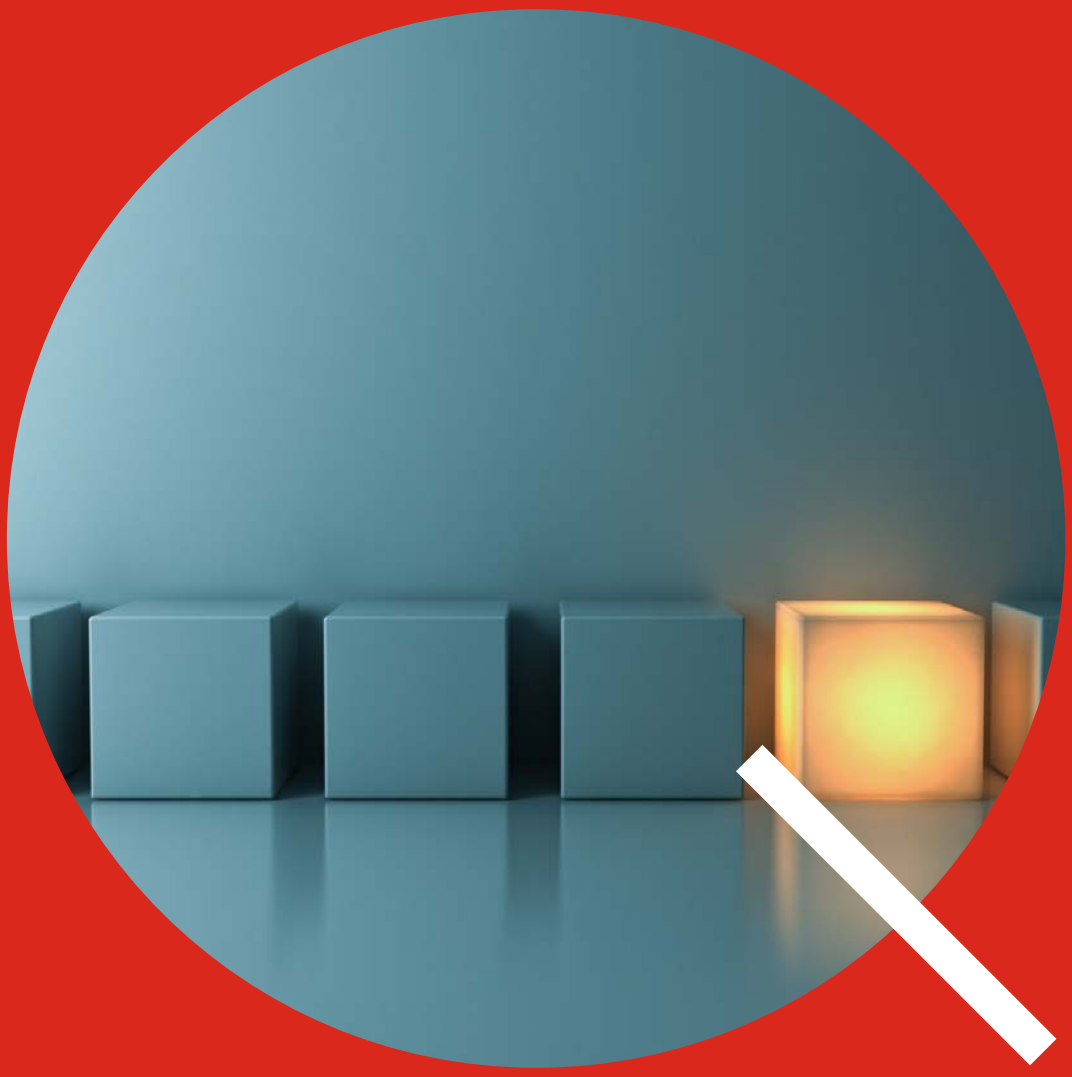
October 2021

Follow-on Interim Evaluation of Innovation Loans

Final Report to Innovate UK



SQW

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Executive Summary

Introduction

1. The Innovation Loans pilot programme has been delivered by Innovate UK across seven competitions, commencing in late 2017. A total of £75 million has been committed in the pilot for business innovation projects to scale up and grow, focusing on late-stage R&D projects with a clear route to commercialisation.

2. This follow-on interim evaluation assesses the programme management and delivery, and the extent to which additional outcomes and impacts for businesses have occurred as a result of Innovation Loans. The timeframe for the evaluation relates to the funds invested through the first seven competitions running from 2017 to 2019 (with Loans being drawn down until 2020/21).

3. The evaluation involved: telephone interviews with representative samples of 50 successful and 72 unsuccessful applicant businesses; 15 delivery stakeholder interviews; 11 external stakeholder interviews; 11 beneficiary case studies; review of programme documentation and monitoring data; and preliminary econometric analysis to inform the future impact evaluation.

Overall conclusions

4. **The findings of the evaluation are very positive and provide evidence of strong progress since the previous interim evaluation in 2019. While this is an interim evaluation, and more time is needed before the impact can be fully assessed, we conclude that Innovation Loans has been a successful pilot.**

5. The level of demand for Innovation Loans has increased over time. The programme has enabled new product development and commercialisation activities, supported investment in research jobs, and there is evidence of growing levels of sales. The finance is also largely additional – few of the beneficiaries would have been able to access similar funding from elsewhere. This is also evidenced by the challenges faced by those businesses that were unsuccessful in applying.

6. The programme has been delivered effectively with clear and well-defined organisational structures and arrangements in place. There was positive feedback from a range of stakeholders who generally felt that the Loans fill a gap in the innovation funding landscape, complementing other finance products.

7. Finally, this progress has been made through a period of huge economic uncertainty and, arguably, the importance of access to finance for innovation will become increasingly important as the economy starts to recover from the Covid-19 pandemic.

What is the interest in, and demand for, Innovation Loans?

8. **Our review of programme monitoring data found that the level of interest in, and demand for, Innovation Loans amongst SMEs has increased across the competition rounds** – tripling from 36 applications in Competition 1 to 107 applications in Competition 7. Across the first seven competitions, a total of 534 eligible applications were submitted of which 102 were successful and 432 unsuccessful (overall success rate of 19%).

9. Evidence from consultations with internal and external stakeholders confirmed that demand for Innovation Loans has risen over time and the programme is viewed as a key finance product in the market. However, a key challenge for the programme going forward relates to accessing the wider pool of innovative businesses that are unaware of Innovate UK support.

What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?

10. The businesses applying for Innovation Loans are relatively young and small. Our review of Beauhurst data for the 476 businesses that applied to the programme shows that four out of five applicants (80%) were at the seed or venture stages, and nearly all (93%) employed less than 50 staff. Around half (48%) were based in London or the South East. The most common sectors were information and communication technology, manufacturing, and professional, scientific and technical activities.

11. Data on the 102 companies that were successful in applying shows that:

- **Over three quarters (78%) were either at the seed or venture stage**, however only one in five seed stage firms received a loan compared to one in three venture-stage firms. Nearly all firms (90%) employed fewer than 50 staff.
- **The majority of the companies (85%) had received some grant funding**, suggesting that these are largely firms with prior Innovate UK support and contact.
- **Just under half of the portfolio (43%) was made up of manufacturing businesses**, reflecting that manufacturing has the highest proportion of SME innovators in the UK.
- **Since the previous interim evaluation in 2019, the proportion of beneficiaries located in London or the South East has reduced (from 48% to 39%)**, suggesting that Innovate UK has made a sustained effort in securing applicants from different regions of the UK.
- **Around two thirds of beneficiaries (62%) had male-only teams**, and a tenth (11%) had teams where women accounted for at least half – broadly in line with the wider business base.

How effective are the processes of implementation and what are the experiences of the customer journey?

12. **There are clear and well-defined organisational structures and arrangements in place for implementing the Innovation Loans programme**. The roles and responsibilities of the Innovate UK delivery team appear to be robust and suitable for addressing the objectives of the programme. The programme has continued to improve since the previous evaluation in 2019, with several changes to processes made which appear to have resulted in an improved customer experience for the applicants. This includes the challenge and assurance built into the structures (e.g. through the Innovation Finance Sub-Committee of Council); expansion of the Innovation Loans delivery team; and the adoption of automation and specialist software for collecting and analysing company data.

13. **Overall, both businesses and stakeholders provided positive feedback on programme delivery**. The different phases of the customer journey – from marketing through to the application, loan award and monitoring – have worked well. Strengths included the terms and conditions of the loan product; the flexibility of terms through the Covid-19 pandemic; the transparency of the decision-making process; and communication with Innovate UK. Whilst the feedback was positive overall, some areas for improvement were identified, including increasing the reach of marketing activities and further streamlining of the processes.

14. **There was general agreement among stakeholders on the importance of the equality, diversity and inclusion (EDI) agenda**. However, there were mixed views regarding the extent to which the design and delivery of the programme can contribute to EDI outcomes: whilst the majority of those that were able to comment recognised that there are some processes in place which aim to encourage greater EDI in innovative businesses, a minority suggested that there was limited ability to do so because these issues are likely to be primarily influenced by firm-level policies. In our view, there is an opportunity for Innovate UK to explore how best to identify and target businesses led by under-represented groups, and provide any necessary support during the application process.

What evidence is there of progress towards the achievement of intended outputs, outcomes, and impacts?

15. **Innovation Loans continues to make strong progress towards achieving intended benefits** as identified in the programme logic model and theory of change. The programme is successfully translating activities and outputs into outcomes and impacts. The results are particularly encouraging given the relatively short time that has elapsed since businesses have been awarded and drawn down Innovation Loans; and the disruption to businesses and the economy from Covid-19.

16. The evaluation found the following key benefits, as reported by business beneficiaries:

- **Innovation capacity and skills** – Nearly all business have improved or expected to improve their innovation capacity (88%) and skills (96%) as a result of Innovation Loans.

Also, the majority of businesses are more **investment ready** (i.e. willing or prepared to overcome equity aversion, lack of investability and presentational failings) and **commercially ready** (i.e. willing or prepared to bring new products, services or processes to market).

- **Increased R&D investment** – 43 businesses provided estimates of the new investment in R&D as a result of the Loans, amounting to £37.4 million. This is higher than the value of Loans awarded to these businesses (£31.8 million). The case study evidence suggests that the Loan allowed businesses to "ringfence" employee time for R&D related activities; invest in new R&D related equipment; and undertake risky projects.
- **Commercialisation/progression through TRLs** – The innovations supported have made significant progress towards commercialisation. Almost all businesses (92%) reported that they had progressed their product or service towards commercialisation. Overall, 84% of the projects (42 cases) have progressed their innovation through TRLs. Of the 50 projects, 18 (36%) innovations have now been fully or partially commercialised, and a further 19 (39%) are at the stage of being tested and scaled in an operational environment.
- **Intellectual Property** – Over a third of businesses (36%) applied for IP, with the same proportion expected to do so in the future. This is across different types of IP applications, most commonly: patents, trademarks and copyrights. The results on IP reinforce the good progress made on moving through TRLs, with IP becoming increasingly important.
- **New products, services, and processes** – 30 businesses (60%) had already introduced a new product, service or process and 18 businesses (36%) expected to do so in the future. Of these innovations, just under half (42%) were new or improved products or services, and a similar proportion were new or improved processes. A total of 15 businesses that introduced new products provided estimates of the cumulative value of sales from their innovations, amounting to £28 million (these can be advanced sales).
- **Productivity** – Process improvements were expected to lead to productivity gains with businesses reporting that the innovation would reduce costs (84% of firms), improve quality (82%) and save time (76%). It is important to recognise that productivity is self-defined by businesses interviewed and mainly related to costs and time efficiency.
- **Follow-on funding** – Over half of the businesses (58%) had secured follow-on funding totalling c. £60 million (mostly equity). Of the 29 businesses that received follow-on funding, the majority (89%) considered the Innovation Loan to have contributed to securing this. The case study evidence points to the credibility associated with having secured the Loan as key to attracting follow-on funding.

17. The Innovation Loans programme has also contributed to perceived spillover benefits for suppliers and customers of beneficiaries. Over two thirds of beneficiaries (70%) reported spillover benefits for suppliers across a range of sectors, notably manufacturing, information and communications, and professional services. The case study evidence suggests that there

have been positive spillover effects for the customers of beneficiaries in the following ways: lower priced goods/services as a result of the Innovation Loan contribute to improvements in production efficiency; and some of the new or improved product/service are 'greener alternatives' compared to other options.

What would have happened to the innovation projects supported if they had not been offered these loans?

18. **Innovation Loans is associated with a high level of finance additionality**, with around three quarters of businesses indicating that they 'probably' or 'definitely' would not have been able to obtain finance elsewhere. **Outcome additionality is relatively high**: in more than half the cases, the Innovation Loan has accelerated projects and around a quarter were wholly additional. There were no cases where the business believed the benefits reported would have been achieved over the same time period and at the same scale and quality, without the Loan.

19. Of the 72 *unsuccessful* applicants, just under half had not received any other funding for their project and those that had, almost three quarters (73%) received a lower amount than their application to Innovation Loans. Importantly, almost all (90%) of the unsuccessful applicants reported that not receiving a Loan has had a considerable negative impact on their business: slowing down growth and/or putting business survival at risk. The feedback from unsuccessful applicants therefore reinforces the additionality of the Innovation Loans programme.

20. Overall, the business survey and stakeholder evidence indicate that the programme is filling a gap in the innovation funding landscape, complementing other finance products and playing an important role in the commercialisation journey of firms.

Economic impacts

21. **Based on our analysis of the beneficiary survey results, we conclude that the Innovation Loans programme is making good progress in generating economic impacts**. The Loans have played a critical part in the commercialisation of new/improved innovations and these businesses are starting to see impacts on employment, sales and turnover.

22. For 50 businesses in the sample, employment had increased by 486 since the Loans were awarded. As a result of the Loan, 44 of the 50 cases (84%) reported that they employed more people, while 52% had increased turnover.

23. After adjusting for additionality and scaling up the results to an 'effective' population of 95 businesses, we estimate that Innovation Loans have supported:

- **346 additional jobs to date (July 2021)**
- **£16.9 million in additional annual turnover to date**
- **£44.7 million (cumulative) additional turnover since Innovation Loans were launched.**

24. Nearly all of the businesses in the sample expect employment and turnover to be higher within three years (i.e. by middle of 2024): supporting c. 1,200 jobs and c. £161 million turnover. These are *gross* estimates and are likely to include significant optimism bias but provide an indication of the ambitions of the funded businesses.

Preliminary econometric testing

25. We undertook preliminary econometric analysis that helps to inform the future final evaluation of Innovation Loans. This work involved exploring the feasibility of estimated net impacts of the programme using a difference-in-difference methodology. The results of our analysis confirmed the feasibility of this approach to impact evaluation. However, we also identified challenges around the coverage of turnover data for Innovation Loans beneficiaries in Beauhurst, the need to control for unobservable characteristics in the statistical model, and the limited post treatment data available for beneficiaries from more recent competitions.

Future development of the programme

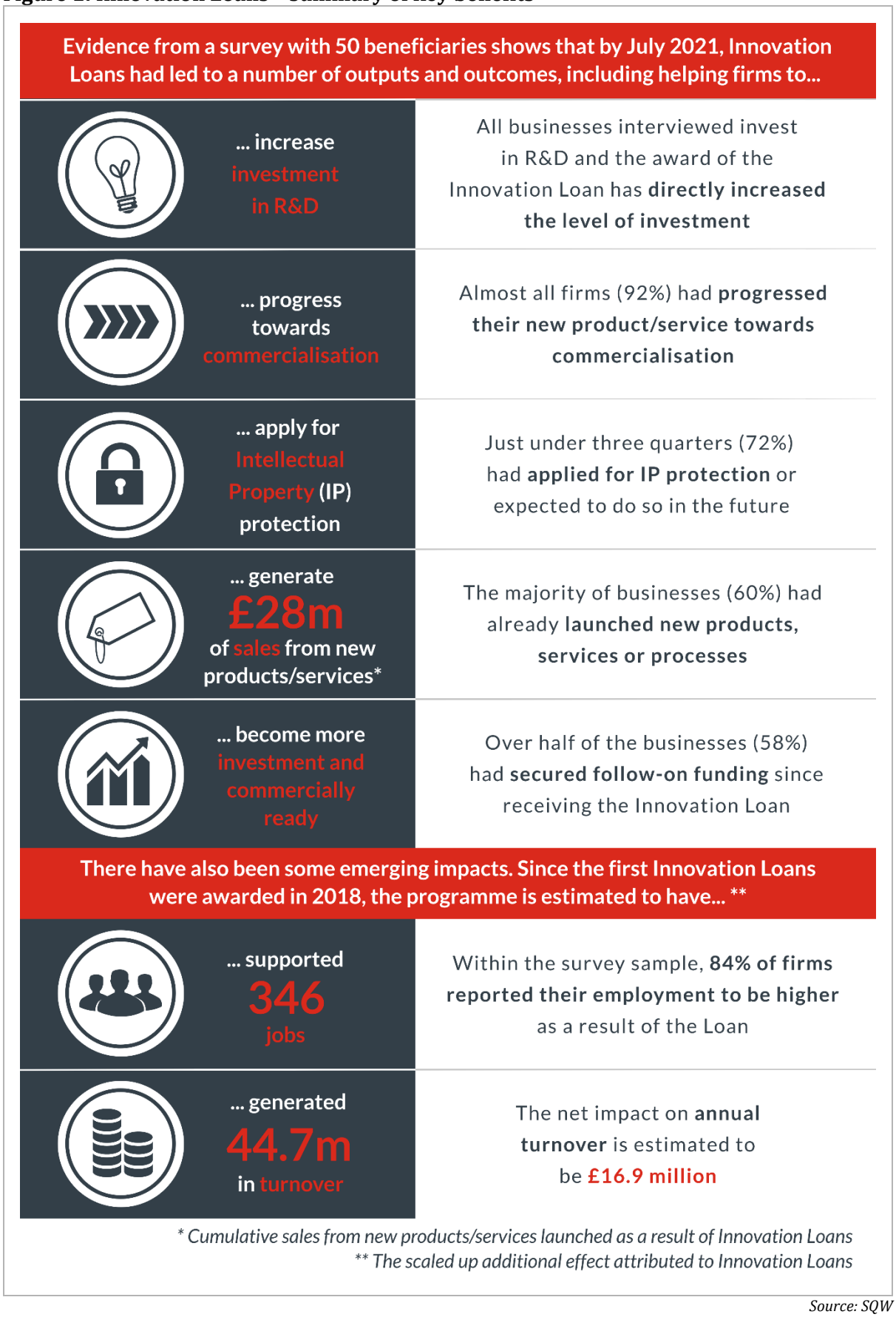
26. Since the pilot, further funding has been committed through Innovation Continuity Loans as part of Innovate UK's coronavirus response package, with the portfolio now standing at some £155m across 200 loans. Approval to transition the programme from a pilot to a 'business as usual' activity has been sought, with funding also dependent upon the outcome of the 2021 Spending Review. Informed by the evaluation evidence from businesses and stakeholders, we make the following suggestions for the development of the programme going forward:

- **Continue to promote and integrate Innovation Loans with Innovate UK's other funding and programmes** to accelerate project commercialisation. This could involve using the extensive networks of Innovate UK EDGE and other initiatives for targeting suitable companies; and fast-tracking previous grants recipients to Loans, if appropriate. A key activity should be further targeting marketing and promotion of Innovation Loans, particularly to potential applicants not currently aware/engaged with Innovate UK (especially under-represented groups e.g. women and ethnic minority-led businesses).
- **Consider expanding Innovation Loans to include (non-financial) business support**. This should be ongoing support to ensure that the Loan is being well utilised, improves firm-level capabilities, and maximises benefits. As a Loan product, the programme currently does not offer expertise to enhance the management practices of the innovating

venture (as is the case with equity investors). There may therefore be potential to incorporate additional programme elements such as mentoring; and supporting firms that applied but were deemed not yet financially ready (helping to facilitate a future pipeline of applications). This is obviously subject to assessment of the potential demand amongst businesses and availability of additional resource required to implement effectively.

- **Explore options for rolling applications in between competitions**. The 'stop-start' competition format may prevent companies from applying if the timings do not match their business cycles and needs. Competitions can ensure strategic focus and rolling applications can enable companies to apply at a time suitable for them – potentially capturing "fresh" ideas in-between competitions. This may also help with further integrating Innovation Loans with Innovate UK's other funding and programmes as it will avoid 'drip-feed' of funding/support.
- **Based on the results of our preliminary work, adopt econometric analysis as one of the strands of research in the future impact evaluation**. This should investigate the possibility of combining Beauhurst data with administrative data on turnover available in Business Structure Database. Apply propensity score matching to establish appropriate comparison groups and use a difference-in-difference specification that: allows for potential variation in pre-existing trends between supported and unsupported companies; accounts for differences in the timing of treatment; and controls for any remaining differences in observable characteristics between the beneficiaries and comparison groups.

Figure 1: Innovation Loans – summary of key benefits

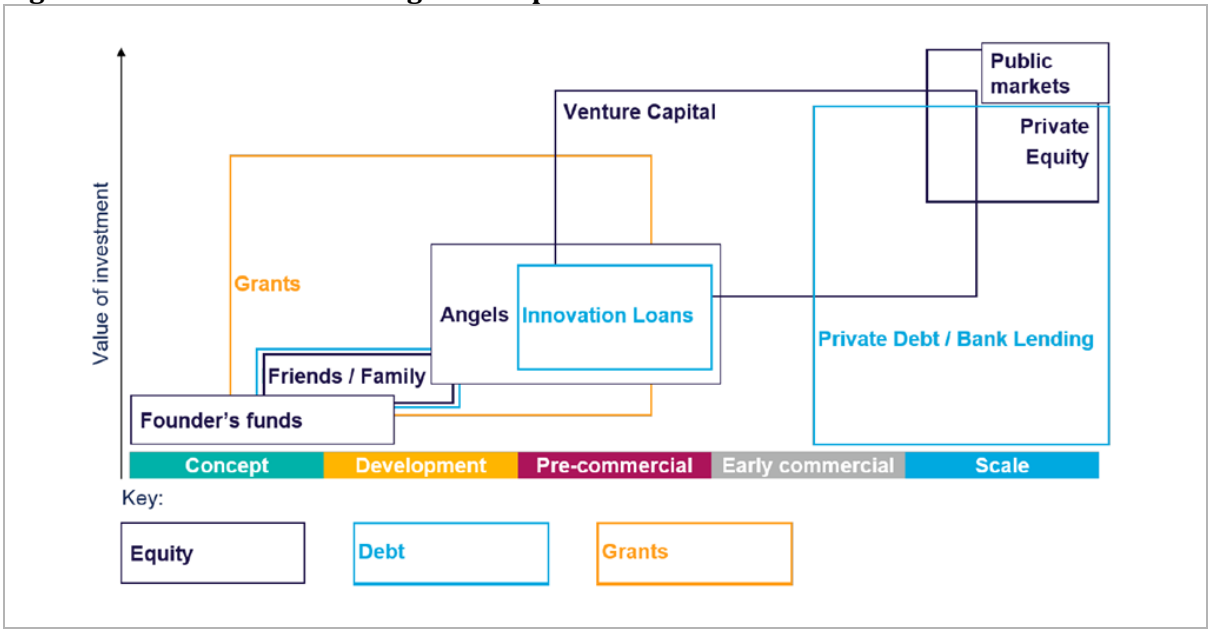


Source: SQW

1. Introduction

1.1 The Innovation Loans programme is a government funded repayable finance product. It seeks to bridge the funding gap for innovative businesses whilst also providing value for money for the taxpayer. The programme is delivered by Innovate UK as a pilot. A total of £75 million was available for business innovation projects, with SMEs able to borrow between £100,000 and £1 million to scale up and grow, focusing on late-stage research and development (R&D) projects with a clear route to commercialisation.[1] The programme is expected to complement the wider landscape for innovation funding – including Innovate UK as well as other available finance for stimulating business-led innovation.

Figure 1-1: Innovation funding landscape



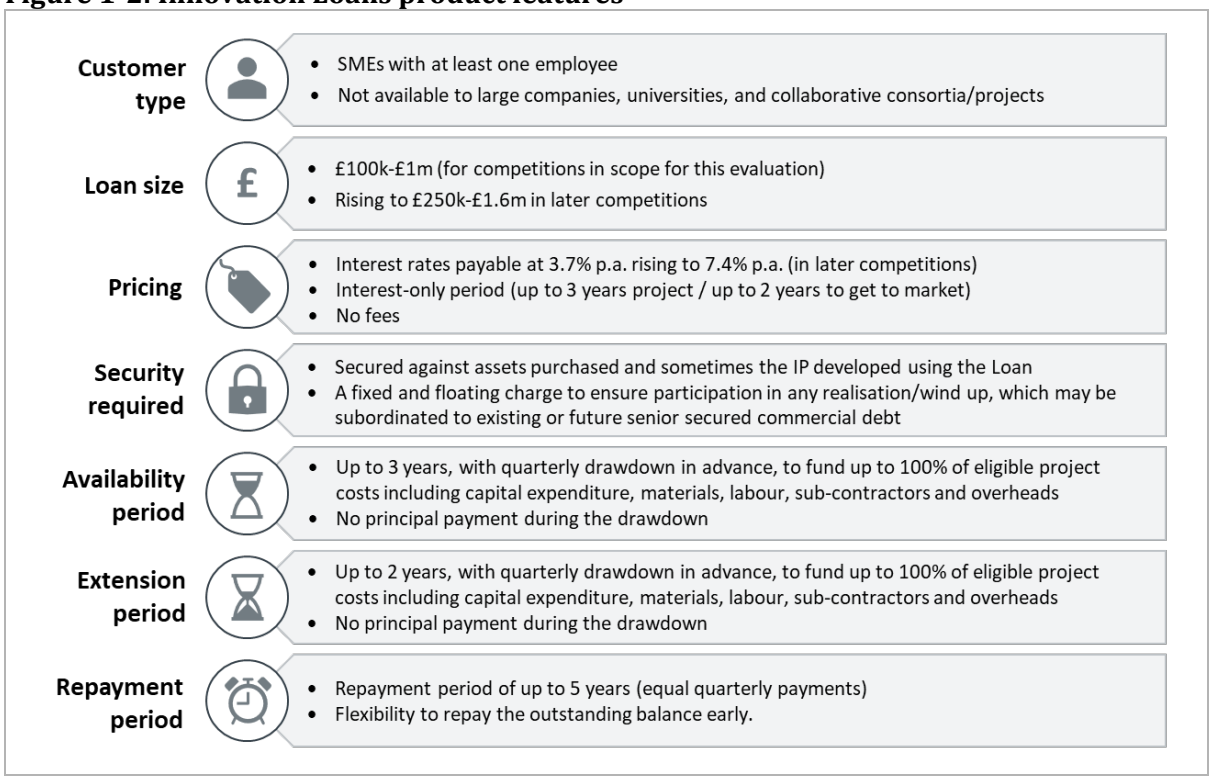
Source: British Business Bank and Innovate UK; UK Innovation Strategy (2021)

1.2 The pilot programme was delivered in 2018/19 and 2019/20 with an initial funding of £50m. In 2019, the pilot was extended with £25m of additional funding. The pilot was delivered through seven competitions (sector-specific and open competitions). It is important to note that funding to businesses/drawdowns continued into 2020/21.

1.3 The programme supports a portfolio of businesses across a range of technologies, sectors and markets, for example in advanced manufacturing, clean energy, healthcare and education. The businesses are relatively young, small and in most cases, have already been developing their technologies (often with grants).

[1] These are 'experimental development' projects that may involve prototyping, demonstrating, piloting, testing and validation of new or improved products, processes or services in environments representative of real life operating conditions.

Figure 1-2: Innovation Loans product features



Source: SQW based on information from Innovate UK

Study objectives and scope

1.4 Innovate UK commissioned SQW, supported by IFF Research and Middlesex University, to undertake a follow-on interim evaluation of the £75 million Innovation Loans pilot programme. This builds on our previous interim evaluation of the pilot programme in 2019 and an earlier scoping evaluation of the new innovation finance products in 2017.

1.5 The overall purpose of the study was to assess programme management and delivery, and the extent to which additional outcomes and impacts for businesses have occurred as a result of Innovation Loans. The focus of our work was on the key research questions identified in Table 1-1, and ensuring that the programme is 'set-up' for a future final evaluation. This, therefore, is not a final impact evaluation to evidence the long term outcomes and impacts of the programme. Given the nature of the innovation projects funded, more time needs to elapse before these can be fully captured. Notwithstanding this, the expectation is to evidence any further progress on 'harder' (and potentially quantifiable) outcome and impacts measures of interest – to the extent possible. The timeframe for the evaluation relates to the £75m pilot funding spent on applicant businesses from 2018/19 to 2020/21.

1.6 The findings from this follow-on interim evaluation are expected to inform Innovate UK's Business Case in a future government spending review. It will also allow Innovate UK and UKRI to learn about alternative R&D financing mechanisms – learning from evaluation is a key part for any assessment, as highlighted by the Government's Magenta Book (2020).

1.7 To be clear, the Innovation Continuity Loans introduced by Innovate UK in response to the Covid-19 pandemic are out of scope for this evaluation.

Table 1-1: Key research questions

#	
1	What is the interest in, and demand for, Innovation Loans?
2	What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?
3	What would have happened to the innovation projects supported if they had not been offered these loans?
4	How effective are the processes of implementation and what are the experiences of the customer journey?
5	What evidence is there of progress towards the achievement of intended outputs, outcomes, and impacts?

SQW, based on Mini Competition, Follow-On Interim Evaluation of Innovation Loans

1.8 There are also four additional questions that are expected to be the focus of a future impact evaluation (Table 1-2). These additional questions were taken into account as part of our evaluation, but as indicated in the Study Specification, we focused on the five questions identified in the table above.

