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MASTEROPPGAVE

Forskjellige synspunkter på innovasjon: Offentlig Finansieringsinitiativer og Små-eller-Mellomstore Bedrifter

Differing Perspectives on Innovation: Public Funding Initiatives and Small or Medium Enterprises

James Maurice Bevan

Innovasjon og Entreprenørskap

Fakultetet for Ingeniør- og naturvitenskap

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24. mai 2024

Jeg bekrefter at arbeidet er selvstendig utarbeidet, og at referanser/kildehenvisninger til alle kilder som er brukt i arbeidet er oppgitt, *jf. Forskrift om studium og eksamen ved Høgskulen på Vestlandet, § 12-1.*

Preface

Denne masteroppgaven markerer slutten av en 4-årig deltidsmasterstudie i Innovasjon og Entreprenørskap. Oppgaven ser på samspillet mellom små og mellomstore bedrifter og forskningsinstitusjoner under offentligfinansiert innovasjonssamarbeid. Jeg håper at denne oppgaven kan bidra til økt forståelse for utfordringene som oppstår i innovasjonssamarbeidsprosjekter.

Jeg vil rette en stor takk til min veileder, Maria Tsouri, som har gitt gode tilbakemeldinger og innsikt gjennom arbeidet med oppgaven. Videre vil jeg også takke alle som bidro til oppgaven ved å stille til intervju eller svare på spørreskjemaet. Jeg er takknemlig for at dere setter av tid fra den travle hverdagen for å svare på alle mulige spørsmål. Til slutt vil jeg takke min familie som har støttet og hjulpet meg gjennom en tøff periode med både fulltidsjobb og deltidsstudie.

Bergen, 22. mai 2024

James Bevan

Sammendrag

Denne oppgaven analyserer og sammenligner ulike perspektiver innenfor innovasjon mellom offentlige finansieringskilder og små-og mellomstore bedrifter, for å kunne identifisere forskjellene i hvordan disse partene ser på innovasjon. Formålet med oppgaven var å prøve å identifisere konkrete utfordringer og mulige løsninger for å styrke samarbeidet mellom dem. Jeg har utført en kvalitativ studie med dybdeintervjuer kombinert med spørreskjema. Ved bruk av kvalitativ metodikk, har jeg sett på hvordan de ulike partnerne i innovasjonssamarbeid forholder seg til innovasjon og offentlig forskningsfinansiering.

Gjennom intervjuene og spørreskjemaet kommer det fram at bedriftene har behov for økt støtte, inkludert relevant offentlig finansiering. Det trekkes også frem det viktige poenget at innovasjonssamarbeid i stor grad oppleves som positivt.

Studien bidrar til en bedre forståelse for utfordringene knyttet til innovasjonssamarbeid og hvordan bedriftene benytter offentlig finansiering for å løse utfordringer.

Abstract

This study analyses and compares various perspectives on innovation between public funding (PF) sources and small and medium-sized enterprises (SMEs) to identify the differences in how these parties view innovation. The purpose of the paper was to identify specific challenges and potential solutions to strengthen collaboration between them. I conducted a qualitative study using in-depth interviews combined with questionnaires. By employing qualitative methodology, I examined how the different partners in innovation collaborations perceive innovation and public research funding.

The interviews and questionnaires reveal that SMEs need increased support, including relevant public funding. It is also highlighted that innovation collaborations are largely perceived as positive.

The study contributes to a better understanding of the challenges related to innovation collaboration and how SMEs utilize PF to address these challenges.

Abbreviations

SME	Small or medium business or enterprise
R&D	Research and Development
RRF (RFF)	Regional Research Fund (“Regionale forskningsfond” in Norwegian)
PF	Public Funding
SSB	Statistics Norway (“Statistisk sentralbyrå” in Norwegian)
FHF	Norwegian Seafood Research Fund (“Fiskeri og havbruksnæringensforskningsfinansiering” in Norwegian)

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1. Introduction

This study will provide a better understanding of the contrasts in the views on innovation between public funding (PF) initiatives and small or medium enterprises/businesses (SMEs). It will identify challenges and viable solutions to improve cooperation between these parties.

SMEs can be defined by the number of employees and annual income. According to Statistics Norway (SSB), an overwhelming majority of businesses in Norway have fewer than 5 employees as shown in Figure 1. A large majority of the companies in Norway are small and medium-sized, with 99.5 per cent having fewer than 100 employees. SMEs are essential contributors to value creation in Norway and to maintain jobs and settlements throughout the country (Norwegian Ministry of Local Government and Modernisation, 2020). On a greater scale, SMEs represent around 99% of all businesses in the EU (European Commission, u.d.).

Number of establishments by size

	2023		2022 - 2023
	Number of establishments	Per cent	Change in per cent
All size groups	**646 884**	**100.0**	**2.7**
No one employeed	438 084	67.7	3.4
1-4 employees	103 654	16.0	0.8
5-9 employees	41 273	6.4	0.4
10-19 employees	31 025	4.8	2.6
20-49 employees	21 987	3.4	2.2
50-99 employees	6 926	1.1	5.0
100 - 249 employees	2 996	0.5	2.8
250 employees and more	939	0.1	5.7

Figure 1 -Norwegian companies sorted by size. (Statistisk sentralbyrå, 2023)

PF is an essential source of financial support for many SMEs in Norway. At the same time, SMEs have varying perspectives and strategies for innovation, and it can be challenging to match these with the requirements and expectations of PF incentives. It is, therefore, essential to understand the contrasts in the views on innovation between PF initiatives and SMEs.

Discovering the challenges with today's policies and solving them can potentially lead to broader adoption of PF and an even more innovative private sector in countries such as Norway (Cooke, Nordic Innovation Models: Why is Norway Different?, 2016) (Castellacci,

2008) (Andreadakis, 2023). Understanding the perspectives of PF agencies and SMEs can inform policymakers about the best approaches to foster innovation. PF agencies often have a broader societal perspective and seek to promote innovation that benefits the public interest. On the other hand, SMEs focus on their specific needs and objectives. By studying these differing views, policymakers can design policies and programs that balance supporting societal goals and meeting the needs of SMEs. PF agencies allocate resources, such as grants or subsidies, to support innovative projects. By studying different views on innovation, these agencies can better identify the areas where public investment can have the most significant impact (Mina, 2020) (Barbieri, Bragoli, Cortelezzi, & Marseguerra, 2019). Understanding the priorities and challenges of SMEs helps ensure that PF is targeted towards projects that have the potential to drive economic growth, create jobs, and address societal needs.

Many PF programs often require SMEs to collaborate with research institutions to promote science-backed innovation that benefits society (Leydesdorff & Etzkowitz, 1998) (Carayannis & Campbell, 2012). Studying the differing views helps identify areas of constructive interaction and potential challenges in these collaborations. It allows both parties to understand each other's expectations, capabilities, and limitations, which can foster more effective partnerships and improve the outcomes of innovation initiatives. PF agencies need to evaluate the effectiveness of their investments in innovation. By studying the perspectives of SMEs, they can gather feedback on the impact of their funding programs. SMEs can provide insights into their challenges in accessing PF, implementing innovative projects, and achieving desired outcomes. This feedback helps PF agencies refine their strategies, improve program design, and ensure greater accountability in allocating public resources. SMEs are essential contributors to innovation systems. By studying their views, policymakers and PF agencies can identify barriers and facilitators that influence innovation within these innovation systems. Understanding the perspectives of both PF agencies and SMEs helps create an enabling environment that supports creation, fosters collaboration, and encourages entrepreneurship.

1.1. Research questions

In the realm of SMEs in Norway, the concept of innovation serves as a driving force for growth and development. These businesses are pivotal contributors to the country's economic landscape, often at the forefront of pioneering ideas and solutions. However, there exists a

pressing need to understand the dynamics of innovation within this sector and how it aligns with the various funding initiatives offered by the public sector. To better understand the dynamics of SMEs and PF initiatives, the following research question has been formed:

How can Public Funding initiatives be optimised for SMEs?

For this question to be answered properly, it is split up into smaller sub questions. This series of questions delves into the intricate relationship between SMEs and innovation, particularly in the context of Norway's PF landscape.

How do SMEs in Norway engage with the concept of innovation?

How do PF initiatives align with the innovation strategies employed by SMEs?

What barriers exist for SMEs in the adoption of PF initiatives?

This thesis to explore how these enterprises engage with innovation, whether the available PF initiatives resonate with their innovation strategies, and the extent to which SMEs rely on external expertise for assistance in securing vital funding. Furthermore, this study aims to identify potential improvements to the existing PF mechanisms, ensuring they align more harmoniously with the evolving innovation practices within SMEs. The goal is to foster an environment where SMEs can fully leverage PF incentives. This would promote effective collaboration with research institutions, thereby maximizing their potential for growth, innovation, and economic impact. By addressing these questions, this study seeks to shed light on the complex interplay between SMEs, innovation, and PF in Norway. Consequently, offering insights that can drive positive change and success for SMEs in Norway.

Collectively, the findings from these questions will offer a comprehensive understanding of the challenges SMEs face in innovation and research projects. The questions will not only lead to identifying the issues but also suggest practical solutions and best practices to streamline these processes. Ultimately, it will contribute to enhancing the efficiency, competitiveness, and innovation capacity of SMEs, which are crucial players in the economic and innovation landscape.

1.2. Personal Experience

In my previous job experience, I had the opportunity to work in an SME with SkatteFUNN projects and applications for regional research council initiatives. These projects often involved collaboration with esteemed research institutions and other business partners. During this period, I encountered several crucial aspects of innovation and research in the business context. One of the significant challenges the company faced was navigating Intellectual Property Rights (IPR) in the context of collaborative research projects. This involved addressing issues regarding the ownership management for research findings and determining the criteria for designating information as sensitive.

Furthermore, we consistently had to grapple with the fundamental question of approaching and researching complex problems effectively. This was not just a theoretical concern but a practical one, as it required a deep understanding of the problem-solving methodologies and innovative approaches necessary to yield valuable outcomes. Additionally, determining the cost implications for the business was another critical facet of our role. We needed to assess the financial commitments required for various research and development (R&D) activities and ensure they aligned with our budgetary constraints and overall business strategy.

SkatteFUNN projects facilitated our efforts in developing novel products tailored to address specific market demands. Efforts to leverage other forms of PF that required greater collaboration with research institutions encountered substantial challenges. These challenges predominantly revolved around determining the scope of necessary research, assessing its potential benefits for the company, and estimating the associated costs. As a result of these challenges, we could not reach a stage where the collaboration with a research institution was fully initiated, and consequently, the funding application was aborted.

Before my introduction to the team, the company traditionally depended on external expertise to assist with funding applications and to comprehend the various funding options available. Depending on a third party for assistance was regarded as a bottleneck, causing project delays, and incurring substantial costs.

These experiences have provided me with valuable insights into the intricacies of innovation

projects, research collaboration, intellectual property management, and the practical aspects of budgeting for research activities. They have also inspired my pursuit of further research in the field of innovation and entrepreneurship, which I am now exploring in my master's thesis. Drawing from this prior experience, it becomes evident why it is imperative to conduct a comparative analysis within the context of other SMEs. The reliance on external expertise for tasks such as grant applications was observed to have a significant impact on project timelines and budgets. This issue is particularly relevant for SMEs, as they often lack in-house resources and expertise, forcing them to partner with external entities to navigate complex processes like securing funding.

By examining this concern within a broader SME context, we can uncover whether other SMEs face similar challenges. Understanding the prevalence of this issue among SMEs is essential, as it not only highlights the shared difficulties faced by this sector but also enables the identification of potential solutions and best practices to streamline such processes. This, in turn, can contribute to enhancing the efficiency and competitiveness of SMEs, which often play a pivotal role in local economies and innovation ecosystems.

1.3. Structure of the thesis

This thesis is structured into distinct sections, each serving a role in examining of the relationship between PF initiatives and the innovation strategies SMEs.

Firstly, general relevant theory from the field of innovation will be presented. Then, contextual information is provided to give a deeper insight into the specifics of the thesis, with a focus on industry-specific relations and the different public funding alternatives. After the necessary foundational information is provided, the thesis describes the research plan along with the method for data collection and analysis. The thesis will subsequently showcase the research's outcomes and discoveries. Finally, the thesis ends with a discussion of the presented results, outlining the research’s limitations, and suggesting potential areas for further study.

2. Relevant Theory

2.1. The Concept of Innovation

Innovation is a concept that can refer to something new or a change made to an existing product, idea, or field. It is an important principle when it comes to business management and the development of business models. Trott (2017) and Fagerberg (2004) both discuss the importance of innovation as a tool to create financial growth and stability during potentially challenging times. Trott claims that businesses must be able to adapt and develop themselves if they want to survive. This means that they must constantly be aware of any changes or developments in their market or region, to determine potential changes to implement.

Innovation is often considered to be the introduction of a new product or breakthrough research, but innovation can be so much more. Sometimes, innovation cannot be defined with a specific action or product, it must be considered the result of a lengthy process that has involved several, irrelevant innovations. Innovation can be defined as a form of interaction between research and market needs, where available knowledge and information are commercialized to meet a need and create value. This innovation process has been studied for many years, with many different models being developed in attempts to understand and explain the process.

