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Sustainable Entrepreneurship Project (SEP)

**THE ROLE OF PUBLIC FUNDING ALLOCATION STRATEGIES
 IN AFFECTING SUSTAINABLE START-UP PERFORMANCE:
 A CASE STUDY OF THE FRISIAN INNOVATION FUND**

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ABSTRACT

Recognizing the importance of stimulating sustainable innovations to effectively address the pressing sustainability challenges, governments are providing public funding for sustainable start-ups. By understanding the allocation strategies, start-ups can effectively utilize the public funding they received in order to achieve their perceived sustainability goals. Funders, on the other hand, also need to measure the performance of the start-ups to ensure the subsidy is producing the desired results. This qualitative study employed a case study of the Frisian Innovation Fund to better understand the allocation strategies and how they affect the sustainable start-up performance. Through data analysis of the primary and secondary data (applications and reports), the findings show that sustainable start-ups allocate their funding into: materials and direct labours; selling, general, administrative activities that cover marketing, certifications, grant applications, and business travel; and research and development purposes. These allocation strategies will eventually result in the desired impacts: financial sustainability, scaling up, exposure to opportunities, increased entrepreneurship, emission and waste prevention, clean water and green energy production, increased circularity, less water scarcity, improved quality of life, social job creation, more innovation and more collaboration and partnership.

Keywords: public funding, government funding, allocation strategy, sustainable start-up, sustainable performance, performance measurement

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INTRODUCTION

Within the last decade, sustainability has become increasingly apparent due to the worsening environmental and societal issues (Dryzek & Pickering, 2018). In addressing these challenges of sustainability, sustainable entrepreneurship is deemed as one of the key initiatives (Veleva, 2021). Sustainable entrepreneurship itself is defined as engaging sustainability in the operational strategy of business while generating shared value by embracing innovation (Atiq & Karatas-Ozkan, 2013) and it has the potential to transform technology, products, and markets (Larson, 2000). An essential actor in driving innovation is none other than start-ups (Pakura, 2020), and in the case of sustainability: sustainable start-ups (Bergmann & Utikal, 2021). Yet, establishing a sustainable start-up is strenuous due to numerous issues such as lack of financial support, low marketing opportunities, inadequate digital awareness, and competition (Anitha & Veena, 2022). To overcome the financial challenge and flourish sustainable innovation, major investments and fundings for sustainable start-up are required (Bocken, 2015).

Among the many funding options like venture capital, bootstrapping, bank loans, public funding, crowdfunding, or angel investor; public funding is one of the frequently used sources (Hisrich et al., 2020). Public funding can be understood as capital coming from the public treasury, which may take form as federal, state, or local government (The Community Tool Box of The University of Kansas, n.d.). Government funding, one type of public funding, has significant benefits in promoting innovation and generating spillover effects (Kumar & Devi, 2020). It also helps prevent sunk costs for innovation, improve monitoring, and maximize social and environmental benefits (Yang et al., 2021).

But the story does not end when sustainable start-ups receive funding from the government. Sustainable start-ups need to strategically allocate the fund to produce optimum results and how

well start-ups allocate their funds is one of the indicators that investors use to assess start-ups' success potential (Cole, 2024). On top of that, their allocation strategies will affect their outcomes, impacts, and performance. Following this reason, there is a necessity to validate whether the fund is allocated according to plans and thus contributing towards the positive impacts as perceived in the beginning. Start-ups also need to focus on measuring their sustainable footprints and demonstrating sustainable authenticity to overcome the sustainability challenges (Kratzer, 2020) and this can be achieved through performance measurement. For these reasons, performance measurement of sustainable start-ups is needed to guarantee that the fund is producing the expected contribution, while start-ups can continue to monitor and improve their businesses.

Following this rationale, the research question is proposed: *how does public funding allocation strategies affect sustainable start-up performance?* This research question will be answered through the case study of the Frisian Innovation Fund, a subsidy provided by the Municipality of Leeuwarden to kickstart sustainable projects in Leeuwarden. Thus, this research aims to develop a framework on how public funding allocation strategies, how start-ups use the funding they received, affect sustainable start-ups performance and develop a measurement framework (metrics) to assess the performance of sustainable start-ups that harness public funding.

This research contributes to the theory by developing a framework of how sustainable start-ups allocate their public funding and how it affects sustainable start-ups' performance. Moreover, a framework to measure the performance of sustainable start-ups who received part of their funding from the government is also proposed. Until now, research on allocation strategies in general, and the measurement framework for sustainable innovation, sustainable start-up, and start-up funding (especially public funding) in particular are still sparse. Furthermore, this research aims to equip sustainable start-up funders, specifically governments, with a starting point in the form of

measurement framework to measure the performance of the fund grantee. By using the framework, it is expected that government and sustainable start-ups can continuously improve their performance and further contribute to sustainable development. Through the allocation strategies framework, sustainable start-ups and entrepreneurs can gather insights on how to allocate the subsidies they received, especially government funding, and their possible contributions to propel sustainability. This research will hopefully encourage sustainable start-ups establishment and improvement.

This research is structured as follows: the Theory section offers the literature review, reference and research gap of each relevant topic; followed by the Methods section detailing the research steps. The Findings section explains the insights of public funding allocation strategies and sustainable performance measurement with its metrics, continued by the Discussion section and followed by the research's recommendation and limitation, as well as possibilities of future research; and lastly, the Conclusion section.

THEORY

Public Funding

Public funding, better known as government funding, can be defined as the financial support provided by the government for activities or services (Garrett & Leatherman, 2000). Governments worldwide designated a large amount of funds to propel innovation and support early stage start-ups, especially in the sector of clean technology or sustainability (Islam et al., 2018). Government funding that takes the form of a small-scale public policy assists entrepreneurs in overcoming entry barriers and financial constraints, reducing costs, as well as encouraging economy-stimulating innovations (Butler et al., 2016). Additionally, securing a grant from the

government also boosts start-ups' legitimacy and catalyzes connections with potential venture capitalists (VC) for further funding opportunities (Islam et al., 2018).

In light of the means of funding, several studies were done to measure the performance of incubator funds, for example the work by Tarroni (n.d.) that validates an incubator activities framework and by Messeghem et al. (2018) that uses balanced scorecard (BSC) to assess incubator performance. There is no measurement framework for public funds, especially government funds, that is aimed for sustainable innovations. The gap arising from these findings are visible because most of the activities done by incubators (such as knowledge sharing, network expansion, co-working, mentoring) are not found in government funding; these activities might contribute more to start-up performance, independent of the fund. Furthermore, government fundings often materializes as a grant or subsidy instead of investment, leading to a different expectation and materiality in performance measurement.

Allocation Strategies

Reflecting on the preceding research about start-ups financial spending, how start-ups allocate or use the funding they received is still under-theorized, not to mention sustainable start-ups with public fundings (especially government fundings). Hence, this research refers back to the spending strategy of common businesses as the guidance for start-ups' allocation strategies framework. Outlining several sources (Jagannath & Koller, 2013; Chen, 2023; Cole, 2024), businesses expenditures can be categorized into:

- a. Materials and direct labours: directly related to the production of goods and services.
- b. Selling, general, and administrative expense (SG&A): including rent, utilities, office supplies, legal costs, sales and marketing, payroll, and insurance costs.

