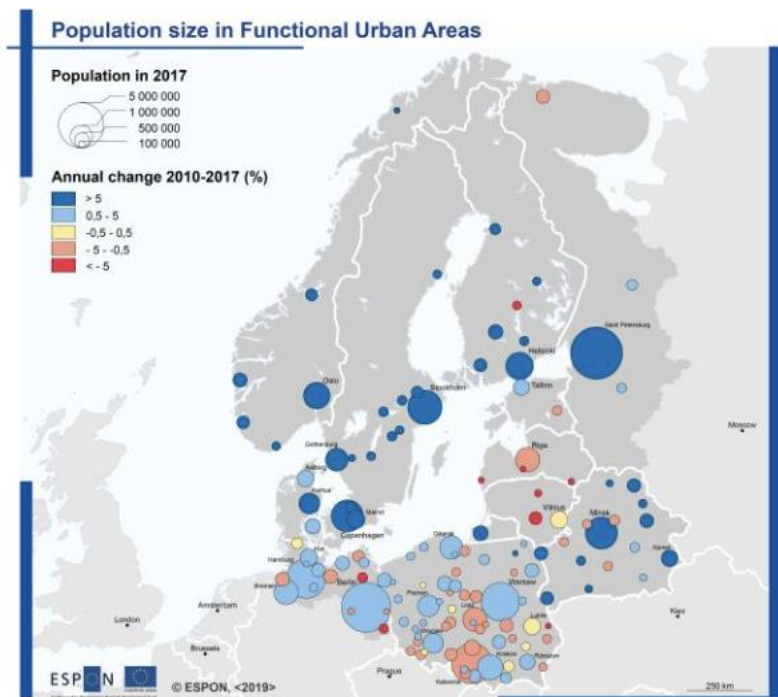

Figure 1 Visualization of the different sizes of FUAs in the BSR (ESPON, 2019).

Even though an innovation scoreboard compares the research and innovation performance level of EU Member States (European Commission, 2023), other European countries, and regional neighbors, it presents the general level without focusing on PSI. However, even with the help of that scoreboard, we can see that the level of innovation in the BSR region is drastically different between Nordic countries, Baltic states, Germany, and Poland (European Commission, 2023). The Gulf of Finland separates Finland and Estonia, the two nations with the most notable differences. From an innovation perspective, Finland is an innovation leader, while Estonia is in a group of countries with moderate innovators, as shown below in Figure 2.
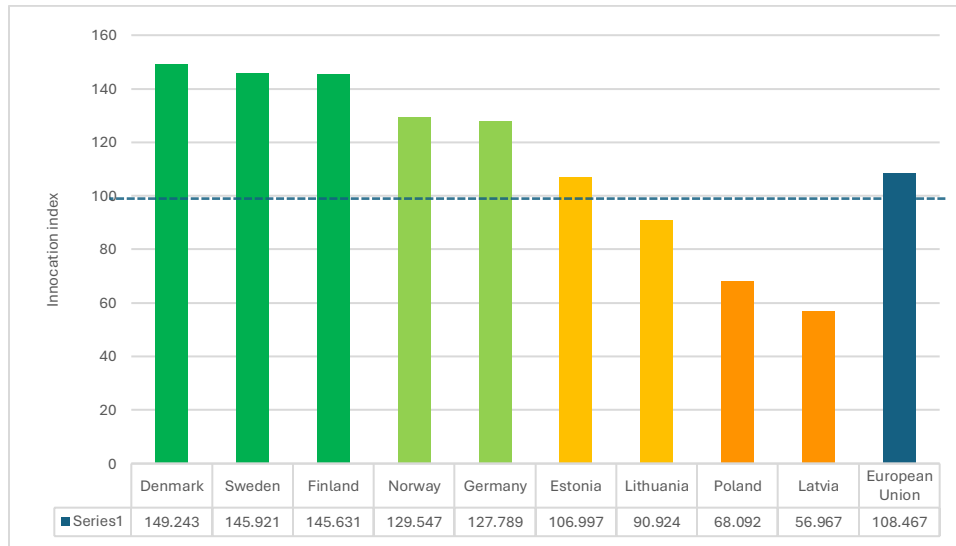
Figure 2 Summary of European Innovation Scoreboard specially collected for BSR countries (European Commission, 2023).

Despite the critical role of innovation in modernizing public services, small municipalities face numerous challenges. These include limited resources, a slow pace of digital transformation, and a conservative approach to management, which often prioritizes traditional methods over potentially risky innovations (Ersoy and Van Bueren, 2020). This reluctance to adopt new technologies is compounded by a lack of modernization skills, flexibility, and quality innovation management, making it difficult to enhance public services effectively (Uyarra et al., 2014).

The research aims to foster the adoption of modern, flexible, and innovative methods for local public services by streamlining the processes of planning, execution, and testing solutions. This will make them accessible to local public authorities, infrastructure, and service providers. Initially, the project will work with its partners, expanding to other municipalities in the BSR.

The paper's primary goal is to bridge theoretical innovation models with practical implementations tailored to the needs of small cities. Local governmental bodies, infrastructure, and service providers will serve as the initial group, clearing the way for the broader adoption of Extended reality (XR) solutions and other advanced technologies. This aims to transform scientific knowledge into accessible instructions, retaining its value while simplifying its application.

Systematic Literature Review and Hypotheses Formulation

The systematic literature review (SLR) used the PICO (Population, Intervention, Comparison, and Outcome) framework to investigate the outcomes of innovation in public services in small cities and municipalities. This methodology enabled an investigation into the existing literature (Nishikawa-Pacher, 2022).

The search query retrieving the most relevant collection of articles was design through several iterations:

("public service organizations" OR "public service institutions" OR government) AND ("small cities" OR "municipalities" OR "villages" OR "small communities") AND (innovation OR "digital transformation" OR "intelligent solutions" OR "immersive solutions") AND ("Baltic Sea region" OR Estonia OR Latvia OR Lithuania OR Finland OR Sweden OR Denmark OR Germany OR Poland)

The articles were collected from the Scopus and the Web of Science databases, resulting in 68 and 166 articles, respectively. The filters utilized included the English language, open access, and a 10-year timeframe from 2004 to 2024.
Then we used a manual selection to ensure that the chosen papers were relevant. Consequently, we chose 36 articles from Scopus and 43 from Web of Science that met our criteria. After eliminating duplicates in both databases, the final result is 74 unique articles (see Figure 3).
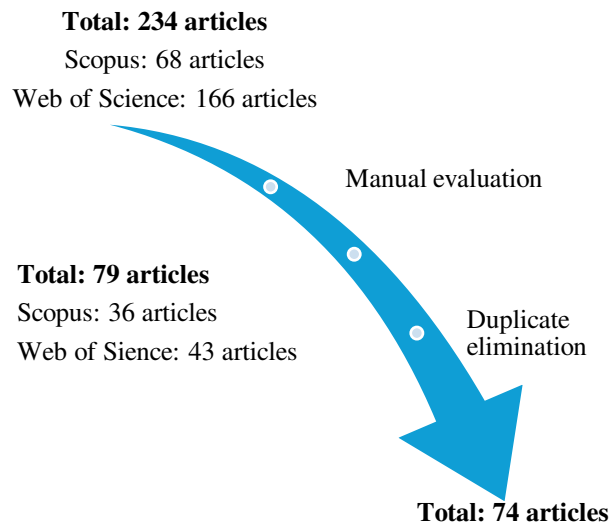
Total: 234 articles
Scopus: 68 articles
Web of Science: 166 articles

Manual evaluation

Total: 79 articles
Scopus: 36 articles
Web of Sience: 43 articles

Duplicate elimination

Total: 74 articles

Figure 3 The process of SLR.