2.1.1. Linear model vs systemic model

The earlier models for understanding were primarily based on the linear model, where basic research or an invention is developed into finalised and often revolutionary product or service, which is further developed and adopted or implemented into a specific market. However, Innovation is not always a linear process with constant improvements. Innovation often takes place with gradual developments leading to the discovery of new barriers causing a need for change in the strategy for further innovation with new developments happening in a different direction than previously anticipated (Banbury & Mitchell, 1995). A company's ability to make these changes and continue down the path of improvements can be determined by the resources available to the company or by geographic limitations linked to the region the company operates from. Such changes can, however, negatively impact a company's ability to

survive or thrive.

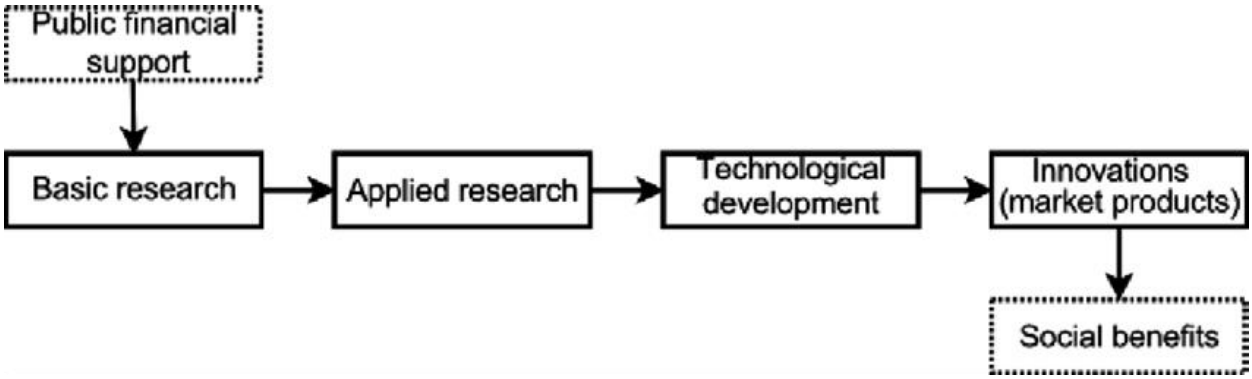

Figure 2 -Linear model of an innovation process (Gust-Bardon, 2012)

The linear model is the idea that basic research is applied into a specific field and later developed into a product or service which is then later released to market, as shown in figure 2. This concept is built around the ideas of science being the conversion of money into knowledge, and innovation being the process of profitable conversion of knowledge back into money.

The systemic model of innovation is a framework that views innovation as a complex and interconnected process involving various stakeholders, organizations, and components within a larger system (Georghiou, 1993). In this model, innovation encompasses a diverse array of components, moving beyond the confines of individual organizations, and embracing a wide spectrum of participants, including businesses, research institutions, government entities, and consumers. Innovation is also fundamentally characterised by the interactions and collaborations between these components, spanning formal collaborations like research partnerships, as well as informal networks designed for the exchange of knowledge and ideas. Innovation finds its nurturing ground within a broader innovation ecosystem; a dynamic environment that promotes the exchange of information, technology, and best practices. Innovation operates as a cyclical and iterative process, with feedback loops facilitating ongoing improvement and adaptation to evolving circumstances. The systemic model acknowledges that the innovation process is influenced by a range of contextual factors, which can include regulatory frameworks, cultural norms, and prevailing economic conditions. Figure 3 shows a systemic model of innovation, where innovation is developed form a combination of the

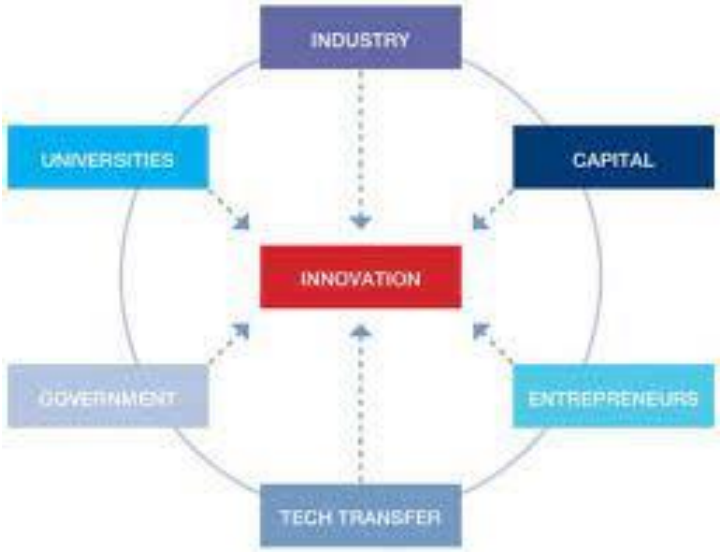

Figure 3 -Example of a systemic model of innovation (Suurs & Roelofs, 2014)

following factors: industry, educational institutions, financial, entrepreneurs, technological transfer, and governing bodies. The systemic model of innovation underscores the intricate web of relationships and interactions among diverse participants in an innovation system, accentuating that innovation is not a linear or isolated progression but rather a dynamic, interconnected phenomenon. These systems encompass various levels from regional to global, each with its distinct characteristics. The following section will delve into the specific types of innovation systems, exploring the perspectives each innovation system provides on understanding how innovation is fostered.

Lundvall (1999) (2007) defines National Innovation System (NIS) as a framework that examines the interplay between national institutions, policies, and economic structures. NIS highlights the role of government, education, and industry in shaping innovation capabilities at a national level.

Cooke (1992) and Cooke et al. (1997) define Regional Innovation System (RIS) as the innovation dynamics within a specific geographical region. RIS examines the interplay between regional institutions, local governments, and businesses, focusing on the importance of regional policies and networks in promoting innovation.

Malerba (2002) (2004) defines Sectoral Innovation System (SIS) as the innovation dynamics within specific industrial sectors. SIS examines the unique characteristics, knowledge bases, and technological opportunities within a sector, and how the influence the innovation

processes and outcomes.

Bergek et al. (2008) and Hekkert et al. (2007) focus on Technological Innovation System (TIS), which analyses the development, diffusion, and use of particular technologies. TIS examines the key functions and interactions that drive technological advancements, emphasizing the role of supportive policies and networks.

Binz and Truffer (2017) define Global Innovation System (GIS) as the innovation dynamics in a transnational context. GIS examines how global networks, international policies, and multinational corporations influence innovation processes and outcomes.

By integrating these systemic views of innovation, the thesis provides a comprehensive understanding of how innovation is cultivated through differing levels of interaction, highlighting the importance of tailored policies and collaborations to enhance innovation performance.

2.1.2. Open versus Closed Innovation

The debate between open and closed innovation has been a central theme in the field of innovation management. For example, Drucker's book Innovation and Entrepreneurship (Drucker, 1985) discusses the ideology behind open innovation, emphasizing on the value of collaboration regarding innovation. While Drucker discusses the concepts and ideas behind Open innovation, he doesn't use the term "open innovation" in his book. This term is believed to have first been coined by Henry Chesbrough (2003) and his work has since been cited by many academic articles and books.

Both open and closed innovation have their merits and are applicable in different contexts. Open Innovation emphasises collaboration with external partners, including suppliers, customers, research institutions, and even competitors. This approach views innovation as a collective effort involving a broader innovation system. Open innovation taps into external sources of knowledge and ideas, recognizing that valuable insights can originate beyond the boundaries of a single organization. This fosters a culture of continuous learning and adaptability. By sharing innovation risks with external partners, organizations practicing open innovation can mitigate potential failures and allocate resources more efficiently. Open innovation can be highly flexible and adaptable, allowing organizations to quickly respond to

changing market conditions and emerging opportunities. The primary challenge of open innovation is managing the complexity of collaborations and protecting intellectual property when working with external entities. Open innovation often leads to cross-industry collaboration. By engaging with partners from different industries, organizations can infuse new perspectives and knowledge into their innovation processes, potentially yielding groundbreaking results. Open innovation is well-aligned with PF initiatives, as it can attract external funding and resources from government or research institutions. These funds can support collaborative projects that bring together diverse knowledge and expertise (Brunswicker & Vanhaverbeke, 2014) (Perkmann & Walsh, 2007).

Closed innovation, on the other hand, emphasises the internal capabilities of an organization. It relies on in-house R&D to drive innovation. This approach offers more control over the innovation process, as all activities occur within the organization's boundaries. Intellectual property and proprietary knowledge are well-preserved. Closed innovation encourages organizations to build in-house expertise, which can lead to deep knowledge in specific domains. Closed innovation might lead to insularity and a lack of exposure to new ideas, potentially making the organization slower to adapt to changes in the market.

In practice, many organizations adopt a hybrid approach, recognizing that a rigid commitment to either open or closed innovation may not be suitable for all situations. They selectively open

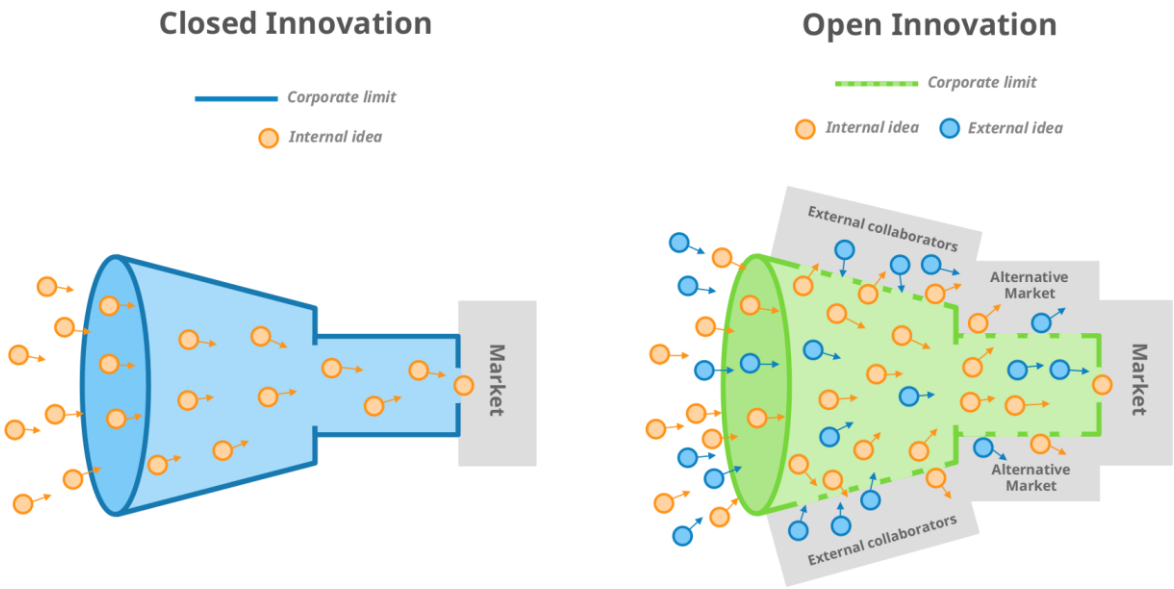

Figure 4 -Open vs Closed Innovation (Isomäki, 2018)

certain parts of the innovation process while keeping others closed.

Figure 4 shows a comparison between open innovation and closed innovation, displaying the ability of open innovation to take input from external ideas and to share its own internal ideas with external collaborators and alternative markets.

The choice between open and closed innovation depends on the organization's goals, resources, and the nature of the industry. Some organizations can benefit from both approaches, adopting an agile innovation strategy that combines internal capabilities with external collaboration to maximize their innovation potential. Ultimately, the key is to be open to the possibilities of both approaches and tailor the innovation strategy to the specific needs and circumstances of the organization.