- c. Research and development (R&D) expense: this includes basic research, especially for start-ups' product and service development.
- d. Depreciation and amortization

It is important to dive deeper into this topic and fill in the research gap because government funds usually do not cover the whole capital needed by sustainable start-ups, and as a result they cannot be attributed fully for the start-ups' performance. Moreover, how sustainable start-ups allocate their funding will affect the material (important and relevant) topics of their performance measurement.

The way companies use the funding will produce different outcomes and in result will eventually affect the long-term goals or impacts that companies want to achieve. In order to showcase the relationship between the allocation strategies and the performance of sustainable start-ups, the Theory of Change is used in this research.

Theory of Change

Theory of Change (TOC) is a description and illustration of how and why a desired change is expected to happen (The Center for Theory of Change, n.d.). It maps out the process of how a change occurs and illustrates the connection between actions and outcomes, and how their interactions bring about the desired long-term goal. It is a valuable tool to understand how resources and activities achieve the goals, find gaps and room for improvement, and evaluate the activities (PCAR, 2018). In leveraging TOC, a logic model (example as seen in Figure 1 below) is visualized to systematically understand how an activity can produce the desired impacts.

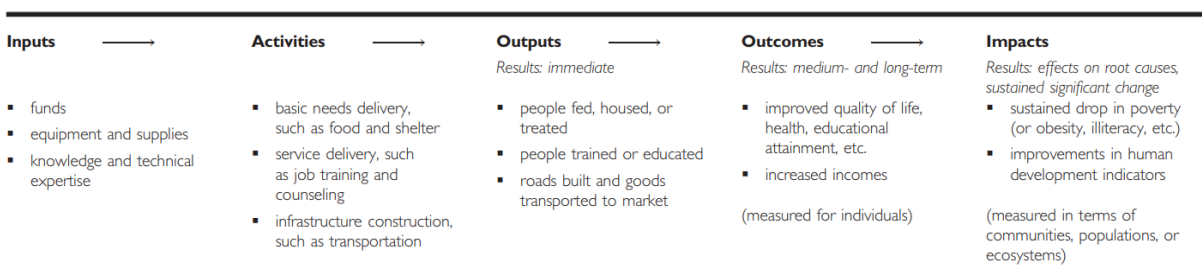


Figure 1. An example of TOC in logic model (Ebrahim & Rangan, 2014)

Some essential parts of the logic model are (Ebrahim & Rangan, 2014; PCAR, 2018; The Center for Theory of Change, n.d.):

- a. Inputs: including funds, equipment and supplies, knowledge and technical expertise.
- b. Interventions or activities: what organizations do with the inputs to achieve the goals.
- c. Outputs: an immediate result due to the interventions or what organizations offer.
- d. Outcomes: medium and long-term results.
- e. Impacts: significant or lasting changes in people's lives brought about by a given action or series of actions, addressing the root causes of a problem. Impacts are more often achieved by a collective effort of actors working toward the same objectives, rather than by individual actions.

Sustainable Start-Up Performance Measurement

Sustainable performance measurement, broadly known as impact evaluation, involves an assessment of impacts or results related to the triple bottom line of sustainability: financial, environmental, and social. Performance measurement is valuable for both organizations and funders. Organizations can evaluate their effectiveness, satisfy external accountability expectations, and guide their improvements. Institutional funders, including the government, on the other hand, can allocate their resources more effectively and strategically on top of legitimizing their funding decisions (Ebrahim & Rangan, 2014).

Discussing the sustainable innovation and sustainable start-ups' performance, several research have proposed measurement frameworks. In terms of measuring sustainable product and process innovation in the manufacturing industry, a measurement scale was developed and was validated through a case study in Turkey (Calik, 2024; Calik & Bardudeen, 2016). Another measurement scale that comprises 36 variables for sustainability-oriented innovation was also developed by Baxter & Chipulu (2023). An indicator to measure sustainable innovation in logistics was also developed by Andersson & Forslund (2018). These studies mostly focus on the manufacturing and logistics industry, in which the sustainability innovation does not arise from the initial starting point of the business development and the organizations observed do not take form as sustainable start-up. These might lead to differences in objectives and goals as well as what they deem as material in performance measurement.

Summarizing, from the literature it is apparent that there is still a notable gap in both sustainable start-up public funding allocation strategies and performance measurement. This research will use these insights to gain better understanding and develop a framework of how sustainable start-ups use the government funding they received and how the funding affects their performance.

METHODS

Research Design

This research is qualitative research that employs a case study to answer the research question. Qualitative research is done to gather non-numerical data to produce insights (Ugwu & Eze Val, 2023), and in this case how public funding allocation strategies affect sustainable start-ups' performance and how to measure their performance. A case study is used to answer the research question because it provides a detailed examination of a single example and provides

information about the broader phenomenon (Flyvbjerg, 2011), in this case the public funding allocation strategies and sustainable start-ups performance measurement.

The object of the case study is the Innovation Fund managed by the Municipality of Leeuwarden. The Innovation Fund is chosen because it is the embodiment of the City of Leeuwarden's commitment to sustainability and is granted as grants or subsidies for start-ups with clear vision and mission for sustainability. Additionally, the Innovation Fund is granted to ten projects annually, which makes it more convenient to communicate with the grantees, and also to keep track of the data and records.

The Innovation Fund.

Recognizing the big role of government in encouraging sustainable innovation, the Municipality of Leeuwarden in The Netherlands founded *Innovatiefonds Circulaire- en Energietransitie*, The Circularity and Energy Transition Innovation Fund (hereafter referred as the Innovation Fund) in 2018. The Innovation Fund aims to support and stimulate start-ups and scale-ups, traditionally focusing on creating economic spin-offs. The fund was originally intended to provide the financial support, which was initially not available in the northern Netherlands, for the spin-offs from the scientific research of Wetsus knowledge institution, focusing on water management and technology. Upon the warm welcome and positive feedback from the start-ups, the municipality decided to broaden the scope of the fund to cover circular economy, sustainable energy and resources, digitalization, healthcare, and many more.

The municipality's main objectives through the Innovation Fund are:

- a. Creating broad prosperity (well functioning society, ecology, and economy) in the region of the North Netherlands, especially Leeuwarden.
- b. Encouraging innovation and entrepreneurship to add value for the region.

- c. Attracting companies and keeping the companies within the region, to prevent brain drain in Northern Netherlands.
- d. Becoming the bridge between companies and other broader regional funding schemes (for example: government funding from the Northern Netherlands or European Union).

The Innovation Fund amounts to €250,000 annually and is granted to ten projects on average (amounting to €25,000 per project). To be considered for the grant, companies have to submit an application form and project plan, which then will be assessed by the municipality depending on their projected impacts for the region. The projects need to be innovative and substantial enough to add value to the region in a broad sense. Furthermore, the project must be a collaboration between at least two parties, one party (company) needs to be in Leeuwarden and the other can come from anywhere. The Innovation Fund subsidizes a maximum of 40% of the project, with the maximum amount of €25,000. The grant will be given in two parts: the first 80% (€20,000) to finish the project aligning to the project plan and the last 20% (€5,000) as additional funds after the companies submit their end report. The subsidy period usually lasts for one year and can be extended under certain circumstances.