Table 1-2: Additional research questions

#	
6	What has been the 'additional' effect of the loan product on outcomes and impacts, covering in particular the effects on innovation behaviour/performance as well as business performance?
7	To what extent can spillover effects be identified from the innovation projects that have been supported by the loan product?
8	Has there been any crowding-out of private R&D investment amongst firms supported?
9	From a government finance perspective, what potential default and impairment profiles and rates can be expected in Innovation Loans programme?

SQW, based on Mini Competition, Follow-On Interim Evaluation of Innovation Loans

1.9 In undertaking the work, we highlight some of the key issues and challenges for this follow-on interim evaluation. These include programme awareness and delivery influencing demand and benefits; the varying and long timescales to outcomes and impacts; the difficulties in attributing outcomes and impacts to the programme in light of multiple external influences; and the influence of the wider context on business performance and innovation given that investment in (and performance of) firms can be affected by the development of technologies, changes in the UK economy and the funding landscape. Whilst this evaluation focused on Innovation Loans awarded prior to the Covid-19 pandemic, the effects of the crisis were still relevant. We considered these in our approach and methods identified below, for example in the design of our research tools and overall analysis of the evidence.

Approach and methods

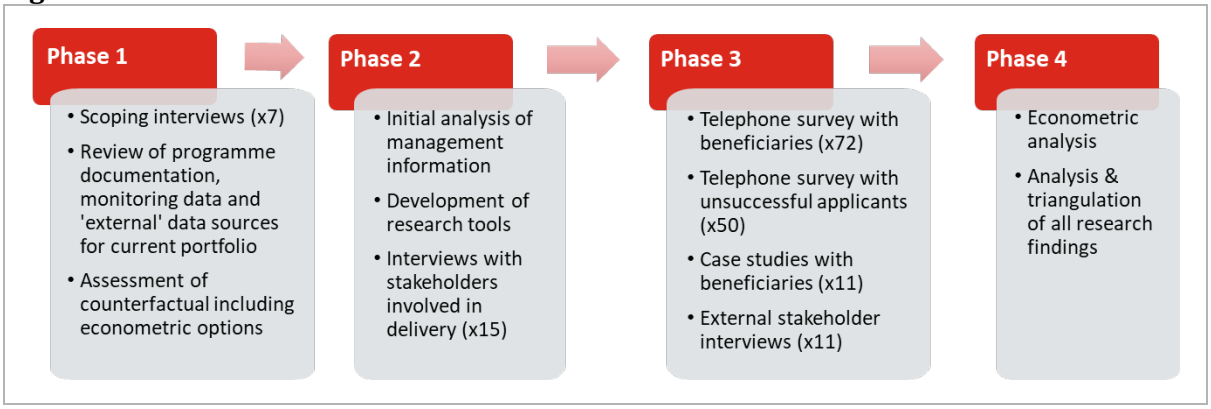
1.10 Our overall approach involved a theory-based assessment to test the extent to which outcomes and impacts have occurred as a result of the Innovation Loans programme – in line with the programme's logic model and theory of change. Specifically, the assessment involved using contribution analysis to test the evidence on outcomes and impacts, whilst considering other factors (internal and external to the firm) which may have contributed to these benefits. Our approach has, therefore, drawn on both qualitative and quantitative data.

1.11 The evaluation involved four key phases:

- **Phase 1:** Scoping and evaluation framework
- **Phase 2:** Programme management and delivery assessment
- **Phase 3:** Primary research with businesses and external stakeholders
- **Phase 4:** Analysis, reporting and dissemination.

1.12 The main research methods are summarised in Figure 1-3.

Figure 1-3: Evaluation methods



Source: SQW

1.13 As indicated above, the evaluation involved separate surveys with 50 beneficiaries and 72 unsuccessful applicants. The estimated margins of error in both beneficiary and unsuccessful applicant surveys are up to ten percentage points. So, if 50% of respondents reported a benefit we can be 95% certain that the true proportion that would have been observed in the whole population of beneficiaries or unsuccessful applicants lies between 40% and 60%. The margin of error is the largest when the proportion of responses is close to 50%.

1.14 Both survey samples are representative of the wider populations of the programme and unsuccessful applicants in terms of businesses' size (proxied with employment), sector, location, and stage of development. The samples are also largely representative of the composition of the programme by competitions in which the companies participated.[2]

[2] The degree to which the samples were representative of the programme was assessed using formal statistical tests (the Pearson χ^2 and Fisher exact tests of proportions). The sample of unsuccessful

1.15 To inform the future final impact evaluation we undertook preliminary econometric analysis of key business performance indicators (employment and turnover growth, attracting follow-on funding). This focused on testing the feasibility of: a) applying statistical matching techniques to construct high-quality comparison groups of unsupported businesses, and b) estimating the net effects of support using a difference-in-differences methodology (i.e. by comparing the trends observed among beneficiaries and comparator businesses over time). We confirmed the feasibility of this approach while identifying several challenges and developing recommendations how to overcome them. A more detailed description of the results of this analysis can be found in Annex C.

Structure of the report

1.16 The remainder of this report is structured as follows:

- **Section 2** sets out the Innovation Loans logic model and theory of change
- **Section 3** presents evidence on the interest in, and demand for, Innovation Loans
- **Section 4** provides an overview of the Innovation Loans portfolio
- **Section 5** assesses the delivery of Innovation Loans
- **Section 6** assesses the outputs and outcomes of Innovation Loans
- **Section 7** provides evidence on the additionality and contribution of Innovation Loans
- **Section 8** estimates the economic impacts of Innovation Loans
- **Section 9** presents evidence from unsuccessful applicants
- **Section 10** sets out the key conclusions.

1.17 In addition, there are five annexes: definition of stages in company development; consultee lists; further detail on the preliminary econometric analysis; details of the programme delivery model; and case studies of business beneficiaries.

applicants slightly overrepresents Competition 3 (by approximately eight businesses). The analysis was based on companies' profiles in Beauhurst.

2. Logic model and theory of change

Logic model and theory of change

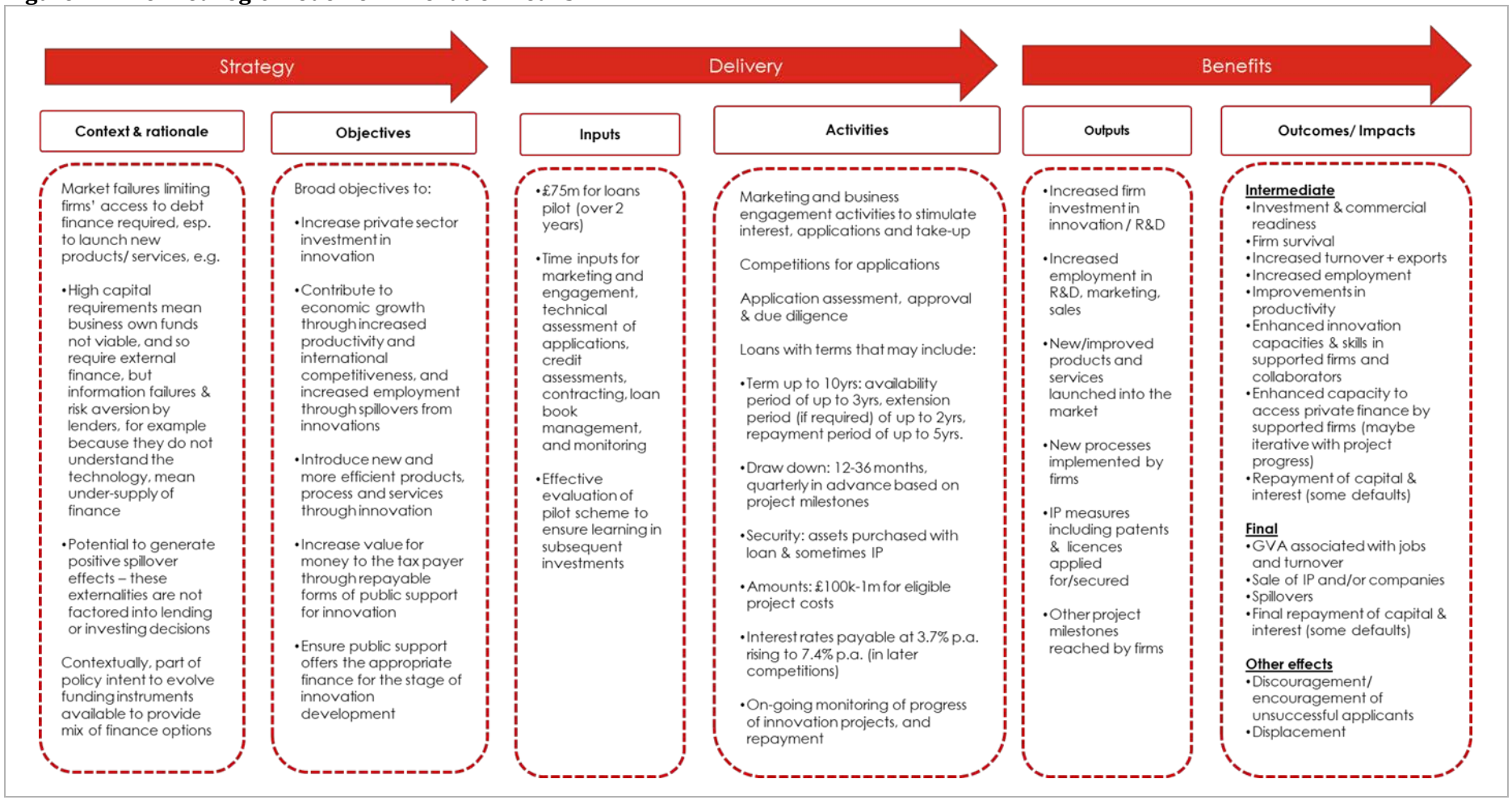
2.1 Figure 2-1 presents the refined logic model for Innovation Loans. This sets out the Strategy (context and rationale), Delivery (inputs and activities) and Benefits (outputs, outcomes and impacts) of the programme. A key rationale for Innovation Loans relates to the strategic case: the 2015 Spending Review committed the UK Government to introducing new repayable finance products, offsetting a reduction in grant funding designed to reduce the national deficit. As a consequence, Innovation Loans was piloted as complementary to grant funding – part of policy intent to evolve funding instruments available to provide a mix of finance options.

2.2 Other countries (e.g. Finland, The Netherlands, France, and Spain) already offer this form of debt finance and this pilot aims to test whether this could be an effective solution in the UK. Innovation Loans will help businesses overcome the funding gap for innovative SMEs by providing an affordable and accessible form of debt funding for credit rationed firms seeking to innovate at later stages of development where there is an identifiable route to market.

2.3 There are market failures that limit firms' access to debt finance required, especially to introduce new products/services. High capital requirements mean relying entirely on business own funds is not viable, and so they require external finance, but information failures and risk aversion by lenders exist. This may be due to not understanding the technology, resulting in under-supply of finance. Another rationale is to generate positive spillover effects – these externalities are not factored into lending or investing decisions.

2.4 The programme benefits cover the initial outputs, such as R&D investment, and new products and services that are delivered by projects financed by Innovation Loans. The benefits include: the subsequent changes in behaviour and performance of the companies including intermediate and final effects such as investment and commercial readiness, turnover, employment, innovation capacities, Gross Value Added (GVA), loan repayments, and potential third-party effects of the products (e.g. relating to discouragement issues, displacement and spillovers).

Figure 2-1: Refined logic model for Innovation Loans



Source: SQW

Theory of change

2.5 The theory of change (ToC) sets out the activities, outputs, outcomes and impacts, and the causal links between them. The evaluation tests the extent to which (and how) the outputs, outcomes and impacts have been achieved as a result of the Innovation Loans programme. This takes into consideration other factors that may contribute to outcomes and impacts, and the context (and time) in which benefits may occur.

2.6 The ToC outlines the key underlying assumptions and potential explanatory factors for the programme. These were tested in the evaluation in order to understand whether and how desired effects have borne out in practice. The underlying assumptions and explanations inform and test the evaluation research questions, set out in section 1. The ToC for the programme is summarised as follows.

2.7 The programme activities, such as marketing and SME engagement, are important in stimulating interest and demand from companies to apply for the loan product. The interest and demand may partly be influenced by size, sector and age of firm, as well as particular features of the loan product. The marketing and engagement activities, along with wider demand from SMEs, are expected to result in applications for loan finance. These are expected to be from SMEs with late stage R&D and innovation projects that are close to market. The assessment activities of the delivery phase consider innovation and credit aspects of applications, prioritising the former: in order to be awarded the loan finance, companies may receive a 'marginal decline' in the credit assessment but only if their innovation score is in the top 25% above quality line (see also Figure D-3 in Annex D).

2.8 The loan finance is postulated to support projects that take forward R&D and innovation activities which may not have happened otherwise, or would have done so at a reduced speed, scale and quality (e.g. if not able to secure finance from commercial sources or use own sources). The loan would be used by firms to develop new or improved products/services. This is expected to be part of late stage R&D activities undertaken by the firm (e.g. an initial pilot launch for final testing and customer feedback, or through investment in new production facilities). This may involve R&D expenditure and require taking on/retaining R&D staff or other staff as part of sales or marketing. Subsequently, products and services may be launched into the market. If the products/services are successful, then this will result in additional sales, some of which may be exports (if overseas sales). The additional output reflects a contribution to GVA for the economy.

2.9 A key assumption is that the loan product is instrumental in developing the new technologies, products or processes. However, there are other factors which may contribute to these effects such as existing knowledge; company strategy (e.g. marketing and branding); the role played by previous or complementary R&D activities; external factors such as growing markets and wider contextual conditions (e.g. Covid-19 and Brexit); and other available financial support for R&D in the innovation funding landscape.

2.10 There are also reasons why the effects may not occur or may do so at a lower scale, speed or quality, for example:

- there is technical failure of R&D supported; this is expected for some projects given their innovative nature (but still possible benefits in expanding the knowledge base)
- market declines or does not exist for product/service, or competitor products/services are preferred by customers
- the commercial case for loan finance cannot be supported
- other non-production costs increase, and so productivity is not improved overall
- some defaults are expected, thus reducing the potential to repay the loan
- the cost of the loan (interest and repayments) reduces future cash available for growth and further investment in R&D
- there is no net positive (additional) effect, e.g. due to displacement from other businesses.

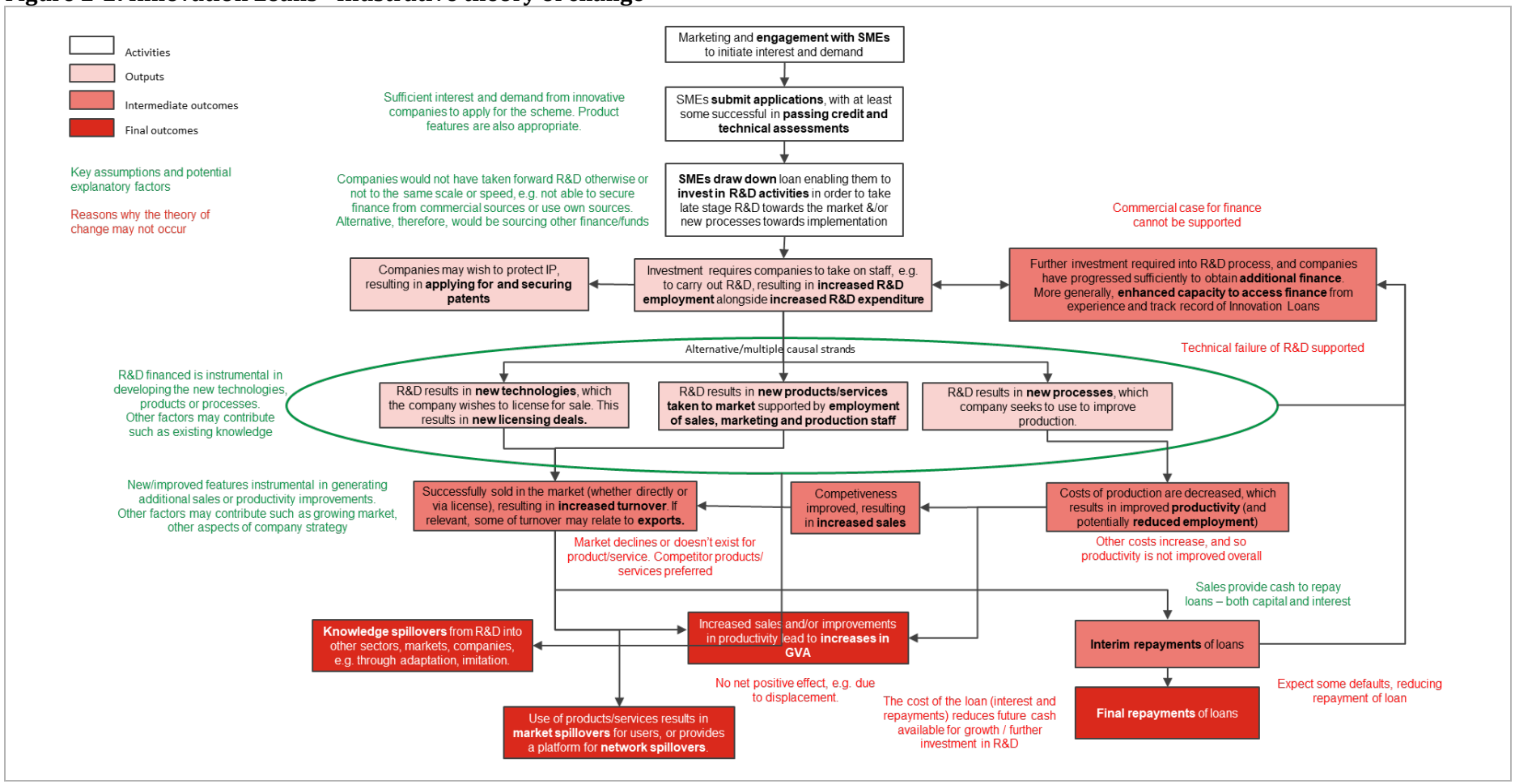
2.11 In some other cases, the loan may be used by companies to develop new or improved processes. As with product and service innovation, this may constitute R&D expenditure and may require taking on/retaining R&D staff. If successful, the process innovation may improve the productivity of the company, which could mean cost reductions and/or employment reductions, or may involve improvements to the 'quality' of products in some way. Through these effects, the competitiveness of the companies' offer may improve, resulting in more products or services being sold than would be the case otherwise.

2.12 It is important to note that innovation in both products/services and processes may be undertaken by companies. It could be the case that the R&D projects supported by the loan product may not lead to the adoption of new/improved processes or the launch of new products/services. It may be that further stages of R&D are required. This may result in attracting additional finance, and further increases in R&D expenditure.

2.13 The ToC also identifies indirect effects, in particular knowledge spillovers from R&D into other sectors, markets and companies (suppliers and customers), for example through adaptation, imitation or movement of people. The process of innovation may generate new knowledge within direct beneficiaries, though this may diffuse to other organisations.

2.14 Figure 2-2 illustrates the ToC described above from activities to final outcomes, with green text identifying the key assumptions and potential explanatory factors, and red text providing the reasons why the ToC may not occur. These were tested in our evaluation.

Figure 2-2: Innovation Loans - Illustrative theory of change



Source: SQW

3. Interest and demand for Innovation Loans

Key headlines

- Across the seven competitions, a total of 534 eligible applications were submitted of which 102 were successful and 432 unsuccessful. In total, 476 firms applied for at least one competition.
- The level of interest in, and demand for, Innovation Loans amongst SMEs has increased across the competition rounds – tripling from 36 applications in Competition 1 to 107 applications in Competition 7.
- Evidence from consultations with internal and external stakeholders confirmed that demand for the programme is increasing. However, a key challenge for the programme going forward relates to accessing the wider pool of innovative businesses that are unaware of Innovate UK support.
- Stakeholder consultees considered the programme to be filling a gap in the funding landscape, although there is a need to keep monitoring its position given the increasing array of finance products available to SMEs.
- The typical loan applicant was at the seed or venture stage (35% and 45% of all applicants, respectively), employing less than 50 staff (93%).
- The majority of firms were operating either in information and communication technology (31%), manufacturing (26%), or professional, scientific and technical activities (23%).
- Around half of all applicants were based in London or the South East (48%), followed by the East of England (10%), the South West (8%) and the North West (8%).

3.1 This section provides evidence on the interest in, and demand for, Innovation Loans across the first seven competitions of the pilot (see Table 3-1). It also profiles the nature of the businesses applying for Loans – both successfully and unsuccessfully. A more detailed overview of the types of businesses that were *successful* in applying is provided in section 4. The analysis is based on programme monitoring data from Innovate UK, external data downloaded from the Beauhurst database (both as at May 2021), and consultations undertaken with internal and external stakeholders.

Table 3-1: Innovation Loans competitions

Competition name	Opening/closing date
Competition 1 (Infrastructure Systems)	Nov 2017 - Jan 2018
Competition 2 (Manufacturing & Materials)	Feb 2018 - May 2018
Competition 3 (Open 1)	Apr 2018 - June 2018
Competition 4 (Open 2)	July 2018 - Sept 2018
Competition 5 (Open 3)	Sept 2018 - Nov 2018
Competition 6 (Open 4)	July 2019 - Sept 2019
Competition 7 (Open 5)	Sept 2019 - Nov 2019

Source: Innovate UK

What is the interest in, and demand for, the pilot products?

3.2 Table 3-2 shows the number of eligible applications received and the number of loans approved in each competition round. Across the first seven competitions, a total of 534 eligible applications were submitted. Of these, 102 applications were successful and 432 were unsuccessful. **The level of interest in, and demand for, Innovation Loans amongst SMEs has increased across the competition rounds** – tripling from 36 applications in Competition 1 to 107 applications in Competition 7.

Table 3-2: Breakdown of applications by competition round

Competition	Total number of eligible applications	Number approved for a loan	Success rate for applications
Competition 1	36	11	31%
Competition 2	28	16	57%
Competition 3	74	14	19%
Competition 4	89	16	18%
Competition 5	96	14	15%
Competition 6	104	17	16%
Competition 7	107	14	13%
All competitions	**534**	**102**	**19%**

Source: Innovate UK monitoring data from May 2021

3.3 Around one in ten firms applied more than once (54 of the 476), and so there is some overlap between the seven competitions. **In total, there are 102 firms that received a loan and 384 firms that were unsuccessful in at least one funding round**. The latter figure includes ten firms that were successful in other competitions, so **a total of 476 firms applied to the programme**. Table 3-3 shows the breakdown of outcomes by total number of applications submitted by firms.

Table 3-3: Number of applications submitted by firms

	Number of firms
Submitted one application	**422**
1 unsuccessful application	330
1 successful application	92
Submitted two applications	**50**
2 unsuccessful applications	41
1 unsuccessful and 1 successful application	9
Submitted three applications	**4**
3 unsuccessful applications	3
2 unsuccessful and 1 successful application	1
Total no. of firms	**476**

Source: Innovation Loans monitoring data

Evidence from stakeholder consultees

3.5 Internal and external stakeholder consultees generally perceived demand for the programme to be high. As such, **the programme was seen as filling a gap in the landscape**, complementing other finance products and providing a *"softer landing"* for firms moving from grants to private funding. The Loans were considered to be a *"good stepping stone for firms in their journey"*, helping to validate the idea which, in turn, unlocks follow-on investment. Innovation Loans were generally viewed as sitting alongside early equity investment.

> **"Innovation Loans fulfil a valuable and valid window, sitting nicely between grant funding and the transition to more private funding through bank loans or equity."**

3.6 Of the consultees that were able to comment, none felt that there was any duplication with other loan products available on the market. However, it was highlighted that there is now an increasing array of finance products available to SMEs, suggesting a need to monitor the programme's position within this evolving landscape.

3.7 There were mixed views on how the Covid-19 pandemic and Brexit may affect demand:

- The pandemic could stimulate demand for Innovation Loans due to retraction of other finance options, additional funding requirements due to pivoting, and increased awareness of public sector business support. However, in some cases firms may choose to reduce R&D activities and so demand for Loans could decrease.
- Whilst many companies are considering relocating operations elsewhere due to Brexit (including R&D departments), it is also possible that there is less of an effect on the types of

companies supported by Innovation Loans. There is limited evidence to date, and so a longer time period is required for assessing any impacts.

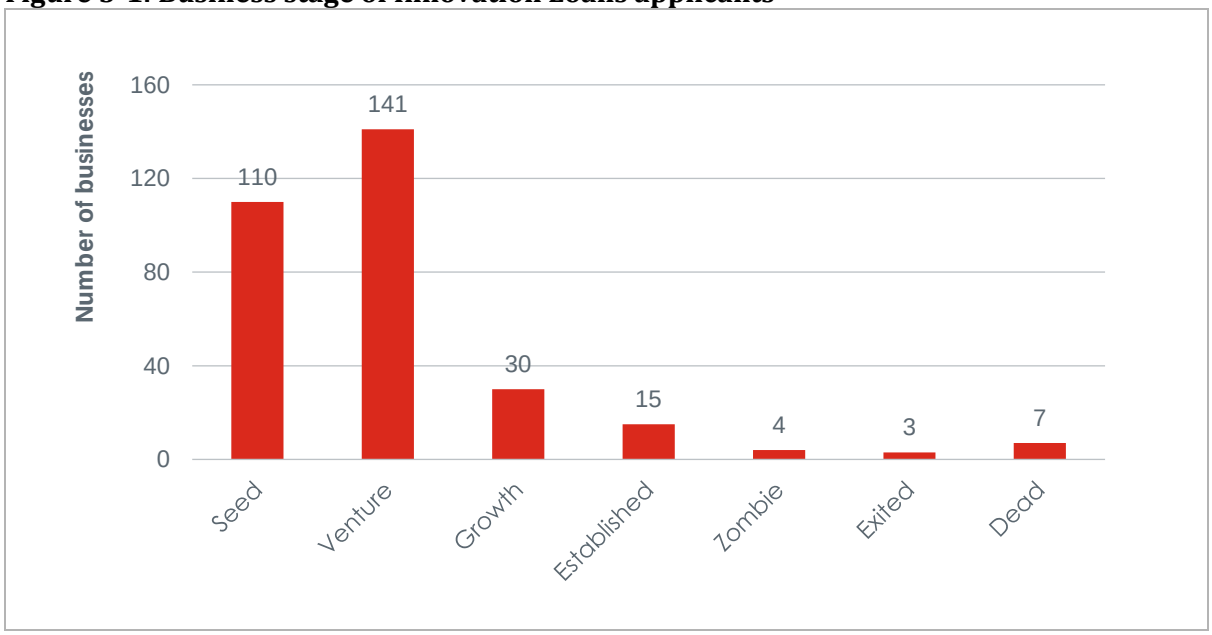
3.8 The stakeholder feedback suggested that awareness of Innovation Loans has continued to increase. However, a key challenge for the programme going forward relates to accessing the wider pool of innovative businesses that are unaware of Innovate UK support.

What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?

Stage

3.9 Figure 3-1 shows the breakdown of applicants by stage of company development (definitions for each stage are provided in Annex A). Four out of five applicants (80%) were at the seed and venture stages. However, only one in five (19%) seed stage firms received a loan compared to one in three (34%) venture firms – likely reflecting their readiness to take on debt funding.

Figure 3-1: Business stage of Innovation Loans applicants

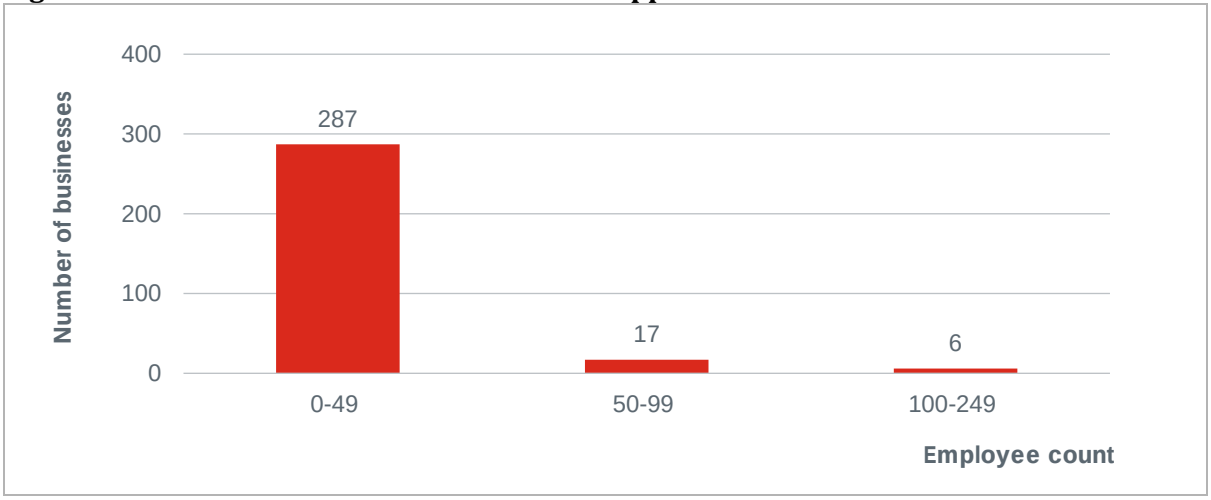


Source: Beauhurst data from May 2021
Base: 310 companies for which data is available (of the total applicant population of 476)

Size

3.10 Figure 3-2 shows the size band for those applicants for which Beauhurst data was available. Among these, nearly all (93%) were micro- or small-sized businesses with less than 50 staff. This profile is similar for both successful and unsuccessful applicants.

Figure 3-2: Business size of Innovation Loans applicants



Source: Beauhurst data from May 2021
Base: 310 companies for which data is available (of the total applicant population of 476)

Sectoral profile

3.11 Table 3-4 shows the breakdown of applicants by sector. A third (31%) of all applicants were operating within information and communication, a quarter (26%) were in manufacturing, and a similar proportion (23%) in professional, scientific and technical activities.