2.1.3. Creative Destruction

Competition, as described by Joseph Schumpeter (Schumpeter, 1942) serves as a powerful catalyst for innovation in several ways. Schumpeter's theory of "creative destruction" aligns with the notion that competition compels businesses to continually seek innovative solutions to gain a competitive edge. Firstly, the pressure to outperform rivals in the market compels businesses to continually seek innovative solutions. Schumpeter's idea of entrepreneurs as agents of innovation resonates with the fact that businesses, under competitive pressure, foster a culture of constant improvement and adaptation. Secondly, competition places a strong focus on meeting customer demands and needs effectively. Just as Schumpeter emphasises the role of entrepreneurs in introducing new products, processes, and business models, competitive markets drive businesses to develop innovative products, services, and experiences that address these requirements. This customer-centric approach fuels innovation that directly benefits people. Furthermore, competition encourages businesses to optimize their operations for efficiency, as Schumpeter acknowledges that innovative firms often gain a temporary monopoly as a reward for their innovations. Cost reduction and resource management become key areas of focus in the competitive landscape, leading to innovations in production processes, logistics, and resource utilization. Diversity in the market, driven by competition, attracts a wide range of talents and ideas, fostering Schumpeter's belief that entrepreneurship is a dynamic force in capitalism. This diversity often results in more creative and diverse approaches to problem-solving and innovation. Market expansion,

in line with Schumpeter's view of innovation driving economic growth, is another outcome of innovation-driven competition. Innovations can open new markets and attract new consumers, leading to economic growth and prosperity for businesses and society. Schumpeter's concepts can be applied to understanding the rapid development of modern technologies such as artificial intelligence, biotechnology, and renewable energy. These technologies showcase the disruptive impact of innovation-driven entrepreneurship and the evolution of industries through creative destruction. These technological breakthroughs have far-reaching benefits, including improved healthcare, sustainability, and increased connectivity. Competition, in both Schumpeter's and the presented perspectives, also nurtures a culture of continuous improvement, as businesses aim to build on their successes and learn from their failures. This ongoing cycle of learning and adaptation drives innovation. Moreover, entrepreneurship, as emphasised by Schumpeter, flourishes in competitive markets, leading to the creation of new startups and disruptive innovations that challenge established industries. These entrepreneurial ventures inject fresh ideas and competition into the market, spurring further innovation. In conclusion, competition, as seen through the lens of Schumpeter's "creative destruction" and the perspective provided, is a driving force behind innovation. It inspires businesses to enhance their products, services, and processes. This competitive environment not only benefits consumers but also contributes to economic and technological progress, making it a fundamental element in fostering innovation and advancement within capitalist economies. Schumpeter's ideas on competition and innovation, particularly his concept of "creative destruction," can conflict with the principles of open innovation. Schumpeter emphasizes internal innovation driven by entrepreneurial firms seeking competitive advantage through the creation of disruptive technologies and temporary monopolies. This conflicts with open innovation, which promotes collaboration with external partners to accelerate innovation, potentially diverting attention away from internal innovation. Furthermore, Schumpeter's model often values the protection of intellectual property, aligning with temporary monopolies, while open innovation often involves a more open approach to sharing knowledge and co-creation, potentially challenging the idea of protecting intellectual property. In Schumpeter's view, competition can involve destructive rivalry, where innovative firms disrupt existing ones. Open innovation, however, encourages cooperative collaboration with external partners, which can be seen as contrasting with Schumpeter's portrayal of competition as a disruptive force. Schumpeter's model may result

in high barriers to entry for new players, while open innovation aims to lower these barriers by allowing external partners to access and contribute to innovation processes. Finally, Schumpeter often focuses on disruptive innovations, while open innovation encompasses both incremental and disruptive innovations. This difference highlights a contrast in the approaches, as open innovation includes smaller, continuous improvements that may not align with Schumpeter's concept of dramatic, industry-altering disruptions. These potential conflicts do not make one approach superior to the other but reflect different perspectives on innovation within competitive or collaborative frameworks. Organizations may choose to blend elements of both approaches depending on their specific goals and contexts, such as pursuing internal innovation for core products while embracing open innovation for complementary innovations.

2.2. Innovation challenges

While it holds the promise of transformative growth and expanded market reach, the potential negative impacts of innovation cannot be overlooked. Innovation often requires substantial investments in research, development, and infrastructure. Without careful planning and evaluation, businesses may face cost overruns that strain their financial resources. It is crucial to assess the potential return on investment and weigh the risks against the rewards before committing substantial capital to innovative endeavours.

Successful innovation often requires organizational change and employee buy-in. Resistance to change, lack of clarity, or inadequate training can impede the implementation of innovative ideas and hinder their success (Berkun, 2007). Effective change management strategies, open communication channels, and fostering a culture that embraces experimentation and learning are crucial for navigating these challenges. Introducing innovative products or services can disrupt existing markets, leading to a shift in customer preferences and competitive dynamics (Christensen, 1997). While this disruption can create opportunities, it can also erode market share and revenue if businesses fail to adapt swiftly. Thoughtful market analysis and a deep understanding of customer needs and expectations are essential to navigate potential pitfalls. The rapid pace of technological advancements can render once-innovative offerings obsolete (Barley, 2020). Businesses must stay vigilant and continuously monitor industry trends to avoid being caught off guard. Failing to keep up with evolving technologies risks losing

competitiveness, relevance, and customer loyalty. Innovations can encounter legal and regulatory hurdles that businesses must navigate. Intellectual property rights, compliance issues, and the need for certifications or approvals may cause delays or additional costs. It is vital to conduct thorough due diligence, seek legal guidance, and proactively address any potential legal or regulatory implications to avoid costly setbacks. The success of innovation relies on consumer acceptance and adoption. Introducing innovative ideas or technologies that fail to resonate with customers can lead to low sales, reputational damage, and wasted resources. Comprehensive market research, customer feedback loops, and iterative product development processes can help validate concepts and ensure alignment with customer needs.

2.3. Innovation and contrasting knowledge bases

A phenomenon within industry arises where actors rely on specific types of knowledge to deliver and develop products or services (Asheim & Coenen, 2005) (Grillitsch, Martin, & Srholec, 2017) (Tödtling & Grillitsch, 2015) (Moodysson, Coenen, & Asheim, 2008). These knowledge bases lean towards a more tacit approach (synthetic knowledge), a more codified approach (analytical knowledge) or more to the cultural or social aspects of knowledge (symbolic knowledge) (Fischer, 2001). These approaches differ regarding how innovations arise and the eventual market value creation through the application of said innovations. This thesis primarily aims to assist in comprehending the dynamics between synthetic knowledge bases and analytical knowledge within a shared cultural context. Consequently, symbolic knowledge will not be explored further as a concept regarding the thesis.

2.3.1. Synthetic knowledge

Synthetic knowledge or engineering-based knowledge is the concept of knowledge that derives from industrial specialisation and sticky knowledge derived from technological advancements. Such knowledge is primarily gained in response to the need to solve specific problems and utilises already existing knowledge in new ways or combinations. Application of this knowledge is often in the form of tailor-suited technology to a specific use case or slightly modifying a pre-existing product to improve performance. This knowledge often lacks the capacity to change technological trajectories without some level of input from the analytical knowledge base.

2.3.2. Analytical Knowledge

Analytical knowledge or scientific knowledge is the concept of knowledge that derives from researching previously unknown or poorly understood topics, with the application of scientific principles and methods. Such knowledge is primarily gained in response to curiosity regarding previously researched topics, and the need to fully understand certain phenomena. Application of this knowledge is often in the form of new products or processes. This knowledge often results in more radical innovations presented than with synthetic knowledge but inherently lacks the ability to utilise and take advantage of these innovations without also utilizing input from the synthetic knowledge base.

2.4. Contrasting modes of innovation

The concept of differing modes of innovation builds further on the theory surrounding differing knowledge bases found in society. Innovation literature often describes the differences between the DUI (doing, using, interacting) and the STI (science, technology, innovation) modes of innovation (Jensen, Johnson, Lorenze, & Lundvall, 2007).

2.4.1. Doing, Using, Interacting (DUI mode)

DUI is primarily based on synthetic knowledge with Trial and error with user experience being a central part of the development of new knowledge. The DUI mode leans to a more hands-on approach with practical experience and knowledge. This is the mode often utilized within blue-collar and/or skilled trades, primarily within manual labour.

2.4.2. Science Technology Innovation (STI mode)

STI is primarily based on analytical knowledge with theoretical reflections and scientific experiments being a central part in the development of new knowledge. This is the mode often utilised within R&D departments, schools, and universities.

2.4.3. Combined and Complex innovation (CCI mode)

Describes complex innovation processes in regional clusters, where diverse kinds of knowledge are combined in innovation activities, often through cooperation (Isaksen & Karlsen, 2012). Simply put, CCI is a form of combination of both the STI and DUI modes. This

combination is said to be far more innovative and lead to far more success in innovation than using only a DUI or STI approach to innovation.

2.5. Absorptive Capacity

Absorptive capacity refers to an organization's ability to effectively recognize and apply new knowledge, information, and technologies. It is a concept that emphasises an organization's capacity to learn from its external environment and integrate that learning into its operations, products, and services. Absorptive capacity is crucial for organizations to stay competitive and adapt to the rapidly changing business landscape. The concept of absorptive capacity is said to have first been introduced by Cohen and Levinthal (1990). They argued that an organization's ability to absorb and leverage external knowledge is a key determinant of its innovative capabilities and long-term performance. According to their framework, absorptive capacity consists of four main dimensions: Acquisition, Assimilation, Transformation, and Exploitation.

Acquisition is the organization's ability to identify and access relevant external knowledge. This involves actively seeking out latest information, engaging in R&D activities, and establishing networks and partnerships with external entities. Assimilation is the organization's ability to understand and interpret the acquired knowledge. This includes analysing, interpreting, and integrating the new knowledge with existing knowledge and capabilities within the organization. Transformation is the organization's ability to apply and adapt the acquired knowledge to its specific context. This involves modifying existing processes, practices, and routines or creating new ones to incorporate the new knowledge effectively. Exploitation is the organization's ability to derive value from the applied knowledge. This includes commercializing innovations, creating new products or services, improving operational efficiency, and gaining a competitive advantage in the marketplace.

Absorptive capacity is influenced by a range of factors, including prior knowledge base, organizational culture, leadership support, the diversity of knowledge sources, and the ability to manage and share knowledge internally. It is a dynamic capability that can be developed and enhanced over time through investments in learning and knowledge management practices. Organizations with high absorptive capacity are more likely to identify emerging

trends, technological advancements, and market opportunities. They can quickly adapt to changes and leverage external knowledge to drive innovation, improve performance, and maintain a competitive edge. On the other hand, organizations with low absorptive capacity may struggle to recognize and utilize external knowledge effectively, leading to missed opportunities and stagnation (Murovec & Prodan, 2009).

In summary, absorptive capacity is a critical capability for organizations in today's knowledge-intensive economy. By effectively acquiring, assimilating, transforming, and exploiting external knowledge, organizations can enhance their innovation capabilities, adapt to changing environments, and achieve sustainable growth.

2.6. Innovation in SMEs

SMEs have a different approach to innovation when compared to larger corporations with much greater resources and outreach. Rosenbusch et al (2011) found that innovation is positively linked to performance in SMEs. They discuss that despite the risk and uncertainty involved with the innovation process, SMEs that pursue an innovation strategy appear to experience that the benefits outweigh the potential downsides. However, this is not to say that innovation processes can be implemented without strategy and planning. Gaining benefits from innovative strategy requires effective management of resources into the right projects at the right time.

SMEs can work on innovation in many ways, some examples are product development, business model innovation, collaboration, technology implementation, and organizational innovation. SMEs can work on developing new products or services that respond to needs in the market or that provide an advantage over competitors. This can be achieved through utilizing the results from R&D efforts, by adopting innovative technologies or production methods. SMEs can also work to change their business model to meet changing market conditions or to create new revenue streams. This may include adopting new distribution channels, offering new services, or changing pricing strategies. SMEs can collaborate with network partners such as other companies, research institutions, or public actors to share knowledge and resources and to create innovative solutions or products (Fornahl, Broekel, & Boschma, 2010). SMEs can also work on implementing innovative technologies or systems to

increase the efficiency and productivity of the business. This can include everything from automating production processes to adopting cloud-based economic management software. An innovative organizational culture can also help to create an environment where ideas and innovation flourish. This can include encouraging creative thinking, keeping communication channels open, and rewarding employees for innovative ideas.

In general, when it comes to innovation management and new product development, SMEs play a crucial role in driving innovation and economic growth. However, they require support and help if they are to grow into larger firms and further contribute to the economy at a larger scale (Trott, 2017). SMEs often have a smaller organizational structure and fewer bureaucratic processes, which can enable them to be more agile and adaptable in responding to market changes and implementing innovative ideas. SMEs can focus on specific market segments or niche areas, allowing them to develop innovative products tailored to the needs of a particular target audience. This specialization can provide them with a competitive advantage over larger companies. SMEs typically have limited financial and resource capabilities compared to larger organizations. Therefore, they often employ different innovation strategies, such as open innovation, collaboration, strategic partnerships, and leveraging external networks to overcome resource constraints and access necessary expertise. Many SMEs have a strong entrepreneurial culture, where employees are encouraged to take risks, experiment with innovative ideas, and contribute to the innovation process. This can foster a creative and innovative environment within the organization. SMEs may face challenges in adopting innovative technologies due to limited resources and expertise. However, advancements in technology, such as cloud computing, software-as-a-service (SaaS), and open-source solutions, have made it easier and more affordable for SMEs to adopt innovative tools and platforms.

Hagen et al (Hagen & Zucchella, 2014) discuss how strategic partnerships and cooperation play a crucial role in the success of SMEs for several reasons. Cooperation can give access to greater resources, SMEs often have limited resources, including financial capital, expertise, and infrastructure. Cooperation allows them to pool resources and share costs with other businesses or partners. By collaborating, SMEs can access additional funding, specialized skills, advanced technologies, and shared facilities, which they may not have individually. This helps level the playing field and enhances their competitiveness. Cooperation facilitates knowledge

sharing and the exchange of best practices among businesses. SMEs can learn from each other's experiences, gain new insights, and tap into different perspectives. This collective learning enables SMEs to acquire valuable knowledge, improve their processes, and enhance their capabilities. Sharing expertise also fosters innovation and creativity within the business ecosystem. Cooperation provides SMEs with opportunities to expand their market reach. By collaborating with complementary businesses, SMEs can access new customer segments, enter new geographic markets, or expand their product/service offerings. Cooperative partnerships allow SMEs to leverage each other's networks, customer bases, and distribution channels, leading to increased market exposure and business growth. Starting and operating a business inherently involves risks. Cooperation enables SMEs to share risks with their partners or collaborators. By spreading the risk among multiple participants, SMEs can mitigate potential losses and enhance their ability to withstand market uncertainties. Shared risks also provide a sense of security and confidence, encouraging SMEs to pursue more ambitious projects and opportunities. Cooperative efforts can lead to cost reductions and improved efficiency for SMEs. Through joint procurement, shared organisation, or collective bargaining power, SMEs can negotiate better deals, obtain volume discounts, and reduce operational expenses. Cooperative initiatives can also streamline processes, eliminate redundancies, and optimize resource allocation, resulting in cost savings and improved productivity. Collaboration fosters innovation by combining diverse expertise, ideas, and resources. SMEs can collaborate with research institutions, universities, or other innovative businesses to undertake joint R&D projects. Sharing R&D costs and resources enables SMEs to engage in more ambitious and technology-driven innovation initiatives, which may have been challenging individually. Cooperative innovation also promotes the cross-fertilization of ideas and the development of groundbreaking solutions. Cooperative organizations and associations can advocate for the interests and concerns of SMEs collectively. By joining forces, SMEs can amplify their voices, influence policies, and engage in dialogue with government agencies, industry regulators, and other stakeholders. This collective influence can shape the business environment, promote favourable conditions, and address the usual challenges faced by SMEs. Borch et al (Borch & Solesvik, 2016) explore the dynamics of choosing collaborative partners in innovation projects. It highlights the difference between actively selecting partners based on predefined criteria (partner selection) and attracting partners who naturally align with the project's goals and values (partner attraction). The study

delves into the advantages and disadvantages of each approach, emphasizing that the choice between them depends on the project's specific objectives and context. Where cooperation is not properly initiated, it can result in a form of parallel closed innovation where both partners simultaneously innovate inwards without true transfer of knowledge across the borders of the partnering companies. Each partner often finds they need some level of input from the other before they can contribute value to the cooperative and collaborative effort. This can result in a paradoxical situation where neither partner is receiving said input, nor can provide similar input to their partner.