This research is conducted through the four following steps: interview with the Municipality of Leeuwarden, interview with the grantees of Innovation Fund, data analysis, and framework development. Moreover, this research adheres to all ethical considerations of the University of Groningen. All participants will be thoroughly informed about the research and data confidentiality through the Information Sheet (see Appendix 1 and Appendix 2) and Informed Consent Form which is signed by the participants before the interview (see Appendix 3). The details of each four steps will be discussed in the following points.

Data Collection: Interview with the Municipality of Leeuwarden

A semi-structured interview with the Municipality of Leeuwarden as the grantor of the Innovation Fund is done to better understand the Innovation Fund, the municipality's objectives through the fund, the criteria of projects, and the subsidy process, as well as the municipality's expectation for the projects (the interview guide can be seen in Appendix 4). Additionally, through discussions with the municipality, the researcher obtained access to companies' project plans and end reports to further support the data analysis.

Data Collection: Interview with the grantees of the Innovation Fund

In parallel to the interview with the municipality, semi-structured interviews with six grantees of Innovation Fund were also conducted to align the information gained through the reports, as well as to gain deeper understanding of how the companies allocate the Innovation Fund, what their perceived contribution are, how their current sustainability performance measurement or reporting are, and what topics they deem material for performance measurement (interview guide can be seen in Appendix 5). The interviews were done through online meetings that lasted for 15 to 30 minutes for each participant, and they were also recorded for data analysis purposes.

The companies interviewed in this research are the sustainable start-ups in Leeuwarden, which were established less than five years ago and work in energy transition, water management and circular economy: all of which align with the initial focus and current objectives of the Innovation Fund. Moreover, the companies also received the fund during the early phase of their business, to reflect the role of governmental support in helping companies move past the valley of death, especially during the innovation process (Ford et al., 2007). The companies will be anonymized for confidentiality and the summary of each company can be seen in Table 1 below.

Table 1 Overview of project companies

Company	Funding period	Sector	Projected cost	Interview participant	Funded project
A	2022 - 2023	Water management and technology	€88,400	CEO & Co-founder	Technology development for increased capacity ocean carbon capture
B	2022	Water management and technology	€67,850	Co-owner	Wastewater treatment for pleasure boating
C	2021 - 2022	Energy transition	€75,000	Project developer	E-methanol biogas energy
D	2022	Water management and technology	€80,000	CEO & Co-founder	Optimization for water distribution leakage detection AI
E	2023 - present	Circular economy	€63,000	Project manager	Impact dashboard for circular materials
F	2021 - 2023	Energy transition	€66,000	Co-owner & product development	Automatization for the production of custom-made solar panels

Data Analysis

On top of the primary data collected through the interviews, this research also harnessed secondary data, taken from the companies' application forms and end reports, both which were submitted to the Municipality of Leeuwarden as part of the subsidy requirement. Additional information gathered from the forms and reports include: companies' profile, companies' objectives related to sustainability, budget allocation planning and report, and perceived positive impact on three sustainability pillars and reports. The interview recordings were then transcribed using the help of Otter.ai (transcriptions can be seen in Appendix 6) and then coded with Atlas.ti. The data analysis was then continued with triangulation of information gathered from the application forms, end reports, and the interview codes.

Framework Development

Through the data analysis process, the framework for public funding allocation strategies was then developed in line with sustainable start-up performance. The framework was developed incorporating the existing literature detailed in the Theory section. To understand how public funding allocation strategies affect the sustainable performance, the logic model of TOC that exhibits expected relationship was employed side-by-side with the coding process. Thematic coding is done throughout the data analysis and framework development: the aggregate dimension is based on the literature review of business expenditures and coding of primary and secondary data was done to form the connection between outputs, outcomes, and impacts; showcasing the relationship between allocation strategies (activities) and impacts.

In the logic model, the Innovation Fund is one of the inputs that companies acquire and the activities are the way companies allocate the fund, which produces outputs and outcomes, eventually leading to the impacts they want to achieve. The impacts reflect companies' sustainability aspirations and the goals that the municipality wants to achieve by granting the Innovation Fund; these actually are the material topics for the performance measurement. The metrics needed to assess the sustainability performance are developed in line with the previous research and existing tools, as well as according to the forms and reports.

FINDINGS

In this section, the results of analyzing the primary and secondary data are discussed in three following points: public funding allocation strategies, sustainable start-up performance, and other findings.

Public Funding Allocation Strategies

The report analysis and coding process generated the codes related to the outcomes in the logic model. The aggregate dimension of the coding process -the allocation strategies- refers back to the business expenditures. In terms of the logic model, how companies allocate the Innovation Fund they received equate the activities that companies do to achieve their sustainability goals (impact). The public funding allocation strategies framework is illustrated in Figure 2 below.