Based on the literature retrieved, we build the distribution and regularity of innovative approaches within public services throughout the Baltic Sea region (see Figure 4). This enables us to identify the countries at the forefront of implementing new technology detect patterns, and potentially discover the elements that contribute to the effective adoption of innovation in small cities and municipalities.
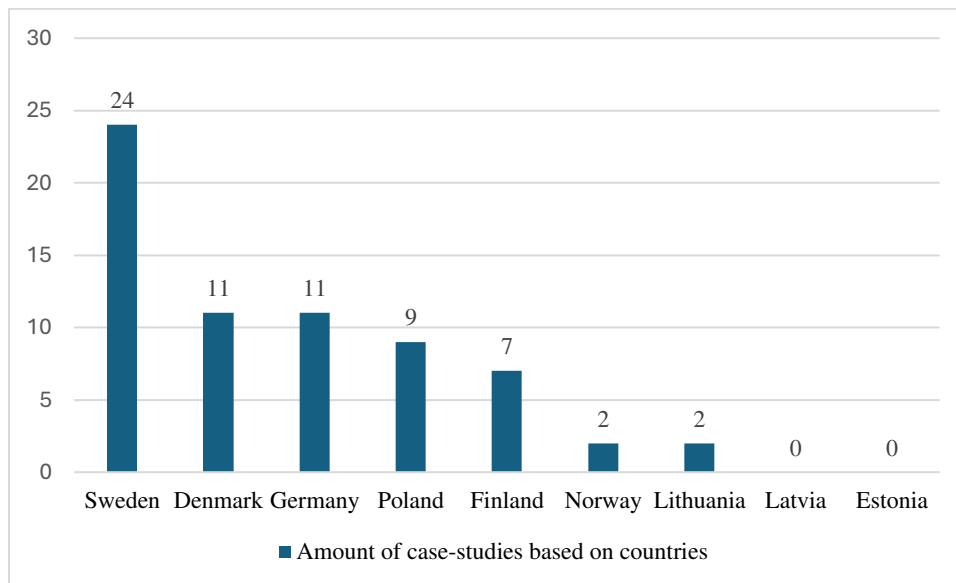
Figure 4 Comparison of Systematic Literature Review results by country of BSR

Figure 4 depicts the distribution of case studies on innovation in public services, which reveals considerable differences among BSR countries. Sweden leads with 24 case studies, suggesting a strong commitment to innovative approaches within the public sector. Denmark and Germany follow with 11 studies apiece, indicating a stronger but lower level of engagement than Sweden. Understanding the characteristics that influence the effective adoption of innovation in Sweden, Denmark, and Germany may provide useful insights for other nations in the Baltic Sea region. This could entail looking further into the policies, budget allocations, and institutional support that enable innovation in these leading countries.

Research gap, questions and methods

The analysis of existing literature demonstrated that the complexity of the unique challenges of small municipalities and towns in making these new decisions has not been fully explored. Drawing on a systematic literature review and informed by empirical evidence, we formulated two research questions to uncover the nuances of innovation.

Research Questions:
1. What are the basic strategies that should support PSI according to the involved parties?
2. What are the main aspects of planning and implementing PSI in small cities and municipalities?

To address the research questions the following methods have been chosen:
1. Systematic Literature Review
2. Survey with two groups (Public Service Providers and Public Service Authorities)
3. Personal Interviews with an executive of the target group
4. Case studies

2 Empirical Part

Survey design

We designed a survey based on several credible sources to assess and enhance innovation in the public sector in BSR. The Innovation Barometer for the Public Sector established standards for evaluating public sector innovation, particularly within the Nordic model, framing the general structure of our survey (Lykkebo, Munch-Anderse and Jacobsen, 2019). Additionally, we studied the results of the Public Sector innovation barometer published by the Ministry of Finance of Finland (Kuivalainen et al., 2022), which provides insights into the innovation environment across Finland's public sectors for understanding potential answers and target groups. The Copenhagen Manual (The Danish National Center for Public Sector Innovation, 2021) further guided the development and measurement of innovation in the public sector, outlining principles and methods that influenced our questionnaire design The Danish National Center for Public Sector Innovation, 2021).

With the help of all these materials, we provided our own survey flowchart, which can be found in Annex 1. The survey's roadmap contains 4 modules; each module was designed to focus on a single topic connected with project goals and provides critical information for our final research. This paper focuses on the 2. module and provides insights into the situation with innovation in PS in BSR.

Preliminary exploration of the target group, data collection and analysis

The data-collecting process was tailored to each participant country and our target group in order to capture a varied spectrum of experiences and viewpoints on public sector innovation. Our survey targeted public sector organizations and was developed with input from project participants with practical experience and insight into the field. Through research and discussions, we identified key aspects; according to the Public Sector Innovation Barometer 2022 survey, the largest lack of resources is found in money and working time: 73% of respondents believe there is insufficient working time, while 61% believe there is insufficient funding for innovative activities. Less than 50% of respondents believe the organization has sufficient skills for innovative efforts (Kuivalainen et al., 2022 p.26). As it was nicely formulated as a paradox between education levels and job satisfaction in the public sector:

> The public sector provides (relatively) high wages to unskilled people and
> (relatively) low wages to the highly trained (Budría, 2010).

This section describes the specific procedures used in each nation, including participant selection, distribution strategies, and response rate optimization techniques. Table 1 summarizes the final response rates and provides an overview of each nation's sample sizes, responses, and rates.

Table 1 The response rate by country

	Sample	Responses	Response rate
Finland	27	5	19 %
Estonia	167	23	14 %
Latvia	78	19	24 %
Lithuania	120	15	13 %
Poland	50	7	14%
Total		69	

Table 1 demonstrates the variance in sample sizes and response rates among nations. A smaller sample size and lower response rates can raise statistical uncertainty in the results, demanding caution when interpreting them. Despite these methodological obstacles, the advantages of learning from each country's statistics outweigh any concerns. Furthermore, general findings across BSR nations are very consistent, allowing us to use identified discrepancies to inform further conversation and research.