In summary, cooperation is essential for SMEs as it provides access to resources, fosters knowledge sharing, expands market opportunities, shares risks, reduces costs, drives innovation, and enhances collective influence.

2.7. Innovation Summary

In summary, while innovation is critical for business growth and relevance, it is not without risks and uncertainty. Innovation is a vital concept for businesses as it allows them to adapt, develop, and create new products, ideas, and models. It involves introducing something new or making changes to existing elements. SMEs have a unique approach to innovation due to their limited resources but can still benefit from it by pursuing an innovation strategy. SMEs can innovate through various means such as product development, business model innovation, collaboration, technology implementation, and organizational innovation. They can leverage their agility and specialization to cater to specific market segments and employ strategies like open innovation and collaboration to overcome resource constraints.

However, innovation also presents challenges that businesses must navigate. These include managing costs, overcoming resistance to change, handling market disruptions, keeping up with technological advancements, and addressing legal and regulatory implications. Businesses must carefully plan and evaluate potential returns on investment, manage organizational change effectively, and stay aware of industry trends and customer needs to successfully innovate. Businesses must approach innovation strategically, conducting thorough assessments, managing financial implications, staying attuned to market dynamics, and nurturing an adaptable organizational culture. By doing so, they can seize the

opportunities while minimizing the potential negative impacts that come with embracing innovation.

Cooperation is an important opportunity for SMEs to gain access to external resources, but cooperation is not always ideal. Where cooperation is not properly initiated, Open Innovation can result in a form of parallel closed innovation where both partners simultaneously innovate inwards without true transfer of knowledge across the borders of the partnering companies. Each partner often finds they need some level of input from the other before they can contribute value to the cooperative effort. This can result in a simultaneously paradoxical relationship where neither partner is receiving said input, nor is able to provide similar required input to their partner.

Two contrasting knowledge bases, synthetic knowledge, and analytical knowledge, play a role in innovation. Synthetic knowledge is based on practical experience and problem-solving, while analytical knowledge stems from scientific research and experimentation. Both forms of knowledge contribute to different modes of innovation, such as the hands-on Doing, Using, Interacting (DUI) mode and the research-driven Science, Technology, Innovation (STI) mode. The combination of both modes, known as Combined and Complex Innovation (CCI), has been found to be highly innovative.

Absorptive capacity is a crucial concept in innovation. It refers to an organization's ability to effectively recognize, assimilate, transform, and exploit new knowledge from its external environment. By acquiring relevant knowledge, understanding it, adapting it to the organizational context, and deriving value from it, organizations can enhance their innovation capabilities and stay competitive. Factors influencing absorptive capacity include prior knowledge, organizational culture, leadership support, diversity of knowledge sources, and knowledge management practices.

In conclusion, innovation is essential for businesses to adapt, grow, and remain competitive. SMEs can leverage their advantages and employ different strategies to innovate. Overcoming challenges, managing different knowledge bases, and developing absorptive capacity are crucial for successful innovation. By embracing innovation, businesses can drive growth, create value, and thrive in today's rapidly changing business landscape.

3. Contextual Information

Due to the nature of this thesis, with a large focus on PF and certain branch-specific relations, the following chapter with give a brief overview explaining the different options with PF and will explain any phenomena that arise in the relevant industries.

3.1. Ocean Technology

I have made a deliberate decision to narrow down the scope of the companies I consider to those exclusively operating within the domain of ocean technology. This strategic choice reflects my intention to focus solely on organisations that are actively engaged in the development and application of cutting-edge technology within an important industry in Norway. By restricting my selection to ocean technology companies, I am not only streamlining my research but also aiming to delve deeper into a specific niche, thus gaining a more comprehensive understanding of the challenges, innovations, and trends within this specialized field. This meticulous approach will enable me to uncover insights, innovations, and potential investment opportunities that may be overlooked in a broader assessment of the business landscape.

As the ocean technology sector continues to expand and evolve, it becomes increasingly vital to emphasise its unique dynamics and technological advancements. This commitment to a more confined range of companies will facilitate a thorough exploration of the intricate interplay between SMEs and public funding initiatives. In doing so, I hope to gain a profound appreciation for the remarkable contributions and progress made by these specialized companies in the pursuit of a more sustainable and technologically advanced future for our oceans.

Ocean technology is a multifaceted field that integrates both interacting and science-technology modes of innovation. The interacting mode thrives on collaborative efforts among scientists, engineers, policymakers, and industry professionals. Cross-disciplinary cooperation is pivotal, as ocean technology encompasses expertise spanning marine biology, engineering, environmental science, and data analytics. Ocean technology remains an emerging field, with ongoing technological breakthroughs and explorations unveiling novel avenues for value

creation and potential market expansion.

Norway, with its extensive coastline and proximity to abundant maritime resources (Thorsnæs, 2023), stands naturally poised as a focal point for ocean technology. SMEs within the country leverage these resources for a multitude of purposes, spanning offshore energy production, aquaculture, shipping, and fisheries (Ny Analyse, 2021). The maritime and offshore sectors are the linchpins of Norway's economy, contributing significantly to the nation's GDP and employment landscape. In this context, SMEs play an indispensable role in sustaining this economic prominence. Drawing upon a rich maritime heritage, Norway has a strong tradition of innovation in ocean technology. It is often the SMEs that lead the way in crafting cutting-edge solutions, encompassing sustainable fishing practices, advanced aquaculture systems, and offshore energy technologies. Ocean technology, in essence, emerges as a paramount tool in addressing pressing environmental concerns. Notably, Norway remains steadfast in its commitment to sustainable practices within its oceanic domains, with SMEs at the forefront of the drive to develop eco-friendly solutions. These encompass clean energy generation and the promotion of responsible fishing methods, aligning with the nation's steadfast dedication to environmental stewardship. The Norwegian Ocean technology sector harbours immense export potential, offering SMEs specialized in this field the opportunity to expand their horizons into international markets. Such expansion is a driving force for economic growth and heightened export revenues. Collaboration is a cornerstone of the Norwegian ocean technology landscape, frequently witnessed between SMEs and esteemed research institutions. This collaborative spirit is facilitated by PF initiatives and serves as a catalyst for innovation and enhanced competitiveness among SMEs. Ocean technology presents a diverse array of applications, ranging from offshore oil and gas exploration to marine biotechnology. SMEs are positioned to tap into these varied niches, presenting a wealth of opportunities for both growth and specialization. Crucially, the Norwegian government has designed and implemented policies and initiatives to bolster the ocean technology sector. This supportive environment renders Norway an attractive hub for SMEs, fostering their ability to operate, innovate, and thrive in this dynamic and vital field.

The Norwegian government places a strong and strategic focus on directing PF initiatives toward the development and advancement of ocean technology, acknowledging it as a field of paramount importance that requires substantial future growth and innovation. This

emphasis is rooted in several key factors, notably the urgency to address critical environmental challenges such as ocean pollution and climate change, coupled with the immense economic significance of ocean technology in sectors such as offshore energy, aquaculture, and shipping. These government allocations of resources aim to stimulate economic growth, create employment opportunities, and enhance export revenues. Ocean technology, being inherently dynamic, continuously relies on technological advancements, making it a prime recipient of PF to support vital R&D endeavours.

Moreover, Norway, as a coastal nation with extensive maritime interests, recognizes the strategic importance of harnessing ocean technology for the efficient utilization of marine resources, thereby aligning with its goals in maritime activities and environmental conservation. In a collaborative effort, PF initiatives foster synergy among research institutions, businesses, and government agencies, leading to an enhanced ecosystem of innovation and knowledge exchange. Additionally, within the context of fierce international competition, the Norwegian government invests in ocean technology to ensure the nation's continued competitiveness in this globally significant field, solidifying its presence within the international ocean technology market.

In summary, ocean technology is pivotal for SMEs in Norway due to its economic significance, innovation potential, environmental responsibility, and opportunities for global expansion. It aligns with the nation's commitment to sustainable practices and harnessing the potential of its extensive maritime resources. Norway’s PF initiatives are pivotal instruments that aim to drive the ocean technology sector forward, allowing for the effective response to environmental challenges, the bolstering of economic growth, the facilitation of innovation, and the achievement of strategic national interests, all while keeping a global perspective at the forefront.

3.2. Public Funding

3.2.1. Public Funding for innovation

Public Funding (PF) encompasses a wide array of financial support mechanisms designed to address the specific needs and objectives of individuals, businesses, or organizations. The following presents an overview of some of the most prevalent PF types.

Grants, a non-repayable form of financing, are awarded by public bodies and organizations to individuals, companies, or organizations for specific purposes, including research, education, environmental protection, or cultural undertakings. Public loans are extended to individuals, businesses, or organizations to facilitate a range of objectives, such as business initiation or expansion, homeownership, and educational pursuits. These loans often offer more favourable terms and lower interest rates in comparison to those offered by private financial institutions. Public tax incentives are structured to offer financial support to individuals, businesses, or organizations, with the aim of stimulating activities, such as investment in innovative technologies or the employment of individuals from specific demographic groups. Public investment serves to underpin a diverse array of projects, encompassing areas like infrastructure development, R&D, and economic advancement. These investments play a pivotal role in augmenting societal and economic foundations. Public guarantees provide individuals or companies access to loans that might otherwise be unattainable due to factors such as limited collateral or creditworthiness. These guarantees serve to enhance loan approval prospects while mitigating risks for lenders. Tax-funded research is a common practice, with public bodies financing research initiatives spanning domains like health, environmental preservation, and technology. These investments propel advancements and innovations in critical areas. Repayment by Results, a unique PF model, mandates repayment; however, the reimbursement structure is intrinsically tied to the performance and achievements of the project or entity that has received funding. This distinctive approach fosters efficient fund utilization and minimizes the risk of misappropriation by aligning financial reimbursement with demonstrated results.

These various PF options collectively accommodate a wide spectrum of needs, objectives, and contextual nuances. Their pivotal role in promoting research, innovation, economic development, and societal progress underscores their significance in the contemporary financial landscape.

3.2.2. Public Funding options

Small and Medium-sized Enterprises (SMEs) in Norway have a diverse array of opportunities to access PF through a myriad of programs and schemes. These initiatives are designed to bolster innovation, foster growth, and stimulate economic development. This section will

discuss some of the more important PF initiatives in Norway.

Research Council of Norway

The Research Council of Norway, referred to as "Norges Forskningsråd" in Norwegian, occupies a central and influential role within Norway's extensive research and innovation framework. Established under the auspices of the Norwegian government, this institution serves as a fundamental contributor to the nation's pursuit of research, technological advancement, and innovation across a diverse array of sectors. The Research Council of Norway functions as a dynamic nucleus, channelling PF, and support to a wide spectrum of entities, including academic institutions, research organizations, and businesses, all actively involved in a myriad of research endeavours. At its core, the Research Council of Norway assumes the vital function of acting as a primary conduit for the allocation of public funds with the specific aim of propelling R&D initiatives, stimulating innovation, and driving technological progress within the nation. With oversight of a substantial budget, the council disburses financial resources to projects and programs that span various scientific disciplines and encompass multiple industrial sectors. This financial investment framework plays a pivotal role in advancing R&D endeavours, nurturing innovation, and propelling technological advancements on a national scale. Furthermore, the council administers and supervises a diverse array of research programs, each meticulously tailored to address an extensive spectrum of societal challenges and opportunities. These programs span an array of subjects, including but not limited to environmental sustainability, healthcare, energy, technology, and social sciences. Through the delineation of these specific research priorities, the council ensures that research initiatives remain closely aligned with the strategic objectives of the nation. This alignment aims to foster a synergy between research efforts and the prevailing needs and goals of the country. An integral aspect of the council's mission is its active promotion of cross-disciplinary and international collaboration. The encouragement of such collaboration is instrumental in facilitating the exchange of knowledge and the practical application of research findings in various contexts. To this end, the council forges partnerships and collaborative relationships between research institutions, businesses, and public organizations, thereby ensuring that research outcomes are effectively applied across diverse spheres of society. Moreover, the Research Council of Norway actively engages with the global research community, promoting international research cooperation and

collaborating with esteemed international research bodies. Additionally, the council facilitates the mobility of Norwegian researchers to participate in global research projects. This international engagement serves to enhance the impact and reach of Norway's research and innovation initiatives, affirming the nation's active role in the global knowledge exchange. Beyond its emphasis on research, the council also supports activities related to innovation. It serves as a bridge between research findings and their practical application, ultimately yielding tangible benefits for both society and the economy. This commitment extends to assisting companies in the process of commercializing innovative products and services. Furthermore, the council maintains a steadfast commitment to rigorous evaluation and quality assurance, ensuring the effectiveness and impact of research projects. It employs systematic evaluation processes to assess the quality and impact of research initiatives, thereby leveraging data-driven insights to optimize resource allocation and make informed strategic decisions.