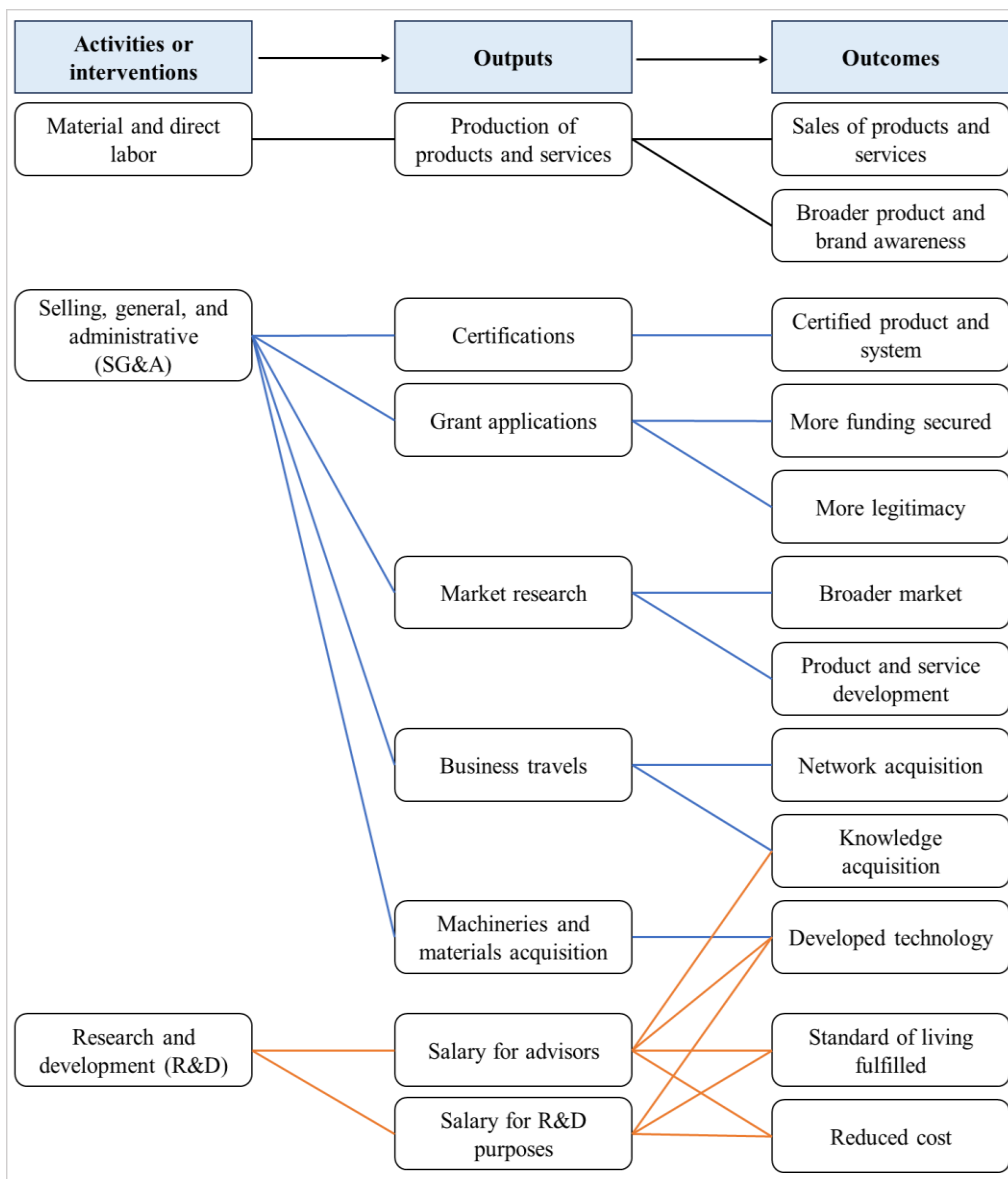


Figure 2. Public funding allocation strategies

Materials and direct labour.

The first allocation strategy is to use the fund for materials and direct labour in the production process. Through this allocation method, companies are able to produce their products or services, and in result they generate sales for their products and services as well as increase their product and brand awareness. This allocation strategy is not too apparent in the analyzed data; only Company A mentioned this type of allocation.

“Some travel costs or *materials*... So mainly we paid for salaries with this... with this money. *And materials*. But the bigger part of the subsidy we use for salaries.”

Selling, general, and administrative.

The next activities start-ups spend their fund into are associated with selling, general, and administrative activities. This allocation strategy entails multiple outputs, as it is the most umbrella strategy that covers a broad range of activities. First, a company directed the fund for the certification process that earned them a certified system.

“... and like maybe third party companies helping us out with certification.” - Company B.

Other companies also utilize the fund to cover the application fees for higher level grants they applied to. By applying to other grants, they were able to secure more capital and they gained more legitimacy by receiving the fund, as it implies that their companies are sustainable and innovative enough.

“We applied for a European grant, LIFE. So you could kind of say Innovation Fund was maybe kind of a stepping stone for the LIFE funds.” - Company C.

Moreover, Company C also spent some of the funding for market exploration, which led them to have broader markets and insights on how to better develop their products and services.

Another company used the fund for another purpose: business travels, which allowed them to gain valuable knowledge and network for their products and innovation. Another output companies got by allocating the fund with this strategy was acquisition of existing resources like. Through this process, companies were able to further develop their technology and innovation.

“Some travel costs or materials, 1K. We took over some equipment from the WETSUS...” - Company A

Research and development.

Last but not least, companies allocate the Innovation Fund for research and development related activities. This allocation strategy is the most frequently seen within the interviewed companies: *all* companies used the fund to develop the innovation they proposed. Several reasons why research and development is the most preferred allocation strategy will be discussed in the Discussion section. This allocation strategy commonly results in salaries, both for advisors and internal personnel who dedicated their working hours for research and development purposes.

“We work with mechanical and electronics engineers to build out our prototype... We attracted a new employee with a junior chemical engineer... mechanical engineer and the new engineer... So mainly we paid for salaries, the salary to develop like the technology.” - Company A.

“So every hour that I spend on a project costs money. If, for example, I cost 50 euros an hour and then the... you get 20 euros an hour from the Innovation Fund that makes it more feasible for a company like this to start something. How we allocate? So it's mostly hours.” - Company C.

“And we separately put the money into... I think maybe 50% of the money went to other companies that helped us develop our automation process.” - Company F.

By improving and innovating the products and services, companies are moving towards technological development and cost reduction for their future operations. Additionally, working

together with advisors enables companies to access more necessary knowledge and expertise. Receiving salaries also translates to their ability fulfilling the standard of living.

Sustainable Start-Up Performance

Through analyzing the application forms and end reports, as well as coding the interviews, the codes associated with impacts in logic model were produced based on companies' perceived sustainability goals and the municipality's objectives through the Innovation Fund (coding structure can be seen in Appendix 7). These impacts are then linked to the outcomes from the allocation strategies framework to better understand how the allocation strategies eventually affect the sustainability performance of a company. Furthermore, the metrics related to each impact were also identified to assist the performance measurement of each company. The metrics proposed in this research considers the measurement practicality, as the measurement is proposed for the government as the funding provider; most of them are direct and relatively applicable. The sustainable start-up performance measurement framework is illustrated in Figure 3.

Financial.

In terms of financial performance, the companies and the municipality are trying to achieve several goals namely: achieving financial sustainability, scaling up, getting exposed to more opportunities, and increasing entrepreneurship in the Northern Netherlands. In principle, all companies are trying to be financially sustainable to sustain the business.

“And obviously it also should be financially feasible if we want to grow a good and sound company, and we also work hard for it. ” - Company D.