Table 3-4: Sectoral composition of the applicant population

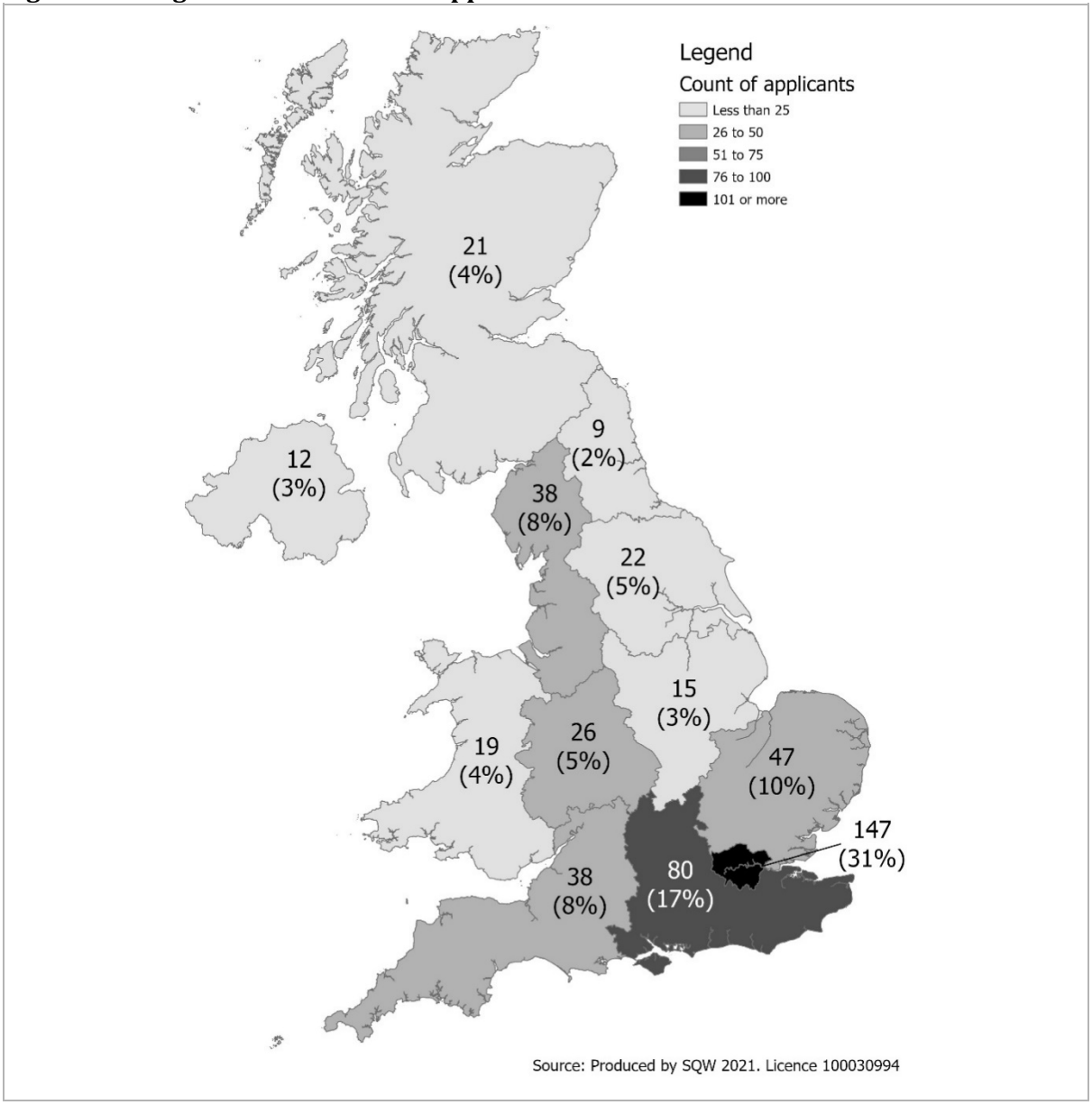
Sector	n	%
Information and communication	149	31%
Manufacturing	125	26%
Professional, scientific and technical activities	109	23%
Administrative and support service activities	24	5%
Wholesale and retail trade / repair of motor vehicles and motorcycles	14	3%
Education	10	2%
Financial and insurance activities	7	1%
Other service activities	7	1%
Electricity, gas, steam and air conditioning supply	5	1%
Human health and social work activities	5	1%
Transportation and storage	5	1%
Water supply, sewerage, waste management and remediation	4	1%
Activities of extraterritorial organisations and bodies	3	1%
Accommodation and food service activities	2	0%
Construction	2	0%
Mining and quarrying	1	0%
Public administration and defence; compulsory social security	1	0%
Real estate activities	1	0%

Source: Beauhurst data from May 2021; Base: 474 companies for which data is available (of the applicant population of 476)

Location

3.12 Figure 3-3 shows the geographical distribution of loan recipients based on head office postcode data from Beauhurst. Around half of all applicants (successful and unsuccessful) were based in London (31%) or the South East (17%), followed by the East of England (10%), the South West (8%) and the North West (8%).

Figure 3-3: Regional distribution of applicants



Source: SQW
Base: 474 companies for which data is available (of the applicant population of 476)

4. Overview of Innovation Loans portfolio

Key headlines

- Across the first seven competitions, a total of 102 loans were awarded (19% success rate for applications) – totalling just under £73 million.
- By May 2021, the majority of loans were either in the initial availability period[3] (60% of the portfolio) or had been granted an extension (29%). Three had been repaid.
- In terms of credit status, the vast majority of the portfolio (88%) were classified as 'normal'. However, eight firms (8%) had either been placed on a 'watchlist' by Innovate UK or were in default – reflective of the degree of risk associated with any investment in innovation, and the impact of Covid-19 on portfolio businesses.
- Over three quarters of those loan recipients for which data was available were either at the seed (24%) or venture stage (54%). Nearly all firms (90%) were micro- or small-sized, employing fewer than 50 staff.
- Just under half of the portfolio (43%) was made up of manufacturing businesses; a fifth (22%) were operating within digital, software and technology, and a tenth (10%) were in healthcare.
- Over a third of beneficiaries were in London (25%) or the South East (14%), followed by the South West (14%) and the North West (10%). Only 5% of businesses were in Northern Ireland, and 3% in Scotland.
- Around two thirds of beneficiaries had male-only teams (62%), and a tenth (11%) had teams where female employees accounted for at least half. The primary C-suite contact – usually the CEO – was male in the vast majority companies for which data was available (87%).
- Whilst half of the companies (48%) had experienced moderate to critical negative impacts from the Covid-19 pandemic, there were clear signs of recovery by May 2021. According to Beauhurst, around half of the portfolio companies (45%) could potentially grow their operations as a result of the pandemic, e.g. due to a surge in demand.

4.1 This section provides a descriptive analysis of the current Innovation Loans portfolio across the first seven competitions of the programme. The analysis is based on monitoring data from Innovate UK and external data downloaded from the Beauhurst database.[4] All figures presented

[3] As defined in the loan agreement, i.e. before any extension is agreed.
[4] The availability of Beauhurst data varied across different indicators. For each indicator, we have specified the number of companies included in the analysis.

in this section are as of May 2021, unless stated otherwise. Where appropriate, we have placed the portfolio companies in the context of the wider business population using weighted data from the 2019 Longitudinal Small Business Survey (LSBS).[5]

Loan activity

4.2 Table 4-1 summarises loan activity across the first seven Innovation Loans competitions (from November 2017 to November 2019). In total, Innovate UK has provided 102 loans[6] (a 19% success rate) amounting to just under £73 million. The average loan value was around £714,000. Whilst the loan-to-project-value ratio (LTpV) ranged from 17% to 100%, the median LTpV was 94% and nearly half (45%) of the loans fully covered the total cost of the project.

4.3 As of May 2021, 81% of the committed loans had been drawn down. Companies had started making interest payments as well as principal repayments, though this was still at an early stage given that even the earliest projects had only just passed, or were close to passing, the three-year mark from loan agreement (see also Figure 4-1).[7]

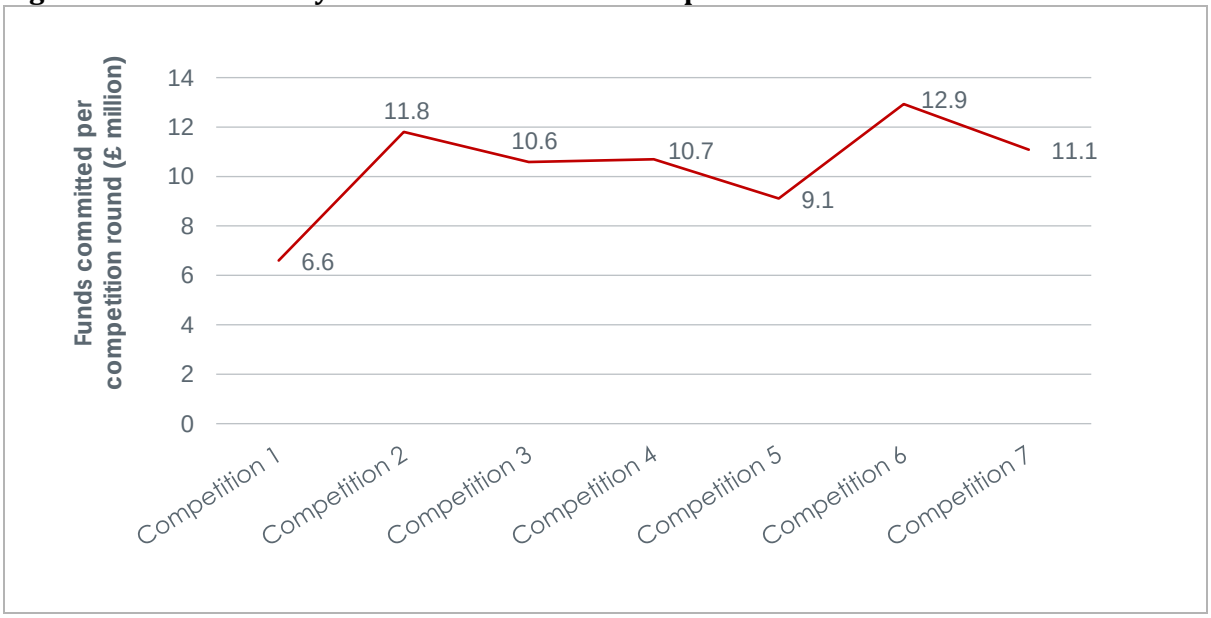
Table 4-1: Loan activity across the first seven competitions

Indicator	Value
Number and size of loans	
Total number of loans provided	102
Total number of applications	534
Success rate for applications	19%
Total value of loans provided	£72,812,031
Average loan value	£713,843
Range of loan-to-project-value (LTpV)	Ranging from 17% to 100%
Status of loans	
Loan drawdowns	£59,310,447 (81% of total loans provided)
Interest payments	£2,724,057 (4% of total loans provided)
Repayments	£2,369,091 (3% of total loans provided)

Source: Innovate UK monitoring data from May 2021

[5] After removing self-employed/companies with zero employees and filtering by variable J1_2019 as a proxy for innovation (Did the company introduce any new or significantly improved products or services during the last 3 years?), the sample includes 1,586 companies.
[6] There are no companies that have received more than one loan.
[7] The availability period for the loans is up to 3 years, with a possible extension period of up to 2 years or until the first commercial sale from the project. The repayment period is up to 5 years, although there is flexibility to repay the outstanding balance early.

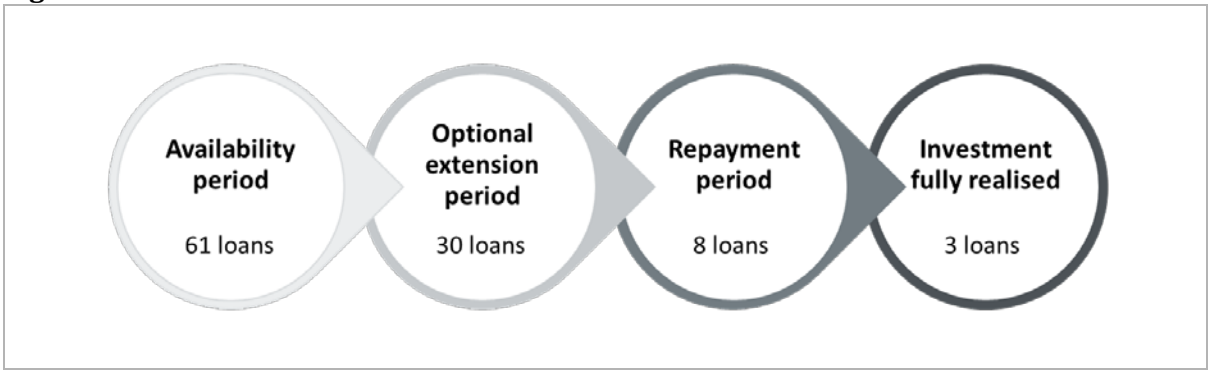
Figure 4-1: Loan activity across the first seven competitions



Source: Innovate UK monitoring data from May 2021

4.4 Figure 4-2 shows the breakdown of the loans portfolio by investment status. As of May 2021, the vast majority of loans were either in the initial availability period (61 loans; 60% of the portfolio) or in the subsequent extension period (30 loans; 29%). The remaining 11 loans had moved to repayment stages, and three of these had been fully repaid.

Figure 4-2: Investment status



Source: Innovate UK monitoring data from May 2021

4.5 Innovate UK monitors the financial position of all portfolio companies each quarter through management information as well as tracking the performance of projects through monitoring officers. Figure 4-3 shows the breakdown of loans by the credit status category assigned to each loan in May 2021:

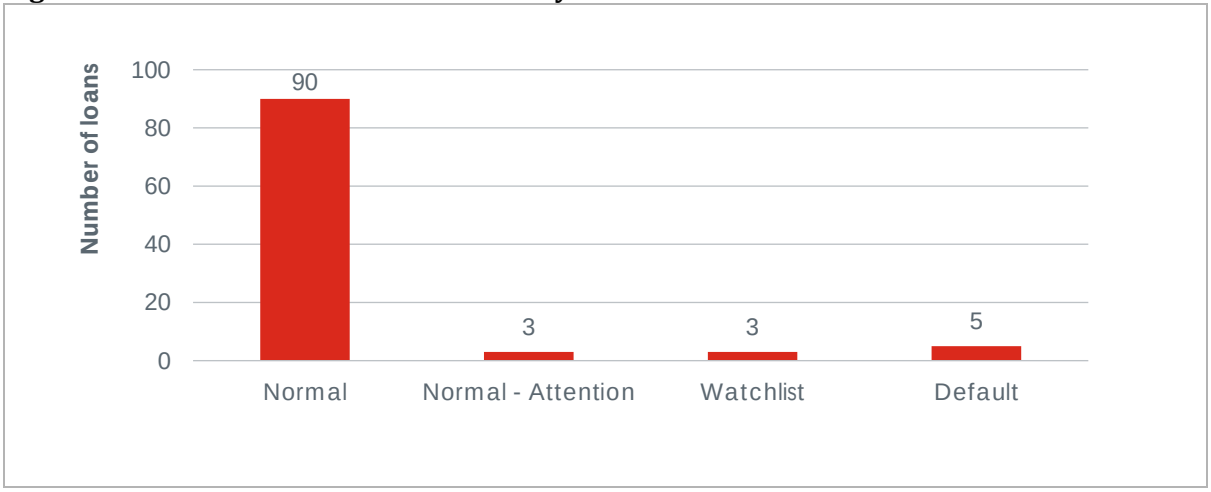
- The vast majority of loans (88% of all) were classified as 'normal', and an additional three (3%) as normal but requiring attention.
- However, three loans (3%) had been placed on a 'watch list' because they had shown a significant deterioration in their financial position. Innovate UK will continue to work with

these companies, as a responsible lender, to seek to avoid events of default if possible and to obtain repayment of outstanding amounts as they fall due.

- Five loans (5%) were in default, with an aggregate exposure of £3.2 million. While the accounting policy is to assume that there will not be any recovery, Innovate UK is engaged with administrators to seek to recover outstanding amounts if possible.

4.6 We understand that by August 2021, two more loans had defaulted, bringing the total exposure up to £4.6 million. Of these seven companies, three had entered into administration and four had breached covenants in their loan agreements or have projects that are considered to have failed. Seven companies, with an aggregate exposure of £3.6m, were on a 'watch list'.

Figure 4-3: Credit status of loans as of May 2021



Source: Innovate UK monitoring data
Base: 101 companies for which data is available (of the total beneficiary population of 102)

4.7 This is broadly in line with credit rating data from Beauhurst which shows that as of May 2021, three quarters (76%) of the beneficiary firms had a positive credit rating: 44 companies (43%) were classified as 'normal', 19 firms (19%) as 'stable', and 14 companies (14%) as 'secure'. However, a fifth of the portfolio firms (22 companies; 22% of all) were classified as 'caution', and a further 3 firms (3%) as 'high risk'.

4.8 Whilst Innovate UK assess the credit score of companies and the feasibility of projects at the application stage, there is a degree of risk and uncertainty associated with any investment in innovation. It is therefore inevitable that some loans have not worked as planned.

4.9 The economic impact of the Covid-19 pandemic has been felt across the portfolio – both by projects and the businesses as a whole (this is further explored in a sub-section below). Many businesses have been able to access other forms of government support including the furlough scheme, Bounce Back Loans (BBLS) and the Coronavirus Business Interruption Loan Scheme (CBILS) – as well as Innovate UK's Continuity support. A number of projects have experienced delays as a result of the pandemic, with the structural flexibility of loans through project and drawdown change requests being used to manage some of this impact. However, the performance of the portfolio and the likelihood of defaults will need to be monitored closely as many of the beneficiaries in the original pilot now approach the start of their repayment periods.

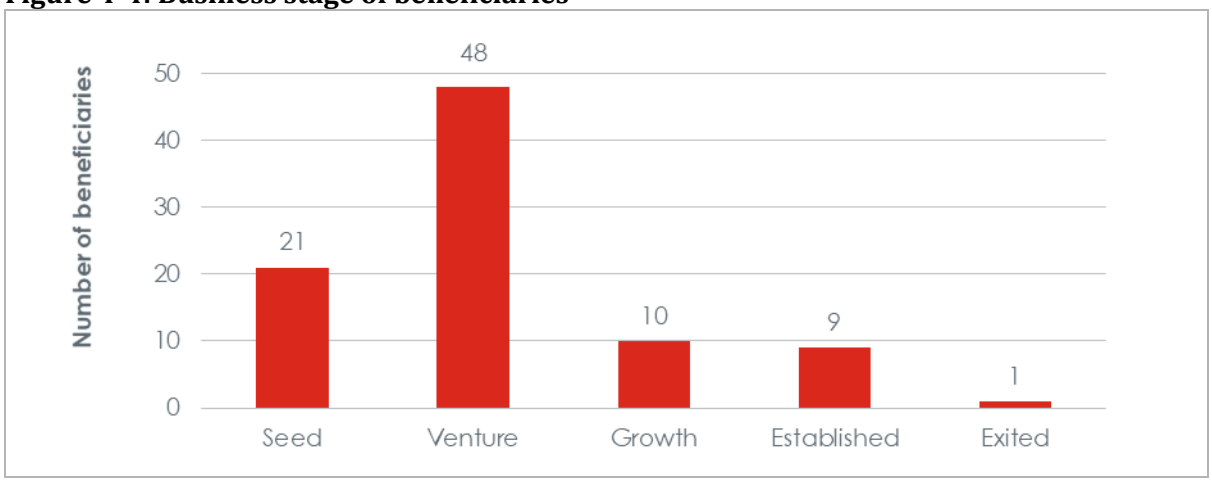
Loan recipients

Status, stage and size

4.10 As of May 2021, almost all of the loan beneficiaries were active (99 of the 102).[8] However, one business had gone into administration and two were in liquidation.

4.11 Figure 4-4 shows the stage of development for 89 of the 102 loan recipients for which Beauhurst data was available (definitions for each stage are provided in Annex A). Over half of those companies (48 firms; 54%) were at the venture stage and a quarter (21 firms; 24%) at the seed stage. A fifth were further along in their development, either at the growth stage (10 firms; 11%) or established businesses (9 firms; 10%). One firm had exited through an Initial Public Offering (IPO) or through acquisition.

Figure 4-4: Business stage of beneficiaries



Source: Beauhurst data from May 2021
Base: 89 companies for which data is available (of the total beneficiary population of 102)

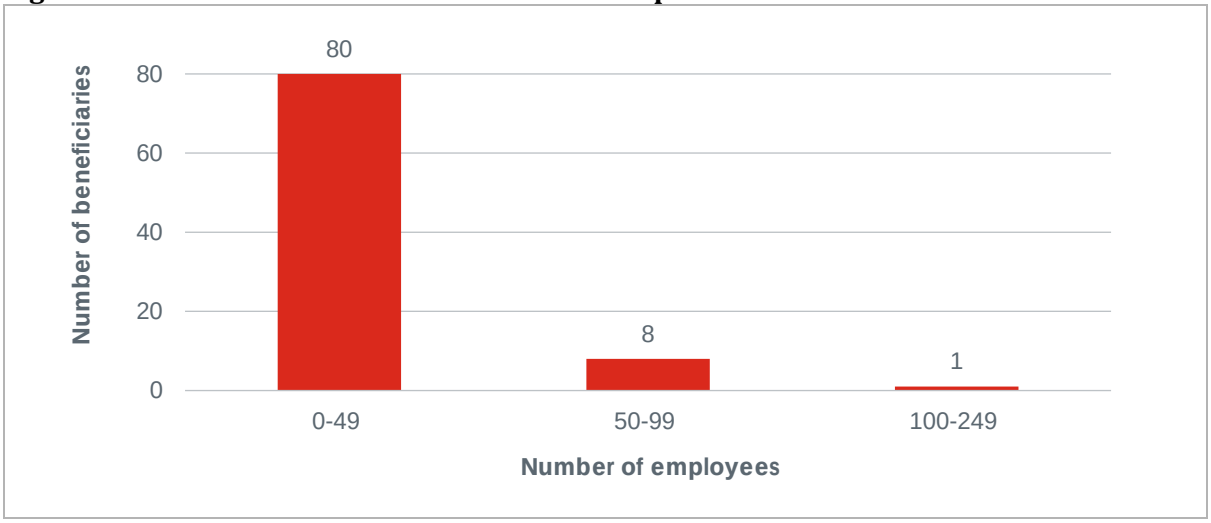
4.12 Among all beneficiaries, 14 were spin-out companies from ten different academic institutions and two public sector research establishments. A total of 16 beneficiaries had been featured on high-growth lists.[9] This suggests that the programme is funding highly innovative young companies.[10]

4.13 Figure 4-5 shows the size band for 89 of the 102 loan recipients for which Beauhurst data was available. Among these, nearly all (80 firms; 90%) were micro- or small-sized businesses employing fewer than 50 people. The remaining nine beneficiaries (10%) were medium-sized: eight of these employing between 50 and 99 people, and one between 100 and 249. This is broadly in line with evidence from LSBS which suggests that the largest proportion of innovation (77.2%) is within micro firms because these are the largest SME employer group (82.4%) – therefore, as medium sized employers only represent 2.4% of all SMEs, they are proportionately a much smaller innovation group. However, there is a significant[11] correlation between

[8] Data on Companies House status from Beauhurst, May 2021.
[9] Beauhurst data, May 2021.
[10] Data on turnover and R&D investment is patchy because firms are not required to file full accounts with Companies House until they turn over at least £10.2m. Looking across the last 10 financial statements, only 8 companies reported turnover and 17 companies R&D expenditure.
[11] (>.05).

innovation activity and increased SME employment size, with higher proportions in the larger size groups being innovative (14.2% of micro, 18.9% of small and 24.6% of medium).

Figure 4-5: Business size of Innovation Loan recipients

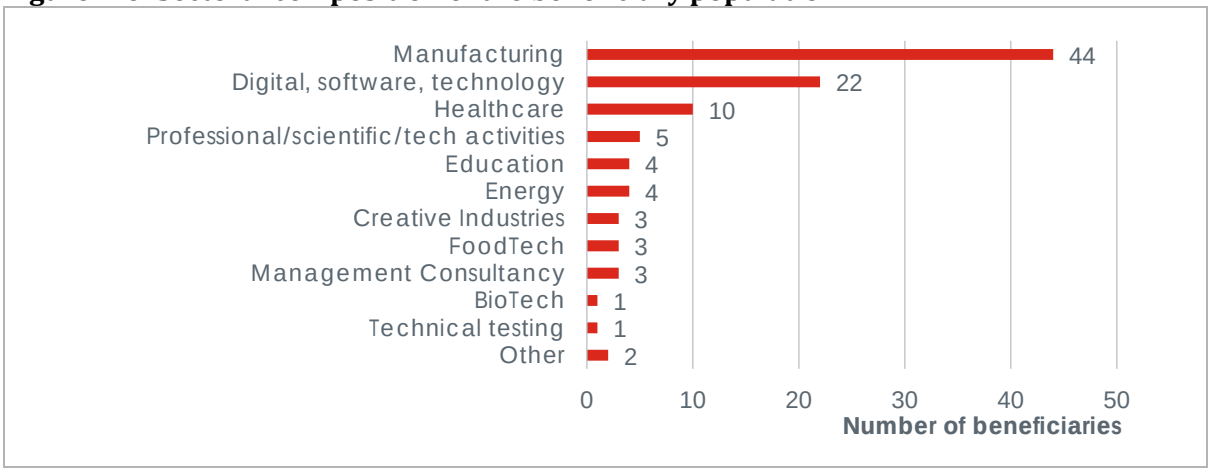


Source: Beauhurst data from May 2021
Base: 89 companies for which data is available (of the total beneficiary population of 102)

Sectoral profile

4.14 Figure 4-6 shows the sectoral composition of the beneficiary population.[12] Just under half of the portfolio was made up of manufacturing businesses – accounting for 43% of the total. A fifth (22%) were operating within digital, software and technology; and a tenth (10%) in healthcare. Other sectors included professional, scientific and technology activities; education; energy; creative industries; FoodTech and BioTech. The high proportion of manufacturing innovators is in line with national data from LSBS – taking a broad sector perspective (i.e. SIC first digit), manufacturing has the highest in-sector proportion of innovators (32%) representing 12.9% of SME employer innovators.

Figure 4-6: Sectoral composition of the beneficiary population



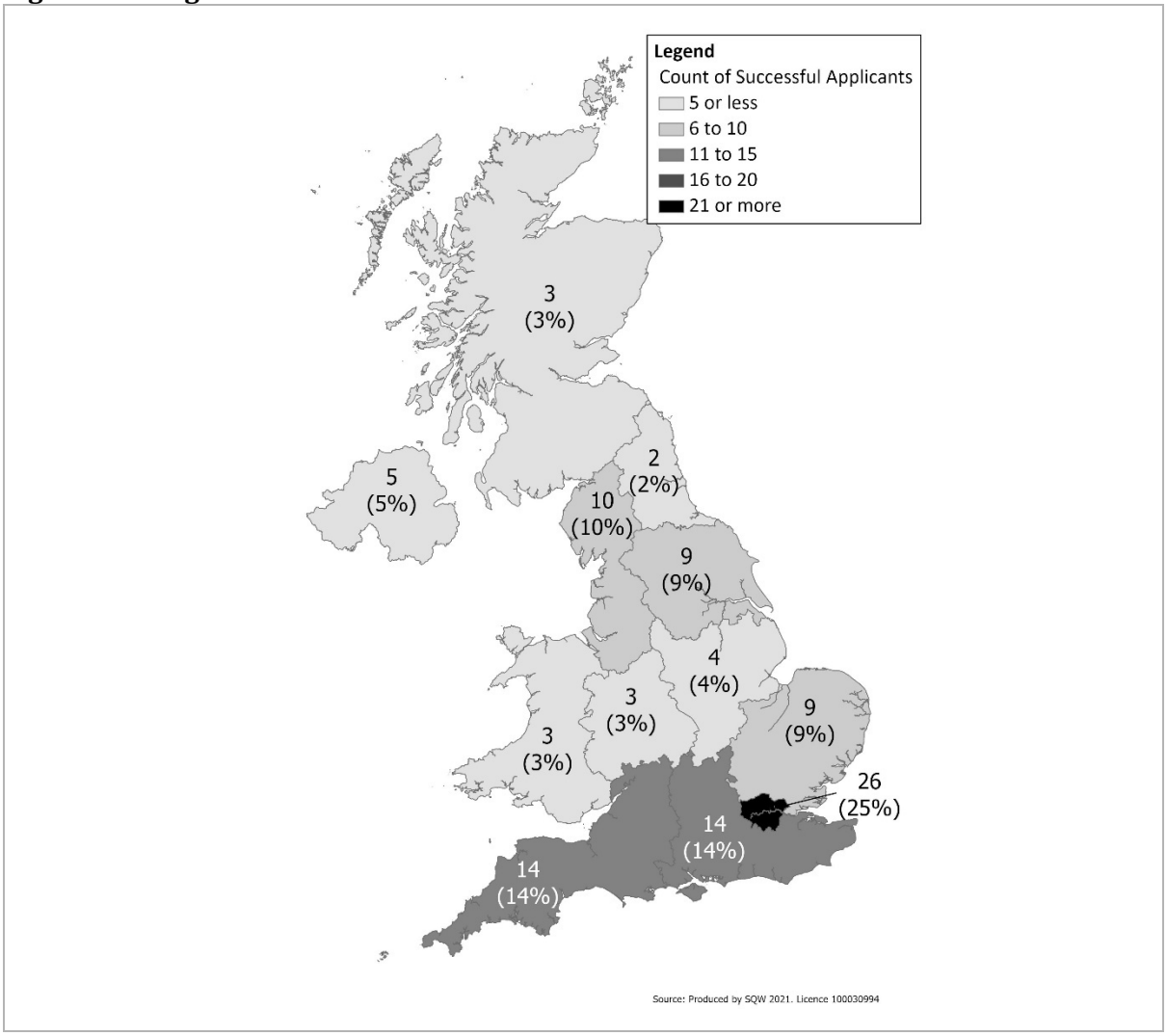
Source: Innovate UK monitoring data from May 2021
Base: All 102 beneficiaries

[12] Sectors as assigned by Innovate UK.