In summary, the Research Council of Norway assumes a central role in shaping the research and innovation landscape of the nation. Its contributions are fundamental in bolstering Norway's global competitiveness, advancing the cause of sustainable development, and addressing pressing societal challenges. The council's unwavering dedication to the promotion of research and innovation underscores its paramount importance in positioning Norway as a leader in various scientific and industrial domains.

SkatteFUNN

SkatteFUNN, an integral component of Norway's framework for promoting R&D, functions as a tax deduction scheme explicitly designed to foster innovation within SMEs. Under this scheme, eligible companies are afforded the opportunity to seek financial relief by having a portion of their incurred costs in R&D projects offset through tax deductions. This strategic initiative plays a pivotal role in facilitating R&D activities and incentivizing companies to actively engage in the pursuit of novel knowledge and technological advancements. SkatteFUNN is administered and overseen by the Research Council of Norway, a key entity responsible for promoting and facilitating research and innovation within the country (Skattefunn, 2022).

The eligibility criteria for companies seeking to benefit from the SkatteFUNN scheme are well-

defined. Essentially, it is accessible to all companies that are duly incorporated and maintain corporate tax liabilities within the sovereign borders of Norway. A fundamental stipulation for participation in the program is that these companies must be actively engaged in R&D endeavours, aimed at the development of either entirely new products or the enhancement of existing ones. This laudable commitment to product innovation is exemplified through the initiation of research projects that lead to the generation of pioneering knowledge, which was hitherto unavailable. The emphasis on novel knowledge creation underscores the program's dedication to fostering genuine advancements, propelling enterprises toward pioneering frontiers in their respective industries.

In practical terms, SkatteFUNN serves as a pivotal driver of technological progress and innovative endeavours within the SME sector. By alleviating a portion of the financial burden associated with R&D initiatives through tax deductions, the program encourages companies to take bold steps in the direction of pioneering discoveries and improved product offerings. This economic incentive operates as a strategic mechanism that aligns the corporate sector's objectives with the broader national agenda of fostering innovation, ultimately contributing to the economic and technological advancement of Norway.

Norwegian Seafood Research Fund

The Norwegian Seafood Research Fund (FHF) is owned by the Norwegian ministry of Trade and financed by the industry through a levy on exports on Norwegian Seafood (Norwegian Seafood Research Fund, u.d.). FHF is a prominent organization established to promote and support industry-based R&D within the Norwegian seafood industry. This collaborative funding approach underscores FHF's mission of facilitating research and development initiatives that serve the broader interests of the seafood industry in Norway.

Innovation Norway

Innovation Norway plays a pivotal role in providing a range of financial and advisory resources tailored to the specific needs of SMEs in their endeavours to foster innovation and growth. As an entity supported by the Norwegian government, Innovation Norway is dedicated to facilitating the innovation and development of businesses, and as such, it extends a suite of financial instruments encompassing loans, grants, and investment support. These financial avenues serve as essential conduits for SMEs seeking the necessary capital to embark on

ventures, including research projects, infrastructure development, or the scaling of operations. Loans offer structured access to capital with favourable terms and interest rates, while grants represent direct capital infusions without the burden of repayment, collectively mitigating the financial risks associated with entrepreneurial pursuits (Innovation Norway, 2020).

However, beyond its role as a financial facilitator, Innovation Norway assumes a broader remit as a knowledge and advisory partner for SMEs. The institution's expertise is instrumental in guiding companies aspiring to develop new products, services, or advanced technologies. Its support spans various facets of business development, encompassing market research, strategic growth planning, regulatory compliance, and entry into international markets. This comprehensive advisory framework is instrumental in charting a course toward successful innovation.

Furthermore, Innovation Norway extends its advisory portfolio to address the pressing issue of sustainability in contemporary business practices. In recognition of the global imperative for environmentally responsible operations, the institution assists SMEs in navigating the landscape of eco-friendly innovation. This guidance encompasses sustainable technology adoption, implementation of green business models, and adherence to responsible production practices, facilitating the alignment of businesses with environmentally conscious principles.

Innovation Norway assumes a multifaceted role as a partner to SMEs, offering both financial support and expert guidance. This collaborative approach provides the essential tools for enterprises not only to survive but to thrive in the dynamic business environment. The institution's commitment to enabling the development of new products, services, and technologies bolsters Norway's culture of innovation and economic expansion, rendering it a prominent hub for SMEs seeking growth and ingenuity.

3.2.3. Supra-national R&D funding

European R&D funding encompasses financial support provided by the European Union and its member states to promote research and development activities across Europe. This funding is designed to foster innovation, enhance scientific research, and drive economic growth by supporting projects that address societal challenges, improve competitiveness, and advance knowledge. One of the primary instruments for this support is the Horizon Europe program, which succeeded Horizon 2020 and allocates billions of euros to various research initiatives. Horizon Europe emphasizes cross-border collaboration, involving universities, research institutions, businesses, and governments in cutting-edge research and innovation. The funding covers a wide range of areas, including health, digital technologies, climate change, and sustainable development. By facilitating collaborative projects and providing substantial financial resources, European R&D funding plays a crucial role in maintaining Europe's position as a global leader in scientific and technological innovation.

European R&D funding plays a pivotal role in advancing ocean technologies, which are crucial for sustainable marine resource management, climate change mitigation, and economic growth. The Horizon Europe program allocates significant resources to research and innovation in ocean technologies, supporting projects focused on marine renewable energy, underwater robotics, sustainable fisheries, and ocean monitoring systems. For instance, the Horizon 2020-funded project Blue Growth aims to harness the potential of Europe's oceans, seas, and coasts by promoting innovations that lead to sustainable exploitation and management of marine resources. Additionally, the European Maritime and Fisheries Fund (EMFF) provides targeted support for developing advanced maritime technologies. These funding efforts facilitate collaboration between research institutions, industry, and governments across Europe, driving technological advancements and fostering a blue economy that balances economic benefits with environmental sustainability.

Norway, while not an EU member, actively participates in European R&D funding schemes, particularly through its association with the Horizon Europe program. This association enables Norwegian researchers, institutions, and companies to engage in collaborative projects and benefit from substantial funding aimed at fostering innovation and scientific advancements. Norway's participation enhances its access to cutting-edge research

networks and technological developments, thereby contributing to its national research and innovation strategies (European Comission, 2020). According to the Research Council of Norway (2024), the country has been highly successful in securing funding from previous and current programs like Horizon 2020 and Horizon Europe, with Norwegian entities participating in numerous projects and receiving significant financial support. This involvement underscores Norway's commitment to addressing global challenges through international cooperation and maintaining a competitive edge in various scientific fields.

In the current European Commission framework, Horizon Europe, there are 312 projects related to ocean technologies. While the Horizon Europe framework is still ongoing, having started in 2022, these projects span various funding schemes, including Horizon and ERC, and cover topics such as “transformations” and “pathfinder challenges.” Norwegian organizations are involved in 77 of these projects, either as partners or coordinators. Figure 5 below illustrates some descriptive statistics on the ocean technologies-related projects in which Norwegian organizations have participated.

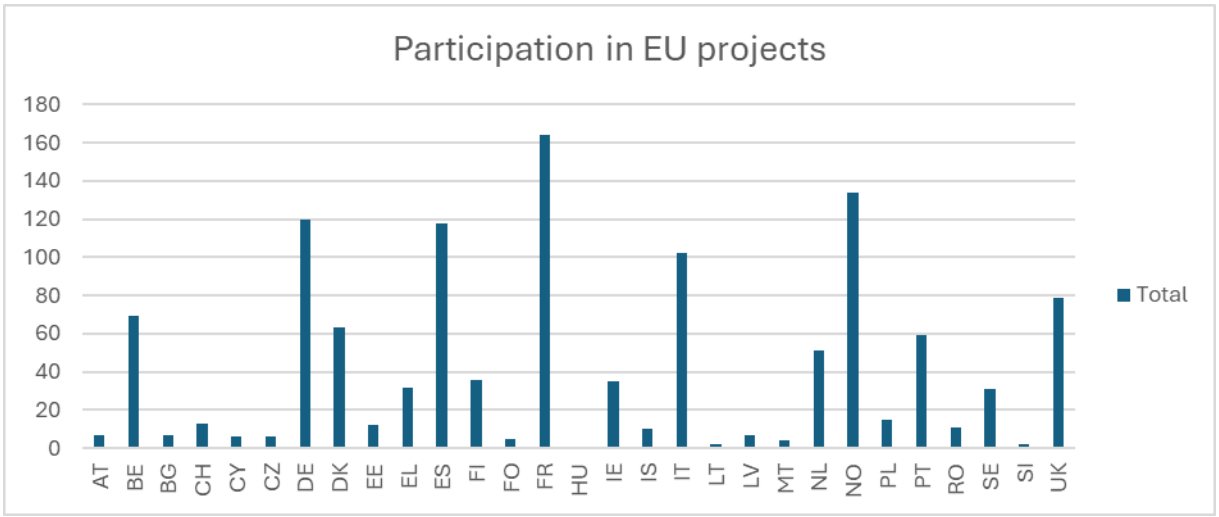

Figure 5 -Participation in EU projects

Although these projects have at least one partner located in Norway, the French organizations are dominant. Norwegian organizations collaborate moreover with German, Spanish, and Italian actors. This is because of the requirements for European funded R&D projects, especially Research and Innovation Actions (RIA) to include in the consortium partners located in three EU countries. Apart from the EEA based actors, Norwegian organizations collaborate in a small degree with organizations located in non-European

countries.

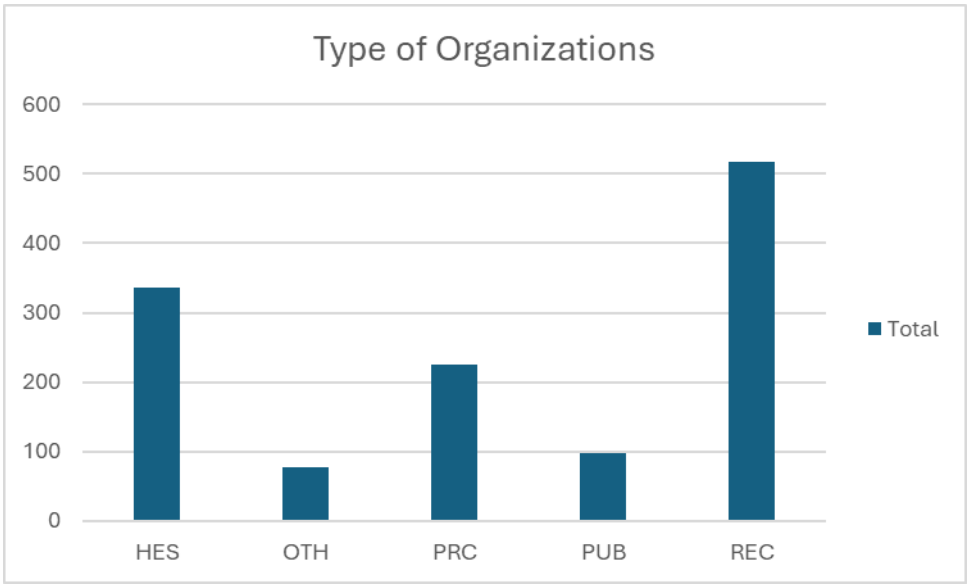

Figure 6 -Type of Organizations

In projects focusing on ocean technologies, research centers (REC) and universities (HES) form the majority of partners. However, there's a significant involvement of private firms (PRC), followed by public agencies (PUB) and other institutions like non-governmental organizations (NGOs)(Figure 6). This provides evidence for the importance of collaboration between academia, research, and industry in these projects.

Out of 1254 organizations participating in Horizon Europe projects related to ocean technologies with at least one partner in Norway, 134 are Norwegian. The table below outlines the Norwegian organizations involved in such projects. Interestingly, while most Norwegian private firms are involved in just one project, research centers and universities are engaged in multiple projects, indicating a deeper involvement in ongoing research and innovation endeavors.