Data analysis methods

Our study used a dual-method approach, combining quantitative and qualitative techniques to examine various approaches to public sector innovation (PSI) in BSR nations. The quantitative method enabled us to objectively examine the data, revealing patterns, trends, and correlations that added depth beyond qualitative research alone. The increased the validity of our findings and provided a solid foundation for concluding PSI. Concurrently, we conducted a qualitative investigation, delving into the nuances of case studies and issues. The investigation used a structured, multi-stage approach to capture the intricacies of public sector innovation in many circumstances. Responses to questions were initially gathered. Although the entire questionnaire was written in English, open-ended questions allowed respondents to express their thoughts and emotions in their native language. These responses were then translated into English (if necessary), classified by kind of PSI (see Figure 4), and grouped systematically for focused investigation.

This meticulous categorization of real-world instances effectively organized the data and created a thorough thematic analysis framework. This dual method, which combined quantitative precision and qualitative depth, presented a comprehensive picture of innovation in the public sector. Our methodology provides a multifaceted approach to data analysis, allowing the same topic to be examined from many viewpoints, resulting in more comprehensive knowledge.
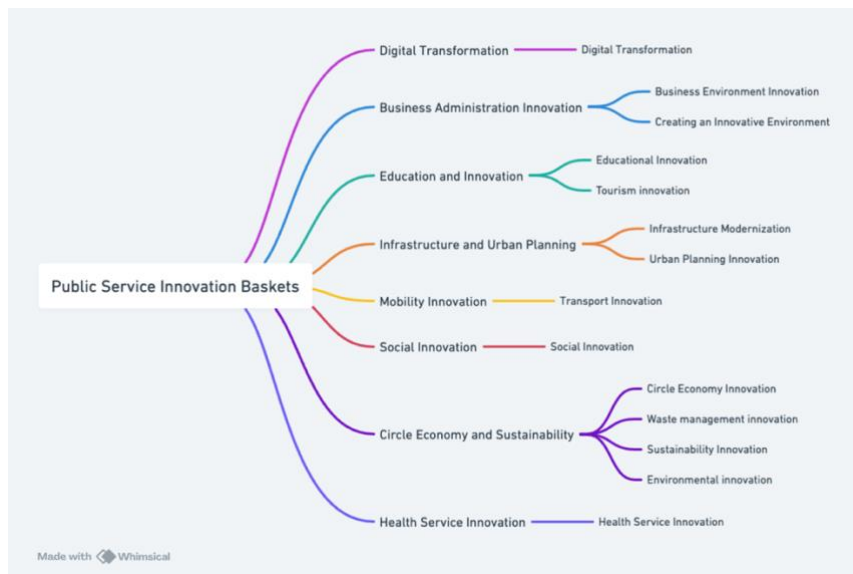
Figure 5 The Public Service Innovation "baskets" for sorting real-life cases.

A systematic survey conducted in the BSR focuses on the multifaceted field of public sector innovation, demonstrating the diversity of organizational features, technical readiness, and a wide range of social innovation perspectives. The study, including results from Estonia, Latvia, Lithuania, Finland, and Poland, is a barometer of current innovative practices and a beacon for future efforts to improve public services. The level of participation and responses in these countries provides insight into the varying degrees of involvement and interest, paving the way for further study of the results and their implications. It is important to note that, for example, many publications from Poland do not guarantee that people working directly in the public sector are involved in the process and know how to carry it out correctly. Since the survey is from several groups of different questions, we focus on the innovation situation in PSI and how we can improve the situation through science.

Results

In the section, we provide the survey results and show the current situation regarding innovation in BSR. When we created the survey, our main goal was to understand the real situation in PS and the main challenges city administrators and public servants face routinely.

First, we wanted to determine the general level of innovation in each location. The poll was organized so that if a respondent answered "yes" to an initial question about innovation, they would be asked to list the most significant innovations achieved in their organization (city, region, or municipality). If the respondent answered "no" or "I'm not sure," they were forwarded to a different question, which asked: "What organizational successes are you proud of? Why?"

We expected some respondents to link innovation largely with producing something new from the start, but this is a common mistake because, according to the OECD (2016), "innovation in the public sector" means **major improvements** to public administration and/or services. It can be characterized as a public sector organization **implementing**

new or considerably enhanced procedures, methods, or services to enhance the functioning and outcomes of a public sector unit."

Figure 6 demonstrates the institutions' participation in innovative activities across five nations between 2017 and 2023. Respondents from each country are divided into three categories: those who answered "yes," indicating engagement in creative activities; those who answered "no," indicating no participation; and those who answered, "not sure." As a result, only 3 of 69 respondents could not provide any examples.
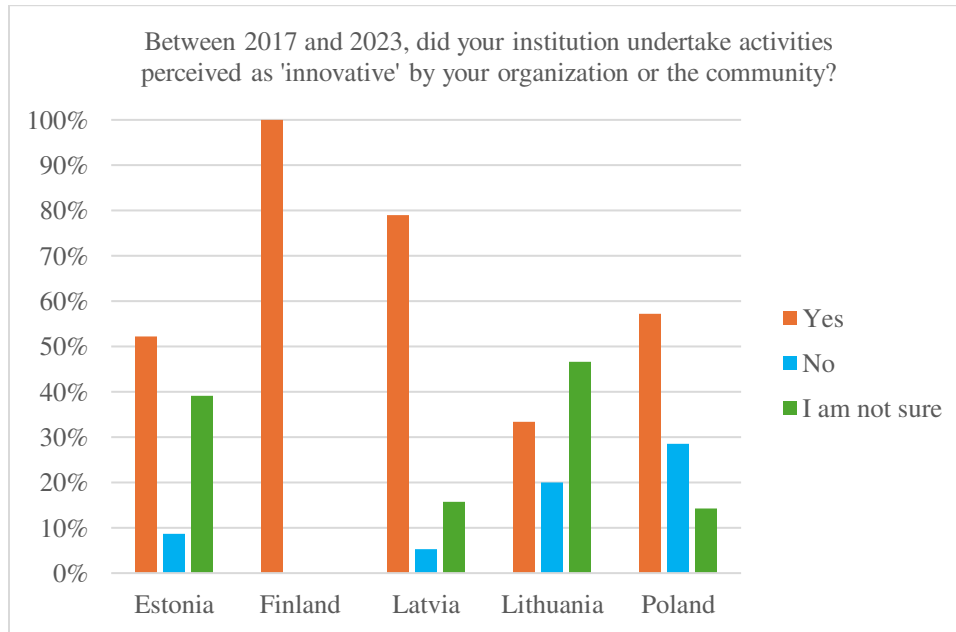

Figure 6 Share of public sector workplaces that have introduced one or more innovations during a five-year period.