Location

4.15 Figure 4-7 shows the geographical distribution of loan recipients based on head office postcode data from Beauhurst. Over a third of beneficiaries were in London (25%) or the South East (14%), followed by the South West (14%) and the North West (10%). Only 5% of businesses were in Northern Ireland, and 3% in Scotland which is broadly in line with LSBS data (and might be impacted by the availability of specialist devolved funds). Since the previous interim evaluation, which covered the first five competitions, the proportion of beneficiaries located in London or the South East has reduced (from 48% to 39%) with more beneficiaries coming from outside these regions. This suggests that Innovate UK has made a sustained effort in promoting and securing successful applicants from different regions of the UK.

Figure 4-7: Regional distribution of beneficiaries

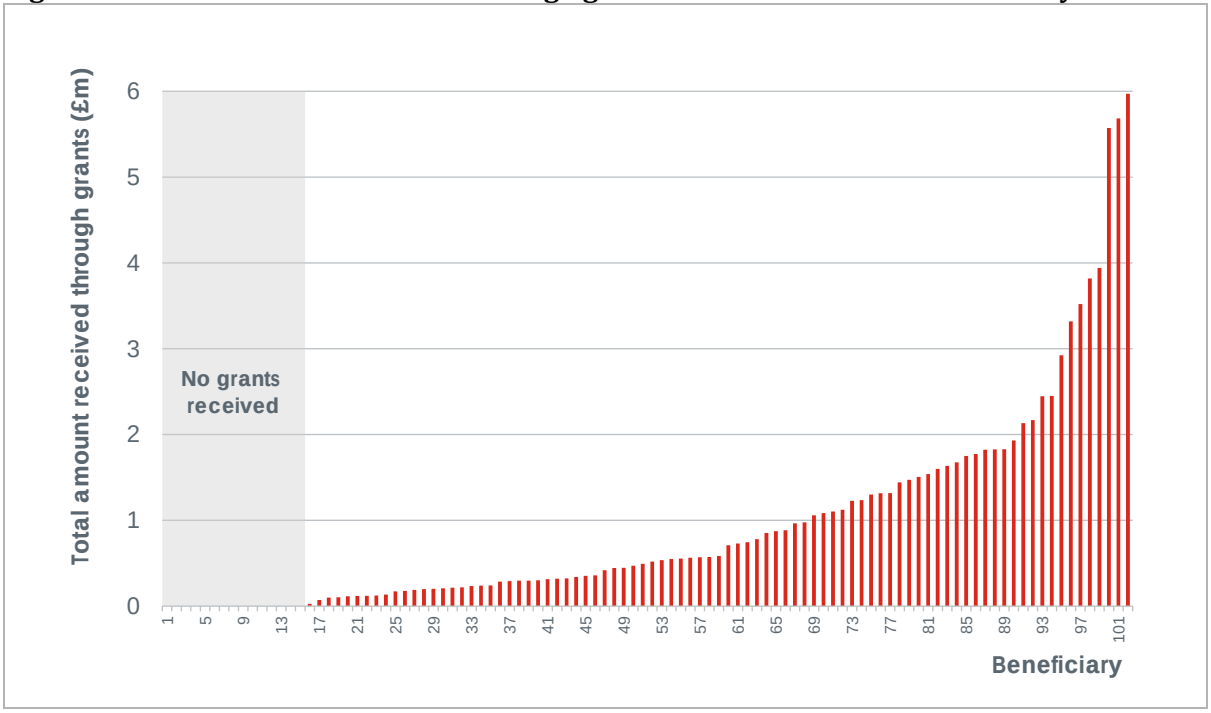


Source: SQW based on Head Office postcode data from Beauhurst, May 2021
Base: All 102 beneficiaries

Investment history

4.16 Data from the Beauhurst database provides an insight into the types and volume of funding received by the beneficiary businesses.[13] By May 2021, the majority of the companies in the loan portfolio (87 firms; 85% of all) had received some grant funding – suggesting that these are largely firms with prior Innovate UK support and contact. Across these firms, the total value of grants amounted to £97.5 million, with the average grant size of around £225,000. Figure 4-8 presents the distribution of the amount of grant funding received across all beneficiaries. For those that had secured grants, this was for an average of five grants per company totalling £1.1 million; 12 companies had received between £2 million and £6 million.

Figure 4-8: Total amount received through grants across beneficiaries as of May 2021

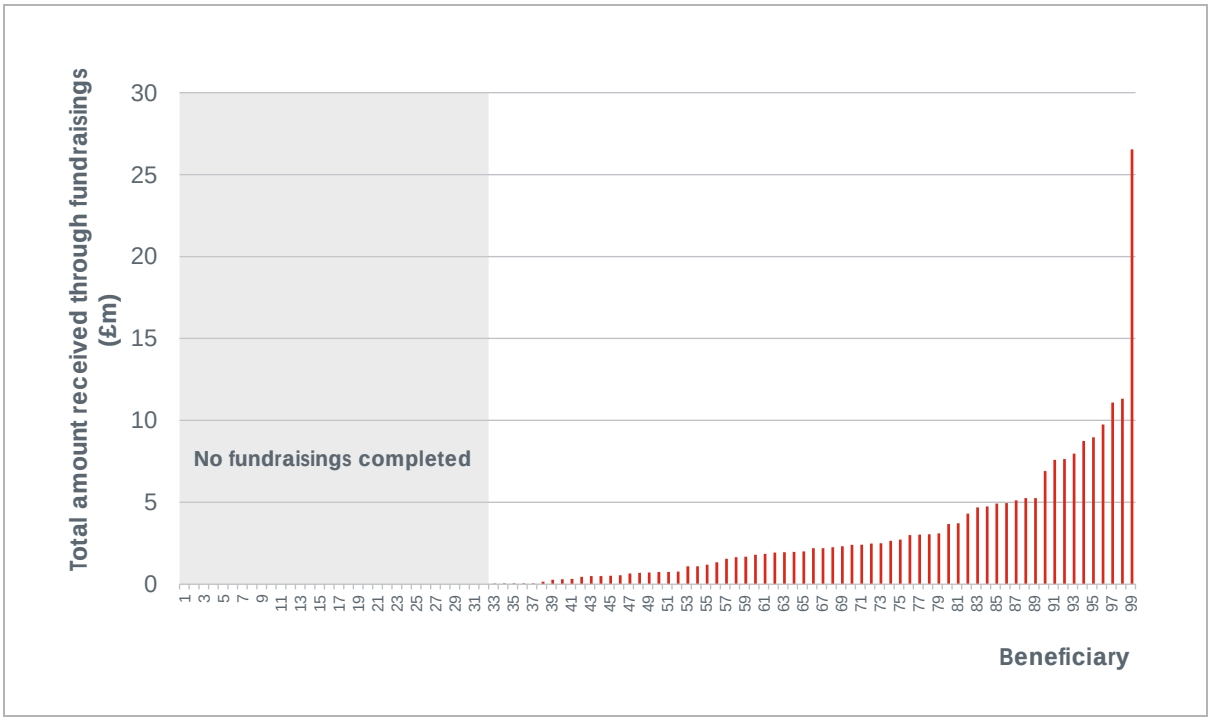


Source: Beauhurst data from May 2021
Base: All Base: All 102 beneficiaries

4.17 Fundraising data[14] from Beauhurst is available for 99 of the 102 beneficiaries. As of May 2021, 67 of the 99 companies had closed fundraising rounds totalling just under £219 million.[15] On average, these firms raised four fundraisings amounting to almost £835,000 per deal; 13 had secured more than £5 million. Figure 4-9 shows the distribution of the amount of funding raised through fundraisings across the 99 beneficiaries.

[13] Note that this includes any funding that the beneficiaries had received by May 2021, i.e. both prior to and after receiving the Innovation Loan.
[14] Fundraisings on Beauhurst cover equity fundraising and debt fundraising.
[15] Note that these figures also include Innovation Loans for the companies where this data has been updated on Beauhurst.

Figure 4-9: Total amount received through fundraisings across beneficiaries as of May 2021



Source: Beauhurst data from May 2021

Base: 99 companies for which data is available (of the total beneficiary population of 102), excluding 3 companies which had completed one fundraising round but for which the amount raised was missing. The shaded area with no fundraisings completed includes 32 companies, of which 13 were missing data but were assumed to be zero because any fundraising would be tracked.

Gender profile

4.18 Whilst the Innovation Loans programme monitors some equality, diversity and inclusion (EDI) indicators for beneficiaries,[16] these are not used as criteria for assessing the applications. Innovate UK data on the composition of teams indicates that two out of three businesses (62%) had male-only teams, with the remainder (38%) employing mixed-gender teams.[17] In one tenth of all firms (11%), female employees constituted at least half of the workforce. Beauhurst data indicates that in the vast majority of companies for which data was available (87%),[18] the primary C-suite contact[19] was male. The gender profile within the portfolio is broadly in line with the wider business population as LSBS data suggests that in 2019, 11% all businesses were women led and a further 24% had equal male/female management teams.

Impact of Covid-19

4.19 Whilst the Covid-19 pandemic has inevitably had a negative effect on many businesses, there are also potential opportunities associated with changes in demand. Further, it may be the case that the types of companies that the Innovation Loans programme is targeting – innovative and high-

[16] Including the make-up of teams by gender, and the gender, nationality and age of company directors.
[17] Data on team composition from Innovate UK was available for 90 of the 102 companies.
[18] Data on C-suite contacts from Beauhurst was available for 89 of the 102 companies.
[19] C-suite contacts are the key individuals who are associated with the company on their websites and LinkedIn profile. The primary C-suite contact is the person at the top of that list, typically the CEO.

growth – are more likely to be agile and able to pivot in order to ensure short-term survival along with long-term resilience and growth.

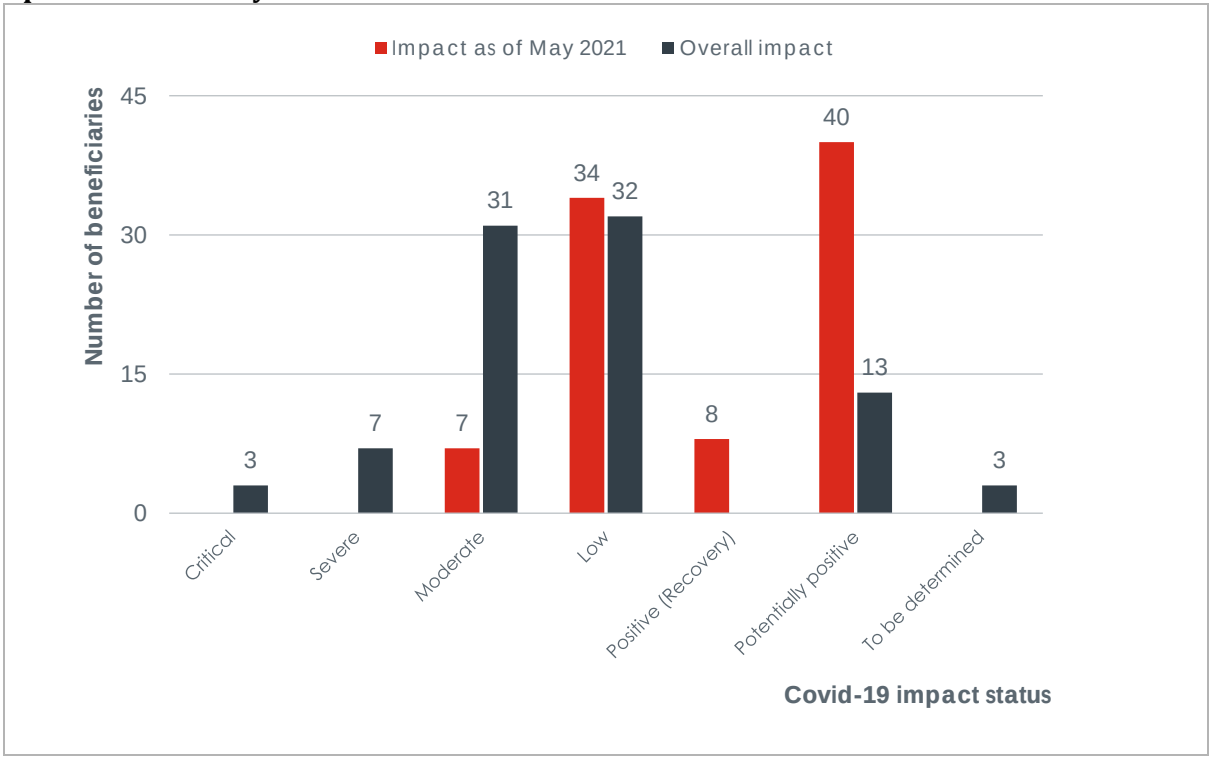
4.20 Beauhurst tracks the impact of Covid-19 by manually assessing each of the individual companies tracked in their database, and then regularly reviewing this.[20] Figure 4-10 shows how many of the 89 beneficiaries with a known Covid-19 status fall within each impact category. The chart presents both the impact as of May 2021, as well as the overall impact since the onset of the pandemic in April 2020 (i.e. the lowest category they were assigned during this period).[21] The data indicates that whilst half of the companies (48%) had experienced moderate to critical negative impacts overall, there were clear signs of recovery by May 2021 at which point:

- around half of the companies (45%) could potentially grow their operations as a result of the pandemic ('potentially positive impact' status)
- a tenth (9%) seemed to have recovered ('positive (recovery)')
- over a third (38%) were largely able to continue normal operations, albeit possibly also furloughing some staff and implementing safety measures such as working from home ('low impact')
- another 8% had suffered disruption beyond mere inconvenience but were mostly able to continue to operate ('moderate impact')
- none of the companies were suffering from serious disruption to their ability to operate ('severe impact') or were facing an existential threat to their ability to continue in operation ('critical impact').

4.21 The findings from Beauhurst are broadly in line with the survey feedback from businesses which also suggests that Covid-19 has had a mixed impact on projects – negative, positive or no change overall (see section 6).

[20] Where possible, Beauhurst draw on information published on company websites and social media channels. Where a company has not announced any changes to its activity, they will conduct careful analysis of the business model, target markets and sector of operation to determine the likely impact of government restrictions and the current economic situation.
[21] Whilst the pandemic reached the UK in March 2020, Beauhurst did not start tracking this indicator until April 2020.

Figure 4-10: Impact of Covid-19 on beneficiaries, as of May 2021 and overall between April 2020 and May 2021



Source: Beauhurst data from May 2021
Base: 89 companies for which data is available (of the total beneficiary population of 102)

5. Assessment of delivery

Key headlines

- There are clear and well-defined organisational structures and arrangements in place for implementing the Innovation Loans programme.
- The programme has continued to evolve and improve since the previous evaluation in 2019, with several changes to processes made (including increasing the frequency of engagement by the Monitoring Officer, and adopting new systems for application data and credit assessments).
- Businesses that were successful in applying for an Innovation Loan generally provided positive feedback on programme delivery. Highest ratings were given to the terms and conditions, followed closely by the flexibility of terms through the Covid-19 pandemic. The two lowest rated aspects were marketing and promotion of the programme, and the time taken from application to decision.
- Similarly, unsuccessful applicants rated the terms and conditions the highest. However, compared to beneficiaries they generally gave lower scores for aspects of delivery. The lowest rated area was the transparency of the decision-making process and feedback – an area where unsuccessful businesses can be expected to be most critical.
- Evidence from stakeholder consultees (both those involved in delivery as well as external) confirms that the structure and mechanisms of the programme are fit for purpose, confirming the findings from the previous evaluation.
- Consultees reported positive feedback on delivery, particularly the terms and conditions offered relative to other finance providers, and the flexibility of terms through the Covid-19 pandemic. However, some areas for improvement were identified, including increasing the reach of marketing activities and further streamlining the processes.
- Stakeholders (external and those involved in delivery) also provided some suggestions for future development of the programme as a whole. These related to: (i) scaling up support in terms of increasing the funds available and widening eligibility criteria to attract more firms; (ii) better integration across Innovate UK's offering; (iii) expanding the non-financial support given to applicants; and (iv) not diversifying the financial support offer (i.e. introduce other financial instruments in addition to loans).

5.1 This section provides an assessment of programme delivery, including the processes in place for implementation and the customer journey for applicants. The evidence is drawn from programme documentation, consultations with the stakeholders involved in delivery and monitoring, survey feedback from successful and unsuccessful businesses, and consultations with external stakeholders (where appropriate). Annex D presents the Innovation Loans delivery model (organisational structure); customer journey across the five main stages (competition setup, application, assessment, execution, and monitoring); and Innovate UK's processes.

How effective are the processes of implementation and what are the experiences of the customer journey?

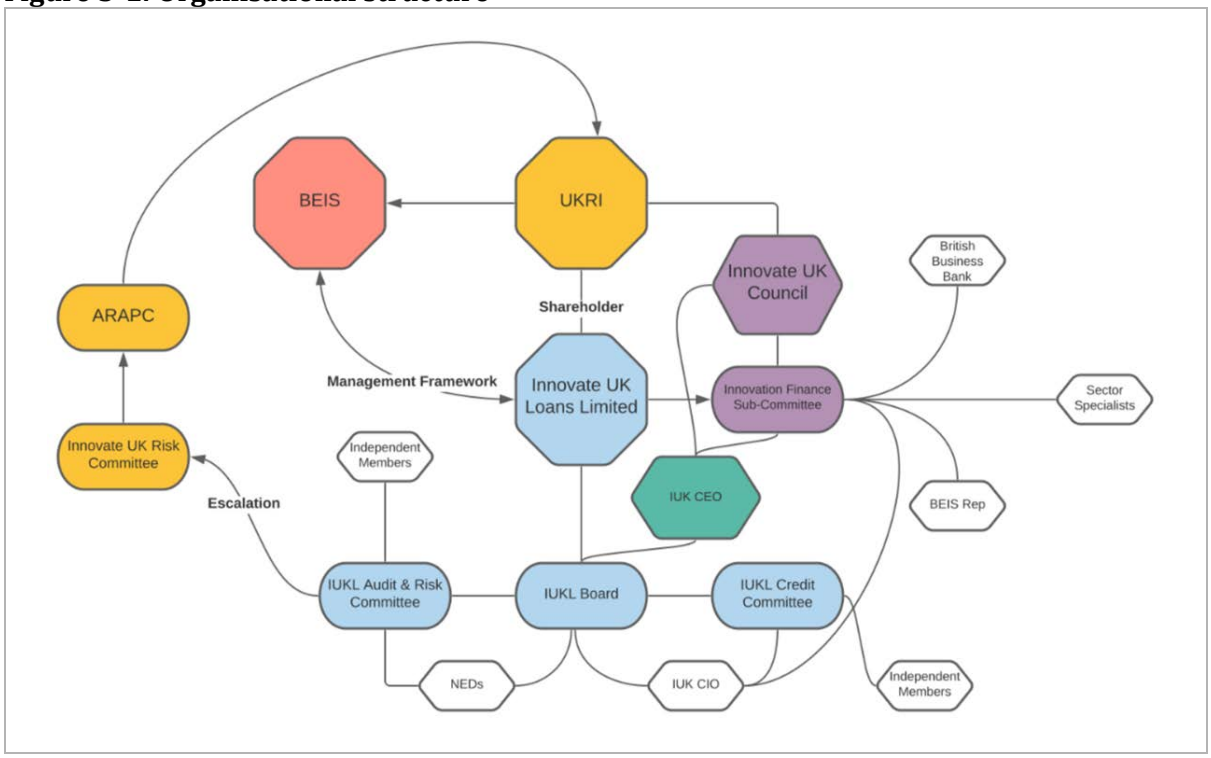
Delivery model

5.2 To deliver the Innovation Loans programme, a Special Purpose Vehicle (SPV) – Innovate UK Loans Limited (IUKL) – was set up as a wholly owned subsidiary of UK Research and Innovation (UKRI) to deliver the programme. The advantages of using an SPV, as highlighted in the Full Business Case (2017), include the following:

- isolated financial risk and increased transparency
- greater transparency of costs (loan finance from grant finance)
- clear lines of accountability and responsibility
- independent and experienced governance
- right expertise is easier to attract
- portability i.e. easier to move, sell off or reduce public ownership on the loan book.

5.3 The Innovation Loans organisational structure design is presented in Figure 5-1. This governance arrangement was developed in partnership with UK Government Investments (UKGI) and in consultation with HM Treasury, BEIS, and the British Business Bank (BBB).

Figure 5-1: Organisational structure



Source: Innovate UK

5.4 This structure reflects some changes since the original Business Case, including as a result of Innovate UK becoming part of UK Research and Innovation (UKRI). Further changes have been made since the previous evaluation in 2019, including the following:

- The previous Strategic Oversight Committee became Innovation Finance Sub-Committee of Council.
  - The Sub-Committee provides challenge and additional assurance that the parameters of the pilot are appropriate and represent value-for-money (VfM).
  - Financial and risk management controls as well as underwriting processes are in place.
- IUKL Board now includes Innovate UK Chief Operating Officer (COO), UKRI Finance Director and a Non-Executive Director (NED).
  - The Board is responsible for achieving the innovation policy objectives - determining the lending, underwriting and operating policies, and management of risk.
  - It also determines how decisions on loan applications are made, as well as developing recovery and write off policies and procedures.
- The Credit Committee includes a NED, with four additional NEDs expected to join in 2021 as 'pool'.
- Proposed establishment of IUKL Audit & Risk Committee, with reporting to Innovate UK / UKRI Audit & Risk Committees.
- Appointment of third party firm to deliver "2nd line of defence" checks and inspections.

5.5 In addition, our scoping discussions highlighted other changes to systems and processes:

- Systems used for inputting application data have been updated, resulting in the databases covering more financial data on each of the companies.
- Credit assessments are now tracked using a specialist software, Airtable[22], instead of Excel. This has made information more accessible to the Credit Committee.
- Some aspects of the due diligence processes have been automated, e.g. checking proof of identification.

5.6 Within the overall organisational structure described above, the organisational chart in Annex D illustrates how the Innovation Loans delivery team is set-up. There have been three key changes since the previous evaluation in 2019:

- set up of a Portfolio Management team within Credit
- recruitment of Credit and Operations Managers, Specialists and Analysts
- recruitment of a dedicated Head of Finance and financial reporting experts.

5.7 Discussions with Innovate UK and our own review of programme documentation suggests that there are clear and well-defined organisational structures and arrangements in place for implementing the programme. The structures, roles, responsibilities and reporting of the Innovate UK delivery team appear to be robust and appropriate for the programme objectives. In particular, we highlight the set-up of the programme as a SPV which reflects private practice; the challenge, assurance and inspection built into the structures (e.g. through the Innovation Finance Sub-Committee of Council, and bringing on board a third party firm for undertaking checks); the design incorporates innovation policy objectives by including UKRI Directors; the expansion of the Innovation Loans delivery team; and changes to systems and processes e.g. use of automation and specialist software to collect and analyse company data.

5.8 The strong processes and structures are also evidenced in the overall positive feedback from business beneficiaries and their good experiences of the programme. Further detail on their feedback is summarised in the following sub-sections.

Business perspectives

Beneficiaries

5.9 The businesses that were successful in applying for an Innovation Loans generally provided positive feedback on programme delivery. Table 5-1 provides the scores given to different aspects of delivery. The highest rates related to the terms and conditions (mean score of 4.3 out of 5), followed closely by the flexibility of terms through the Covid-19 pandemic (4.2). Other highly rated aspects included monitoring of the project (4.1); transparency of the decision-making process and feedback (4.0); and communication with Innovate UK throughout the application and

[22] https://www.airtable.com/

documentation process (4.0). The box below provides an example from a case study to illustrate the importance of flexibility, particularly during the pandemic.

Case study example: Flexibility of the programme

NuNano is an advanced manufacturing company which specialises in the design and manufacture of probes for atomic force microscopy and cantilever-based sensors. Soon after commencing the Innovation Loan-funded project in March 2020, activity was brought to a halt by the Covid-19 pandemic which forced the company's main facility at the University of Edinburgh to close. The firm was able to adjust the terms of the Loan to account for this, delaying the drawdowns and the entire project by five months. Once the facility was able to open again, NuNano restarted work on the project. The flexibility of the programme was considered essential to ensuring business survival:

"NuNano would not have survived that period if the terms of the Loan had been applied rigorously – Innovate UK were very helpful in that respect."

5.10 In terms of how the application process compares to other providers, almost three quarters (70%) considered Innovation Loans to be 'good' or 'very good' in relation to other public sector funders; just over half (56%) thought the same when comparing to private sector providers.

5.11 The elements that scored lowest related to marketing and promotion of the programme (3.5) and the time taken from application to decision (3.6).

Table 5-1: On a scale of one to five, where one is very poor and five is very good, how would you rate the following elements of delivery so far?

	Score		
	1 or 2	4 or 5	Mean score
The terms and conditions offered relative to other finance providers in the market offering similar loan products	2%	86%	**4.3**
Flexibility of terms through the Covid-19 pandemic	2%	70%	**4.2**
Monitoring of the project	4%	78%	**4.1**
Transparency of the decision-making process and feedback	8%	74%	**4.0**
Communication with Innovate UK throughout the application and documentation process	4%	70%	**4.0**
The application process relative to other public sector funders	10%	70%	**3.9**
The application process relative to private sector finance providers	10%	56%	**3.7**
Time between application and decision	20%	50%	**3.6**
Marketing and promotion of Innovation Loans	16%	46%	**3.5**

Source: SQW/IFF survey of Loan beneficiaries (n=50)

Unsuccessful applicants

5.12 Table 5-2 shows the scores given to different aspects of delivery by unsuccessful applicants. Similar to beneficiaries, unsuccessful applicants rated the terms and conditions the highest (mean score of 4.1 out of 5). However, in addition to scores being generally lower, there were two key differences in the pattern of ratings:

- Marketing and promotion and the time between application and decision – the two lowest-rated categories for beneficiaries – were in second and third place, though the mean scores (3.7 and 3.2, respectively) were similar to those given by beneficiaries.
- Transparency of the decision-making process and feedback was rated the lowest with a mean score of 2.6 – much lower than the beneficiary rating of 4.0. This is an area where unsuccessful businesses can be expected to be most critical.

Table 5-2: How would you rate the following elements of the process of applying for an Innovation Loan?

	Score		
	1 or 2	4 or 5	Mean score
The terms and conditions offered relative to other finance providers in the market offering similar	1%	65%	**4.1**
Marketing and promotion of Innovation Loans	14%	61%	**3.7**
Time between application and decision	21%	39%	**3.2**
Communication with Innovate UK throughout the application and documentation process	24%	42%	**3.2**
The application process relative to other public sector funders	26%	29%	**3.1**
The application process relative to private sector finance providers	32%	29%	**2.9**
Transparency of the decision-making process and feedback	51%	29%	**2.6**

Source: SQW/IFF survey of unsuccessful firms (n=72)

Stakeholder perspectives

5.13 The strengths and weaknesses of the programme reported by stakeholder consultees are summarised in Table 5-3. Overall perceptions of the programme were positive, with particular strengths including the sufficient loan value and competitive interest rates; the flexibility of the programme; and the personalised, hands-on support provided from application through to project monitoring.

> **“Innovate UK can offer a more bespoke offer than commercial banks which are “broader brush”.”**

5.14 There was general agreement on the importance of the equality, diversity and inclusion (EDI) agenda. However, there were mixed views among stakeholders regarding the extent to which the design and delivery of the programme can contribute to EDI outcomes:

- The majority of those that were able to comment on this indicated that the marketing, application and decision-making processes in place aim to encourage EDI in innovative businesses, or are being improved in line with this aim (e.g. through collecting EDI data in applications). However, it was generally thought that further progress is required to encourage EDI amongst both loan recipients as well as internally within Innovate UK.
- A minority of stakeholders suggested that there was limited ability for Innovation Loans to encourage greater EDI within businesses because whilst the competitions are open to anyone, these issues are likely to be primarily influenced by the make-up of the Board and firm-level policies.

> **"This seems to be a core focus of the Innovation Loans team – they make a great effort to ensure that all aspects of diversity are accommodated, for example by encouraging applications from all backgrounds."**

5.15 In terms of the future direction of the programme, stakeholders made four key recommendations:

- **Scaling up support:** There are three dimensions to a potential scale up of the programme: (i) Increasing the overall pot of money to facilitate more loans; (ii) Widening the eligibility criteria (e.g. to cover more established companies); and (iii) Increasing the value of the loans and/or providing further credit to approved businesses (providing milestones have been met). The majority of consultees suggested that depending on demand, the programme should be scaled up in one or more of these respects to increase the extent of benefits generated.
- **Increasing the volume and reach of marketing and promotion activities:** In particular, there are opportunities to engage those applicants that are currently not aware of Innovate UK support. There are potential opportunities in closer working relationships with Innovate UK EDGE to help *"utilise the full reach of the Innovate UK family"*, as well as reaching out to businesses through other networks like accelerators hubs, universities and LEPs.
- **Consider alternatives to the competition format:** Introducing a more dynamic, rolling application process would enable companies to apply at a time that matches their business cycles and is suitable for them. Alternatively, providing further notice of future opportunities would help SMEs to plan accordingly.
- **Better integration across Innovate UK's offering:** Introduce a fast-track system for businesses that have previously received Innovate UK grants to move on to Innovation Loans more easily. An alternative option would be to introduce a hybrid loan/grant product – initially a grant which can more seamlessly progress into a loan. There is potential for

Innovation Loans to better converge with Innovate UK EDGE and the Scaleup Programme to better target suitable companies, e.g. through the network of business advisors.