Table 1 -Participations in Horizon Europe

Row Labels	Count of name
NORCE NORWEGIAN RESEARCH CENTRE AS	12
NORSK INSTITUTT FOR VANNFORSKNING	9
UNIVERSITETET I TROMSOE - NORGES ARKTISKE UNIVERSITET	9

STIFTELSEN NANSEN SENTER FOR MILJOOG FJERNMALING	8
UNIVERSITETET I BERGEN	8
NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	7
HAVFORSKNINGSINSTITUTTET	6
NORSK POLARINSTITUTT	5
SINTEF AS	4
SINTEF OCEAN AS	4
UNIVERSITETET I OSLO	4
NOFIMA AS	3
AKVAPLAN NIVA AS	2
KONGSBERG MARITIME AS	2
METEOROLOGISK INSTITUTT	2
NORDLANDSFORSKNING AS	2
OSLOMET - STORBYUNIVERSITETET	2
SIOS SVALBARD AS	2
STIFTELSEN NORGES GEOTEKNISKE INSTITUTT	2
STIFTELSEN NORSK INSTITUTT FOR NATURFORSKNING NINA	2
ALMA CLEAN POWER AS	1
BERGEN HAVN AS	1
BLUE LICE AS	1
CLARA VENTURE LABS AS	1
COVARTEC AS	1

ECCSEL EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM	1
HOGSKULEN PA VESTLANDET	1
Innovasjon Norge	1
KARLSOY KOMMUNE	1
KUNNSKAPSPARKEN HELGELAND AS	1
KYSTVERKET	1
LEROY SEAFOOD GROUP ASA	1
MUNDAL SUBSEA AS	1
NAXYS TECHNOLOGIES AS	1
NORD UNIVERSITET	1
Nordkvaløya-Rebbenesøya verneområdestyre	1
NORGES FORSKNINGSRAD	1
NORGES GEOLOGISKE UNDERSOKELSE	1
NORWEGIAN SEAWEED ASSOCIATION AS	1
OCEAN FOREST AS	1
OCEAN OASIS AS	1
OFFSHORE SENSING AS	1
PHEROUSA GREEN TECHNOLOGIES AS	1
PUKKA TRAVELS INTERNATIONAL AS	1
SINTEF ENERGI AS	1
SJY SEAWEED AS	1
STATENS VEGVESEN	1

STIFTELSEN GRID ARENDAL	1
STIFTELSEN HUB OCEAN	1
STIFTELSEN NILU	1
STIFTELSEN NORSAR	1
STIFTELSEN RURALIS INSTITUTT FOR RURAL- OG REGIONALFORSKNING	1
Stinger Technology AS	1
Tidetec AS	1
UNIVERSITETET I SOROST-NORGE	1
VIKEN FYLKESKOMMUNE	1
VIKING HYDROGEN AS	1
VOLCANIC BASIN PETROLEUM RESEARCH AS	1
WARTSILA NORWAY AS	1

The bulk of Norwegian organizations participating in Horizon Europe projects are situated in major urban centers such as Bergen, Oslo, Tromso, and Trondheim (Figure 7), which aligns with the concentration of universities and research centers in these cities. However, smaller

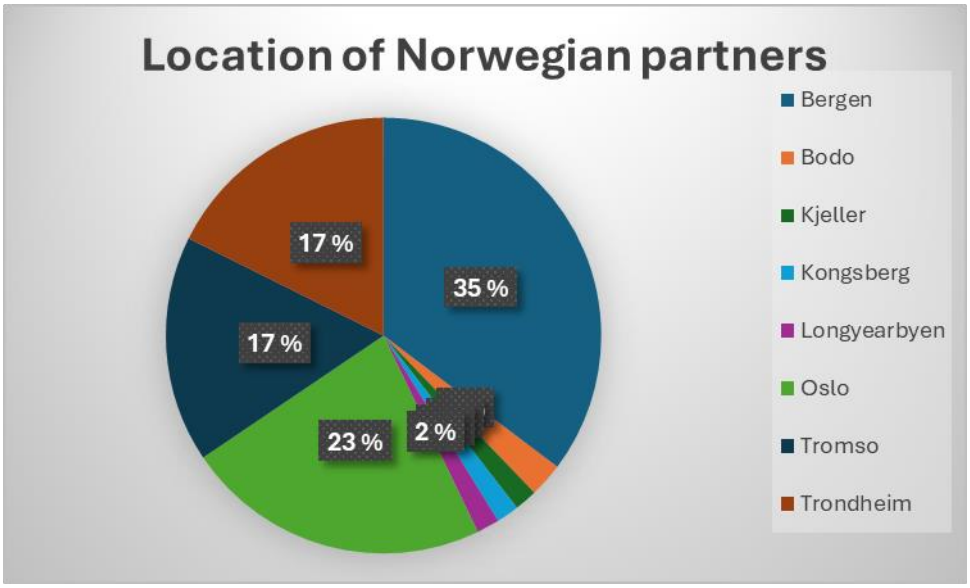

Figure 7 -Location of Norwegian partners.

locations like Bodo, Kjeller, and Kongsberg also contribute to these projects, highlighting the widespread geographical involvement across Norway, beyond its urban hubs.

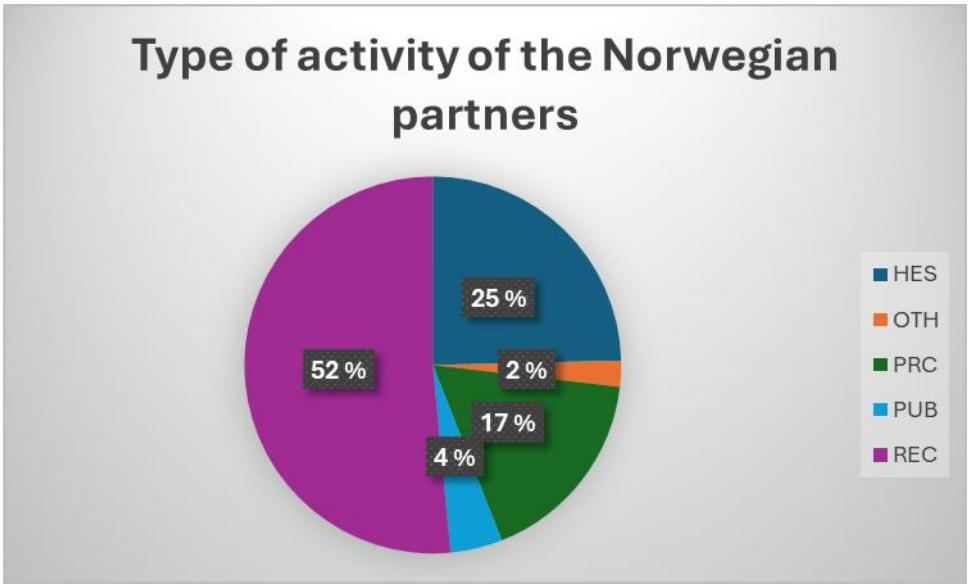

Figure 8 -Type of activity of the Norwegian partners.

Most of the Norwegian partners are research centres (52%), universities (25%), and private firms (17%) in terms of number of participants (Figure 8).

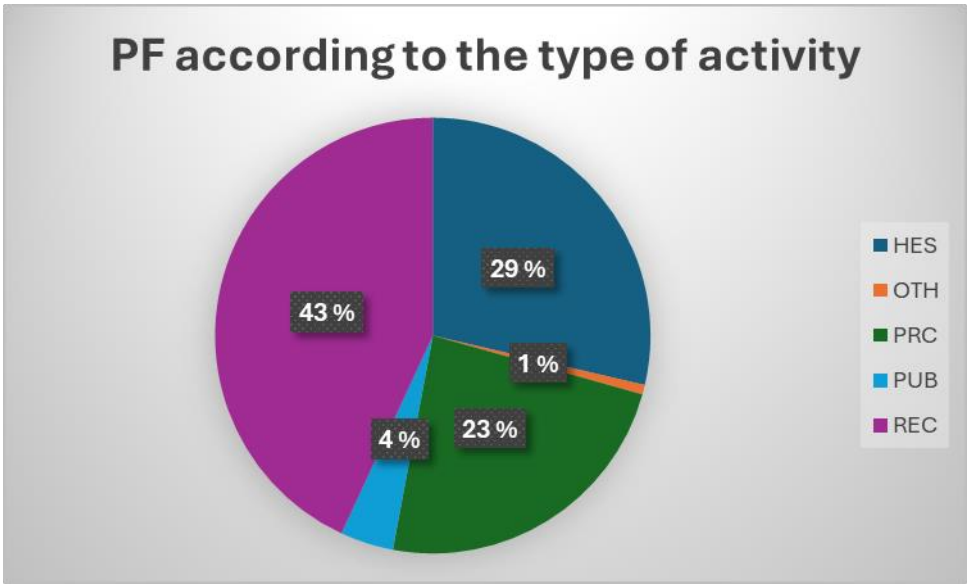

Figure 9 -PF according to the type of activity

In terms of funding from European Commission, research centres receive lower percentage than the participation (43%), while universities receive 29% and private firms 23% (Figure 9).

Finally, from the 23 Norwegian private firms that participate in European funded projects related to ocean technologies, 11 are SMEs. These SMEs received during Horizon Europe framework a total of € 4,734,188.50.

4. Research Design and Methodology

This chapter outlines the methodological approach employed in this research to investigate the complex dynamics of PF for innovation projects in SMEs. Research design is a crucial aspect of any research project, and the approach chosen depends on the research goals and the nature of the study (Easterby-smith, Thorpe, Jackson, & Jaspersen, 2018). There are several different approaches to research design. **Descriptive Research** aims to describe a phenomenon without manipulating variables, often used in surveys and observational studies. **Exploratory Research**, on the other hand, involves preliminary data collection and interviews to gain insights and formulate hypotheses when a deeper understanding of a problem is needed. **Explanatory Research** is used to identify causal relationships, typically involving experiments, controlled studies, and statistical analysis to establish cause-and-effect connections. **Qualitative Research** focuses on understanding and interpreting human behaviour, using interviews, focus groups, content analysis, and case studies. In contrast, **Quantitative Research** involves collecting and analysing numerical data to test hypotheses and generalise about a population, employing surveys, experiments, and statistical analysis. **Mixed-Methods Research** combines both qualitative and quantitative methods to provide a comprehensive perspective on a research problem. **Longitudinal Research** collects data from the same subjects over time to study changes and developments, while **Cross-Sectional Research** gathers data from a sample at one point in time to compare different groups, variables, or attributes. **Action Research** is a collaborative approach where researchers work with participants to solve practical problems and implement solutions. **Case Study Research** involves in-depth exploration of a single entity to understand a specific phenomenon in detail. **Ethnographic Research** immerses the researcher in a cultural or social group to observe and understand their behaviours and practices. **Grounded Theory** is a qualitative approach used to develop new theories based on the data collected, often in social sciences. **Survey Research** is conducted using surveys to collect data from a large sample to understand attitudes, preferences, and behaviours. **Experimental Research** involves the manipulation of variables

to test hypotheses and determine causal relationships, characterized by random assignment and control groups. Finally, **Historical Research** focuses on examining past events, often involving the analysis of archival documents, records, and historical narratives. The choice of research design approach depends on the research question, available resources, and the nature of the research problem.

Given the nature of the research questions and the need to obtain a comprehensive understanding of this subject, a mixed-method approach has been chosen. This chapter explains the rationale behind the selection of a mixed-method approach, details the qualitative interview process, and underscores the significance of incorporating a literature review.

4.1. Research Design

The research questions are predominantly exploratory and look at how PF can be used and what obstacles could potentially arise. This is a topic that has previously been discussed, but not directly aimed at SMEs operating in the Norwegian market. Due to the exploratory manner of the research questions, the main part of the research is to be designed following the style of a qualitative case study. According to Yin (Yin, 2018), it is recommended that case studies be chosen when the research satisfies five criteria:

1. The research questions should be formulated with "how" and/or "why".
2. One must have little or no control over human behaviour.
3. The phenomenon to be studied must exist to this day.
4. It must be possible to observe the phenomenon to be studied directly.
5. It must be possible to obtain information from people involved in the phenomenon.

These five criteria are satisfied by the research questions and the nature of the phenomenon. It is appropriate to obtain information from several sources of evidence, as a case study that is built on more than one source of evidence will be of higher quality than a case study built on only one source of evidence (Yin, 2018).

The study will largely be based on qualitative methods. First, qualitative interviews will be conducted with a selection of representants from SMEs with experience with PF for innovation projects. The interviews will focus on views and strategies for innovation, as well as challenges and opportunities in matching the perspectives of PF and SMEs. Given the limited number of available informants, I decided to complement my research with a Questionnaire to increase the number of contributions and potentially uncover additional information. This was deemed necessary due to the potentially invasive and demanding nature of requesting interviews with informants working in a position with day-to-day operations in a small company.

This approach will not only enhance the robustness of my research but also provide a more comprehensive perspective on the topic under study.

4.2. Data collection

4.2.1. Interviews

Data will predominately be collected through qualitative interviews with a selection of representants from SMEs with experience with PF for innovation projects. The interviews will be conducted either digitally or by means of a questionnaire. The interviews will be conducted in a semi-structured in-depth manner, which provides the flexibility to deviate from rigidly predefined questions and instead concentrate on the themes and insights introduced by the informants themselves. This approach acknowledges the dynamic and fluid nature of the interview process, allowing for a more organic and open-ended dialogue. By affording informants the opportunity to share their perspectives and experiences in a less constrained manner, this approach aims to capture a richer and more nuanced understanding of the subject matter. It encourages participants to express their thoughts and narratives freely, fostering a deeper exploration of the issues at hand.

This style of interview suits the research questions as there is a limited number of individuals who have experience and knowledge of the topic, known as key informants (Easterby-smith, Thorpe, Jackson, & Jaspersen, 2018). In addition, the questions are exploratory and require depth on the topic. The key informants are connected within the topic and understand industry-specific conditions, which can lead to information that was previously unknown becoming known during an interview. This can contribute to a change in further research and

how subsequent interviews are carried out.