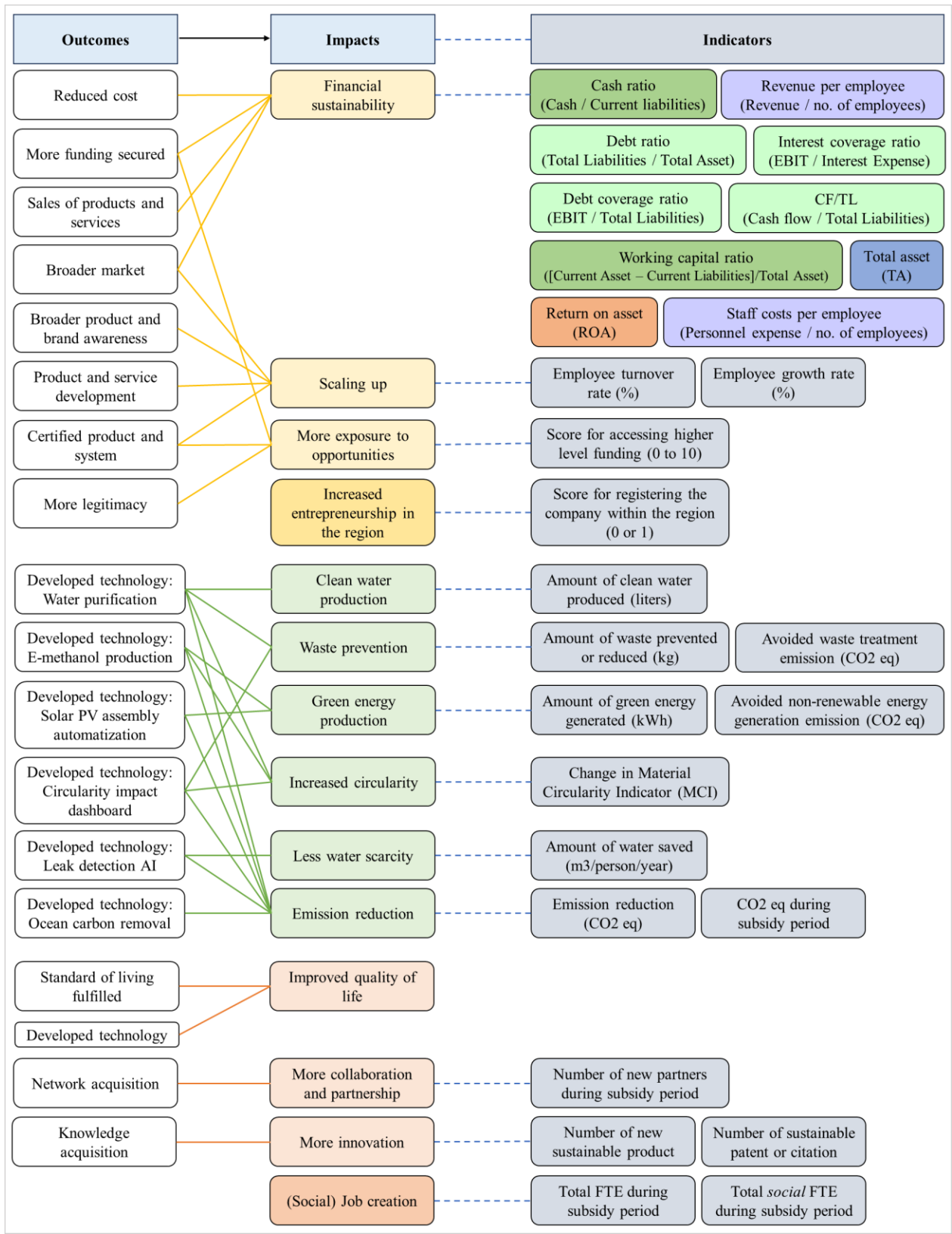


Figure 3. Sustainable start-up performance and metrics

The outcomes that will help companies achieve financial sustainability through revenue and profit increase are cost reduction, more funding and capital, sales of products and services, and broader market reach. Various financial indicators are used to measure financial sustainability in accounting and preceding research. The financial sustainability is measured in several categories according to preceding study about financial statements as predictor for start-up survival (Fuertes-Callén et al., 2022): firm's size (reflected by the total asset), profitability (measured by Return on Asset - ROA), solvency, liquidity, and ability to secure talents. Start-up's solvency is measured by the debt ratio, interest coverage ratio, debt coverage ratio, and cash flow to total liabilities ratio. The measures to liquidity are working capital ratio and cash ratio, and for human capital development, revenue per employee and staff costs per employee are used. This reference is used because the study uses first-year financial statements to display the uncertainty of the financial statements in the early stages of start-up establishment.

Companies also have the ambition to scale-up their businesses in order to broaden their impact and they are aiming to increase their scale to international level.

"First phases, and then the upscaling... starting new things." - Company B.

"There are not so many companies that have this global ambition and also have this kind of growth mindset that we have. It's really important to... from a technology perspective to prove it in different countries and different regions, different types of networks, different cultures, etc." - Company D.

In order to scale-up, it is preferable for companies to expand their market share and increase their product and brand awareness. They also need to to develop their products and services in line with market trends, as well as to have a replicable, certified products or system. To measure scale ups, two metrics are used: employee turnover and employee growth. These metrics are based on OECD's definition of scale-ups: SMEs with 10-249 employees that grow in employment or

turnover at an average yearly rate of 10% or more for three consecutive years (OECD, 2021). It is worth noting that they need to start with 10 employees to be considered a scale-up.

Additionally, by gaining more legitimacy and having certified products and systems, companies are expected to have more exposure to opportunities, in this case leading them to even larger funding possibilities. This impact reflects the objective of the municipality as the funding provider.

"And when they finish a project within the Innovation Fund, they might come... they might reach it to the next level. They can do the application for the other funds. So we try to build it as... as region. So, this is the first step." - Municipality.

This impact can be measured by, for example, the extent to which a company is able to secure more funding. For instance, score 0 when the company is not applying to higher level funding or no higher level funding available, score 5 if the company applied to higher level funding, and score 10 if the company is granted the higher level funding. The metric needs to be developed further according to the funding availability, companies' conditions, and municipality's expectations.

Lastly, through the Innovation Fund, the municipality aims to increase entrepreneurship within the region of Northern Netherlands, especially Leeuwarden, in the long term.

"That's actually why we have this fund, to attract companies to the region, to hold the companies in the region, to not have a brain drain in Northern Netherlands. That they stay within the region, the companies.

That they add value to a region." - Municipality

This lasting impact is achieved through every collective activity done by the companies. To measure entrepreneurship, for instance, a binary score can be used to identify whether the company registered the company in Leeuwarden within the subsidy period (1) or not (0).

Environmental.

Although their solutions are directed to solve *different* environmental problems, all interviewed companies have a strong focus to make positive impacts for the environment. In fact, contributing to the environmental pillar of sustainability is what drives all companies to do what they are doing and develop their technology. Details regarding the environment-related goals of the companies can be found in Appendix 7 as well.

Company B, in particular, aims to produce clean water by developing their water purification technology. In order to measure this impact, the amount of clean water produced during the subsidy period in liters is proposed as a metric. Through developing the water purification technology and developing the circularity impact dashboard, both Company B and Company E aim for waste prevention that can be measured with the amount of (potential) waste prevented or reduced and extended to the avoided waste management emission.

Company C and Company F both aim for green energy production by developing their e-methanol production and automated solar PV assembly technology. Green energy production can be measured by the amount of green energy produced (kWh) during the subsidy period, and can be extended to the amount of avoided non-sustainable energy production. By developing their technology, Company B, C, and E are contributing to increasing the circularity as well. This can be measured by observing the change in the Material Circularity Indicator (MCI) developed by the Ellen McArthur Foundation before and after the subsidy period. By utilizing the Excel tool provided by Ellen McArthur Foundation, the circularity of product and material is scored from 0 (fully linear) to 1 (fully circular).

Conversely, Company D has a strong focus in reducing the water scarcity through their leak detection AI. To measure this impact, the amount of (potential) water savings in m³ per person

per year, aligned with the metrics of Falkenmark Index or water stress index (White, 2012). Lastly, all companies' technologies are eventually aimed at emission reduction. To measure the emission reduction companies can calculate the amount of (potential) CO₂ equivalent saved or reduced and to account for the emissions produced by the company, the CO₂ equivalent of the emission should also be measured.

Social.

Regarding the social pillar of sustainability, both the municipality and companies aim to improve the quality of life of their surrounding communities and provide job opportunities. By allowing competitive salaries to fulfill standard of living, they are improving the quality of life of the people involved in the company. Continuously developing their technology is expected to eventually increase the communities' quality of life as well.

"The swim water is much better so people can actually go swimming without being... without being alarmed about swimming water quality." - Company B.

"Clean water and sanitation for all is one of the SDGs as well, where we focus on to get on with as well a bit the smart cities, smart and sustainable cities." - Company D.

Among all impacts, measuring the well-being or quality of life is relatively challenging, as social impacts are oftentimes immeasurable (Molecke & Pinkse, 2017). On top of that, quality of life consists of a myriad of social dimensions and it is only apparent after a relatively longer period of time. The measurement tools for quality of life are still largely being developed and each region is currently having different measures for it (for example: The 8+1 Dimensions from Eurostat, WHOQOL - WHO Quality of Life). It is recommended that improved quality of life is not measured within the subsidy period, but in a further time frame. Moreover, the achievement in

other impacts will result in improved quality of life as well. Thus, for the time being, there will be no quality of life metrics proposed in this research.