- **Expanding the non-financial support given to applicants:** There are other factors alongside finance which enable businesses to grow. There is therefore potential to offer firms more bespoke, non-financial support to "complete the picture", particularly considering the level of effort and due diligence that goes into identifying the best, most innovative companies:
  - For example, loan recipients could be required to complete a management and leadership component as a compulsory step to receiving a loan. Providing additional support would also help to close some of the common capability gaps that are apparent in applications, e.g. around financial modelling.
  - There may be an opportunity to partner with Innovate UK EDGE and the Scaleup Programme. There are also opportunities in offering peer-to-peer support within the cohort/alumni community, similar to the SME element in Horizon 2020 where coaching support is mandated alongside the grant.
  - It may also be an idea to consider offering support to firms that applied but were deemed not yet financially ready for an Innovation Loan. Helping to turn these firms into more suitable candidates would mean the programme could facilitate a future pipeline of applications.
- **Not diversifying the financial support offer:** On balance, consultees felt that the programme should not expand into other instruments because:
  - other instruments may not be necessary – Innovation Loans have been designed to fill a specific gap in the market
  - expanding into equity may crowd out the private equity market, and could cross over with other government-backed finance providers (e.g. the British Business Bank).

Table 5-3: Key strengths and weaknesses of the Innovation Loans programme reported by internal and external stakeholder consultees

	Specific features of the Innovation Loan product	Marketing & promotion	Application & decision process	Monitoring process
Strengths	• Loan value is of significant scale and covers a significant proportion of project costs • Competitive interest rate • Flexibility in drawdown period and amount; options for a repayment holiday • Strong focus on enabling full commercialisation; loan period is sufficient to allow firms to focus on de-risking the technology • Lack of arrangement fees and personal guarantees	• A wide range of promotional activities and channels, including social media, Roadshows and webinars • Some integration within the wider Innovate UK offering (e.g. through MOs) and with partners (e.g. KTN) • There is a clear offer and businesses understand exactly what they are going to get – more so than with equity deals	• Personalised and *"holistic"* processes that are not fully automated, enabling individual conversations with applicants prior to a lending decision • Strong technical expertise at Innovate UK to assess the innovation component • Apparent emphasis on EDI outcomes with data collected in applications • Ongoing improvements and streamlining	• Hands-on process with support and engagement from a *"dedicated team"* throughout (including MOs and Account Managers) – this offers *"a more synergistic and informed relationship than with a bank"* • The monitoring process prepares companies for the *"reality of private finance"*
Weaknesses	• Whilst the loan value is substantial, it could be increased to cover larger projects as well as other types of commercialisation costs (e.g. marketing) • Equally, the minimum loan value excludes firms working on eligible projects that require less funding	• More and wide-reaching marketing and promotion is needed to reach those applicants that are currently not aware of Innovate UK support • This could be done by partnering with Innovate UK EDGE, and reaching out through other networks (e.g. accelerator hubs, universities and LEPs)	• The application process is burdensome, both for the reviewers and the applicants (particularly those that have no previous Innovate UK experience), and could be better streamlined • The competition format may prevent firms from applying if the timings do not match their business cycles • Excluding applications from consortia may hinder firms that rely on co-development	• Information from MOs could be better utilised and integrated across Innovate UK, although ongoing improvements were noted • Reporting templates could be improved, although some efforts were noted • Better communication between the Loans team, MOs and support staff would help to ensure that SMEs are provided with consistent, up-to-date information

Source: SQW consultations with stakeholders

6. Assessment of outputs and outcomes

Key headlines

- The business survey received feedback from 50 beneficiaries of Innovation Loans. The sample was representative of the population of 102 businesses.
- **The finance additionality of Innovation Loans is high**, with around three quarters of businesses indicating that they 'probably' or 'definitely' would not have been able to obtain finance elsewhere. For a quarter of businesses that would been able to obtain finance elsewhere, most would have taken up to two years longer to secure the money. The results suggest that Innovation Loans are filling a gap in the finance landscape.
- **Innovation capacity and skills** – Nearly all business had already improved their innovation capacity (80%) and innovation skills (90%) as a result of Innovation Loans. The majority of businesses are more **investment and commercially ready**.
- **Increased R&D investment** – 43 businesses provided estimates of the new investment in R&D as a result of the Loans. This totalled £37.4 million, higher than the value of Loans awarded to these businesses (£31.8 million).
- **Moving towards commercialisation/ progression through TRLs –** Almost all businesses (92%) had progressed their product or service towards commercialisation. Of the 50 cases, 18 (36%) have now been fully or partially commercialised, and a further 19 are at the stage of being tested and scaled.
- **Intellectual Property (IP) –** Over a third of businesses (36%) applied for IP, with the same proportion expected to do so in the future. Patents, trademarks and copyrights were the most common type of IP applied for.
- **New products, services, and processes –** 30 businesses (60%) introduced a new product, service or process and 18 businesses (36%) expect to do so. A total of 15 businesses that introduced new products provided estimates of the cumulative value of sales from their innovations amounting to £28 million.
- **Productivity –** Process improvements were expected to lead to productivity gains with businesses reporting that the innovation would reduce costs (84%), improve quality (82%) and save time (76%).
- **Follow-on funding –** Over half of the businesses (58%) secured follow-on funding totalling c. £60 million (mostly equity); nearly all of them stated that Innovation Loans contributed to this.

6.1 This section presents the survey results from interviews with 50 beneficiaries of the Innovation Loans programme. This includes progress on funded projects, alternative sources of funding sought by businesses, and a range of outputs and outcomes: investment in R&D; IP applications; progression towards commercialisation; innovation capacity and skills; investment and commercial readiness; and spillover benefits.

Loan application

6.2 Table 6-1 shows the sources through which beneficiaries first became aware of Innovation Loans. **Most firms heard about the programme from Innovate UK (92%)**. In particular, they were likely to learn of it via the Innovate UK mailing list, website, or one of the promotion events.

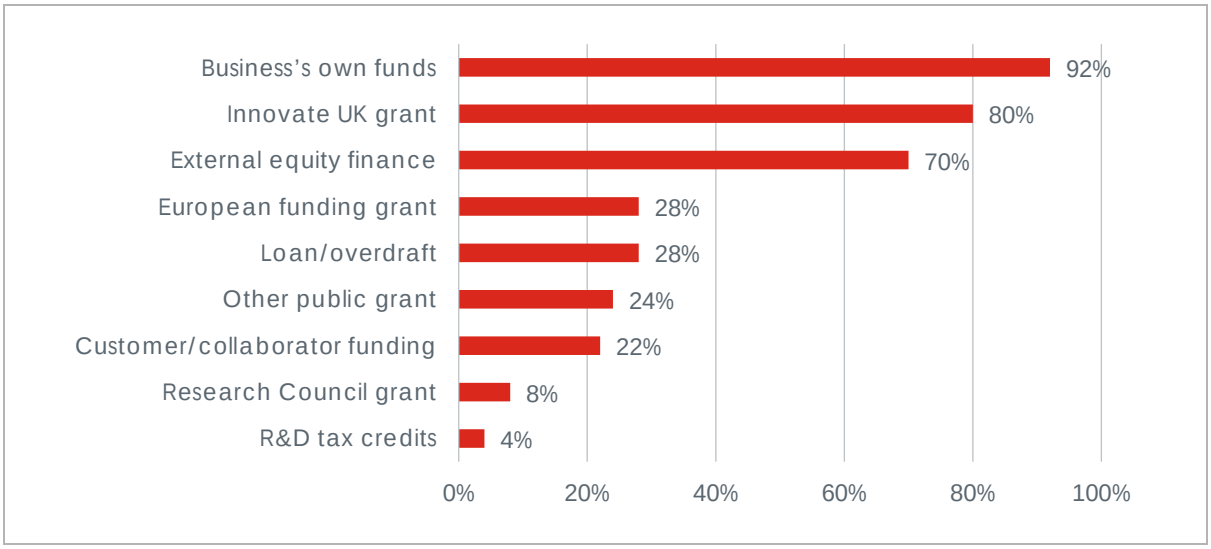
Table 6-1: How did you first become aware of the Innovation Loans?

	n	%
Innovate UK	46	92%
Word of mouth	3	6%
Bank manager	1	2%
Business adviser/ Consultant	1	2%
Knowledge Transfer Network (KTN)	1	2%
Other	1	2%
Don't know	1	2%

Source: SQW/IFF survey of Loan beneficiaries (n=50; multi-code)

6.3 Most of the businesses had been engaged with Innovate UK prior to applying for a Loan: **80% had previously funded R&D activities with an Innovate UK grant**. Other previous forms of R&D funding commonly used by beneficiaries include the businesses' own funds (92%) and external equity finance (70%) (Figure 6-1).

Figure 6-1: What sources have you used to fund R&D in the past, prior to receiving the Innovation Loan?

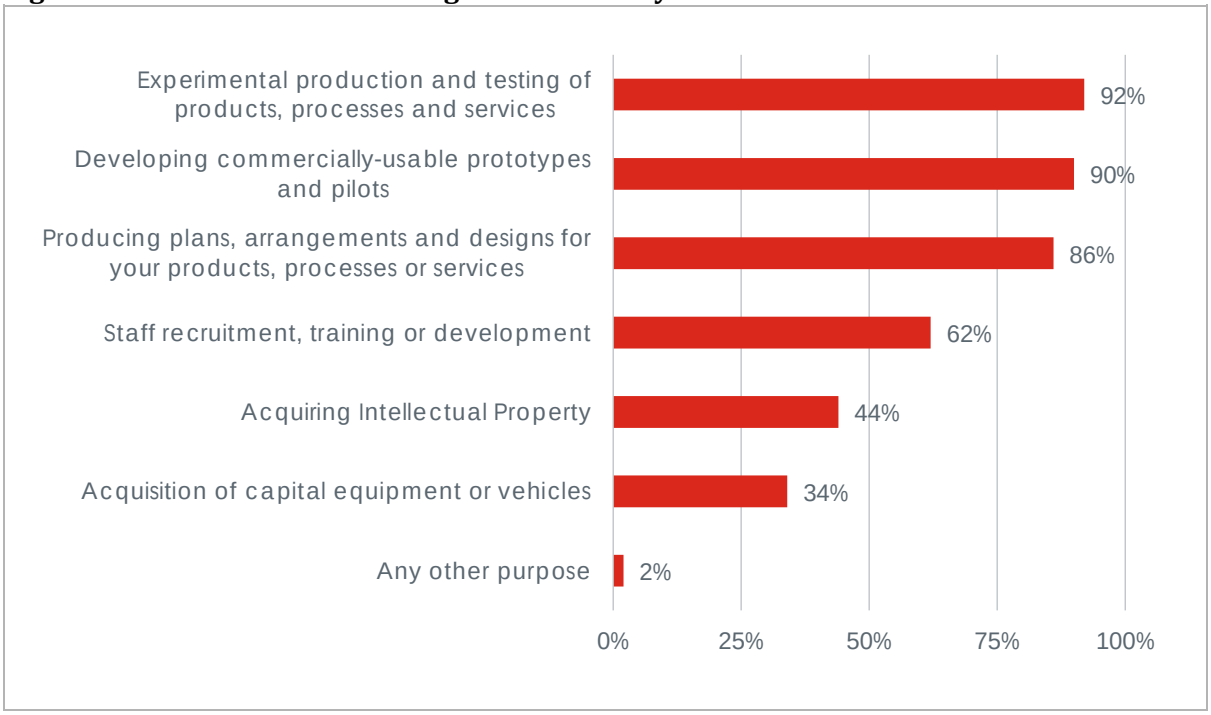


Source: SQW/IFF survey of Loan beneficiaries (n=50, multi-code)

Use of Innovation Loans

6.4 **Businesses intended to use Innovation Loans for a combination of activities** (Figure 6-2). These mainly related to: experimental production and testing of new products/processes/services (92%); developing commercially usable prototypes and pilots (90%); producing plans, arrangements and designs for products/processes/services (86%); staff recruitment, training and development (62%); and acquiring Intellectual Property (44%).

Figure 6-2: Which of the following activities was your Innovation Loan intended for?



Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.5 In terms of project progress, 18 businesses (36%) reported that projects were running to schedule and four (8%) that they were ahead or well ahead of schedule. However, 19 projects (38%) were 'slightly' behind schedule and a further eight (16%) were 'well behind' schedule.

Table 6-2: Is the project progressing as expected?

	n	%
Well ahead of schedule	1	2%
Ahead of schedule	3	6%
On schedule	18	36%
Slightly behind schedule	19	38%
Well behind schedule	8	16%
Don't know	1	2%
Total	**50**	**100%**

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.6 **For around three quarters of businesses (72%), Covid-19 delayed commercialisation of the product/service**. This was evident in several case studies where delays were attributed to the impact of the pandemic on R&D operations (e.g. forced closure of facilities) and a drop in demand for the technology (as clients cut spending). Another six firms (12%) changed the type of product/service, and one (2%) abandoned the project altogether. Conversely, a minority of beneficiaries reported that the project had been accelerated by the pandemic (five businesses; 10%).

Table 6-3: How has Covid-19 impacted on the project over the last year?

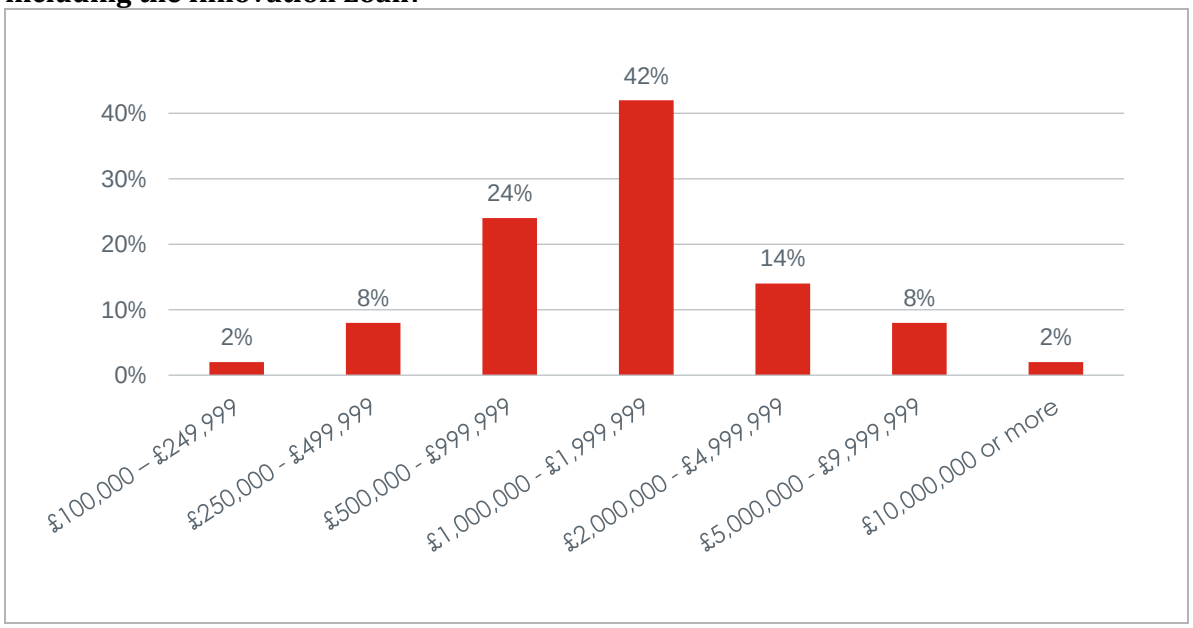
Impact of Covid-19	n	%
Abandoned the project	1	2%
Delayed commercialisation of product/service	36	72%
Changed the type of product/service	6	12%
No effect	4	8%
Accelerated the commercialisation of product/service	5	10%
None of the above	6	12%

Source: SQW/IFF survey of Loan beneficiaries (n=50, multi-code)

Alternative sources and finance additionality

6.7 Across all sources (including Innovation Loans), businesses were seeking various amounts of funding for their innovation project. **Three quarters of beneficiaries (76%) were looking for less than £2 million**, with the largest proportion seeking between £1 million and £2 million (Figure 6-3).

Figure 6-3: How much were you seeking in total for the project, that is from all sources including the Innovation Loan?



Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.8 **Around three quarters (74%) of businesses had considered accessing other forms of funding alongside the Innovation Loan**. Equity finance was the most common type of alternative funding, considered by over half of the survey respondents (54%). Beneficiaries were also likely to consider grant funding (40%) or accessing a loan – either from a family/friend/business partner/directors/owner (26%) or a bank/building society/other financial institution (22%).

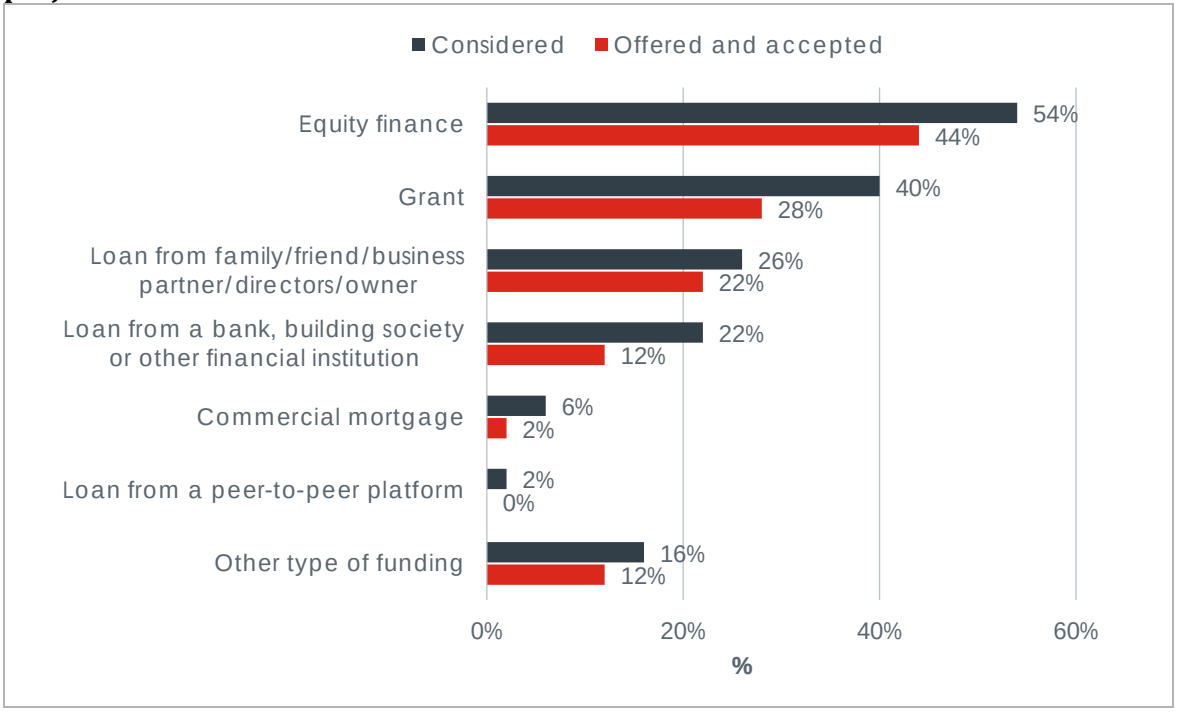
6.9 **Overall, just over two thirds (68%) of beneficiaries were offered other funding alongside Innovations Loans** (62% of all firms *accepted* the other funding).[23] Importantly, most of the businesses that were offered other funding (82%) indicated that the Innovation Loan helped them to secure at least one of the offers.[24]

6.10 Figure 6-4 provides a summary of the funding options that businesses received (and accepted):

- **Equity** was successfully applied for and accepted by 22 out of the 27 businesses that considered it (44% of total). Of the remaining five businesses that did not receive equity finance having considered it, two turned down an offer and a further three reported that they had held talks with potential equity investors but failed to secure an offer.
- **Grants** were the next most common form of funding offered and accepted by 14 respondents (28%).
- **Other Loans** were secured by 34% of beneficiaries: 11 respondents received loans from family/friend/business partner/director/owner and seven secured a loan from a bank/building society/other financial institution. Most businesses receiving a loan were able to secure the full amount (11 out of 17).
- **'Other' sources** included asset financing and investment from a sister/partner company.

[23]There was a relatively even split between those that were offered one other type of funding (16 businesses) and those offered multiple types of funding (18 businesses).
[24] If businesses were offered multiple types of funding, and the Innovation Loan helped to secure any of these, they are included in this figure.

Figure 6-4: Did you secure any other funding, alongside the Innovation Loan, for this project?



Source: SQW/IFF survey of Loan beneficiaries (n=50, multi-code)

Finance additionality

6.11 **Finance additionality is high, with three quarters (74%) of businesses reflecting that they 'probably' or 'definitely' would not have been able to obtain finance elsewhere for the activities** (Table 6-4). Around a quarter of businesses (26%) were likely to have been able to obtain finance elsewhere, however, for most of these businesses (8 out of 13), the process would have taken up to two years longer.

Table 6-4: In the absence of the Innovation Loan, do you think you would have been able to obtain finance elsewhere for these activities?

	n	%
Yes, definitely	1	2%
Yes, probably	12	24%
No, probably not	28	56%
No, definitely not	9	18%
Total	**50**	**100%**

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.12 **The results show that Innovation Loans are filling a gap in the finance landscape**. Without it, many beneficiaries would not have been able to access alternative funding, meaning that the R&D and commercialisation being undertaken are likely to be additional activities. Case study evidence shows that there are various reasons why firms would not have been able to access other funding (see example box below).

Case study example: Finance additionality

Catagen was established in 2012 as a spinout company from Queen's University Belfast. Up until 2016, Catagen provided emissions test equipment to manufacturers, whilst also undertaking significant R&D into the energy efficient gas reactor technology at the centre of its offering. In 2017, the firm pivoted to provide services and expertise to the industry, rather than the equipment itself. The new business model brought with it a significant degree of scalability, for which Catagen required external finance to undertake late-stage R&D of the test equipment.

Catagen considered equity finance, but decided against this option for three reasons:

- *it was considered that VC funds would have undervalued the company due to the lack of proven scale at that point*
- *equity investment brings with it stringent terms and greater pressure to reach profitability, which may have had negative implications for the business*
- *a greater degree of equity investment may disincentivise the original founders.*

Debt financing was therefore recognised as the preferred option. Commercial loans, however, were not available to Catagen due to the lack of traditionally recognisable company assets. Catagen applied for the Innovation Loans programme in 2018 and received a Loan of £1 million in June of that year. The company would not have been able to secure the same level of finance elsewhere at that time, and so there is a high degree of finance additionality.

What evidence is there of progress towards the achievement of intended outputs, outcomes and impacts?

Investment in R&D

6.13 **All the businesses interviewed invest in R&D and the award of the Innovation Loan directly increased the level of investment**. Within the sample, 43 businesses provided estimates of the new investment in R&D as a result of the Loans. The total was £37.4 million, higher than the value of Loans awarded to these businesses (£31.8 million).

6.14 Evidence from the case studies also demonstrates the positive impact of the Innovation Loan to R&D spending in beneficiary businesses. The Loan allowed companies to "ringfence" employee time for R&D related activities; invest in new R&D related equipment; and undertake loss leading projects for the sake of product development.[25] The following box introduces one such example.

[25] Loss leading projects involve selling a product/service at a price that is not profitable in order to attract new customers or facilitate product development.

Case study example: Investment in R&D

Specialising in the design and manufacture of probes for atomic force microscopy and cantilever-based sensors, NuNano used the Innovation Loan to prioritise R&D into a new, more efficient, probe manufacturing process. Specifically, the loan allowed NuNano to retain R&D jobs that it otherwise may have lost; buy equipment needed for the commercialisation of the new manufacturing process; and partner with another technology firm which brought specialist equipment and expertise. These three outcomes all increased to company's overall capacity to innovate and so advanced the new process towards commercialisation. Once the process is operational (expected September 2021), NuNano will gradually start to see turnover and productivity benefits.

6.15 **A large majority of businesses (84%) reported that Covid-19 had implications for the level or type of R&D and innovation activities undertaken –** in line with evidence presented earlier in this section relating to the impact of the pandemic on projects overall. For around a third of businesses (30%), the focus of R&D and innovation activities shifted, but with little change to the overall level. However, over a fifth (22%) were forced to reduce their R&D activities and just under a tenth (8%) brought some activities to a halt. On the other hand, a quarter (24%) of survey respondents noted that the pandemic had positively affected the level of R&D activities being carried out (Table 6-5).

Table 6-5: Which of the following best describes the impact the Covid-19 pandemic has had on your business's R&D and innovation activities to date?

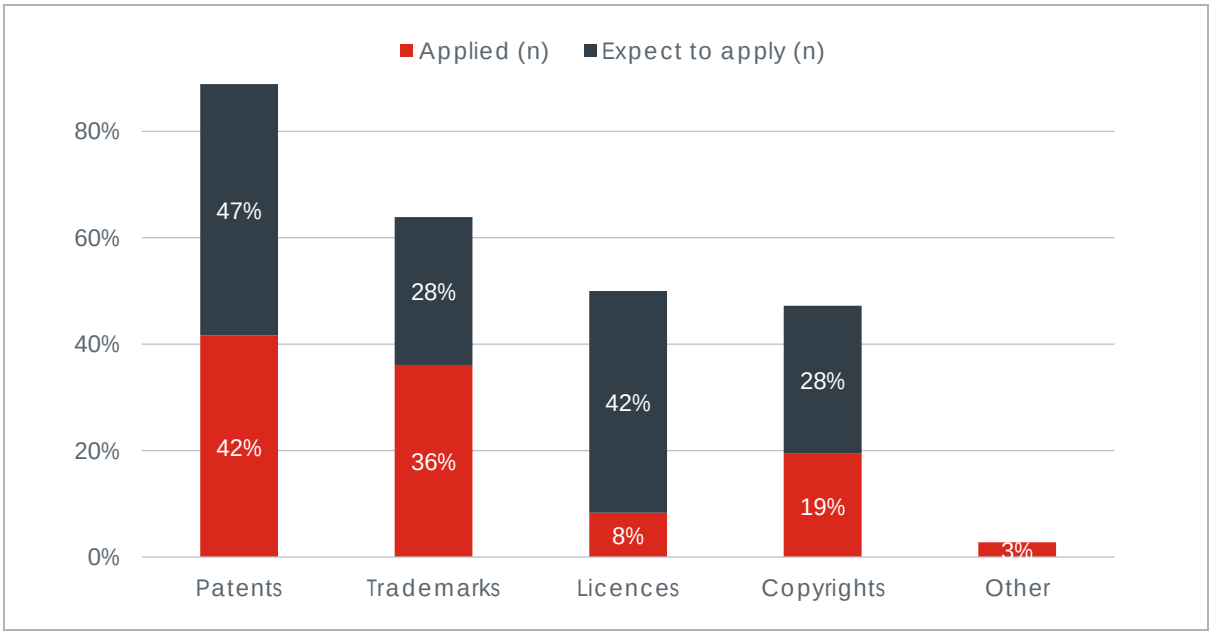
	n	%
Stopped all activities	3	6%
Stopped all non-critical/core activities	1	2%
Reduced activities	11	22%
Reprioritised activities but not changed overall level	15	30%
No change in activities	8	16%
Increased activities	12	24%
Total	**50**	**100%**

Source: SQW/IFF survey of Loan beneficiaries (n=50)

Intellectual Property

6.16 **Encouragingly, receiving an Innovation Loan has resulted in over a third of businesses (36%) applying for Intellectual Property (IP)** – most commonly patents and/or trademarks (Figure 6-5). The same proportion (36%) had not yet applied for IP but expected to do so in the future.

Figure 6-5: What types of IP protection have you applied for, or expect to apply for, as a result of the Loan?



Source: SQW/IFF survey of Loan beneficiaries (n=36, businesses who have applied for IP or expect to apply for IP as a result of receiving an Innovation Loan)

6.17 **Most businesses reported that receiving an Innovation Loan had improved their innovation skills (90%)** or were expected to in the future. Similarly, **the innovation capacity of most businesses had increased (80%)**, with some expecting this in the future (Table 6-6).

Table 6-6: As a result of receiving an Innovation Loan, has your business improved its…?

	Yes	No but expect to in future	No and don't expect to in future
Innovation Capacity	40 (80%)	4 (8%)	6 (12%)
Innovation Skills	45 (90%)	3 (6%)	2 (4%)

Source: SQW/IFF survey of Loan beneficiaries (n=50)

Moving towards commercialisation

6.18 **Almost all beneficiaries (92%) considered that they had progressed their product or service towards commercialisation to some extent** (Table 6-7). The survey then used a set of five broad Technology Readiness Level (TRL) categories to determine the scale of progress that had been made.

Table 6-7: As a result of receiving an Innovation Loan, has your business progressed any products/services towards commercialisation?