4.2.2. Questionnaire

In addition to the data collected through qualitative interviews, a questionnaire will also be provided as an alternative option to the informants. Recognizing the time constraints faced by SME professionals, the questionnaire offers a convenient alternative to one-on-one interviews. This approach acknowledges the limited resources of SMEs and aims to accommodate their busy schedules, ensuring broader participation in the study. The questions used in the questionnaire are largely based on the same questions as the interview guide, but with some limitations.

The questionnaire is predominantly built up with pre-defined response options, such as Likert scale questions and multiple-choice queries, aiming for structured and quantifiable data collection. These are supplemented with demographic questions to gather information about respondents' characteristics. In contrast, the interview guide relies on open-ended inquiries to elicit detailed and qualitative responses from participants. Probing questions and follow-ups delve deeper into respondents' answers, while scenario-based queries assess hypothetical situations. This approach facilitates in-depth exploration of perspectives, experiences, and insights.

The questionnaire is seen as a necessary tool to enable data collection from informants that otherwise may not have been able to contribute with a response, with the limitations that come with this method.

4.3. Ethics and Data Protection

Ethics and data protection play a pivotal role in the research process, particularly in studies involving interviews and the exploration of personal experiences. In the context of this thesis, their significance is amplified due to the unique combination of my prior background and the qualitative approach to data collection. These factors collectively underscore the potential for biased opinions to seep into the research, thereby influencing the outcomes in ways that can be detrimental to the overall validity and integrity of the study.

Ethical considerations cannot be ignored in any research endeavour, but they take on an even

greater importance when delving into personal narratives and individual accounts. The very nature of interviewing subjects and gathering firsthand experiences implies a profound responsibility to treat participants with respect and protect their privacy. It is essential to secure informed consent, maintain confidentiality, and ensure that individuals are aware of their rights in the research process. Failing to uphold these ethical standards can result in harm to the participants and the research itself.

Moreover, the qualitative nature of data collection in this thesis poses its own set of ethical challenges. Qualitative research often entails open-ended questions and in-depth discussions, which can lead to the inadvertent introduction of researcher bias. As someone with prior experience in the field, it is crucial to be acutely aware of the potential for preconceived notions or personal biases to influence the research process. Guarding against this requires maintaining a reflexive stance, continually questioning one's own assumptions, and diligently working to mitigate any unintended impact on the collected data.

Data protection is another cornerstone of ethical research. Safeguarding the privacy and anonymity of participants is not just a moral obligation; it is often a legal requirement. The interviews and inquiries directed towards informants were deliberately anonymized, omitting any personal information pertaining to the individuals in question. Careful steps were taken to eliminate any identifiable markers or clues regarding the interviewees' identities, with the primary goal of shielding the interview subjects from potential adverse consequences.

In essence, this thesis acknowledges the critical role of ethics and data protection in the research process. By recognizing the potential for biases and diligently addressing them, the study aims to uphold the highest standards of integrity and validity. Through a commitment to ethical conduct and data protection, this research strives to provide a true reflection of the subjects' experiences and insights while ensuring their rights and privacy are honoured throughout the study.

4.4. Selection Criteria

4.4.1. Choice of Interview Subjects

The central focus of this thesis revolves around the experiences of SMEs in the context of innovation projects funded by public sources. As a result, the interviews are strategically

oriented towards gathering insights and information specifically related to these experiences. To effectively achieve this, the most optimal approach is to conduct interviews with representatives from SMEs who possess firsthand experience in this domain. The criteria for the selection of SMEs to be contacted, in relation to their engagements with PF, have been thoughtfully established to ensure precision and relevance. These criteria are designed to identify and engage with SMBs that can provide meaningful and insightful perspectives on the subject, thus contributing to a more focused and informed exploration of the thesis's core objectives. The criteria are as follows:

Sector Focus: The SMEs under consideration primarily operate within the ocean industries, encompassing sectors such as aquaculture, subsea, energy, and shipping.

Company Size: These businesses should predominantly have fewer than 50 employees, and their affiliations with larger international corporations should be limited or non-existent.

Experience with PF: Selected SMEs should possess a track record of involvement in publicly funded innovation projects. These projects should typically involve cooperative efforts with research organizations, including entities like IPN, RFF, and others.

By adhering to these criteria, the aim is to engage with SMEs that are not only geographically relevant but also have pertinent experience in publicly funded innovation projects within the specified sectors. This approach is designed to obtain a more targeted and focused perspective on the research objectives.

A diverse group of informants will be engaged to provide a multifaceted view of the research questions from distinctive vantage points. The criteria for selecting these informants will revolve around their extensive experience in the realm of publicly funded innovation projects, ideally encompassing participation in multiple collaborative initiatives involving SMEs and R&D institutions. By including a range of informants with such extensive and varied experience, the research aims to capture a more comprehensive and nuanced perspective on the subject matter. These informants bring valuable insights and firsthand knowledge of the intricacies and challenges inherent to innovation projects in the context of PF. Their experiences in diverse collaborative settings involving SMEs and R&D institutions will offer invaluable insights into the complexities, successes, and shortcomings of such endeavours.

This diverse informant group will enrich the research by contributing unique viewpoints, enriching the quality and depth of the data, and helping to generate a more holistic understanding of the research questions. The intention is to ensure that the research benefits from a well-rounded and multifaceted exploration of publicly funded innovation projects in the context of SME and R&D institution collaborations.

To ensure a well-rounded and comprehensive analysis, interviews will also be conducted with R&D institutions. This approach aims to introduce a contrasting viewpoint for the purpose of comparison. These R&D institutions, which could include research organizations, academic institutions, or innovation centres, play a pivotal role in collaborative innovation projects with SMEs.

Engaging with R&D institutions adds depth to the research by offering insights from the other side of the collaborative spectrum. Their experiences, challenges, and perspectives in working alongside SMEs on publicly funded innovation projects can provide a valuable counterpoint to the viewpoints of SMEs themselves. By including this contrasting view, the research endeavours to create a more balanced and nuanced understanding of the dynamics and intricacies involved in these collaborations. This comprehensive approach enables a more holistic exploration of the challenges, successes, and opportunities within the realm of publicly funded innovation projects.

Interview subjects

Publicly available lists from both SkatteFUNN and the Research Council of Norway were used to create a preliminary list of potential candidates. The selection criteria were used to remove any irrelevant candidates from the list and and the relevant candidates were contacted regarding their participation in an interview. The candidates who responded and contributed to the study are displayed in Table 2.

Table 2 - Interview Subjects

Anonymised name	Industry sector	Type of business	Number of Employees	Innovation Projects with PF?	Data Collection Method
Informant 1	Aquaculture	Salmon Production	10-30	Yes	Interview
Informant 2	Offshore Energy	Equipment Supplier	0-10	Yes	Interview
Informant 3	Aquaculture	Services supplier	30-50	Yes	Questionnaire
Informant 4	Research Institution	-	500-1000	Yes	Questionnaire
Informant 5	Aquaculture	Services supplier	10-30	Yes	Questionnaire

4.5. Analysis

The data will be subjected to a comprehensive thematic analysis, a method that systematically uncovers the predominant themes within the collected information. The primary focus of this analysis will be to discern the overarching themes related to views and strategies concerning innovation, along with the challenges and opportunities arising from aligning the perspectives of PF entities with those of SMEs. This examination will endeavour to draw meaningful comparisons between the viewpoints expressed by SMEs and the perspectives of R&D institutions. In doing so, it will seek to identify contrasting stances, as well as the challenges that emerge in the context of innovation. One of the central objectives of this analysis is to highlight potential discrepancies and divergent opinions between these two key stakeholder groups. It is crucial to unveil areas of discord or misalignment, which may hinder the

collaborative efforts in the field of innovation. By surfacing these contrasting viewpoints, the analysis will pave the way for a deeper understanding of the hurdles and complexities associated with fostering innovation within the PF and SME ecosystems.

Furthermore, the analysis will strive to identify feasible solutions and improvements that can enhance the cooperation between PF organizations and SMEs. This includes exploring innovative strategies, policy changes, or collaborative mechanisms that can bridge the gaps in perception and create a supportive environment for mutual growth and development. The aim of this analysis is to not only shed light on the existing challenges but also to propose practical measures for streamlining and optimizing the relationship between PF bodies and SMEs in the pursuit of innovation.

5. Findings and Results

Interview Informants

Informant 1

The first interview featured Informant 1, who serves as the Head of Research and Development (R&D) at a fish farming company based in Norway. The informant has a strong technical background in biology combined with experience with publicly funded innovation projects from their job prior to their current position.

The company, herein referred to as Company A, is a Norwegian enterprise specializing in salmon farming, with its primary focus on producing healthy and sustainable high-quality farmed salmon. Situated in Norway, one of the world's leading nations in salmon aquaculture, Company A has access to the natural resources and expertise necessary to achieve this goal. The company places a strong emphasis on sustainable practices, including environmental considerations and responsible resource management. They work closely with local authorities and communities to ensure that their operations align with national and international standards for sustainable aquaculture. Company A is deeply committed to delivering healthy and flavourful salmon to customers worldwide. They invest in modern technology and research to ensure that their farming methods are efficient and result in high-quality products.

Company A has been involved in various innovation projects, including those funded by SkatteFUNN and Innovation Norway (within environmental technology). They are in the initial stages of a pre-project with a public research facility regarding recycling the byproduct of aquaculture operations consisting of fish faeces and leftover food from fish farming facilities.

Company A has ambitious growth goals and aims to obtain new concessions for additional facilities over the next 10 years. They believe that public financing support programs will always be a part of working on innovative and pioneering solutions, as they do. Throughout the interview, Informant 1 highlights the importance of project management and planning in dealing with public financing. Challenges related to communication and ensuring that research organizations deliver on their commitments have been faced. The level of external support can impact the company's ownership of the project. Informant 1 strongly believes that public financing helps reduce the risk associated with innovation projects, allows access to more expertise at a lower cost, and provides answers based on scientific and solid data. Company A has a pilot project that has transitioned to the operational/production phase, showcasing successful public funding of their initiatives.

Informant 1 feels that many SMEs would benefit from support in the planning phase to ensure a well-thought-out project execution plan. This could be in the form of external guidance or some form of new funding program that caters to businesses in the early planning stages of an innovation project. Public organizations can better cater to SMEs that may lack the knowledge and resources to apply for public financing by providing guidance and resources during the planning phase. Likewise, businesses need to understand the processes within public organizations and the way STI modes of innovation take place. Informant 1 also mentioned experiences with public research organizations prioritizing their own project agendas, sometimes directing a company's specific inquiries into their ongoing initiatives to secure funding and pursue their own research interests.

The main takeaway from the interview with Informant 1 is the importance of effective project management in collaborative innovation endeavours and the potential for greater support for SMEs during the planning stages of innovation projects.

Informant 2

The second interview featured informant 2, a technical manager in a SME that provides equipment and tools predominantly to the energy sector.

The company, herein referred to as company B, has a long history of developing innovative solutions for their customers. Informant 2 also describes company B as actively seeking opportunities beyond its own industry boundaries. Informant 2 discusses the different avenues for funding they have explored to lower the risk of investment while securing business growth and development. Public funding has been one of those avenues. Company B have applied for grants and loans offered by RFF and SkatteFUNN. Public funding has provided an opportunity for company B to secure financial support without solely relying on traditional banking institutions. Additionally, it has allowed for cooperation with research institutions such as SINTEF allowing the company to better understand the STI methodology regarding innovation.
However, the application process posed challenges, including stringent criteria and administrative complexities. Informant 2 finds navigating through the administrative procedures and documentation requirements to be overwhelming at times, especially with the limited resources in the company.

Despite these challenges, public funding has significantly contributed to the company's growth and success by enabling them to undertake projects and initiatives that drive innovation and competitiveness in their industry. Informant 2 seems optimistic towards public funding and cooperation with research institutions but feels there is a steep learning curve to the processes involved. Informant 2 hopes the company can gain knowledge and experience to better gain value from public funding and cooperation.

Looking ahead, the company plans to continue seeking public funding to support its strategic growth initiatives, including plans to eventually spread into other industries and markets.

Questionnaire informants

The informants responding to the questionnaire have varied backgrounds, including SMEs within aquaculture industry and one research institution.

These differences become apparent in the response to the questions, with the research institution having a positive outlook on PF and the required collaboration, with their main concerns being linked to the amount and relevance of PF initiatives to their research.

The SMEs mainly view collaboration between research institutions and SMEs as a method of gaining access to knowledge that isn't available in their own company, with PF initiatives enabling access at a somewhat discounted price.

The responses from the SMEs varied greatly with some of the responses being more critical to parts of the collaboration with research partners, while others appeared have minimal reflection upon the challenges regarding their collaborative efforts. These criticisms often centred around issues such as communication barriers, misaligned goals, and the practical challenges of implementing research findings into their business operations. These SMEs expressed a need for more streamlined and effective collaboration processes to maximize the benefits of their partnerships with research institutions.

Conversely, other SMEs appeared to have minimal reflection on the challenges of their collaborative efforts. These respondents tended to focus more on the positive aspects, such as the knowledge and innovation gained through these partnerships. They reported fewer concerns and seemed more satisfied with the outcomes of their collaborations.