Evidently, every company mentioned job creation as their main social impact, in which this impact can be achieved through the collective activities that produce the perceived outcomes. Particularly, Company E extends this impact to creating job opportunities for people with distance to the labour market.

"We have a group of people who have a distance to the labour markets... we try to do with the hub now is to create more jobs." - Company E.

"We are creating jobs. So now we are with 12 people and six of them... six or seven of them are working within the Leeuwarden region." - Company A.

"And of course, we generate some bit of jobs. At the moment six (people are involved in the company now)." - Company B.

"So to some extent, we also look there for partnerships with local people to create jobs there as well." - Company D.

In order to measure this impact, two metrics based on the analyzed reports are proposed: total FTE (full-time equivalent) during subsidy period and total *social* FTE during subsidy period. Social FTE translates to the accumulated FTE of people with distance to the labour market.

In addition to that, the municipality also has the long term goals of encouraging more innovation, collaboration, and partnerships. The network companies acquired is expected to foster more collaboration and partnership, while the new knowledge companies obtained will potentially result in further innovation.

"So whenever they are cooperating with knowledge institutions, or other companies within this region, try to do everything local and together with the community... that's the factors for us that... that enhances the quality of the project." - Municipality.

"And of course, they have to add some substantial value, substantial value to the circular economy and renewable energy or sustainable energy." - Municipality.

Adapted from Calik (2024), two metrics can be used to measure the sustainable innovation: number of new sustainable products (or service, technology, systems) during the subsidy period and number of sustainable patents or citations during the subsidy related to the new product during the subsidy period. On the other side, collaboration and partnerships can be measured by the number of new partners during the subsidy period.

Other Findings

On top of the previously discussed findings, the interviews provided additional information about how companies came across the Innovation Fund, their thoughts on the process and the Innovation Fund in general, along with their current state of sustainable performance measurement. Most of the companies got the information of funding availability through word of mouth, either from the staff of the municipality or the people working at the Leeuwarden water campus ecosystem, the initial partner of the Innovation Fund. Some other companies recognized the funding opportunities through their experience and then leverage the connection that they have.

"And so we were involved in the water campus ecosystem. And then I think after talking to (someone at Wetsus), he pointed out to this gemeente Innovation Fund, the municipality Innovation Fund, and then we reached out to (someone at the municipality)." - Company A.

"Well, we got some personal contact from the *gemeente*, so like, municipality." - Company B.

“I knew a few people from the *gemeente* and I got noticed by the water alliance I think as well.” -

Company D.

“He (the co-founder) is quite well connected. Okay, so I think that's how we came across these

kinds of opportunities, subsidies.” - Company E.

Other than that, the participants also expressed their satisfaction with the whole procedure of the Innovation Fund. They agree that the application process was approachable and efficient, it is the right amount of effort for the right amount of money. The ease of application makes the Innovation Fund more attractive to start-ups and entrepreneurs.

“So I think the amount of work that it takes to apply to them and to make the final report is... is good for

the... for the amount of money that it is.” - Company C.

“The application process was, in my opinion, doable. So it was... I would say, a perfect way of doing it.”

- Company D.

“Because often, these procedures can be very long and very uncertain. And as an entrepreneur, you don't have that much time to give to these kinds of things, especially if the amount is not that high, then it's too much effort to put into it. And it (the Innovation Fund) was a really... really pleasant actually. Maybe

what is interesting to know is that there are many subsidy... subsidies available. Some are... very often

actually, it's really hard to tap into them as a small company” - Company F.

Utilizing the subsidy, start-ups can afford to have bigger space to move and larger margin of error, enabling them to focus more on the innovation and making sure the innovation is indeed making a difference.

“The thing is the innovation companies... They exist because they want to do innovation and they don't want to hassle with money. So it makes it easy and doesn't need to be much money but if it's easy that brings a process very much further” - Company B.

“And for us that really made it possible to also really focus on the innovation instead of also trying in the meantime, to go too quick and let's say not have the good product in place. So for us it was really it... It gave us some... some margin of error, so to say, to really focus on the innovation and make sure that the innovation was also really being developed in a good way.” - Company D.

In short, the companies concurred that the Innovation Fund was very useful and it helped them setting the wheels in motion.

“This is really a great way to get companies started. I'm just very happy with this. This really takes us a step further.” - Company B.

Discussing the performance measurement and sustainability reporting, most of them are familiar with sustainable performance measurement, but they are not yet doing it formally or doing it only for internal purposes; none of the interviewed companies did sustainability reporting. Although they are aware of performance measurement, several reasons are keeping them from officially conducting it. The companies are still very young and are in their early stages, in which they have other things to prioritize, such as developing their products and securing capital, above doing performance measurement despite their sustainability-driven business operations.

“We are a really young company... So you know... it's a small company so we don't (do measurement performance or sustainability reporting)...” - Company C.

Besides that, companies perceive doing performance measurement and sustainability reporting as difficult and time consuming. As it is not mandatory for them to do the measurement and reporting, companies have yet to see the advantages in putting more effort into conducting them.

“No, we don't (do sustainability reporting or performance measurement). I'm definitely familiar with it. It's quite hard to do this reporting. So if it would be mandatory, we will do it. But it's not mandatory that we don't see... advantages in doing so.” - Company F.

On the other hand, some others are taking incremental steps to imbue performance measurement and sustainability reporting, starting with working on projects together with researchers or attending sessions about conducting the reporting.

“We also perform the TEA (technical economic analysis), and not ESG report. We did a short LCA two years ago and last year, it was a research project of a master's student who performed an LCA together with an external expert.” - Company A.

“We have started. So we have had some sessions already on impact statements and also making our impact mission.” - Company D.

Smaller share of the interviewed companies are considering impact measurement more actively due to stakeholder pressure or because impact measurement is one of their core business innovations (internal purposes).

“And now with our current investors, we also start thinking more and more about the impact statement that we have with the company.” - Company D.

“So we did an LCA study and we came up with a rate of 88%. So, when we extract one tonne of CO₂, there's net removal at 880 kilograms of CO₂.” - Company A.

“... the application was about to create an impact dashboard. So it's interesting to see what kind of impact do we make when we pick up coffee grounds, for example. And what impact do we make by creating new products from it. Like there's... there's impact there and to make it measurable we worked on an impact dashboard.” - Company E.

DISCUSSION

Outlining the findings in the previous section, several points are discussed deeper in this part. Reflecting on the allocation strategies, it is evident that all companies spent the larger portion of the Innovation Fund for research and development activities. This allocation mostly results in internal salaries of the founders or core personnel of the company, as indicated that the companies are now in the early stage with a small number of people. By getting paid for their hours developing their products, they can fully focus on innovation and do not need to worry about unpaid work hours. Other than that, focusing on research and development is the most common strategy for start-ups because at early stage start-ups need to innovate, on top of innovation being the main focus of the Innovation Fund. And for the smaller portion of the subsidy, the allocation is scattered for different activities ranging from production and marketing to certifications and travels. This indicates that companies realize that developing their technologies is the most likely needed outcome to produce the desired impacts as seen in the logic model and companies have different approaches to complement their research and development activities.