Second, we asked respondents to share the most recent innovation presented by themselves or their organization between 2017 and 2023, even if they saw it as a failure. We received 98 cases out of 69 responses, with 96 being successful and two failing. Figure 7 depicts the participation in public service innovation across five countries. These figures must be interpreted cautiously because they are based on self-reported survey participation rather than a full examination of the key PSI sectors in each country. For analysis Figure 7, we used Public Service Innovation Baskets (see Figure 5). Notably, Latvia has the greatest reported participation in infrastructure modernization, emphasizing updating existing structures and services. Estonia's results show significant involvement in digital transformation and sustainability innovation, indicating a desire to incorporate digital technologies and sustainable practices into their socioeconomic structure. The data reflect respondents' perspectives and experiences with innovation programs in their regions.
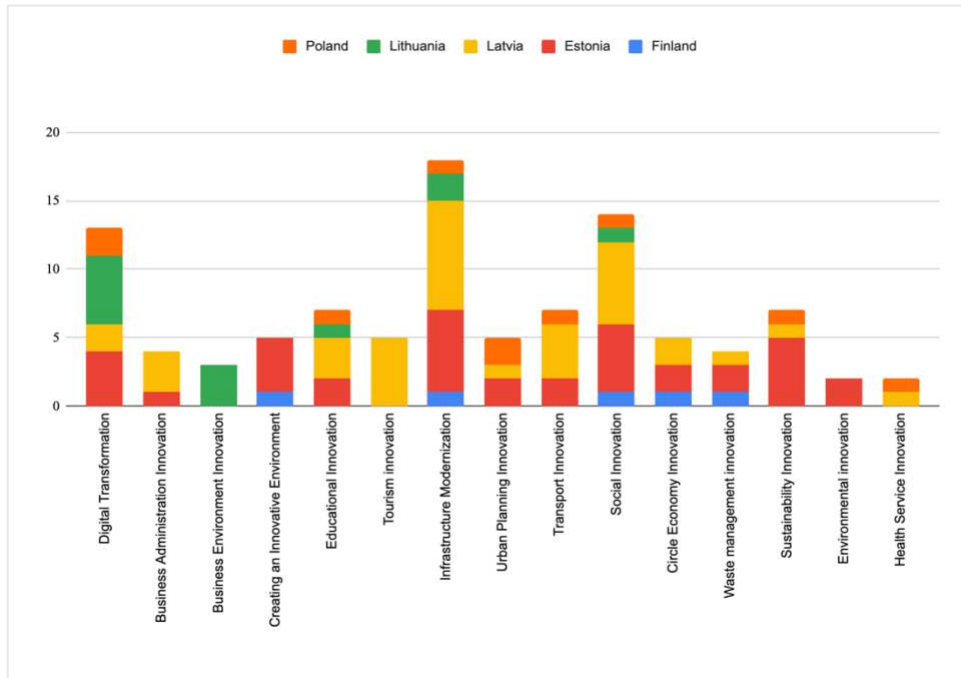
Figure 7 The distribution of cases by types of PS innovations and countries of the BSR region.

After that, we wanted to know if the respondent's organizations aimed to identify the organizational structure that supports innovation by asking if there was a dedicated individual or department coordinating such initiatives within the previous five years. The bar chart (see Figure 8) depicts the results: 27% of organizations confirmed having such a function, whereas 49% did not have a defined person or department for innovation, and 24% were doubtful. This data indicates the organization's emphasis (or lack thereof) on innovation processes within various entities.

Figure 8 The status of organizational structure in PSA and PSP organizations.

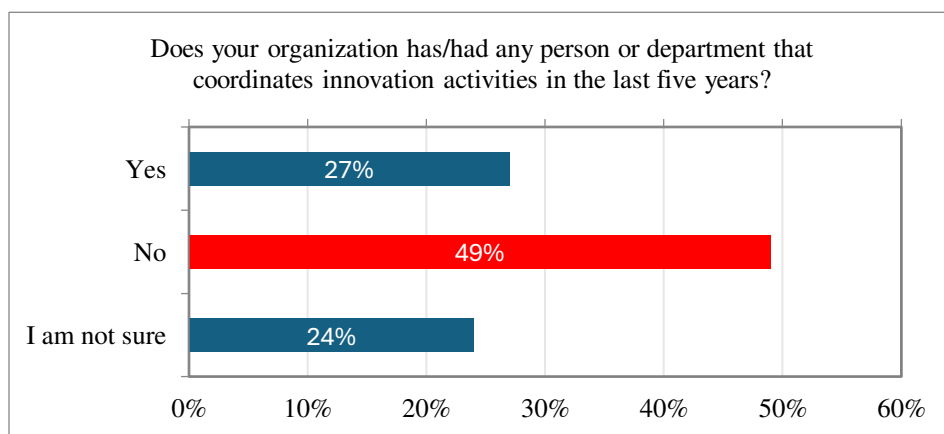Next we asked participants *What do you think will help you to implement innovations more effectively? Please rank every statement: give 5 points, if it is essential to your organization, 1 point is unimportant.* With this question, we wanted to know what should support the PSI implementation in the organization. Figure 9 shows that providing information on needs and opportunities and leadership and team support were seen as the most important factors in driving innovation forward.
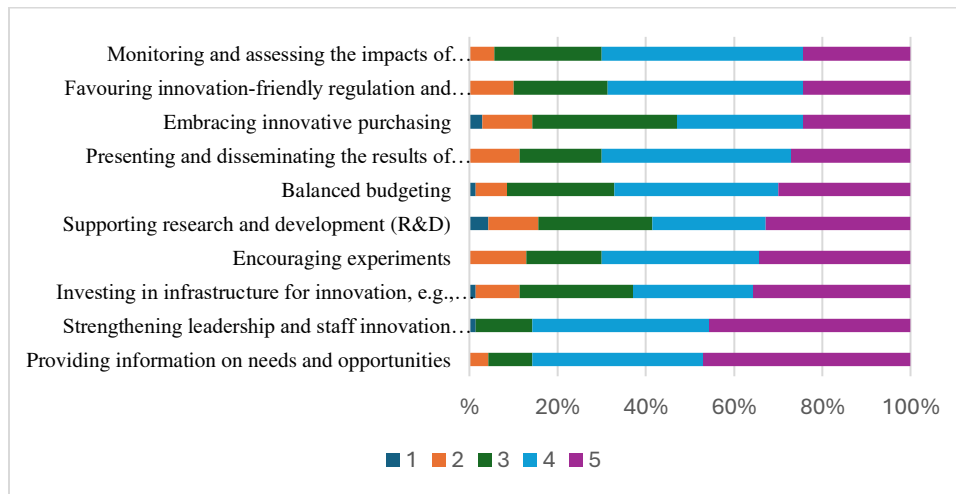
Figure 9 The main strategies of PSI innovation implementation.