In summary, while the research institution and SMEs both recognize the value of collaboration and PF initiatives, their experiences and perspectives differ. The research institution focuses on the strategic alignment and relevance of PF initiatives, whereas SMEs are more concerned with practical access to knowledge and the cost-effectiveness of these collaborations. The varied responses from the SMEs indicate a spectrum of experiences, from critical to highly positive, highlighting the complexity of fostering effective research-business partnerships in the aquaculture industry.

6. Discussion

6.1. Conclusion

The findings from this study align with and expand upon previous research on the dynamics of collaboration between research institutions and SMEs, providing nuanced insights into their interactions. Prior studies have consistently highlighted the mutual benefits of such collaborations, particularly the role of research institutions in providing advanced knowledge and technological innovations to SMEs. This current research reaffirms these benefits, demonstrating that SMEs highly value the access to expertise and reduced-cost research facilitated by PF initiatives.

Interviews with SMEs and research facilities further revealed key insights into resource constraints, time management challenges, and the importance of collaboration. SMEs emphasized the need for efficient resource allocation, while both SMEs and research facilities recognized the mutual benefits of collaboration but identified barriers such as differences in workplace culture, conflicting interests, and concerns regarding intellectual property. The research institution's focus on the relevance and strategic alignment of PF initiatives with their research goals introduces a critical dimension to understanding collaboration dynamics. Previous research may not have sufficiently addressed this institutional perspective, which is crucial for designing PF initiatives that are mutually beneficial and strategically aligned.

The findings from SMEs also highlighted the critical importance of the early phase in innovation projects. Proper planning and the early implementation of PF initiatives into the SME's strategy play crucial roles in the success of these projects. SMEs often struggle to efficiently collaborate with research facilities, especially during these initial stages. This suggests that more targeted support during the early phase of innovation projects could ensure that SMEs' efforts are directed correctly and efficiently.

This support for SMEs can extend beyond mere financial assistance. Non-monetary support, such as third-party organisations, can significantly enhance the collaborative experience. Third-party organisations can act as intermediaries to facilitate the partnership between

SMEs and research institutions. These intermediaries can provide various forms of support, including mentorship and consulting services, where expert mentors and consultants guide SMEs through the complexities of collaboration, offering advice on best practices and strategies for effective partnership. Additionally, third-party organizations can provide SMEs with access to specialized equipment and facilities, such as advanced laboratories and research equipment, which might otherwise be inaccessible, thereby enhancing the quality of their research and development efforts. Training and development programs, including workshops, seminars, and training sessions organized by third parties, can equip SME staff with the latest skills and knowledge, enabling them to better engage with research institutions and apply new innovations effectively. Moreover, facilitating connections between SMEs and other industry players through networking opportunities helps build a network of collaborators, fostering knowledge exchange and potential partnerships. Lastly, legal, and administrative support, including assistance with intellectual property management, contract negotiations, and compliance with regulatory requirements, can alleviate some of the administrative burdens associated with collaboration.

Overall, this study contributes to a more comprehensive understanding of the collaborative landscape in the ocean industry, highlighting both the benefits and challenges from the perspectives of both SMEs and research institutions. While the fundamental value of collaboration is well-recognized, optimizing these partnerships requires addressing specific concerns and expectations of all involved parties. Future research should continue to explore these dynamics, aiming to develop frameworks and best practices that enhance the effectiveness and satisfaction of collaborative efforts in the industry.

6.2. Limitations

This study has some limitations. First and foremost, the selection of participants is a limiting factor in the generalisability of the study's results. The extent to which the findings can be applied to a broader population is dependent on the diversity and size of the sample of SMEs and public funders. Additionally, the generalizability of the research will depend on the ability to link these findings to existing theory and find matching patterns (Yin, 2018).

To enhance the reliability and validity of the research findings, it will be necessary to aim for

a sufficiently large and varied sample. A more extensive and diverse participant pool can help mitigate potential biases and render the findings more representative of the broader context. However, the challenge of gaining access to such participants and encouraging their active participation should also be recognized as a limitation. This analysis met some challenges in recruiting individuals for research, unsurprisingly considering SMBs often have stringent time constraints and professional commitments. This led to a somewhat narrower sample size, potentially impacting the comprehensiveness of the study's insights.

Furthermore, the depth of the analysis is another limiting factor. This research relies primarily on the use of qualitative interviews, which provide a rich and nuanced understanding of the subject matter but do not offer the quantifiable measurements associated with quantitative research methods. As a result, the depth and breadth of the analysis are constrained, and the findings may not be as readily comparable or generalizable as quantitative data. Additionally, it is essential to acknowledge the potential for personal bias due to the researcher's own experience. As the researcher, one's prior involvement or experience in the field can influence the interpretation of data and the framing of research questions.

Effort has been made to address these limitations through robust participant selection and self-awareness regarding personal bias, but these factors remain a clear limitation to the validity of the research.

6.3. Recommendations for further study

The findings derived from this study shed light on the pivotal role of PF initiatives in providing significant growth opportunities to SMEs. Nonetheless, it also illuminates the challenges faced by certain SMEs in securing PF or navigating collaborations with R&D partners, for a variety of reasons.

The study's research endeavours unveiled a nuanced landscape in which the impact of PF initiatives on SMEs proved multifaceted, influenced by a myriad of factors.

It became evident that while many SMEs reaped substantial benefits from PF, there existed a segment of businesses that remained beyond the coverage of such support. This disparity in the distribution of opportunities illuminated the need for a deeper understanding of the

factors contributing to the unequal accessibility and utilization of PF programs. While certain SMEs demonstrated remarkable growth trajectories, others struggled to leverage these initiatives effectively, raising questions about the underlying challenges that must be addressed to ensure equitable support for all eligible businesses.

The study's exploration of research questions revealed an inherent complexity in attempting to answer them through empirical data analysis. This complexity primarily emanated from the scarcity of information related to the size and scope of companies contained within the project databases accessible through the Research Council of Norway. The limitations stemming from these database constraints posed a challenge in comprehensively assessing the extent to which SMEs, both large and small, benefited from PF initiatives.

The absence of detailed and comprehensive data on company size hindered the ability to draw definitive conclusions regarding the influence of size on a business's capacity to capitalize on PF. It emphasised the need for enhanced data collection and more comprehensive databases to facilitate more nuanced analyses in future studies.

The SMEs participating in the study have successfully received funding from PF initiatives, greater insight could potentially be gained from expanding studying SMBs unsuccessful in such applications and examining the causes.

Nevertheless, despite these challenges, the study contributes to our understanding of the intricate relationship between PF initiatives and SME growth, highlighting the necessity for further research that can explore this complex landscape with greater precision and depth.

Attachments

Attachment 1 -Email request for participation

Hei,

Jeg er en masterstudent hos Høgskulen på Vestlandet i Bergen (HVL) som for tiden arbeider med min masteroppgave innenfor Innovasjon og entreprenørskap. Tittelen på oppgaven er "Kontrasterende synspunkter på innovasjon mellom offentlig finansiering og SMB: En kvalitativ studie av norske bedrifter".

Oppgaven går ut på å avdekke mulige barrierer som dukker opp i innovasjonsprosjekter der det er samarbeid mellom bransjeaktører og FoU-institusjoner.

Jeg ønsker å dra nytte av deres kunnskap og erfaring i forbindelse med oppgaven, og lurer på om dere kunne være interessert i å bidra ved å svare på spørsmål relatert til temaet. Dette kan gjøres enten gjennom et intervju eller ved å besvare et spørreskjema, avhengig av hva som er mest praktisk for dere.

All informasjon som hentes skal bevares og behandles i henhold til HVL sine retningslinjer, og personlig informasjon om informanter blir anonymisert.

Jeg håper at dere er åpne for å bidra, og ser frem til å høre fra dere.

Med vennlig Hilsen,

James Bevan

Masterstudent ved HVL

Innovasjon og Entreprenørskap

Attachment 2 -Interview Guide

Om Bedriften

- Kan du gi en kort beskrivelse av bedriften du jobber i?
- Hva er bedriftens misjon/mål/verdier?
- Hvordan vil du beskrive innovasjonskulturen i din organisasjon?

Om kunnskapsbase i bedriften

- Er kunnskapen i bedriften mer teoretisk eller praktisk tilnærmet?
- Hvilket utdanningsnivå er mest vanlig i bedriften?

Om innovasjonsprosjekter i bedriften

- Hva slags innovasjonsprosjekter har bedriften vært involvert i, og hvordan ble de finansiert?
- Hvordan ser du for deg bedriften vil utvikle seg, og tror du at offentlig finansiering vil være en del av det?

Offentlig finansiering

- Hvilke erfaringer har du med offentlig finansiering og innovasjonsprosjekter?
- Har du møtt noen utfordringer lenket til finansiering av innovasjon?
- Har du møtt på noen ulemper med offentlig finansiering i forhold til andre finansieringskilder?
- Hva tenker du er de største fordelene med offentlig finansiering for innovasjon i forhold til andre finansieringskilder?
- Har dere noen suksesshistorier eller eksempler på innovasjonsprosjekter som har blitt finansiert av offentlige midler?
- Hva slags støtte eller ressurser trenger din bedrift for å være mer vellykket i å søke om og motta offentlig finansiering for innovasjon?
- Hvordan kan offentlige organisasjoner rette seg mer mot SMB-er som ikke har kunnskap/ressursene til å søke om off fin

Attachment 3 -Questionnaire

Jeg er en masterstudent hos Høgskulen på Vestlandet i Bergen (HVL) som for tiden arbeider med min masteroppgave innenfor Innovasjon og entreprenørskap. Tittelen på oppgaven er "Kontrasterende synspunkter på innovasjon mellom offentlig finansiering og SMB: En kvalitativ studie av norske bedrifter".

Oppgaven går ut på å avdekke mulige barrierer som dukker opp i innovasjonsprosjekter der det er samarbeid mellom bransjeaktører og FoU-institusjoner.

Spørreskjemaet er helt anonymt uten noe personlig informasjon. All innsamlede data behandles i tråd med HVL sine retningslinjer.

Så lenge du kan identifiseres i datamaterialet, har du rett til:
- Innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene.
- Å få rettet personopplysninger om deg
- Å få slettet personopplysninger om deg
- Å sende klage til Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke.

Hvor kan jeg finne ut mer?
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:
James Maurice Bevan, Høgskulen på Vestlandet, student, 571706@stud.hvl.no
Maria Tsouri, Høgskulen på Vestlandet, prosjektansvarlig/veileder, Maria.Tsouri@hvl.no
Ansvarlig personvernombud ved Høgskulen på Vestlandet: Anne-Mette Somby, Anne-Mette.Somby@hvl.no

- Samtykker du til at svarene dine blir behandlet?

(1) ❍ Ja, jeg samtykker

(2) ❍ Nei

- Kan du gi en kort beskrivelse av bedriften du jobber i?
- Hva er bedriftens misjon/mål/verdier?
- Hvordan vil du beskrive innovasjonskulturen i din organisasjon?
- Er bedriften mer opptatt av eksperimentell utvikling eller forskning?

(1) ❍ Eksperimentell Utvikling (Trial by error)

(2) ❍ Analytisk Forskning

- Hvilket utdanningsnivå er mest vanlig i bedriften?

(6) ❍ Ingen formell utdanning

(1) ❍ Fagskole

(2) ❍ Bachelor

(3) ❍ Master

(4) ❍ Phd

(5) ❍ Usikker

- Har bedriften vært involvert i innovasjonsprosjekter sammen med FoU-institusjon

(1) ❍ Ja

(2) ❍ Nei eller usikker

- Hvordan ser du for deg bedriften vil jobbe med innovasjon fremover?

(1) ❍ Mange nye innovasjonsprosjekter

(2) ❍ Noen nye innovasjonsprosjekter

(3) ❍ Lite sannsynlig med nye innovasjonsprosjekter

(4) ❍ Ingen flere innovasjonsprosjekter

(5) ❍ Usikkert

- Dersom du mener innovasjon blir en stor del av bedriftens fremtid, hvordan tror du det vil finansieres?

(1) ❍ Gjennom offentlig finansiering

(2) ❍ Egne midler

(4) ❍ Andre finansieringsmidler

(5) ❍ Ingen innovasjonsprosjekter

- Har bedriften erfaring med offentlig finansiering?

(2) ❑ SkatteFUNN

(4) ❑ Innovation Norway

(5) ❑ SIVA

(6) ❑ Enova

(7) ❑ Regional Forskningsfond

(8) ❑ Fiskeri og Havbruksnæringens Forskningsfinansiering

(1) ❑ Ingen

(3) ❑ Annen _____

- Hvordan opplever du innovasjonsprosjekter med offentlig finansiering

(4) ❍ null

(2) ❍ Negativt

(3) ❍ Nøytralt

(1) ❍ Positivt

- Begrunn svaret på forrige spørsmål
- Har du møtt noen utfordringer i forbindelse med offentlig finansiering?
- Har du møtt noen utfordringer i forbindelse med samarbeid med FoU-institusjon?
- Hva tenker du på som de største fordelene med offentlig finansiering for innovasjon i forhold til andre finansieringskilder?
- Har dere noen suksesshistorier eller eksempler på gjennomførte prosjekter som har blitt offentlig finansiert
- Hva slags støtte eller ressurser trenger din bedrift for å være mer vellykket i søke om og motta offentlig finansiering for innovasjon?
- Hva slags støtte eller ressurser trenger din bedrift for å være mer vellykket i samarbeid med FoU-institusjoner?
- Hvordan kan offentlig finansierings initiativer bedre treffe din bedrift sine behov?

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