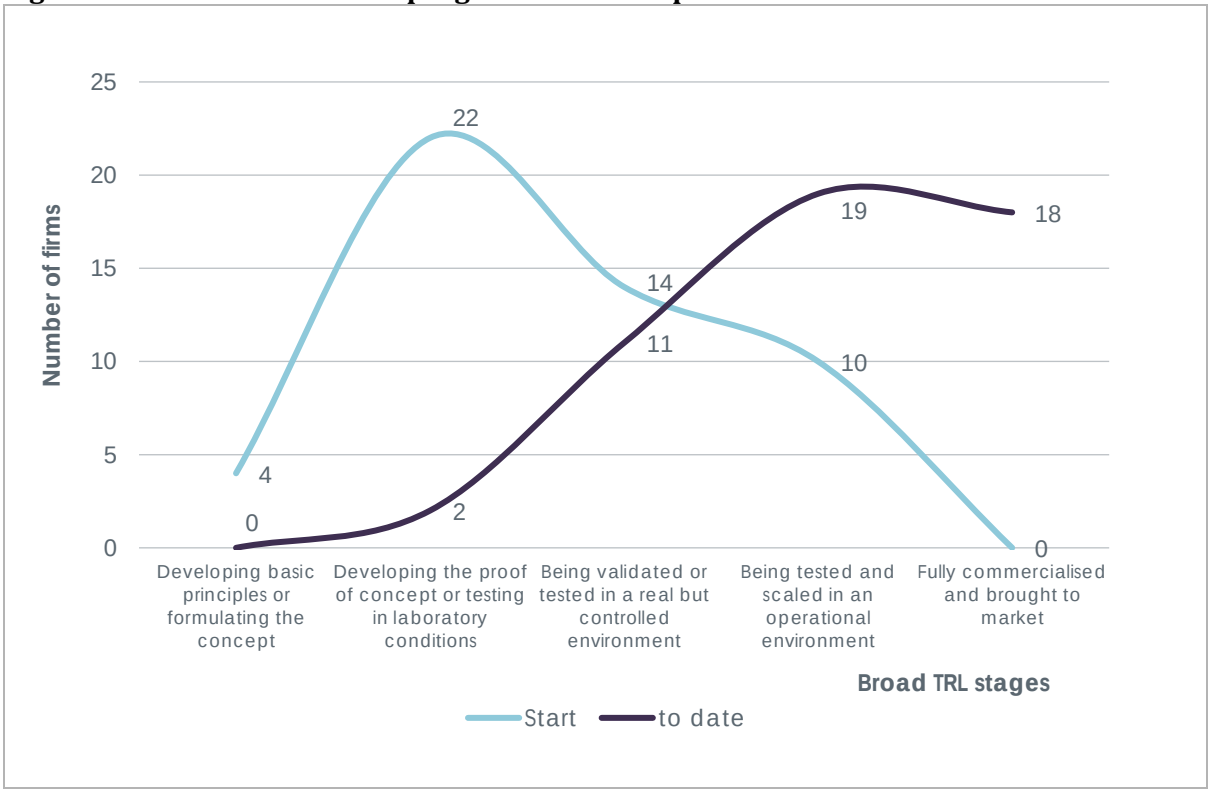
Response	n	%
Yes	46	92%
No but expect to in future	2	4%
No and don't expect to in future	2	4%

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.19 Figure 6-6 shows the profile of firms in terms of their projects' broad TRL stage *when they first received the Loan* and *the current position*. **The innovations supported have made significant progress towards commercialisation** and the Figure shows how the profile has shifted to the right as these projects have progressed.

6.20 Overall, 84% of the projects (42 cases) have progressed their innovation through these broad TRLs. Of the 50 firms, 18 (36%) have now been fully or partially commercialised, and a further 19 (39%) are at the stage of being tested and scaled in an operational environment.

Figure 6-6: Shift in broad TRL progress from receipt of Loans



Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.21 Figure 6-7 shows this progress through TRLs in more detail, relative to the starting position. For example, of the 22 projects that were 'developing the proof of concept or testing in laboratory conditions' at the time of receiving their Loan:

- 8 are now being validated or tested in a real but controlled environment
- 7 are being tested and scaled in an operational environment
- 5 have been commercialised and brought to market
- 2 are still in the original category.

Figure 6-7: Analysis of shift in innovation progress (number of firms)

			Current position			
	Starting point - number of firms		Developing the proof of concept or testing in laboratory conditions	Being validated or tested in a real but controlled environment	Being tested and scaled in an operational environment	Commercialised and brought to market
At time of receiving Loan	Developing basic principles or formulating the concept	4	-	2	1	1
	Developing the proof of concept or testing in laboratory conditions	22	2	8	7	5
	Being validated or tested in a real but controlled environment	14		1	6	7
	Being tested and scaled in an operational environment	10	-	-	5	5
	Total	50	2	11	19	18

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.22 Case study evidence provides further insight as to *how* the projects have progressed towards commercialisation (see example box that follows).

Case study example: Moving towards commercialisation

*For **Keit Spectrometers**, a spin-out from Rutherford Appleton Laboratory, the Innovation Loan was required to help the firm modify its existing spectrometer product in order to target a wider range of customers. Specifically, the Loan was intended to be used for producing plans and designs of the product; developing prototypes and pilots; and experimental production and testing of the product in live customer use cases. In August 2021, the firm was over half way through the 18-month project and commercialisation was expected by March 2022. By then, the product had progressed through TRLs – from 'being validated or tested in a real but controlled environment' to 'being tested and scaled in an operational environment'. There were a number of trials underway with target customers.*

*Another company, **Spiro Control** develops and provides digital operations solutions for companies in the chemical, petrochemical, and oil and gas sectors. In 2017, Spiro Control secured a grant of £69k from Innovate UK to develop a new control system which improves the efficiency of industrial processes. The company sought additional finance to continue the "evolution" of this technology. The Innovation Loan contributed to the development of a commercially usable prototype and the transition away from the software development phase to deployment with customers. Spiro Control could then fund loss leading projects with early adopters. These enabled further product development, informed by use in a real-world environment. Securing the Innovation Loan has therefore enabled Spiro Control to learn from these projects and advance the technology through TRLs and closer to full commercialisation.*

New products, services and processes

6.23 The survey looked in more detail at the new products, services and processes that the Loans have enabled. Within the sample, **the majority of firms (60%) had already introduced a new product, and over a third (36%) expected to do so in the future** (Table 6-8). Of these, just under half (42%) had introduced a new or improved product or service, and a similar proportion (42%) had introduced a new or improved process.

Table 6-8: As a direct result of receiving an Innovation Loan, has your business sold any new or improved products, services or processes?

Response	n	%
Yes	30	60%
No but expect to in future	18	36%
No and don't expect to in future	2	4%

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.24 Among those that have introduced new products to date, 15 firms provided an estimate of the cumulative value of sales from these innovations. **In total, these innovations had generated cumulative sales of £28 million, including one case reporting sales of £15 million to date.** These can be advanced sales that are not reflected in the turnover figures reported later in this report. In addition, 29 businesses provided estimates of their *expected* value of the sales of new products and services in two years' time. The average value of future sales was £2.7 million.

6.25 The following case study examples demonstrate two beneficiaries who have been able to bring new products, services and processes to the market using the Innovation Loan.

Case study example: New products, services and processes

Following industry feedback, Keit Spectrometers identified an opportunity to modify its existing spectrometer product to work in a wider range of more demanding environments and therefore appeal to a wider range of customers. Spectrometers have applications in a range of industrial settings, including biotechnology, oil and gas, chemicals, and pharmaceuticals.

KwickScreen is an innovative space management solution business delivering retractable screens as a flexible alternative to curtained partitions for hospitals to allow for infection isolation. The firm secured an Innovation Loan in order to redesign the manufacturing process, to allow for scalability. With the funding from the Loan, KwikScreen has successfully progressed the manufacturing process from being tested and scaled in an operational environment, to being fully commercialised and brought to market.

6.26 **There were also considerable productivity benefits through process improvements**: 84% of the sample of businesses expected the innovation to reduce costs, 82% that it would improve quality, and 76% that it would save time. The box below provides an example of a case where the improved product has led to productivity benefits for the business.

Case study example: Productivity improvements

Sciencesoft specialises in the development of reservoir engineering simulation software, primarily for the oil and gas sector. The Innovation Loan supported Sciencesoft in developing improvements to its existing software prototype. The product that Sciencesoft now offers is a more "complete solution" than it would have been at this stage without the Loan. This will lead to an increase in productivity as the company can sell a new product at a greater price per unit, thereby saving employee time on supporting elements of the sale (e.g. licencing).

Investment and commercial readiness

6.27 The vast majority of businesses are more investment and commercially ready as a result of Innovation Loans (Table 6-9).[26] Both investment and commercial readiness are important in enabling firms to commercialise new products or services and secure further finance.

Table 6-9: As a result of receiving the Innovation Loan, has your business become more investment/commercially ready

	Yes	Somewhat	No
As a result of receiving the Innovation Loan, has your business become more investment ready?	36 (72%)	(13) 26%	1 (2%)
As a result of receiving the Innovation Loan, has your business become more commercially ready?	41 (82%)	7 (14%)	2 (4%)

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.28 This is supported by case study evidence which shows a number of ways that Innovation Loans have helped to prepare companies for commercialisation and investment. For example, the application process was a valuable learning experience for some beneficiaries, who reported that they better prepared to apply for other finance options as a result. Furthermore, progressing innovations through the Technology Readiness Levels has brought products/services closer to the market, thus reducing the perceived risk associated with the technology for potential investors. In one case, the Loan also played an important role in changing the firm's attitude towards debt finance, increasing their willingness to access other loans (see box below).

Case study example: Investment readiness

Hexigone Inhibitors manufacture chromate free corrosion inhibitors. The firm secured an Innovation Loan of £547k to scale its manufacturing process. As well as benefits relating to the improved efficiency of its manufacturing process, Hexigone reported that securing the Loan increased its confidence in raising further finance. Importantly, the loan is changed the attitude of the firm in relation to debt finance:

"The Innovation Loan has just changed our mindset to know debt isn't bad and can be a good thing. It has changed our viewpoint from constantly searching for grants."

Since receiving the Loan, Hexigone has been able to secure an additional £900k of investment. The company was more investment ready as a result of the Loan because they no longer required capital investment to scale its production.

[26] Investment readiness means that businesses as more willing or prepared to overcome equity aversion, lack of investability and presentational failings. Commercial readiness means that they are more willing or prepared to bring new products, services or processes to market.

Follow-on funding

6.29 The majority of beneficiaries reflected that their confidence in raising and using finance had increased (76% of firms) and that they were more likely to seek equity or further loan finance as a result of the Innovation Loans experience (40% and 26%, respectively).

6.30 Over half of the businesses (58%) had secured follow-on funding since receiving the Innovation Loan. The total amount of follow-on funding secured was around £60 million. By far the most common type of funding received was equity (by 66% of the firms), followed by loans from a bank, building society or other financial institution (17%) (Table 6-10).

Table 6-10: What type of follow on funding did you secure?

	n	%
Equity Finance	19	66%
Loan from a bank, building society or other financial institution	5	17%
Covid-related Government or local authority grants or schemes	4	14%
Innovate Grant	4	14%
Loan from family/friend/business partner/directors/ owner	3	10%
Non-Covid related Government or local authority grants or schemes	2	7%
Other finance	3	9%

Source: SQW/IFF survey of Loan beneficiaries (n=29 businesses that secured follow on funding, multi-code)

6.31 Of the 29 businesses that received follow-on funding, the vast majority (89%) considered the Innovation Loan to have contributed to securing this (Table 6-11). The feedback from the case studies highlighted the credibility associated with having secured the Innovation Loan as key to attracting follow-on funding.

Table 6-11: To what extent did the Innovation Loan contribute to bringing in this follow-on funding?

	n	%
Entirely	1	3%
To a large extent	12	41%
To a moderate extent	9	31%
To a small extent	4	14%
Not at all	3	10%
Total	**29**	**100%**

Source: SQW/IFF survey of Loan beneficiaries (n=29 businesses that secured follow-on funding)

Spillover benefits

6.32 Spillover effects are a type of externality that occur when the innovation of one firm affects the performance of other businesses (either positively or negatively). **Over two thirds (70%) of beneficiaries reported spillover benefits for suppliers**. Spillover benefits affecting competitors were less common (4%) (Table 6-12).

Table 6-12: Spillover benefits to suppliers and competitors

	Benefited already	Expected to benefit in next 2 years	No	Don't know / refused
Have your suppliers also benefited indirectly as a result of you receiving the Innovation Loan, or will benefit in the next two years?	35 (70%)	8 (16%)	7 (14%)	0 (0%)
Have your competitors also benefited indirectly as a result of you receiving the Innovation Loan, or will benefit in the next two years?	2 (4%)	5 (10%)	41 (82%)	2 (4%_)

Source: SQW/IFF survey of Loan beneficiaries (n=50)

6.33 Table 6-13 shows which sectors the suppliers that benefitted from spillovers were in. Just over half of the suppliers were based in the manufacturing sector (53%), followed by information and communications (26%), and professional services (14%).

Table 6-13: Which sectors are the suppliers in?

Sector	n	%
Manufacturing	23	53%
Information and communications	11	26%
Professional, scientific and technical activities	6	14%
Electricity, gas and water supply	1	2%
Wholesale and retail trade	1	2%
Accommodation and food service activities	1	2%
Total	**43**	**100%**

Source: SQW/IFF survey of Loan beneficiaries (n=43, businesses reporting achieved or expected spillover benefits for suppliers)

6.34 Evidence from case studies provided further insight into the routes through which spillover effects to suppliers may occur. For example, in implementing projects, beneficiaries create demand for products/services within their supply chain, in turn improving knowledge and leading to business benefits for suppliers[27]. The box below provides one such example.

Case study example: Spillover benefits

Catagen is a Queen's University Belfast spinout which provides advanced emissions aftertreatment testing and development services. The Innovation Loan allowed Catagen to test and scale its technology in an operational environment, which meant they could "fully demonstrate, in the eye of the customer, the capability of the test process". As a result, Catagen's customer base and turnover increased considerably in the time between receiving the Loan in 2018 and the onset of the Covid-19 pandemic in 2020 (which held back progress). This growth resulted in spillover benefits for Catagen's suppliers due to a higher volume of orders:

"Our supply chain has greatly benefitted from the success of Catagen – there have been millions of pounds funnelled through us to suppliers."

This, in turn, has led to suppliers building their capabilities. For example, Catagen's equipment requires specialist welding which previously had to be done in Sweden. Since experiencing significant growth in demand from Catagen, a local supplier based in Northern Ireland has learned this skill. Catagen has a total of 60-70 suppliers in industrial services and professional services, 95% of which are located in the UK.

6.35 **The programme has also had positive spillover effects for the customers of beneficiaries.** For example, case study evidence shows that customers may receive lower priced good/services from the beneficiaries, when the Innovation Loan has brought about improvements in production efficiency. Customers may also benefit from access to new/improved products and services (as discussed above). Customers benefitting from new/improved products and services were mostly in the manufacturing sector, professional scientific and technical activities, or human health and social work activities.

[27] To be clear, suppliers are not formally involved in the Innovation Loan funded project, but some beneficiaries rely on their suppliers to provide equipment and other resource to undertake the project.

Table 6-14: Will your new or adapted product or service improve the environment?

	n	%
Yes, offers a greener alternative for customers	32	70%
Yes, uses a greener manufacturing process	18	39%
No real environmental impact	10	22%
Negative environmental impact	1	2%

Source: SQW/IFF survey of Loan beneficiaries (n=46 businesses that have experienced or expect to experience new products)

7. Additionality and contribution

Key headlines

- Outcome additionality is relatively high. There were no cases where the business believed the benefits reported would have been achieved over the same time period and at the same scale and quality, without the Innovation Loan.
- In more than half of the cases (58%), the Innovation Loan has accelerated projects and over a quarter (28%) were wholly additional.
- For 90% of the sample, the Loan was considered to have been 'the 'critical' or 'an important' contributory factor in achieving the reported benefits.

Outcome additionality

7.1 **Outcome additionality is relatively high**. There were no cases where the business believed the benefits reported would have been achieved over the same time period and at the same scale and quality, without the Loan. In more than half of the cases (58%), the Innovation Loan had accelerated projects and in a further third it helped them happen on a bigger scale. Over a quarter (28%) were wholly additional. This pattern is consistent with the findings from the case studies. These are innovative businesses and regardless of the Loan will try to pursue the development of ideas they believe will succeed eventually. The Loan enables them to do this by accelerating development, by allowing activity to be scaled up (when it would otherwise have been on a smaller scale), or by improving the quality of the development.

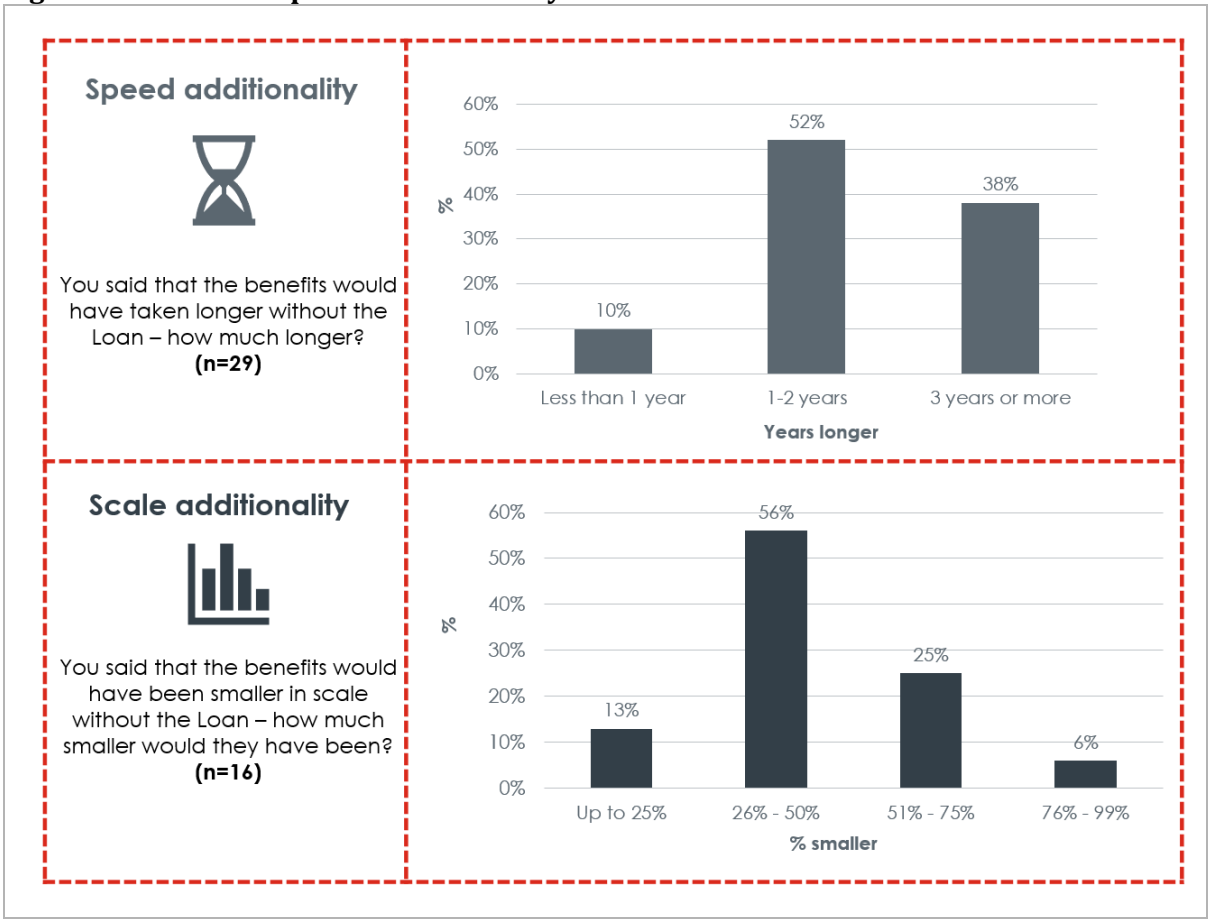
Table 7-1: Would the benefits experienced have been achieved without the Innovation Loan?

Type of additionality	No. of cases	% of cases
The benefits would have happened anyway, over the same time period and at the same scale and quality, without the loan	0	0%
The benefits would have happened anyway, but they would have taken longer to achieve	29	58%
The benefits would have happened anyway, but at a smaller scale	16	32%
The benefits would have happened anyway, but they would have been of lower quality	10	20%
None of these benefits would have happened	14	28%

Source: SQW/IFF business survey (n=50, multi-response)

7.2 Figure 7-1 provides details on speed and scale additionality. Around half of the businesses which reported an acceleration of benefits indicated that outcomes would have taken between one and two years longer without the Loan (52%). Over a quarter (38%) reported that benefits would have taken a minimum of three years longer. The more detailed question on scale additionality found that nine businesses (56% of businesses reporting scale additionality) would have achieved 26%-50% less benefits without the Loan and five (13%) would have achieved less than half of the reported benefits.

Figure 7-1: Details of partial additionality



Source: SQW/IFF survey of Loan beneficiaries (base size varies and is indicated above)

Contribution analysis

7.3 The survey also examined the contribution of Innovation Loans *relative to other factors* that may have influenced the outcomes reported by Loan beneficiaries. Table 7-2 identifies these other factors. The two most commonly cited factors were market demand and external economic conditions (52%), and pre-existing or new business plan/strategy which has been implemented (24%).

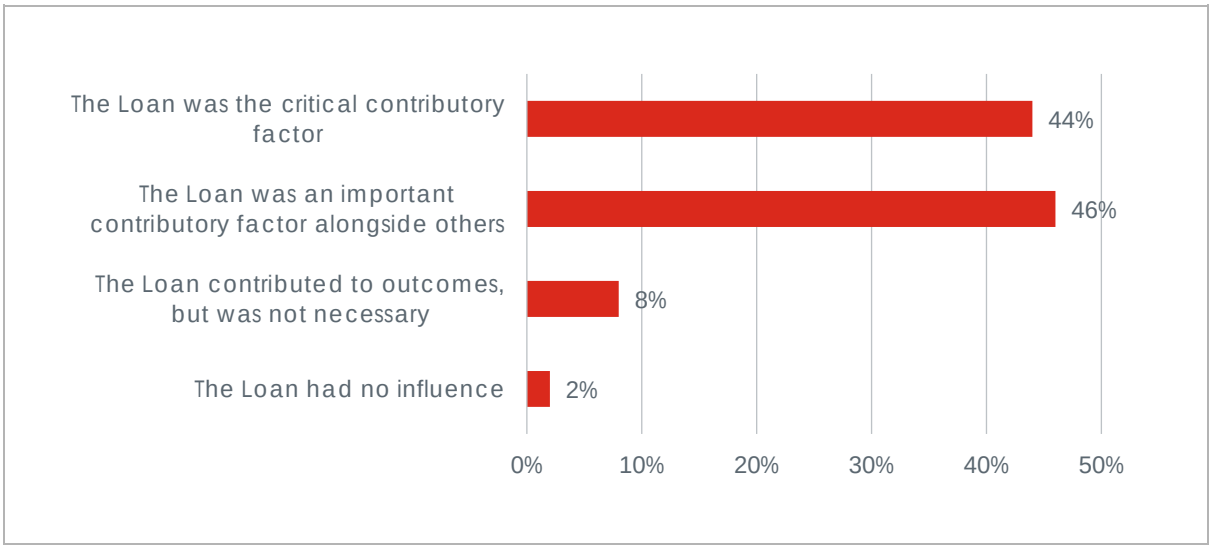
Table 7-2: What other factors outside of the Innovation Loan may have contributed to the benefits that you have described?

	Other contributing factors	n	%
Internal to business	Pre-existing or new business plan/strategy implemented	12	24%
	Existing or new senior management team/business leadership in place	9	18%
	Other R&D activities in the business	8	16%
	Existing knowledge within the business	7	14%
External to business	Market demand and external sector and economic conditions	26	52%
	Technology changes and developments	5	10%
	Regulatory or policy changes	5	10%
	Other forms of financial support	3	6%
	Other	4	8%
	Don't know	8	16%

Source: SQW/IFF survey of Loan beneficiaries (n=50, multi-code)

7.4 **For 90% of the sample, the Loan was considered to be the 'critical' or an 'important' contributory factor** in achieving the reported benefits (Figure 7-2).

Figure 7-2: What has been the role of the Innovation Loan in achieving the benefits described relative to these other factors?



Source: SQW/IFF survey of Loan beneficiaries (n=50)

8. Economic impacts

Key headlines

- Based on the survey of beneficiaries, economic impact results look promising. The businesses supported have grown quickly (employment has grown by 62% from when they first received the Loan), and sales and turnover are also increasing as innovations are commercialised.
- This has happened over a time when the Covid-19 pandemic has had a huge impact on business performance and the economy.
- There is evidence that the Loans have played a critical part in the commercialisation of these new products and that these businesses are starting to see impacts on sales and turnover.
- Across the 50 businesses in the sample, employment had risen by 486 since the Loans were awarded. As a result of the Loan, 44 of the 50 cases (84%) reported that they employed more people, while 52% had increased turnover.
- Tests on the sample and population carried out for the econometrics indicate that the sample is representative of the wider population of Loans recipients in terms of businesses' size, sector, location, and stage of development.
- After adjusting for additionality and scaling up the results we estimate that the Innovation Loans programme had:
  - supported 346 additional jobs at the time of the interview in July 2021
  - generated almost £17 million in additional annual turnover by the time of the interview and a cumulative £44.7 million since Innovation Loans were launched.
- Employment grows ahead of sales and turnover. As the new products are commercialised we would expect to see further impacts on sales and annual turnover.
- If GVA grows to reflect the level of additional employment reported at this stage (using the UK mean value of GVA per worker for small businesses of £43,000 per year) would indicate additional GVA of £15 million a year.

8.1 This section presents the emerging impacts attributed to Innovation Loans among the beneficiaries interviewed. At this stage we would expect to find a reasonable effect on employment, as the Loans are used to hire researchers, and some evidence of increasing sales as products and services are commercialised. While there is reassurance that businesses report projects progressing toward commercialisation, it will not be until this translates into sales, productivity improvements and customer benefits, that the programme can be fully assessed.

Employment

Innovation Loans are supporting growing businesses

8.2 The analysis starts by comparing the level of employment among the sample of businesses at the time they applied for the Innovation Loan, and later, at the time they were interviewed in July 2021. Total employment at the time of application across all 50 businesses was 777 (15.5 employees per enterprise). At the time of our survey, this was 1,263 – an increase of 62%. From applying for the Innovation Loan to the time of the interview, these businesses had created 486 new posts.

8.3 Table 8-1 sets out the details, by competition. The sample sizes for each competition are small and there is no obvious pattern in job growth across them. We might have expected to see the earlier loans demonstrating higher jobs growth given that they have had more time, but this does not seem to be the case.

Table 8-1: Change in employment since first drawdown of Loan

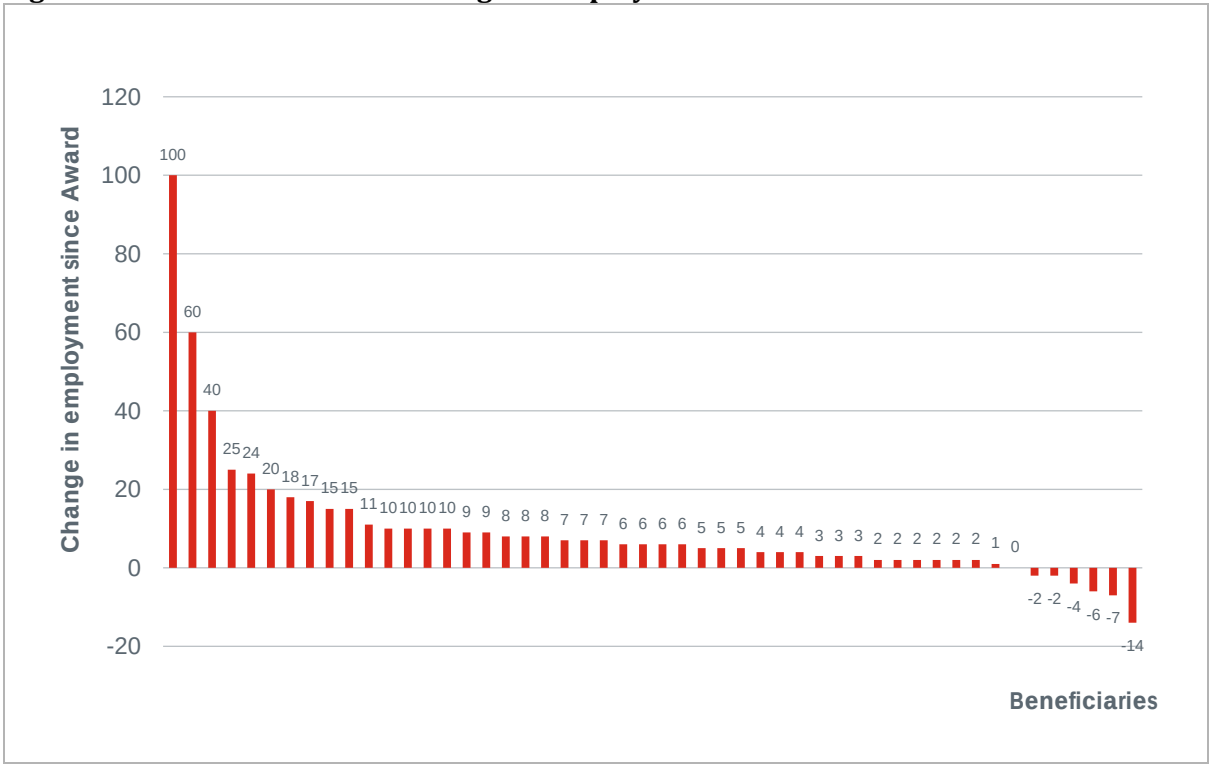
Competitions	FTEs at Loan	FTEs at interview	Change	Change per case	Cases
Competition 1 (Infra Systems)	68	115	47	5.2	9
Competition 2 (Man & Materials)	65	147	82	16.4	5
Competition 3 (Open 1)	108	126	18	2.6	7
Competition 4 (Open 2)	75	145	70	14.0	5
Competition 5 (Open 3)	207	231	24	4.0	6
Competition 6 (Open 4)	86	178	92	10.2	9
Competition 7 (Open 5)	168	321	153	17.0	9
Total	**777**	**1,263**	**486**	**9.7**	**50**

Source: SQW/IFF survey of Loan beneficiaries (n=50)

Employment has increased in almost all the businesses despite the Covid-19 pandemic

8.4 Almost 90% of the businesses that received a Loan had grown employment since the award. Figure 8-1 shows the distribution of this change in employment ranging from 100 new jobs in the highest case, to a loss of 14 jobs in the lowest. We know from the case studies that at least one firm had subcontracted activities to an external organisation. So, although the firm employed fewer people directly, employment was created elsewhere.