Then we suggest the open question, where every participant could share their own experience and share what needs are in their organization. The results echo Figure 9, which also mentions the need for strong leadership, educational and agile approaches, leveraging of European funds, and cross-department cooperation, but also the need for community engagement, inclusive planning, and user-oriented solutions.
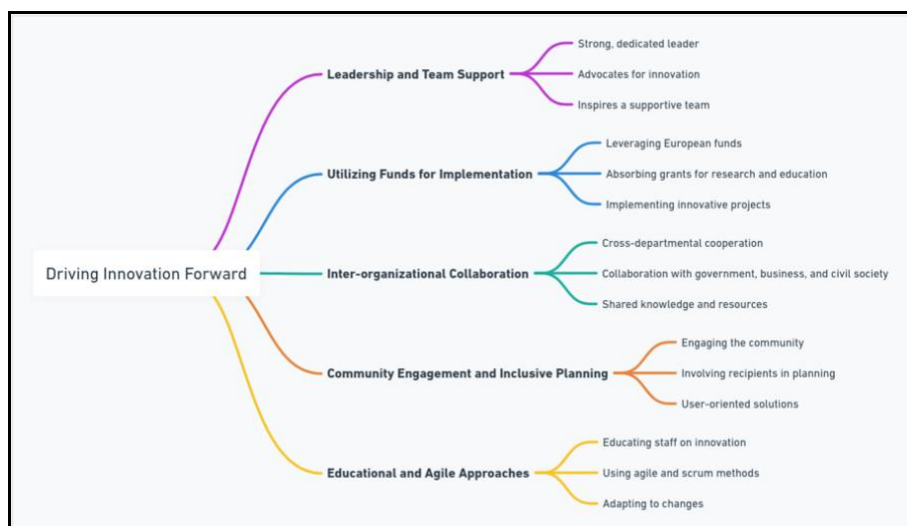
Figure 10 The basic needs for PSI implementation

11

As a final step, we use the literature review and survey results to elaborate methodology in the form of a handbook. The handbook intends to provide practical advice on supporting innovation in the public sector. Having designed the handbook, we prove its workability by the case study that concludes the remainder of the paper.

3 Building Blocks of PSI

Public service is various services and activities strategically planned, tested, implemented, and improved by central or local government to solve the challenges and find a better way to deliver service through legal and within the regulations (Elida et al. 2023). Innovation in public services should reduce the costs of services, increase the efficiency and quality of the work or services provided by employees, and improve the administrative process. Reducing costs and improving services motivates policymakers, political leaders, and top executives to innovate in the public sector (Demircioglu, 2023). MEPIN Measuring Public Innovation in the Nordic project surveyed in Finland, Norway, Sweden, Denmark, and Iceland and concluded that the main objectives of public service innovation are to enhance quality/efficiency and the quality services provided by the government (Bloch, & Bugge, 2013). Strategically aligning and sharing the common goal, skills, knowledge, and resources benefits all organizations involved. In another case, it might have a negative impact (Chen et al. 2020). Risk is part of innovation, but it's important to access and manage risk to succeed (Osborne, et al. 2020).

For any organization, its crucial to understand the need for PSI in the organization, find the Idea to solve the problem, assess their existing capabilities, make a strategy to solve the problem, form an active team to work, and collaborate with partners with similar objectives and resources, know the real budget of project and ensure stable source of funds, measure the risk and manage the risk, use social media and network to involve public and following the trend and most importantly review and improve the process if required to be successful innovation. Building blocks are the foundation or framework that ensures achieving public service innovation objectives. The building blocks below are created after reviewing the research article by Chen et al. (2020), Demircioglu (2023), Cinar et al. (2019), Cinar et al. (2024), Witell et al. (2016).
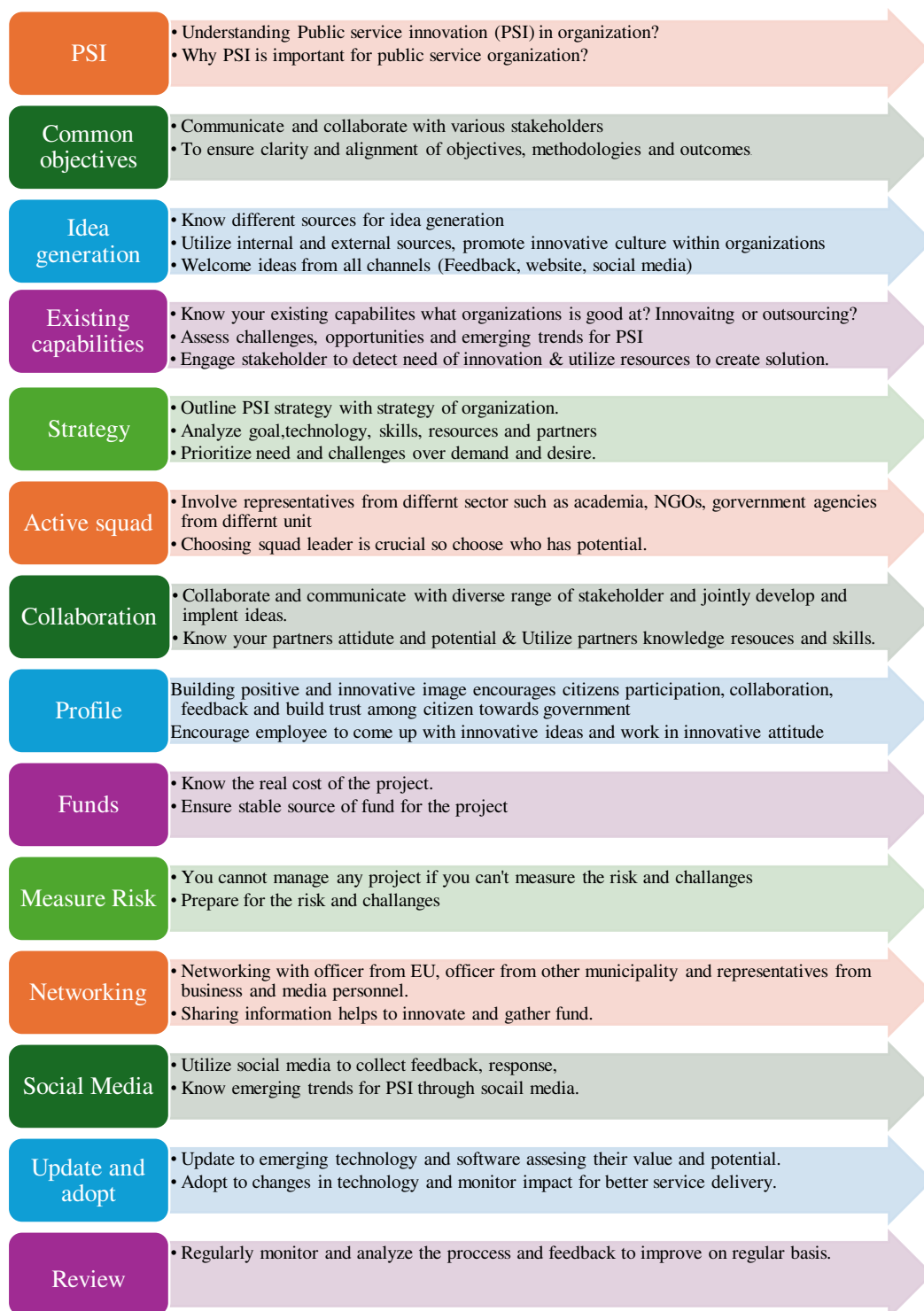
PSI	• Understanding Public service innovation (PSI) in organization? • Why PSI is important for public service organization?
Common objectives	• Communicate and collaborate with various stakeholders • To ensure clarity and alignment of objectives, methodologies and outcomes
Idea generation	• Know different sources for idea generation • Utilize internal and external sources, promote innovative culture within organizations • Welcome ideas from all channels (Feedback, website, social media)
Existing capabilities	• Know your existing capabilites what organizations is good at? Innovaitng or outsourcing? • Assess challenges, opportunities and emerging trends for PSI • Engage stakeholder to detect need of innovation & utilize resources to create solution.
Strategy	• Outline PSI strategy with strategy of organization. • Analyze goal,technology, skills, resources and partners • Prioritize need and challenges over demand and desire.
Active squad	• Involve representatives from differnt sector such as academia, NGOs, gorvernment agencies from differnt unit • Choosing squad leader is crucial so choose who has potential.
Collaboration	• Collaborate and communicate with diverse range of stakeholder and jointly develop and implent ideas. • Know your partners attidute and potential & Utilize partners knowledge resouces and skills.
Profile	Building positive and innovative image encourages citizens participation, collaboration, feedback and build trust among citizen towards government Encourage employee to come up with innovative ideas and work in innovative attitude
Funds	• Know the real cost of the project. • Ensure stable source of fund for the project
Measure Risk	• You cannot manage any project if you can't measure the risk and challanges • Prepare for the risk and challanges
Networking	• Networking with officer from EU, officer from other municipality and representatives from business and media personnel. • Sharing information helps to innovate and gather fund.
Social Media	• Utilize social media to collect feedback, response, • Know emerging trends for PSI through socail media.
Update and adopt	• Update to emerging technology and software assesing their value and potential. • Adopt to changes in technology and monitor impact for better service delivery.
Review	• Regularly monitor and analyze the proccess and feedback to improve on regular basis.