In terms of impacts and sustainable performance, companies seem to lean more towards environmental impacts rather than the social impact. For financial performance, it is implied that having a good performing financial condition is the first step towards the other two pillars. While most companies have extensive environmental goals they want to achieve, the social impact they mentioned is mostly job opportunities. Only two companies, Company D and Company E

explicitly pointed out more social impacts such as social workplace, transnational opportunities, collaboration and cooperation. This phenomenon might occur because the participating companies are the ones in the water management and energy transition industry instead of the socially focused sector. When asked about their negative impacts, companies acknowledged that they still have impacts on the environment, as they are now not yet 100% sustainable. For instance, their operations still produce waste and they can not resort to a fully sustainable supply chain because it is simply out of their control at the moment. However, all of them are trying their best to maximize their positive influence. Moreover, only a small number of companies are doing the performance measurement and reporting because of reasons such as: complexity, costs to conduct it at current phase of business, and impracticalities for early-stages enterprises (Ebrahim & Rangan, 2014).

To assist the municipality in conducting performance measurement of the grantees, some metrics were proposed for each impact. As pointed out by Molecke & Pinkse (2017), impact measurement is still a challenge, especially for social impact which is not measurable most of the time. This statement is reflected during the process of determining the most suitable metric for the social topics, in which multiple metrics were found for a single impact (i.e. improved quality of life). Apart from it, the measurement of environmental sustainability is undoubtedly more time consuming and data intensive (for instance, carbon emission reduction). Measuring the impact of each company is a challenging feat because impact is measured at the community level, which involves a lot of other actors beyond the company. Another thing to note is that the metrics are intended to measure long-term impacts of the companies, but the municipality needs to do the measurement once the subsidy period ends (one year in average); the time unit for the measurement

might conflict each other: measurement done for the subsidy period *or* the period when the impacts reached their optimum (long-term).

All in all, the Innovation Fund, and government funding in general, is helpful to assist start-ups in their early stage of development and it gives them room for improvement and innovation as well as margin of error. The Innovation Fund is also approachable by start-ups, the amount of effort is worth the amount of subsidy, and it acts as a stepping stone to higher level government and public funding for companies. The Municipality of Leeuwarden is aiming to achieve broad prosperity in the region, and the Innovation Fund is playing an important part in it, by becoming the bridge for companies to produce the financial, environmental, and social impacts.

Limitations

Besides the perceived contributions this research gives in theory and practice, this research possesses a number of limitations. First, this research incorporates only a small number (six) of companies receiving the Innovation Fund and the start-ups are mostly working in the water technology and energy transition sector, thus limiting the generalizability of the findings and possibly restricting the material measurement topics (although one might argue that having sector specific indicators is more valuable). Other than that, the metrics proposed in this research are not yet validated further due to the limited timespan of the research. Additionally, the government funding in the case study provides a relatively smaller amount of money compared to the larger funding scheme (for example, LIFE from the European Union) and has certain restrictions for the use of funding: both might lead to limitations in allocation strategies. Finally, in principle, the Innovation Fund has a subsidy period for one year. Relating to this, companies might produce less or different outcomes compared to the funding scheme with longer subsidy timeframe, as most of the results are usually more apparent in the medium or longer period of time.

Future Research

The limitations mentioned previously open the possibilities for further research on these topics. Upcoming studies can validate the frameworks proposed in this research with other industry sectors and funding schemes as the research objects. There is also a possibility to explore the allocation strategies for sustainable start-ups beyond the product development phase and in the later stages of business. On top of that, the research potential for sustainable performance measurement is still vast, as the material topics differ for each company and condition. In this case, future research can continue validating and developing the metrics offered in this research, and even more: developing the mechanism, dashboard, or tool to aggregate the measurement result and produce a single score to assist the performance measurement process and make performance measurement more approachable and communicable for all stakeholders

CONCLUSION

This research aims to understand how sustainable start-ups make use of the public funding they received, in this case government subsidy: The Frisian Innovation Fund, and how the allocation strategies eventually help them achieve the perceived long-term goals or impacts. Generally, start-ups allocate the funding into three categories: materials and direct labours to produce the products and services; selling, general, administrative activities that cover marketing, certifications, grant applications, and business travel; and research and development purposes, which is the most frequently seen strategy in all interviewed companies. These activities and outcomes are helping the companies moving forward to the sustainability impacts they want to achieve. These material topics can be categorized into the three pillars of sustainability: financial (financial sustainability, scaling up, exposure to opportunities, and increased entrepreneurship), environmental (emission and waste prevention, clean water and green energy production,

increased circularity, and less water scarcity), and social (improved quality of life, social job creation, more innovation and more collaboration and partnership). Metrics for each material impact were also proposed to assist the performance measurement.

Through the interviews, some recommendations are also suggested to improve the region's sustainable performance measurement and funding ecosystem. As it is noticeable that companies are not doing performance measurement and sustainability reporting yet, the municipality can eagerly educate the companies about the importance of performance measurement and reporting. Through performance measurement, start-ups are able to evaluate and eventually improve their value chain, leading to better and broader impacts. Doing performance measurement is also beneficial for them to increase their legitimacy and transparency, making their businesses more attractive for stakeholders. Taking it one step ahead, the municipality can develop a dashboard or tool, or provide services and subsidies to help companies measure and report their performance. One company also suggested that the municipality takes more proactive actions to involve the companies more in developing the region's sustainability. The collaboration and cooperation between the government and sustainable start-ups will further boost the sustainable initiatives in the region and beyond.

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APPENDIX

Appendix 1: Information sheet for the Municipality of Leeuwarden



INFORMATION SHEET

Title of study: *The Role of Public Funding Allocation Strategies in Affecting Sustainable Start-Up Performance: Case Study of the Innovation Fund*

Dear, The Municipality of Leeuwarden

Thank you for your interest in participating in this research. This letter explains what the research entails and how the research will be conducted. Please take time to read the following information carefully. If any information is not clear, kindly ask questions using the contact details of the researchers provided at the end of this letter.

WHAT THIS STUDY IS ABOUT?

The objective of this research is to understand the role of public funding in affecting sustainable start-up performance and to develop a measurement framework out of it. The main research question is: *how does public funding affect sustainable start-up performance in making social and environmental impact?* This research question will be answered through the case study of the Innovation Fund.

WHAT DOES PARTICIPATION INVOLVE?

Participating in this study means that you agree to an interview of approximately 30 to 60 minutes. During this interview the researcher will ask you questions that focus on the mechanism of the Innovation Fund and your expectations for the projects that received the Innovation Fund.

DO YOU HAVE TO PARTICIPATE?

Participating in this study is **completely voluntary**. You are in no shape or form forced to participate in this study and choose not to answer questions without any consequences or providing reasons.

ARE THERE ANY RISKS IN PARTICIPATING?

There is no risk in participating in this research.

ARE THERE ANY BENEFITS IN PARTICIPATING?

There are no direct benefits in participating in this study. However, the participant may contribute to further the knowledge within the field of sustainable start-up performance and impact measurement of public funding.

HOW WILL INFORMATION YOU PROVIDE BE RECORDED, STORED AND PROTECTED?

All data generated in the process of this research project will be stored until the completion of the project according to the GDPR rules of the University of Groningen. Only members of the research team will have access to the data generated in the process of this research. Participants of this study will be *completely* anonymized, and no personal data will be found in the research paper.