Figure 8-1: Distribution of the change in employment since first drawdown



Source: SQW/IFF survey of Loan beneficiaries (n=50)

The Loans have had a big impact on employment

8.5 The figures above relate to the *overall change in employment* in these businesses, rather than the effect of the Loans. To assess the latter, businesses were asked whether the number of staff they employ now is higher or lower than it would have been if they had not received the Loan. In the sample of 50, 42 cases (84%) reported that employment was higher as a result of the Loan, 10% reported that there had been no new employment, and in three cases employment had fallen.

8.6 Businesses were also asked to estimate how much higher or lower employment was as a result of the Loan. All 42 of those that reported higher employment were also able to provide an estimate of the difference. Across these cases they estimated that the Loan had increased employment by 233 FTE jobs. Two of the three that reported lower employment estimated this to have been by an aggregate of eight jobs.

Table 8-2: Is the number of staff you now employ higher or lower than it would have been if you had not received the Loan?

	Number of responses	Number providing an estimate	Number of new jobs
Higher	42 (84%)	42 (84%)	233
Lower	3 (6%)	2 (4%)	-8
The same	5 (10%)	-	-

Source: SQW/IFF survey of Loan beneficiaries (n=50)

Case study example: Increasing employment

Hexigone Inhibitors was spun out of research undertaken at the Swansea University Corrosion Research Group, and now develops and manufactures corrosion inhibitors which are free from chromate, phosphate and heavy metals. The firm applied for an Innovation Loan to facilitate the scale-up of its manufacturing processes and so bring its product closer to commercialisation. Although the project is ongoing, the Loan has already enabled Hexigone to improve the efficiency of its manufacturing processes and techniques, enabling to scale up production. As a result, the company has expanded from only two employees to 12, with five of these roles considered attributable to the Loan. An additional 35 jobs were expected by 2024.

8.7 To estimate the *net impact*, the analysis must also take account of whether similar outcomes could have been achieved anyway, perhaps through using other resources. To do this, the results from the outcome additionality questions (reported in Table 7-1) are applied to the changes in employment and turnover that they reported, case by case:

- Where activity would have taken place anyway, on a smaller scale, the employment and turnover estimates are adjusted to reflect that. For example, if a project would have been 50% of the size, we take 50% of the employment estimate.
- For cases where the Loan has accelerated activity, we have modelled the net change in employment over the period since the Loan, in a straight line. This allows us to compare it against a profile where the project is delayed and measure the net additional job years as well as the number of posts in 2021. For example, if a business reports an additional four jobs since the Loan started in 2018, we assume that these were created across the four years to 2021 (Table 8-3). If the business indicates that the Loan brought forward activity by two years. The net effect would be two additional jobs by 2021. This method is applied case by case.

Table 8-3: Example of application of employment acceleration method

	2018	2019	2020	2021
Example of profile of jobs attributed to the Loan reported in 2021	1	2	3	4
Counterfactual - without the Loan (2-year delay)	0	0	1	2
Net *additional* jobs	1	2	2	2

Source: SQW

- Where the reported outcomes would not have happened at all without the Loan, these are considered to all be entirely additional. We have not included any separate allowance for improvements in quality. Only two businesses indicated that this was the only difference.

8.8 Applying this approach to each of the cases there are estimated to be a total of 182 additional jobs.

Future employment

8.9 Estimating the impact of the Loans on future employment is less robust and likely to include significant optimism bias but nevertheless provides an indication of the ambitions of the funded businesses.

8.10 Nearly all (45) of the businesses in the sample expected employment to be higher within three years. They estimated that in three-years' time (i.e. by mid-2024) they will employ a further 1,201 full-time equivalent staff as a result of receiving the Loan.

Turnover

8.11 Across the sample, 45 businesses provided turnover figures, of which four were zero. The total among those that reported a figure was £70 million (an average of £1.5m per business). The survey also found that a high proportion of this turnover is generated through exports. Using the mid points of the ranges, a **there is an estimated £30.7 million (44%) generated overseas**.

Table 8-4: Turnover and export values

Proportion of turnover from exports	Turnover (£m)	Number of firms
0%	9.2	17
1% - 25%	15.8	11
26% - 50%	7.7	7
51% - 75%	28.4	11
76% - 99%	8.9	4
Total	70.0	50
Weighted average (mid-point values)	**30.7**	

Source: SQW/IFF survey of Loan beneficiaries (n=45)

8.12 To assess the impact of the Loans, businesses were asked whether their turnover was higher or lower than it would have been if they had not received the Loan. In the sample of 50, 26 cases (52%) reported that their turnover was higher as a result of the Loan, one said it was lower (Table 8-5). Across these cases, the Loan was estimated to have increased turnover by £16.6 million, while one reported a negative impact of £500,000.

Table 8-5: Is turnover now higher or lower than it would have been if you had not received the Loan?

	Number of responses	Number providing an estimate	Turnover attributable to the Loan (£m)
Higher	26 (52%)	23 (46%)	£16.6
Lower	23 (46%)	-	£0.5
The same	1 (2%)	1 (2%)	-

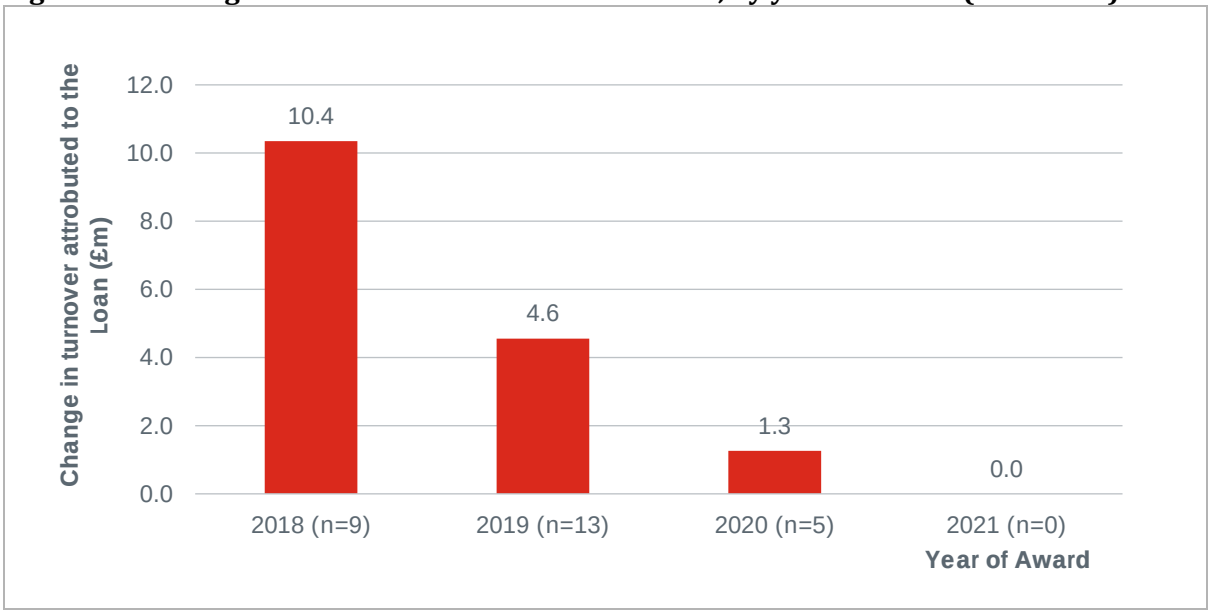
Source: SQW/IFF survey of Loan beneficiaries

Case study example: Increase in turnover

Kwickscreen is an innovative space management solution business delivering retractable screens as a flexible alternative to curtained partitions for hospitals to allow for infection isolation. The firm used an Innovation Loan of £350k to redesign its core manufacturing process to facilitate a scale-up. The new process has stimulated significant turnover growth, increasing turnover by £7.5million to date, with another £12million expected by 2024.

8.13 Unlike the employment growth over time, where the additional jobs tended to be created shortly after the Loan award, the impact on turnover demonstrates a clear lag. Figure 8-2 shows that the additional turnover was much higher among the earlier recipients. This pattern suggests that, over time, we will see further growth in turnover as the projects supported by the later Loans are commercialised and then scaled up. However, the number of cases from 2018 awards reporting a change in turnover (9) is still only 60% of the all the awards in that year.

Figure 8-2: Change in turnover attributed to the Loan, by year of award (£ millions)



Source: SQW/IFF survey of Loan beneficiaries (n=27 firms that quantified a turnover impact)

Turnover additionality

8.14 The approach to estimating turnover additionality is the same as used for employment and takes into account the responses given to the additionality question in Table 7-1. To provide estimates of the *net change* in turnover attributable to the Loans we have applied the response to this question to the change in turnover reported by each business. For cases where the Loan has accelerated activity, we have modelled the net change in turnover over the period since the Loan and estimated the difference between the accelerated turnover generated with the Loan, and the "counterfactual" with a delay. This is done by assuming a straight-line growth of turnover from the Loan award date to the reported impact in 2021.

8.15 Applying this approach to each of the cases in the sample gives an increase of almost £9 million in annual turnover by 2021 (from the 26 cases reporting impacts to date) and a cumulative increase in turnover of £23.5 million *to date.* This cumulative figure uses the assumption that turnover has grown in a straight-line.

Future turnover

8.16 Estimating the impact on future turnover is less robust and likely to include significant optimism bias but provides an indication of the ambitions of the funded businesses. Businesses were asked whether they expected future turnover in the next three years to be higher, the same or lower as a result of the Loan. All but one of the businesses (98%) thought turnover would be higher within the next three years. In total, these 49 businesses estimated that turnover would be £161 million higher in three years, or around £3.2 million each.

Scaling up the results

8.17 The results presented are based on interviews with 50 of the 102 businesses receiving Loans. An important question is whether these 50 are representative of the 102, or whether there is some response bias – businesses that have been less (or more) successful were less (or more) likely to participate in the survey.

8.18 Tests on the sample and population carried out for the econometrics indicate that the sample is representative of the wider population of Loans recipients in terms of businesses' size, sector, location, and stage of development. The samples are also largely representative of the composition of the programme by competitions in which the companies participated.[28]

8.19 Table 8-6 sets out the results from the sample and for the population of all businesses receiving a Loan. The "effective population" is reduced from 102 to 95 to exclude the seven known business failures. The results are then scaled up on the basis of the number of cases. **The net impact on annual turnover is estimated to be £16.9 million, and the cumulative turnover to date £44.7 million. Innovation Loans are also estimated to have supported 346 additional jobs.**

[28] The degree to which the sample is representative of the programme was assessed using formal statistical tests (the Pearson χ^2 and Fisher exact tests of proportions). The analysis was based on companies' profiles in Beauhurst.

Table 8-6: Scaling up the economic impacts

	Sample	Effective population[29]
Number of cases	50	95
Net additional turnover at interview (£m)	8.9	16.9
Net additional *cumulative* turnover (£m)[30]	23.5	44.7
Gross change in employment	486	923
Net additional jobs attributed to the Loans	182	346

Source: SQW survey and estimates

8.20 These estimates are based on the survey results and the feedback from businesses receiving Innovation Loans. They reflect only the additional employment and turnover that has been created to date. This is likely to underestimate the overall impact as it only covers the cases where new sales have been made. Over the next few years, we would expect many of the other innovations to be commercialised and turnover to continue to grow in those that are already reporting sales.

8.21 In these small, innovative businesses, we would expect employment to grow ahead of sales as new products and services are commercialised, and indeed this seems to be the case. Simply assuming that sales and GVA grow to reflect the level of additional employment reported at this stage and using the UK mean value of GVA per worker for small businesses (£43,000 per year)[31] would indicate additional GVA of £15 million a year.

[29] The effective population is the total number of loans excluding known business failures.
[30] The cumulative figure assumes that the additional turnover has grown in a straight line from the year of the award to the reported impact in 2021.
[31] ONS (2020), Firm-level labour productivity measures from the Annual Business Survey, Great Britain: 1998 to 2018. https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/articles/firmlevellabourproductivitymeasuresfromtheannualbusinesssurveygreatbritain/1998to2018#appendix-a-data-and-methods

9. Evidence from unsuccessful applicants

Key headlines

- Around half (51%) of the businesses that were unsuccessful in applying for an Innovation Loan had previously used Innovate UK grants for funding R&D, typically alongside business' own funds and/or equity finance.
- The primary reason for applying for an Innovation Loan was that they 'were more flexible in their arrangement' compared to other sources of funding (cited by 68% of firms), closely followed by the loans being 'less expensive overall' (67%).
- Around two thirds (68%) of the firms stated that the loan was not intended to be used as part of a wider funding package. Overall, unsuccessful applicants were looking for less finance for their projects than successful applicants: two thirds of unsuccessful firms (66%) were seeking less than £1 million, compared with 34% of beneficiaries.
- Of those that were unsuccessful in applying for an Innovation Loan, just under half (43%) had not received any other funding for the project. Of those that had, almost three quarters (73%) received a lower amount than their application to Innovation Loans.
- Almost all (90%) unsuccessful applicants reported that not receiving a Loan has had a considerable negative impact on their business: slowing down growth and/or putting business survival at risk.
- There is evidence of potential benefits from engaging with the Loan programme, albeit unsuccessfully, as almost half (43%) of the businesses considered that their ability to make the case for investment had improved, and around a third (31%) reported that the experience had led to greater confidence in their ability to raise finance in the future.

9.1 This section sets out the key results from a telephone survey with 72 businesses that were unsuccessful in applying for an Innovation Loan. The purpose of the survey was to gather information on: general awareness of Innovation Loans; the broader availability of funding for innovation projects; experiences of the application process covered in section 5; and any broader benefits that may have been experienced by the firms.

9.2 Almost all respondents were rejected for an Innovation Loan, however in three cases, applications were approved but the applicants were unable to meet the loan conditions in the final stages (within the required time) or failed to accept the loan offer before it expired. Most of the unsuccessful applicants (92%) had not successfully applied for an Innovation Loan at any other

time but six firms had received a Loan after 2019 (i.e. from one of the later competitions not in scope for this evaluation).

Sources of funding used prior to the application

9.3 Prior to applying for an Innovation Loan, the applicants had funded R&D through a variety of means but primarily using their own funds (92%) and external equity finance (58%). Around half of the unsuccessful applicants (49%) had not applied for other Innovate UK funding. Of those that had applied, most had been successful (32 of the 36) and only four had applied without success.

Table 9-1: Before applying for an Innovation Loan, had you previously applied for or received funding from Innovate UK?

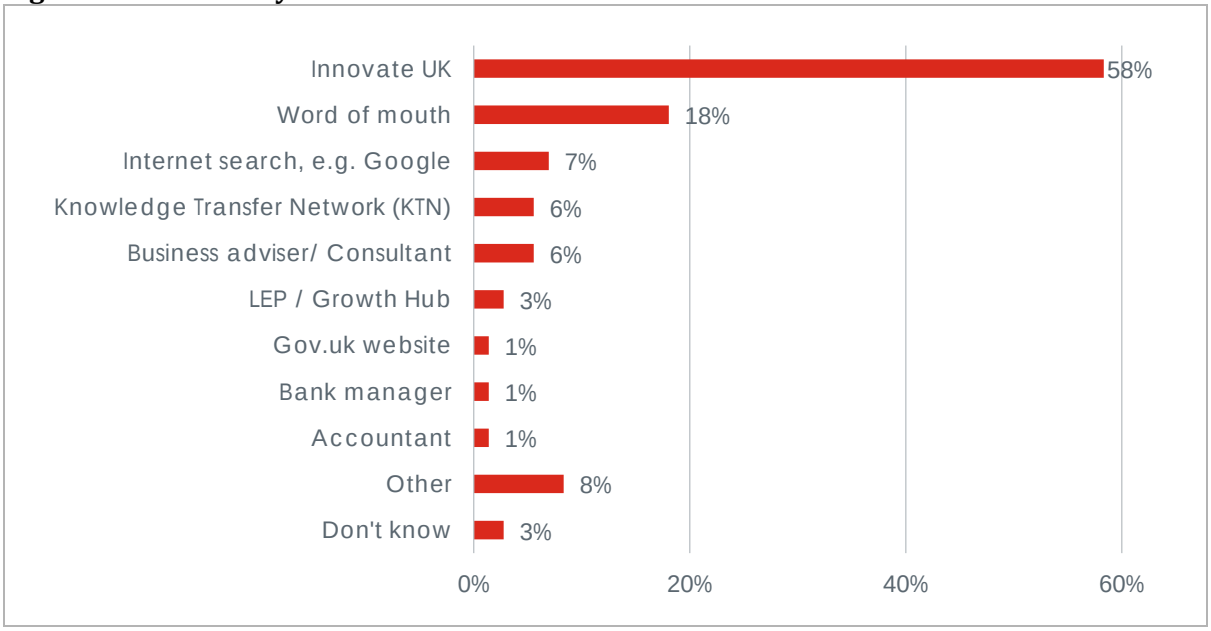
	n	%
Yes, applied and received funding	32	44%
Yes, applied but did not receive funding	4	6%
No, not applied	35	49%
Don't know	1	1%
Total	**72**	**100%**

Source: SQW/IFF survey of unsuccessful firms (n=72)

Loan application

9.4 **Over half of the unsuccessful applicants (58%) found out about Innovation Loans through communication with Innovate UK** – primarily through the mailing list (25 applicants) or Innovate UK events (7). Other sources included word of mouth (18%), internet searches (7%) and the Knowledge Transfer Network (6%) (Figure 9-1).

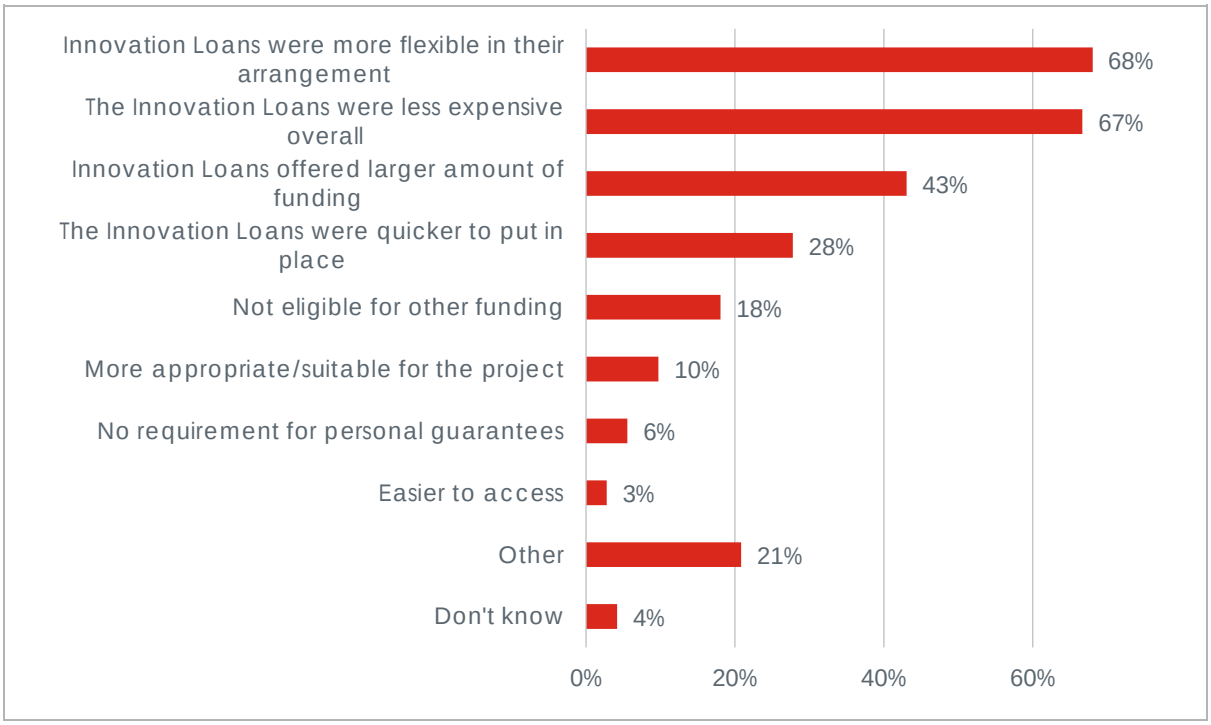
Figure 9-1: How did you first become aware of the Innovation Loans?



Source: Source: SQW/IFF survey of unsuccessful firms (n=72)

9.5 The primary reason for applying for an Innovation Loan was that they 'were more flexible in their arrangement' compared to other sources of funding (cited by 68% of firms), closely followed by the loans being 'less expensive overall' (67%). Figure 9-2 shows the main reasons respondents applied for an Innovation Loan rather that other sources of funding.

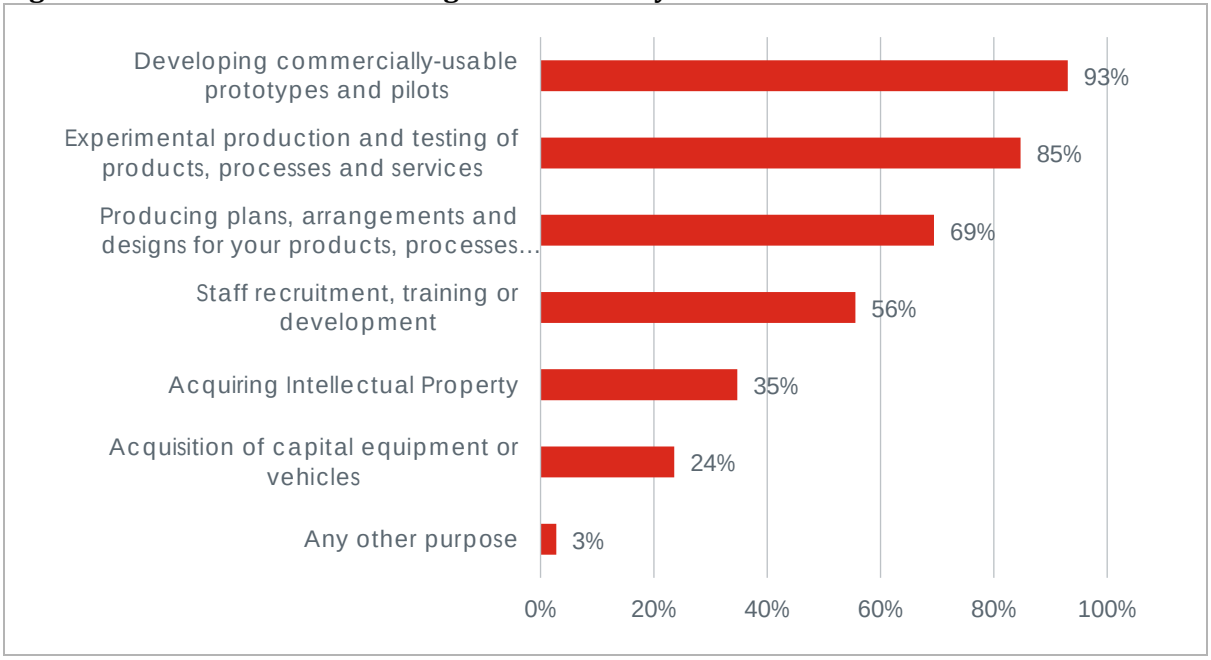
Figure 9-2: Why did you apply for an Innovation Loan rather than applying to other sources?



Source: SQW/IFF survey of unsuccessful firms (n=72)

9.6 **The unsuccessful applications were to fund a variety of activities**, typically covering at least two of the activities shown in Figure 9-3. The most frequently cited uses were developing commercial prototypes and pilots (93%), and experimental production and testing (85%).

Figure 9-3: Which of the following activities was your Innovation Loan intended for?

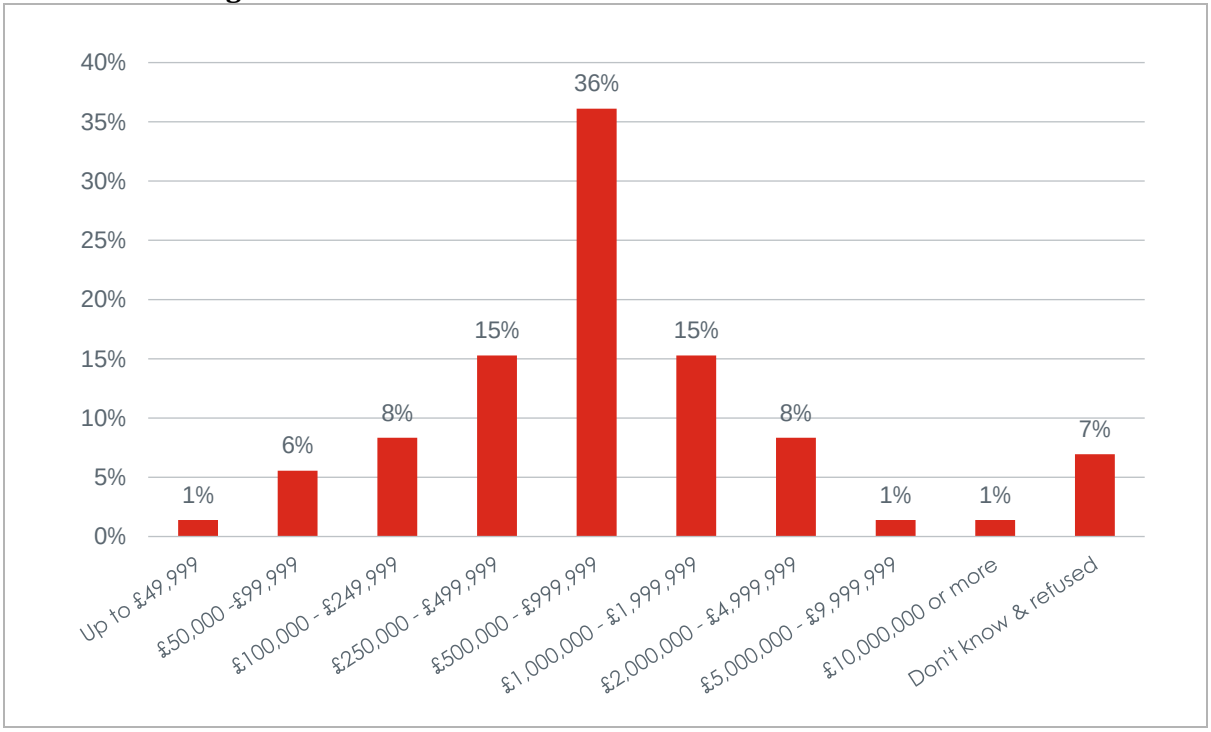


Source: SQW/IFF survey of unsuccessful firms (n=72)

9.7 **Around two thirds (68%) of the firms stated that the Innovation Loan was not intended to be used as part of a wider funding package**. In terms of the level of funding required, two thirds (66%) were seeking less than £1 million across all sources including the Innovation Loan. Around a quarter (23%) were seeking between £1 million and £5 million, and only a few (2%) for over £5 million (Figure 9-4).

9.8 Compared to the beneficiary population, survey data suggests that overall, unsuccessful applicants were looking for less finance for their projects than successful applicants (34% of beneficiaries were seeking less than £1 million; 56% between £1 million and £5 million; 10% over £5 million).

Figure 9-4: How much finance were you seeking in total for the project, that is from all sources including the Innovation Loan?



Source: SQW/IFF survey of unsuccessful firms (n=72)

Additionality

9.9 In order to assess the additionality of the programme (alongside evidence from beneficiary businesses), it is important to gather information on whether unsuccessful applicants were able to secure funding from other sources. **Just under half (43%) of all firms had not received funding from any other sources for the activities described in the Loans application** (Table 9-2). There was no obvious pattern in variation by the quality of application, i.e. by innovation score or credit outcome.

Table 9-2: Have you received funding from other sources to finance the activities that were described in your Innovation Loans application?