Figure 12 Building blocks of PSI

City A – Successful innovation

City A has set forth an ambitious mission to transition into a waste-free municipality by the year 2050, underscoring a commitment to sustainability and environmental stewardship. This endeavor comprehensively explores recycling possibilities for household and industrial waste streams. Inspired by the exemplary success achieved in metal can recycling, an impressive 97% recycling rate, municipal authorities have thought to extend practices to textiles. The European Union report reveals that the average citizen throws approximately 11 kilograms of textiles annually; the EU will bring new regulations to keep textile waste bins separately by 2025.

City A conducted a pilot program to evaluate the viability and possibility of textile recycling. To test this innovative idea, waste containers were placed in the city center, providing convenient access for citizens to deposit unwanted clothing items. The municipality decided to reward individuals who contributed a full bag of textiles, eligible to receive rewards in the form of passes redeemable at local recreational facilities, cafes, and other community services. Remarkably, the pilot program surpassed initial expectations, with a high success rate in citizen engagement and textile collection. There was a collection point close to the city center, but rewards such as passes to the pool and cafe were only given from the pop-up collection point. Many textiles should have been directly taken to the waste center. All the collected textiles are then processed into thread, insulation materials, and acoustic panels for industrial use at waste management plants. After the pilot program's success, City A proceeded to its commitment to textile recycling and, to find the best solution, conducted a national design competition. Collaboratively organized with the Sustainable Foundation, the University of Applied Sciences, and other organizations, this competition was a platform to find innovative proposals for recycled textiles. City A aims to find the best innovative way to utilize used fabrics by fostering a culture of innovation and collaboration.

Figure 13 Public recycling textiles in City A.

City B – Learning Opportunity Innovation

City B's mission was to offer easy and accessible opportunities for people to get rid of used but usable clothes and find environmentally friendly solutions for recycling them. City B made a strategy to install containers for textiles, and finally, the long-awaited containers for textiles collection were installed in the town. City B asked people to bring

dry, clean, and useable clothes, shoes, bags, and textile accessories like toys that have been useless but still could be used by others in a closed plastic bag for recycling. People were repeatedly informed about the recycling containers on the municipality's Facebook page and official website, along with instructions. Furthermore, instructions and pictures were posted on containers (see Figure 10). Several articles were published to promote the project in regional and local newspapers. The use of containers was advertised in the program on the local radio FM. Clothes and other items had to be in a closed bag so they would not get dirty when emptying the container and transferring it to the processing center.

Recycling containers were checked regularly and emptied, when necessary, but mostly once a week. The City B maintenance truck was used to collect and transport all the items to the waste station from their reuse center; additionally, the capital city came to pick up all the items at their own expense. After picking all the items, they were sorted and re-circulated through its stores and cooperation partners. Even though City B asked that only things suitable for recycling be taken into these containers, citizens still brought some unsuitable items or even simple waste. As a result, sometimes City B had to sort the items, which was an additional cost. City B repeatedly asked that the containers be used for their intended purpose, which was to direct as many materials as possible to recycling and ensure the consistent operation of the service.

For a long time, additional notifications and instructions for recycling were given, but the partner and collector refused to collect the goods as the condition of the clothes and other items was poor, the distance traveled to pick up goods was long, and additional sorting was necessary. After several experiments and location changes of containers, the recycling containers had to be removed because people threw real garbage, various broken devices, and wet junk that ruined the suitable products. The main problem was throwing unusable clothes into containers. Additionally, there were extra labor costs, and partners refused to collect unsorted items.

Figure 14 One of the recycling containers in City B.

Comparison of both cases

City A and City B both started projects to be sustainable and reduce textile waste. City A made a strategy of recycling the textiles that **could not be used anymore.** At the same time, City B made a strategy of **reusing useable** textiles, shoes, bags, and toys. City A had a high budget and collaborated with local businesses, academia, NGOs, and government agencies whose common objective was sustainability and supported the campaign. City A encouraged people by providing incentives. People supported it as they

got a reward for getting rid of old, unusable clothes like tablecloths, curtains, and old, damaged clothes. City B had a lower budget and asked for untorn, clean, useable clothes, shoes, and bags that could be reused because City B's partner could sell them in secondhand stores and social media pages, and on top of that, people did not receive any reward or credit for recycling due to which people didn't support as expected. City B collaborated with a profit-making organization that had to pay many expenses for transportation and sorting. Objectives of partners were not common as City B looked for sustainability, whereas partner organizations looked for profit. City A collaborated with different organizations, due to which people were informed about the campaign and gained support from all age group residents, whereas City B did not collaborate with other organizations.