INFORMED CONSENT FORM

By signing the informed consent form you as the participant indicate your willingness to participate in this study while still being able to withdraw until the date stated above.

WHO SHOULD YOU CONTACT FOR FURTHER INFORMATION?

For any further question please contact the researcher Brigitta Ancelina (University of Groningen) by email b.ancelina@student.rug.nl

Appendix 2: Information sheet for companies



university of
 groningen

campus fryslân

INFORMATION SHEET

Title of study: *The Role of Public Funding Allocation Strategies in Affecting Sustainable Start-Up Performance: Case Study of the Innovation Fund*

Dear, (company)

Thank you for your interest in participating in this research. This letter explains what the research entails and how the research will be conducted. Please take time to read the following information carefully. If any information is not clear, kindly ask questions using the contact details of the researchers provided at the end of this letter.

WHAT THIS STUDY IS ABOUT?

The objective of this research is to understand the role of public funding in affecting sustainable start-up performance and to develop a measurement framework out of it. The main research question is: *how does public funding affect sustainable start-up performance in making social and environmental impact?* This research question will be answered through the case study of the Innovation Fund.

WHAT DOES PARTICIPATION INVOLVE?

Participating in this study means that you agree to an interview of approximately 30 to 60 minutes. During this interview the researcher will ask you questions that focus on your experience with the Innovation Fund and the changes that the Innovation Fund brings to your organization.

DO YOU HAVE TO PARTICIPATE?

Participating in this study is **completely voluntary**. You are in no shape or form forced to participate in this study and you can withdraw your involvement in this study (on 3 May 2024 at the latest) and choose not to answer questions without any consequences or providing reasons.

ARE THERE ANY RISKS IN PARTICIPATING?

There is no risk in participating in this research.

ARE THERE ANY BENEFITS IN PARTICIPATING?

There are no direct benefits in participating in this study. However, the participant may contribute to further the knowledge within the field of sustainable start-up performance and impact measurement of public funding.

HOW WILL INFORMATION YOU PROVIDE BE RECORDED, STORED AND PROTECTED?

All data generated in the process of this research project will be stored until the completion of the project according to the GDPR rules of the University of Groningen. Only members of the research team will have access to the data generated in the process of this research. Participants of this study will be *completely* anonymized, and no personal data will be found in the research paper.

Appendix 3: Link to signed informed consent forms

https://drive.google.com/drive/folders/1DzmSAL03W6jtT3WcNwuZ5eFInvTD9i8?usp=drive_link

Appendix 4: Interview guide for the Municipality of Leeuwarden

INTERVIEW GUIDE FOR MUNICIPALITY OF LEEUWARDEN (GRANTOR OF INNOVATION FUND)

- Informed consent form
- Ask for permission to record the interview

Introduction & the Innovation Fund

1. Can you please tell me about the Innovation Fund?
 - a. Since when did the municipality offer Innovation Fund?
 - b. What kind of fund is the Innovation Fund? **Make sure that the fund is subsidies instead of loans**
 - c. What kind of industry does the municipality give the grants to?
 - d. Do they only receive the fund at the early stage of their projects? Or can it be at any stage (e.g. later stage)
 - e. What is the amount of the fund can each project receive?
 - f. Can they receive the fund more than once?
2. What is the main objective of the Innovation Fund in contributing to sustainability?
3. What kind of prerequisites do projects need to have to receive the fund?
 - a. Is the fund given **only** to start-ups **and/or** sustainable-oriented projects?
4. What processes need to be done for projects to receive the fund?
5. What kind of risks does the municipality perceive when granting the fund?

Expectations

Aligning municipality's expectations and perceived expectations by companies, making sure the expectations were communicated

6. What do you expect from the projects that have received the fund?
7. **First, make sure that municipality does not expect monetary return by giving subsidies.** If the municipality does not expect monetary return, what kind of return does the municipality wish to see?
8. How do you see the fund is used by the projects?

Checking the current condition of closure, aligning with companies' responses
9. Does the municipality require any form of reporting or feedback from the projects that receive the grant?
 - a. If yes, can you elaborate? (e.g: allocation report)
 - b. If not, why?
 - c. What kind of information do you wish to understand if the projects need to report back?
 - d. How often do you wish them to report? Once? Every year?

Material topics and performance measurement

10. What is the most important thing the projects need to achieve with the fund?
11. What do you think is the biggest positive impact that projects can give to the environment and society?
12. What do you think is the potential negative impact that projects have to their environment and society?

Closing

13. How do you see the alignment between the municipality's expectation and the projects' current business?
 - a. What parts align, what not?

THANK THE INTERVIEWEE!

Appendix 5: Interview guide for companies

INTERVIEW GUIDE FOR GRANTEES OF INNOVATION FUND

- Inform the summary of the research
- Informed consent form
- Ask for permission to record the interview

Introduction

1. Can you please tell me who you are and explain a little bit about what your company does?
 - a. When was the company founded?
 - b. What is the company sustainability goals?
 - c. What sustainability initiatives they pursue?

The Innovation Fund

2. Can you please tell me how did you come across the Innovation Fund?
 - a. What was the process of applying?
 - b. How long did the process take?
 - c. What do you think of the process?
3. When did you receive the fund? At what stage of the business did you receive the fund? → **to see differences or similarity between business stages**

Attribution of the Innovation Fund

4. How much amount did you receive from the Innovation Fund?
 - a. Can you estimate, how many percent from your whole fund needs the Innovation Fund cover?
 - b. ***make sure that companies are indeed receiving the fund as subsidies instead of loan***

Seeing what kind of changes did the fund make

5. Would you mind sharing how did you allocate the fund that you received?
Or how do you think the Innovation Fund has helped your business?
 - a. For what purposes was the Innovation Fund used for?

Attribution of the Innovation Fund

6. Did you also receive any kind of other funding besides Innovation Fund?
 - a. If yes, can you estimate the amount of funding in percentage?
 - b. If yes, at what stage of the business did you receive these other funds? Before or after the Innovation Fund?

Checking whether their materiality aligns / aligning what municipality deems material and what companies perceive

7. Did the municipality have any kind of expectation when they granted the fund?
 - a. If yes, would you mind elaborating on that?
 - b. What do you think of the expectations?

If not, what kind of contributions does the municipality want to see through your business?

Performance and impacts of the company / organization

Checking companies' awareness of performance measurement and reporting

8. Do you do any impact monitoring or measurement or sustainability reporting?
Checking what companies deem as material, aligning materiality from both sides
9. What do you think is the biggest positive impact your company has on sustainability?
 - a. On environment?
 - b. On small-scale surrounding?
 - c. On larger scale society?

10. Do you think there is any possible negative impact your company has on the environment and the society?

Checking the current condition of closure, aligning with municipality's response

11. Did the municipality require any kind of reporting or feedback for the fund use?
 - a. If yes, can you elaborate?

Closing

12. How do you see the alignment between the municipality's expectation and your current business?
 - a. What parts align, what not?

THANK THE INTERVIEWEE!

Appendix 6: Link to interview transcription

<https://drive.google.com/drive/folders/1WBST1yni86en4KfV1BmYPAo0fvLEc0JD?usp=drive>
link

Appendix 7: Coding scheme for sustainability goals and municipality's objectives