Social media played another vital role, as City A's campaign was promoted as the world's first textile recycling campaign, so people shared it on social media and promoted it proudly. City A has a clear goal of being a waste-free city by 2050; working on that, City A is launching various sustainability campaigns to make people aware of recycling. In City A, containers were placed separately in familiar places where people often visited, whereas in City B, containers were placed along with other waste containers in unfamiliar locations. City A used recycled items to manufacture industrial items, which had huge demand, whereas City B re-circulated after sorting for reuse, which had less demand. City A reviewed and organized a hackathon in collaboration with the Sustainable Foundation, the University of Applied Sciences, and other organizations to find the best use of recycled textiles, whereas City B decided to stop the operation, looking at cost, and decide to go back to the old system, of donating directly to partners location.

Table 2 Comparison between City A and City B cases on the base of most Building blocks of PSI

Dimension	City A	City B
Type	Sustainability-Mission innovation	Sustainability-Mission innovation
Objectives	Recycle unusable textiles	Recycle useable healthy textiles
Idea generation	Internal and external source	Internal source
Strategy	Recycle - Containers were separately in accessible and busy streets.	Reuse - Containers were along with other containers in unfamiliar locations.
Collaboration	Academia, local businesses, NGOs, government agencies with municipality	Profit making businesses (Reuse center)
Fund	High and stable source	Low source of fund
Profile	Encouraging people by rewarding passes to pools and café, worlds first textile recycling	No reward, Sustainable project
Networking	Local businesses, NGOs, government agencies, sustainable foundation, University of Applied Sciences, and other organization	Some consultations are done
Social media	Advertisement on websites, social media sites.	Advertise at Facebook, website, regional and local newspaper, and radio show.
Location	Processing plant was near to the warehouse	Processing plant far from the warehouse
Recycling/Reuse	Industrial product (Thread, insulation materials and acoustic panels)	Sorted and re-circulated to stores
Review	Looked for better way to reuse recycled materials	Stopped campaign without improvements

The main differences are:
- Amount of budget,
- Strategy as one recycled old unusable textile whereas other reused useable healthy clothes,
- City A collaborated with academia, local businesses, government agencies, and NGOs with the same objective, in contrast to City B collaborated with profit-making businesses with different objectives,
- City A provided a reward system, whereas City B did not,
- City A placed containers in familiar, busy streets where people often walked, compared to City B, which placed containers in unfamiliar places along with other waste containers.

Learning from the cases

A stable and reliable source of funds is essential for ensuring smooth operations and implementing the necessary changes for the campaign's success. When selecting business partners and stakeholders, align the vision, strategy and objectives, skills, knowledge, and available resources and technology. Collaboration and networking are vital in promoting events and facilitating knowledge exchange and resources. Utilize the resources of partners effectively and outsource the service if necessary. Thoroughly assess all potential risks and develop a risk management strategy to mitigate the risk of failure. Involve citizens and stakeholders in the innovation process to minimize and share the risk. Monitor the operation and make necessary changes.

Conclusions, limitations, further work

The study shows that the basic strategies that should support the small cities' administration in implementing innovations are focused leadership and a dedicated team for innovation. These factors may have an impact on the effectiveness of the other top strategies, such as raising and allocating funds for implementation, encouraging inter-organizational collaboration, ensuring community engagement and inclusive planning, and implementing educational and agile approaches. Without a leadership individual or team to organize these initiatives, organizations may struggle to efficiently access money, work across departments and with external partners, engage with communities, and capitalize on educational possibilities for innovation. This gap highlights a potential opportunity for growth for these organizations. It emphasizes the need to create roles or departments that promote and streamline innovation activities, in accordance with the survey's approaches. By closing this gap, PS organizations can better position themselves to reap the benefits of innovation while remaining competitive in their respective areas. The proposed Building Blocks of PSI should also cover the main aspects of the planning and implementation process to make it simpler and less challenging.

The research findings have limited generalization potential due to an unbalanced representation in the sample and the exclusion of some relevant articles and case studies from the systematic literature review. Furthermore, the practical tools identified as the building blocks of PSI require further work and testing.

Despite these limitations, the study adds to our understanding of the issues that small communities face in the BSR and provides a solid framework for planning and executing PSI. Future studies should attempt to increase the sample size to ensure a more equitable representation, as well as incorporate a wider range of case studies to evaluate and develop the recommended solutions. This continuous study will help small municipalities implement new technology in an innovative and sustainable manner, ultimately boosting the quality of public services.

Authors contribution

Sponsors

Acknowledgments

References

Bloch, C. and Bugge, M.M. (2013). Public sector innovation—From theory to measurement. *Structural Change and Economic Dynamics*, 27, pp.133–145. doi:https://doi.org/10.1016/j.strueco.2013.06.008.

Budría, S. (2010). Schooling and the distribution of wages in the European private and public sectors. *Applied Economics*, 42(8), pp.1045–1054. doi:https://doi.org/10.1080/00036840701721109.

Chen, J., Walker, R.M. and Sawhney, M. (2019). Public Service innovation: a Typology. *Public Management Review*, 22(11), pp.1–22. doi:https://doi.org/10.1080/14719037.2019.1645874.

Cinar, E., Mehmet Akif Demircioğlu, Ahmet Coskun Acik and Simms, C. (2024). Public sector innovation in a city state: exploring innovation types and national context in Singapore. *Research Policy*, 53(2), pp.104915–104915. doi:https://doi.org/10.1016/j.respol.2023.104915.

Cinar, E., Trott, P. and Simms, C. (2018). A systematic review of barriers to public sector innovation process. *Public Management Review*, 21(2), pp.264–290. doi:https://doi.org/10.1080/14719037.2018.1473477.

Elida, S.S., Listiyawati, L., Zain, D., Sasongko, A.E.T. and Alun, I.N. (2023). Measuring the impact of public service innovation on user satisfaction. *International Journal of Research in Business and Social Science (2147- 4478)*, [online] 12(2), pp.560–568. doi:https://doi.org/10.20525/ijrbs.v12i2.2356.

Ersoy, A. and Van Bueren, E. (2020). Challenges of Urban Living Labs towards the Future of Local Innovation. *Urban Planning*, 5(4), pp.89–100. doi:https://doi.org/10.17645/up.v5i4.3226.

ESPON (2019). *BT2050 Territorial Scenarios for the Baltic Sea Region Targeted Research Main Report*. [online] Available at: https://www.espon.eu/sites/default/files/attachments/ESPON%20BT%202050%20_%20 Main%20Report_0.pdf [Accessed 25 Apr. 2024].

European Commission (2022). *European innovation scoreboard*. [online] research-and-innovation.ec.europa.eu. Available at: https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en.

Kuivalainen, M., Hauhtonen, R., Alanko, I., Sanz, A. and Pussinen, P. (2022). *Public sector innovation barometer 2022 Central government results*. [online] p.26. Available at: https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164466/VM_2022_78.pdf?sequence=1&isAllowed=y.

Lykkebo, O.B., Munch-Anderse, M. and Jacobsen, N. (2019). *Innovation Barometer for the public sector*. [online] Available at:

https://www.ks.no/globalassets/fagomrader/innovasjon/innovasjonsbarometeret-for-kommunal-sektor/measuring-new-nordic-solutions-innovation-barometer-web.pdf [Accessed 3 May 2024].

Mehmet Akif Demircioglu (2023). Public sector innovation: sources, benefits, and leadership. *International Public Management Journal*, pp.1–31. doi:https://doi.org/10.1080/10967494.2023.2276481.

Nishikawa-Pacher, A. (2022). Research Questions with PICO: A Universal Mnemonic. *Publications*, [online] 10(3), p.21. doi:https://doi.org/10.3390/publications10030021.

Osborne, S., Brandsen, T., Mele, V., Nemec, J., van Genugten, M. and Flemig, S. (2019). Risking innovation. Understanding risk and public service innovation—evidence from a four nation study. *Public Money & Management*, 40(1), pp.52–62. doi:https://doi.org/10.1080/09540962.2019.1621051.

The Danish National Center for Public Sector Innovation (2021). *Copenhagen Manual Online – Innovation Barometer*. [online] innovationbarometer.org. Available at: https://innovationbarometer.org/copenhagen-manual/read-online/ [Accessed 6 Oct. 2023].

Uyarra, E., Edler, J., Garcia-Estevez, J., Georghiou, L. and Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. *Technovation*, [online] 34(10), pp.631–645. doi:https://doi.org/10.1016/j.technovation.2014.04.003.

Witell, L., Snyder, H., Gustafsson, A., Fombelle, P. and Kristensson, P. (2016). Defining service innovation: A review and synthesis. *Journal of Business Research*, [online] 69(8), pp.2863–2872. doi:https://doi.org/10.1016/j.jbusres.2015.12.055
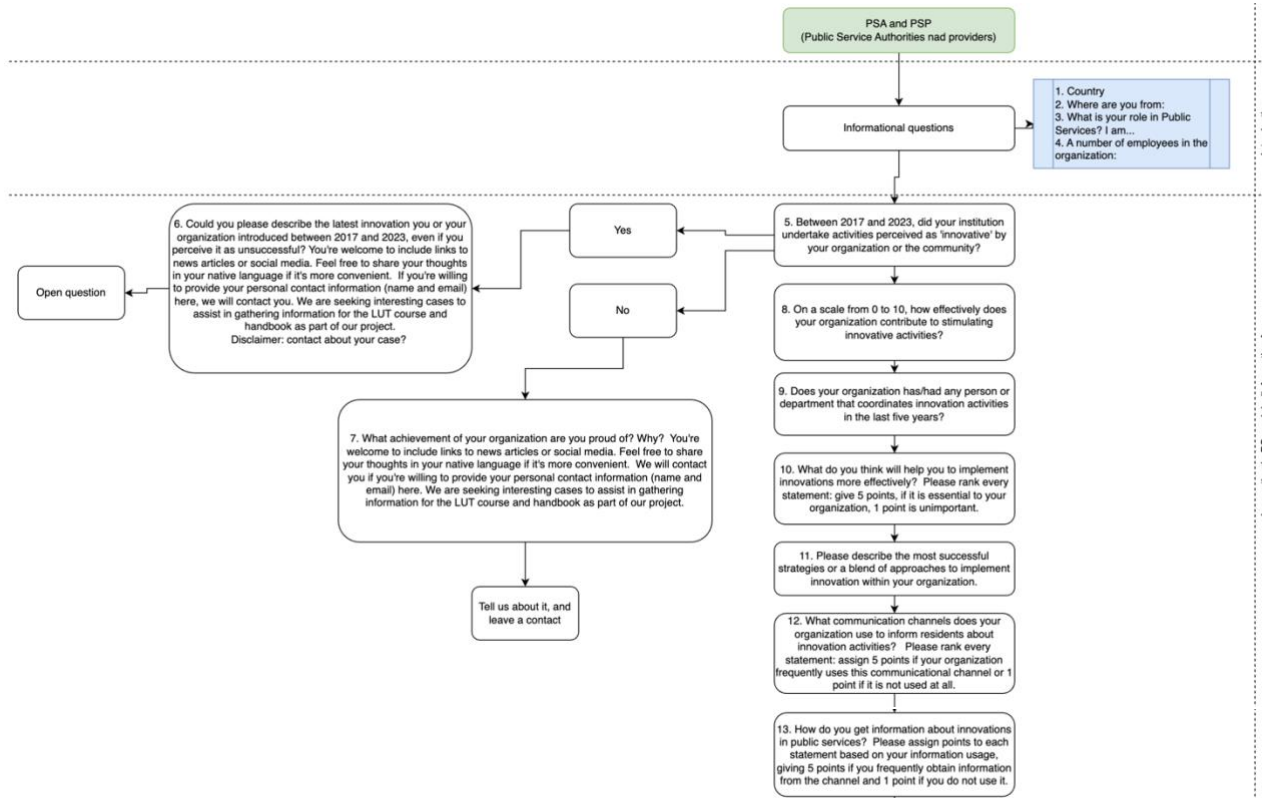
Appendix 1

The   *flowchart*
of   *the*   *survey*

14. We understand you meet hundreds of challenges in your city or municipality. Please share 2-3 most critical that could be formulated (and possibly solved) at social hackathons.

15. Has your organization utilized any immersive technologies (AR/VR/XR) for any specific purposes? (e.g., training, public engagement)

Yes

No

I do not know

17. Please describe how immersive technologies have been used in your organization.

If yes, leave your contact if you want to know more about immersive technologies (AR/VR/XR):

16. If you will have the knowledge and the opportunity, will your organization try it?

If yes, leave your contact if you want to know more about immersive technologies (AR/VR/XR):

Are there any specific challenges or obstacles your organization has encountered when implementing AR/VR/XR technologies?

18. In which areas of the public sector do you believe immersive-intelligent solutions and artificial intelligence can have the most significant impact on your organization? (Select all that apply.)

- Education and Training
- Healthcare and Telemedicine
- Tourism
- Public Safety and Emergency Response
- Urban Planning and Infrastructure Management
- Environmental Conservation and Management
- Social Services and Welfare
- Transportation and Traffic Management
- Public Engagement and Communication
- Administrative and Back-office Functions
- Other (please specify)

19. What is your vision of the future in using immersive intelligent solutions and artificial intelligence in public organizations?

Thank, you for partisipation

2