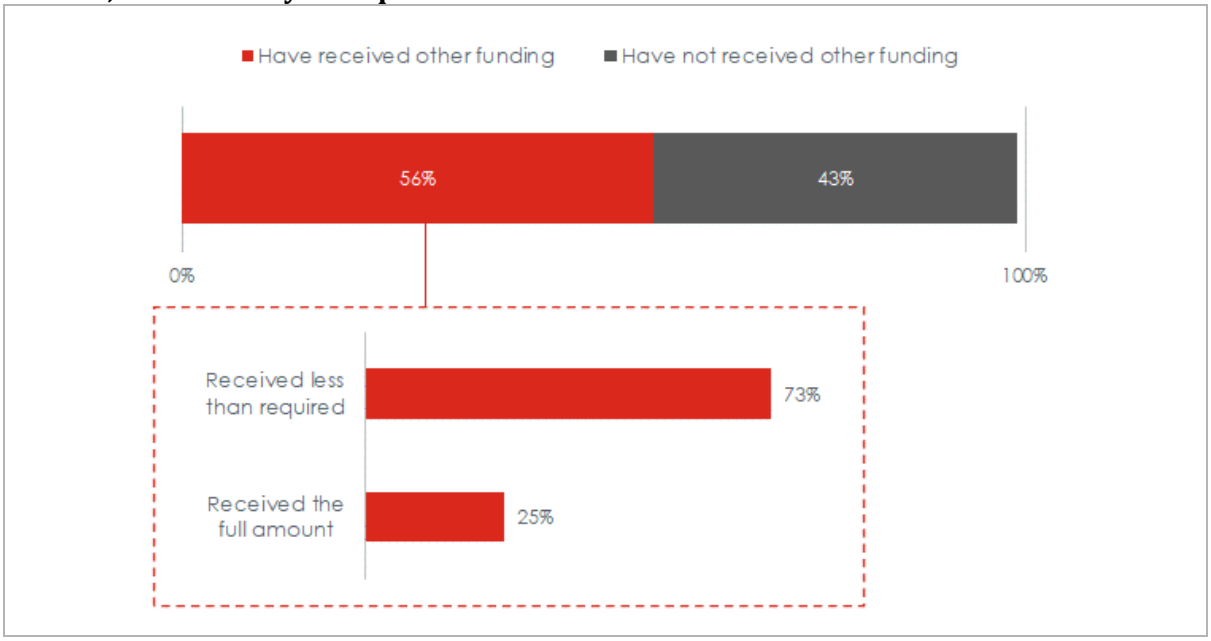
	n	%
Yes	40	56%
No	31	43%
Refused	1	1%
Total	**72**	**100%**

Source: SQW/IFF survey of unsuccessful firms (n=72)

9.10 **Of those that had received some other funding, only a quarter (25%) were able to obtain the full amount that they were seeking** (representing only 14% of the total businesses surveyed). Two thirds (68%) had secured less than half of the amount they required. Over half (55%) of those that secured any other funding had changed some of the activities, primarily due to lack of funding (cited by 18 of the 26 firms). The majority (86%) of unsuccessful applicants

said that they were continuing to search for sources of external funding. This suggests that very few of the businesses were able to secure equivalent funding, thus strengthening the additionality argument of Innovation Loans.[32]

Figure 9-5: In total, were you able to secure the full amount across all of these alternative sources, or less than you required?



Source: SQW/IFF survey of unsuccessful firms (n=72)

9.11 The perceived effect of not securing an Innovation Loan provides another useful indicator to assess the counterfactual. Almost all (90%) unsuccessful applicants reported that not receiving a Loan had a considerable negative impact on their business (Table 9-3). For over three quarters of all respondents, the unsuccessful application had held back growth either considerably (40%) or partially (36%); for over a tenth (14%) it had put the business at risk of failure.

Table 9-3: As a result of not securing finance from the Innovation Loan, what has been the effect on your business's development?

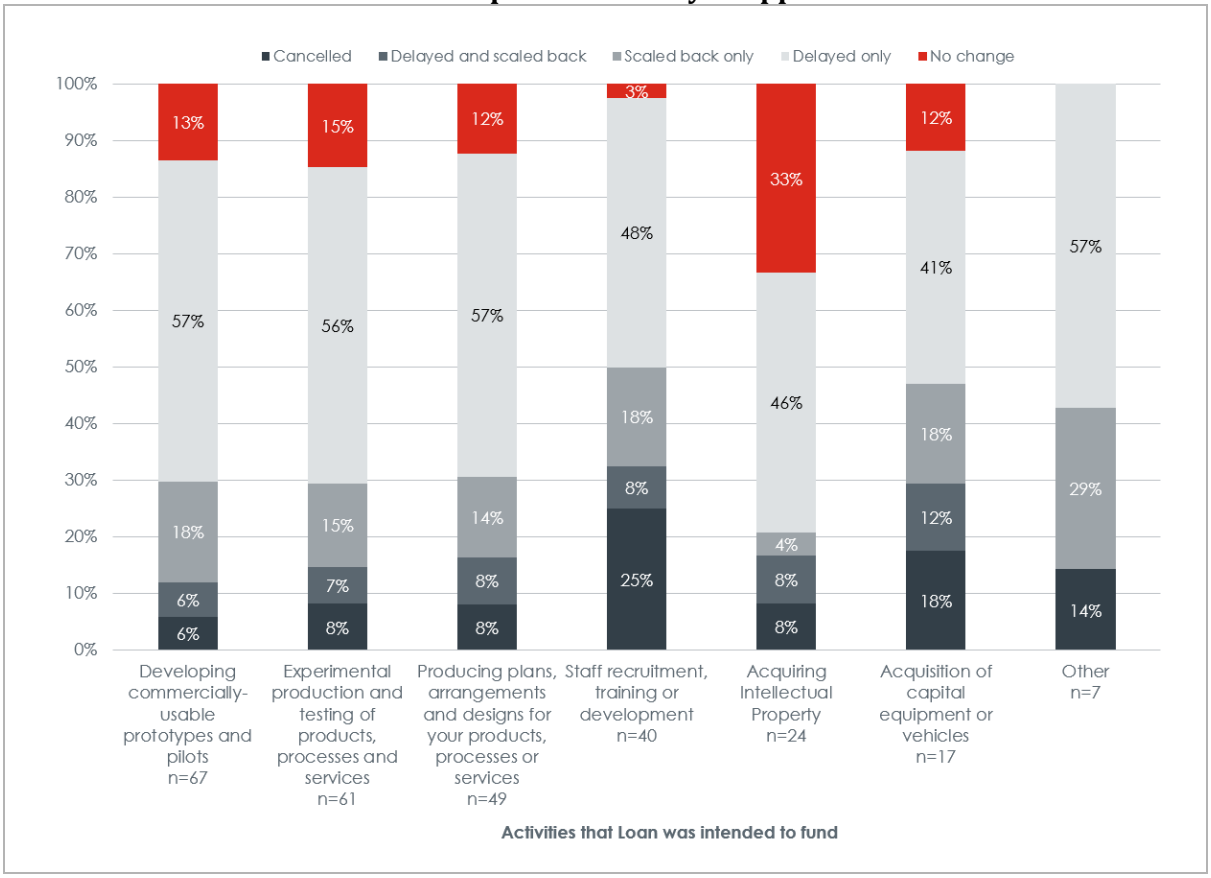
	n	%
It has considerably held back the growth	29	40%
It has partially slowed down growth	26	36%
It has put business survival at risk	10	14%
Because we have found better alternatives, it has helped speed up growth	2	3%
It has made no real difference	1	1%
None of these	4	6%
Total	**72**	**100%**

Source: SQW/IFF survey of unsuccessful firms (n=72)

[32] Note that there was an almost equal proportion of firms stating that the terms of the funding from other sources were either better (40%) or worse (38%) compared to Innovation Loans.

9.12 In terms of the specific activities mentioned in the Innovation Loans application, the extent to which these were affected varied. Staff recruitment, training or development was most likely to be cancelled (25%), followed by the acquisition of capital equipment or vehicles (18%). Acquisition of Intellectual Property was the most likely not to have affected by all – cited by a third (33%) of all firms.

Figure 9-6: As a result of not securing an Innovation Loan, have you delayed, scaled back or cancelled the activities that were planned when you applied for it?



Source: SQW/IFF survey of unsuccessful firms (base size varies depending on which activities the loan was intended to be used for)

Building finance confidence

9.13 There is evidence of potential benefits from engaging with the Loan programme, albeit unsuccessfully, as just under a third (31%) reported that the experience had led to greater confidence in their ability to raise finance in the future. Moreover, despite the unsuccessful outcome of the application, almost half (43%) of the businesses considered that their ability to make the case for investment had improved. This suggests that the role of Innovation Loans in preparing businesses for other funding options may also extend to some unsuccessful applicants.

Table 9-4: Impact of Loan application on ability to raise finance and case for investment

	Yes	No
Do you feel that applying to Innovation Loans has led to you having greater confidence in your ability to raise finance in the future?	22 (31%)	50 (69%)
Do you feel that applying to Innovation Loans improved your ability to make your case for investment?	31 (43%)	41 (57%)

Source: SQW/IFF survey of unsuccessful firms (n=72)

10. Conclusions

10.1 The Innovation Loans pilot programme has been delivered by Innovate UK across seven competitions, commencing in late 2017. A total of £75 million was available for business innovation projects to scale up and grow, focusing on late-stage R&D projects with a clear route to commercialisation.

10.2 The overall purpose of this follow-on interim evaluation was to assess programme management and delivery, and the extent to which additional outcomes and impacts for businesses have occurred as a result of Innovation Loans. The timeframe for the evaluation relates to the funds spent on businesses from 2018/19 to 2020/21.

10.3 The evaluation involved telephone interviews with successful and unsuccessful applicant businesses, delivery stakeholders interviews, external stakeholder interviews, case studies with beneficiaries, review of programme documentation and monitoring data, and preliminary econometric analysis to inform the future impact evaluation. A total of 50 beneficiaries and 72 unsuccessful applicants responded to the surveys. Both survey samples are representative of the wider populations of the programme and the competitions in which the companies participated.

10.4 In presenting the findings below, it is important to highlight that this not a final impact evaluation to evidence the long term outcomes and impacts of the programme. Given the nature of the innovation projects funded, more time needs to elapse before these can be fully realised. Nevertheless, the findings are very positive and demonstrate strong progress since the first interim evaluation in 2019.

What is the interest in, and demand for, Innovation Loans?

10.5 **Our review of programme monitoring data found that the level of interest in, and demand for, Innovation Loans amongst SMEs has increased across the competition rounds** – tripling from 36 applications in Competition 1 to 107 applications in Competition 7. Across the first seven competitions, a total of 534 eligible applications were submitted of which 102 were successful and 432 unsuccessful (overall success rate of 19%).

10.6 Evidence from consultations with internal and external stakeholders confirmed that demand for the programme has risen over time and is viewed as a key finance product in the market. However, a key challenge for the programme going forward relates to accessing the wider pool of innovative businesses that are unaware of Innovate UK support.

What is the nature of the businesses applying, and the projects which form the focus of the applications for funding?

10.7 **The businesses applying for Innovation Loans are relatively young and small**. Our review of Beauhurst data for the 476 businesses that applied to the programme shows that four out of five (80%) applicants were at the seed or venture stages, and nearly all (93%) employed less than 50

staff. Around half (48%) were based in London or the South East. The most common sectors were information and communication technology, manufacturing, and professional, scientific and technical activities.

10.8 Data on the 102 companies that were successful in applying shows that:

- Over three quarters (78%) were either at the seed or venture stage, however only one in five seed stage firms received a loan compared to one in three venture firms. Nearly all firms (90%) employed fewer than 50 staff.
- The majority of the companies (85%) had received some grant funding, suggesting that these are largely firms with prior Innovate UK support and contact.
- Just under half of the portfolio (43%) was made up of manufacturing businesses, reflecting that manufacturing has the highest in-sector proportion of SME innovators in the UK
- Since the previous interim evaluation which covered the first five competitions, the proportion of beneficiaries located in London or the South East has reduced (from 48% to 39%).
- Around two thirds of beneficiaries (62%) had male-only teams, and a tenth (11%) had teams where women accounted for at least half – broadly in line with the wider business population.

How effective are the processes of implementation and what are the experiences of the customer journey?

10.9 **There are clear and well-defined organisational structures and arrangements in place for implementing the Innovation Loans programme**. The roles and responsibilities of the Innovate UK delivery team appear to be robust and suitable for addressing the objectives of the programme. The programme has continued to improve since the previous evaluation in 2019, with several changes to processes made which appear to have resulted in an improved customer experience for the applicants. This includes the challenge and assurance built into the structures (e.g. through the Innovation Finance Sub-Committee of Council); expansion of the Innovation Loans delivery team; and the adoption of automation and specialist software for collecting and analysing company data.

10.10 **Overall, both businesses and stakeholders provided positive feedback on programme delivery**. The different phases of the customer journey – from marketing through to the application, loan award and monitoring – have worked well. Particular strengths included the terms and conditions of the loan product; the flexibility of terms through the Covid-19 pandemic; the transparency of the decision-making process; and communication with Innovate UK. Whilst the feedback was positive overall, some areas for improvement were identified, including increasing the reach of marketing activities and further streamlining the processes.

10.11 **There was general agreement among stakeholders on the importance of the equality, diversity and inclusion (EDI) agenda**. However, there were mixed views regarding the extent to which the design and delivery of the programme can contribute to EDI outcomes: whilst the

majority of those that were able to comment recognised that there are some processes in place which aim to encourage greater EDI in innovative businesses, a minority suggested that there was limited ability to do so because these issues are likely to be primarily influenced by firm-level policies. In our view, there is an opportunity for Innovate UK to explore how best to identify and target businesses led by under-represented groups, and provide any necessary support during the application process.

What evidence is there of progress towards the achievement of intended outputs, outcomes, and impacts?

10.12 **Innovation Loans continues to make strong progress towards achieving intended benefits** as identified in the programme logic model and theory of change. The programme is successfully translating activities and outputs to eventual outcomes and impacts. The results are particularly encouraging given the relatively short time that has elapsed since businesses have been awarded and drawn down Innovation Loans; and the disruption to businesses and the economy from Covid-19.

10.13 The evaluation found the following key benefits, as reported by business beneficiaries:

- **Innovation capacity and skills** – Nearly all business have improved or expected to improve their innovation capacity (88%) and skills (96%) as a result of Innovation Loans. Also, the majority of businesses are more **investment ready** (i.e. willing or prepared to overcome equity aversion, lack of investability and presentational failings) and **commercially ready** (i.e. willing or prepared to bring new products, services or processes to market).

- **Increased R&D investment** – 43 businesses provided estimates of the new investment in R&D as a result of the Loans, amounting to £37.4 million. This is higher than the value of Loans awarded to these businesses (£31.8 million). The case study evidence suggests that the Loan allowed businesses to "ringfence" employee time for R&D related activities; invest in new R&D related equipment; and undertake risky projects.

- **Commercialisation/progression through TRLs** – The innovations supported have made significant progress towards commercialisation. Almost all businesses (92%) reported that they had progressed their product or service towards commercialisation. Overall, 84% of the projects (42 cases) have progressed their innovation through TRLs. Of the 50 projects, 18 (36%) innovations have now been fully or partially commercialised, and a further 19 (39%) are at the stage of being tested and scaled in an operational environment.

- **Intellectual Property** – Over a third of businesses (36%) applied for IP, with the same proportion expected to do so in the future. This is across different types of IP applications, most commonly: patents, trademarks and copyrights. The results on IP reinforce the good progress made on moving through TRLs, with IP becoming increasingly important.

- **New products, services, and processes** – 30 businesses (60%) had already introduced a new product, service or process and 18 businesses (36%) expected to do so in the future. Of these innovations, just under half (42%) were new or improved products or services, and a

similar proportion were new or improved processes. A total of 15 businesses that introduced new products provided estimates of the cumulative value of sales from their innovations, amounting to £28 million (these can be advanced sales).

- **Productivity** – Process improvements were expected to lead to productivity gains with businesses reporting that the innovation would reduce costs (84% of firms), improve quality (82%) and save time (76%). It is important to recognise that productivity is self-defined by businesses interviewed and mainly related to costs and time efficiency.
- **Follow-on funding** – Over half of the businesses (58%) had secured follow-on funding totalling c. £60 million (mostly equity). Of the 29 businesses that received follow-on funding, the majority (89%) considered the Innovation Loan to have contributed to securing this. The case study evidence points to the credibility associated with having secured the Loan as key to attracting follow-on funding.

10.14 The Innovation Loans programme has also contributed to ***perceived*** **spillover benefits** for suppliers and customers of beneficiaries. Over two thirds of beneficiaries (70%) reported spillover benefits for suppliers across a range of sectors, notably manufacturing, information and communications, and professional services. The case study evidence suggests that there have been positive spillover effects for the customers of beneficiaries in the following ways: lower priced goods/services as a result of the Innovation Loan contribute to improvements in production efficiency; and some of the new or improved product/service are 'greener alternatives' compared to other options.

What would have happened to the innovation projects supported if they had not been offered these loans?

10.15 **Innovation Loans is associated with a high level of finance additionality**, with around three quarters of businesses indicating that they 'probably' or 'definitely' would not have been able to obtain finance elsewhere. **Outcome additionality is relatively high**: in more than half the cases, the Innovation Loan has accelerated projects and around a quarter were wholly additional. There were no cases where the business believed the benefits reported would have been achieved over the same time period and at the same scale and quality, without the Loan.

10.16 Of the 72 unsuccessful applicants, just under half had not received any other funding for their project and those that had, almost three quarters (73%) received a lower amount than their application to Innovation Loans. Importantly, almost all (90%) unsuccessful applicants reported that not receiving a Loan has had a considerable negative impact on their business: slowing down growth and/or putting business survival at risk. The feedback from unsuccessful applicants therefore reinforces the additionality of the Innovation Loans programme.

10.17 Overall, the business survey and stakeholder evidence indicate that **the programme is filling a gap in the innovation funding landscape, complementing other finance products and playing an important role in the commercialisation journey of firms**.

Economic impacts

10.18 **Based on our analysis of the beneficiary survey results, we conclude that the Innovation Loans programme is making good progress in generating economic impacts.** The Loans have played a critical part in the commercialisation of new/improved innovations and these businesses are starting to see impacts on employment, sales and turnover.

10.19 For 50 businesses in the sample, employment had increased by 486 since the Loans were awarded. As a result of the Loan, 44 of the 50 cases (84%) reported that they employed more people, while 52% had increased turnover.

10.20 After adjusting for additionality and scaling up the results to an 'effective' population of 95 businesses, we estimate that Innovation Loans have supported:

- **346 additional jobs to date (July 2021)**
- **£16.9 million in additional annual turnover to date**
- **£44.7 million (cumulative) additional turnover since Innovation Loans were launched**.

10.21 Nearly all of the businesses in the sample expect employment and turnover to be higher within three years (i.e. by middle of 2024): supporting c. 1,200 jobs and c. £161 million turnover. These are *gross* estimates and are likely to include significant optimism bias but provide an indication of the ambitions of the funded businesses.

Preliminary econometric analysis

10.22 We undertook preliminary econometric analysis that helps to inform the future final evaluation of Innovation Loans. This work involved **exploring the feasibility of estimated net impacts of the programme using a difference-in-difference methodology**. We considered two alternative comparison groups: a) a set of businesses similar to Innovation Loans beneficiaries drawn from the wider business population using propensity score matching (PSM); and b) unsuccessful applicants with an Innovation Score of 70 and above. The analysis focused on selected key outcome measures, including employment and turnover growth, and used a combination of programme monitoring data and information from Beauhurst.

10.23 The results of our analysis **confirmed the feasibility of this approach to impact evaluation**. We were able to construct high-quality comparison groups and test the validity of main assumptions behind the difference-in-deference approach. However, we also identified three challenges: First, the coverage of turnover data for Innovation Loans beneficiaries in Beauhurst is 'patchy', and as a result proxies for turnover (cash and shareholder funds) had to be identified and used in the analysis. Second, since propensity score matching does not account for unobservable characteristics, some minor differences in pre-existing trends between beneficiaries and matched comparator companies remained and needed to be explicitly controlled for in the statistical model. Finally, due to the timing of the evaluation limited post treatment data was available, especially for beneficiaries from more recent competitions.

Future development of the programme

10.24 Informed by the evaluation evidence from businesses and stakeholders, we make the following suggestions for the development of the programme going forward.

- **Continue to promote and integrate Innovation Loans with Innovate UK's other funding and programmes** to accelerate project commercialisation. This could involve using the extensive networks of Innovate UK EDGE and other initiatives for targeting suitable companies; and fast-tracking previous grants recipients to Loans, if appropriate. A key activity should be further targeting marketing and promotion of Innovation Loans, particularly to potential applicants not currently aware/engaged with Innovate UK (especially under-represented groups e.g. women, ethnic minority-led businesses).

- **Consider expanding Innovation Loans to include (non-financial) business support**. This should be ongoing support to ensure that the Loan is being well utilised, improves firm-level capabilities, and maximises benefits. As a Loan product, the programme currently does not offer expertise to enhance the management practices of the innovating venture (as is the case with equity investors). There may therefore be potential to incorporate additional programme elements such as mentoring; and supporting firms that applied but were deemed not yet financially ready (helping to facilitate a future pipeline of applications). This is obviously subject to assessment of the potential demand amongst businesses and availability of additional resource required to implement effectively.

- **Explore options for rolling applications in between competitions**. The 'stop-start' competition format may prevent companies from applying if the timings do not match their business cycles and needs. Competitions can ensure strategic focus and rolling applications can enable companies to apply at a time suitable for them – potentially capturing 'fresh' ideas in-between competitions. This may also help with further integrating Innovation Loans with Innovate UK's other funding and programmes as it will avoid 'drip-feed' of funding/support.

- **Based on the results of our preliminary work, adopt econometric analysis as one of the strands of research in the future impact evaluation**. This should investigate the possibility of combining Beauhurst data with administrative data on turnover available in Business Structure Database. Apply PSM to establish appropriate comparison groups and use a difference-in-difference specification that: allows for potential variation in pre-existing trends between supported and unsupported companies; accounts for differences in the timing of treatment; and controls for any remaining differences in observable characteristics between the beneficiaries and comparison groups.

Annex A: Stages in company development

A.1 Table A-1 defines the different stages of company development referred to in analysis.

Table A-1: Stages of company development

Stage	Definition
Seed	A youngish company with a small team, low valuation and funding received (low for its sector), uncertain product-market fit or just getting started with the process of getting regulatory approval. Funding likely to come from grant-awarding bodies, equity crowdfunding and business angels.
Venture	A company that has been around for a few years, has either got significant traction, technology or regulatory approval progression and funding received and valuation both in the millions. Funding likely to come from venture capital firms.
Growth	A company that has been around for 5+ years, has multiple offices or branches (often across the world), has either got substantial revenues, some profit, highly valuable technology or secured regulatory approval significant traction, technology or regulatory approval progression, funding received and valuation both in the millions. Funding likely to come from venture capital firms, corporates, asset management firms, mezzanine lenders.
Established	A company that has been around for 15+ years, or 5-15 years with a 3 year consecutive profit of £5m+ or turnover of £20m+. It is likely to have multiple (often worldwide) offices, be a household name, and have a lot of traction. Funding received, if any, is likely to come from corporates, private equity, banks, specialist debt funds and major international funds.
Exited	The company has done an IPO or been acquired. Management buyouts (MBOs) are not considered to be exits.

Source: Beauhurst

Annex B: Consultee list

Scoping consultations

Table B-1: Scoping consultees

No.	Name	Organisation	Position
1	Neil McDaid	Innovate UK	Chief Investment Officer
2	Nigel Walker	Innovate UK	Deputy Director, Lending & Investor Partnerships
3	Jose Argudo Pazmino	Innovate UK	Evaluation Lead Specialist
4	Emily Hogg	Innovate UK	Head of Lending & Investment Operations
5	Scott O'Brien	Innovate UK	Deputy Director (Credit)
6	Jenny Jones	Innovate UK	Head of Investment Finance
7	Alice Roycroft	BEIS	Senior Policy Advisor

Source: SQW

Delivery stakeholder consultations

Table B-2: Delivery stakeholder consultees

No.	Name	Organisation	Position
1	Andrew Wade	Innovate UK	Credit Specialist
2	Camille Moran	Scottish Enterprise	Specialist
3	Cliff Funnell	Innovate UK	Monitoring Officer
4	Emily Maule	Innovate UK	Lending Operations Analyst
5	Howard Partridge	Innovate UK	Regional Manager (East of England)
6	James Doherty	Innovate UK EDGE	Scaleup Director for the Scaleup Programme
7	Jon Tenner	Innovate UK	Monitoring Officer
8	Jon Wood	Innovate UK	Regional Manager (Wales)
9	Jufen Fernandes	Innovate UK	Customer Support Service Executive
10	Lynne Thomas	Innovate UK	Monitoring Officer
11	Maxine Adam	Innovate UK	Deputy Director, Business Growth
12	Mike Skinner	Innovate UK EDGE	Innovation & Growth Specialist
13	Peter Treadwell	Growth Company	Operations Director
14	Susanne Coles	KTN	Head of Investment & Business Development
15	Tammy Gilder	Innovate UK	Competitions Manager

Source: SQW

External stakeholder consultations

Table B-3: External stakeholder consultees

No.	Name	Organisation	Position
1	Christopher Buckland	Oxford Innovation Services	Innovation Coach
2	David Denny	Longwall Ventures	Partner
3	Greg Warren	British Business Bank	Senior Manager, Policy
4	Irene Graham	ScaleUp Institute	CEO and Board Director
5	Jane Galsworthy	Oxford Innovation Services	Managing Director
6	Julie Baker	NatWest Group	Head of Enterprise and Community Banking
7	Katrin Herrling	Funding Xchange	CEO and Co-founder
8	Paul Tselentis	24 Haymarket	CEO and Co-founder
9	Priya Guha	Merian Ventures	Venture Partner
10	Richard Holmes	Oxford Innovation Services	Business Growth Adviser
11	Rod Beer	UKBAA	Managing Director
12	Shaun Beaney	ICAEW	Manager, Corporate Finance Faculty

Source: SQW

Case study consultations

Table B-4: Case study consultees

No.	Name	Organisation	Position
1	Adam Kingdon	Utonomy Ltd	CEO
2	Alan Murrell	Korn Wall Ltd (trading as KwickScreen)	CEO
3	Andrew Woods	Catagen Ltd	CEO
4	Ann Kramer	The Electrospinning Company Ltd	CEO
5	Dean O'Connor	NanoSUN Ltd	CEO
6	Lindsay Wood	Sciencesoft Ltd	Director
7	Matthew Dreaper	Keit Limited	Finance Director
8	Nigel Salter	NuNano Ltd	Non-Executive Director
9	Patrick Dodds	Hexigone Inhibitors Ltd	CEO
10	Patrick Thorpe	Spiro Control Ltd	Managing Director
11	Sarah Coward	The Forever Project	CEO

Source: SQW

Annex C: Econometric analysis

C.1 In order to net impacts of the Innovation Loans programme in a statistical and robust way, the future final impact evaluation will need to consider the counterfactual position (i.e. what would have happened in absence of Innovation Loans). This can be done by comparing the outcomes for beneficiaries to those observed among unsupported businesses.

C.2 This annex presents key findings from our preliminary econometric analysis that helps to inform the approach for the final impact evaluation.

Approach to econometric analysis

C.3 In our preliminary analysis we used the **difference-in-difference methodology (DiD)**. DiD is recognised in the Magenta Book as a robust evaluation approach to assessing the counterfactual position which reaches level three on The Maryland Scientific Methods Scale (SMS)[33] providing robust evidence of impacts.

C.4 This method estimates the net effect of support by comparing changes in outcome measures observed across supported (the treatment group) and unsupported (the comparison groups) companies over time. Only the growth that is observed in the treatment group beyond what is demonstrated by comparator businesses is attributed to the programme.

C.5 Our analysis focused on selected key outcome measures: **employment, turnover[34] and attracting follow-on funding**. We have also confirmed the feasibility of econometric analysis for other outcome measures, such as R&D investment and Innovation activity (e.g. proxied with patent applications).[35]

C.6 The standard DiD approach to a large extent relies on the **'parallel trends' assumption** that in absence of support beneficiaries would have followed the same trajectory as business in the comparison group. Since supported businesses are likely to systematically differ from the wider business population, both on observable and unobservable characteristics, if beneficiaries were to be compared to a random sample of unsupported businesses, the parallel trends assumption would likely be violated. This issue is known as **selection bias**. Therefore, the choice of comparison groups is critical for ensuring the method provides accurate estimates of the programme's impacts.

[33] https://whatworksgrowth.org/resources/the-scientific-maryland-scale/
[34] Turnover was proxied with shareholder funds and cash, as explained below.
[35] It is important to note that DiD is not well-suited for binary outcomes. An example of a binary outcome would be whether the business attracted follow-on funding – 'yes' vs 'no' – rather than the amount of attracted funding, which would be a continuous outcome measure. Binary outcomes measures are better analysed using logit or probit models that allow to identify factors associated with the outcome and to assess whether securing an Innovation Loan increases the chances of achieving the outcome.

Comparison groups

C.7 In our analysis we explored two comparison groups:

- **Group 1:** Businesses similar to the beneficiaries drawn from a wider SME population using Propensity Score Matching (PSM)
- **Group 2:** Unsuccessful applicants (UAs) with Innovation Score of 70 and above.

C.8 **Propensity Score Matching (PSM)** – a statistical matching technique that allows to limit the influence of selection bias by identifying groups of companies with similar **observable characteristics** to the treated group. Differences in important unobservable characteristics (for example in propensity to seek support, management style and openness to change) may remain. For this reason, **it is important to consider multiple complementary comparison groups.**

C.9 Unsuccessful applicants (UAs) can form a good comparison group because businesses which apply for the same programme are likely to be similar in their ambition to innovate and have comparable observable characteristics (to satisfy the programme's criteria). We reviewed the list of UAs, their application scores and characteristics, and concluded that all **UAs with an Innovation Score above 70 are suitable comparators.** However, their credit ratings, age and pre-competition levels of employment were statistically significantly different from those of beneficiaries and should be controlled for in the statistical model used to estimate the effect of support.

C.10 For PSM to be successful in selecting the most appropriate comparator businesses from the wider business population, **observable characteristics used for matching should correlate with receiving an Innovation Loan**. This, combined with the fact that comparable data should be available for both supported and unsupported businesses, highlights the importance of choosing the data sources suitable for analysis.

Secondary data sources

C.11 When selecting the most appropriate secondary database for the analysis we considered three alternatives: Beauhurst, Business Structure Database (BSD) and Fame. For this follow-on interim evaluation we were using Beauhurst as it contains a range of additional variables which help to improve the quality of comparison groups (such as target client group, credit ratings and effects of Covid-19 on businesses) and provides sufficient coverage of the programme (89 of 102 current beneficiaries have sufficient data on key characteristics).[36]

C.12 One challenge associated with using Beauhurst data is that financial information relies on data disclosed by companies. Businesses are not required to file full accounts with Companies House if their turnover is under £10.2m, which is the case for most firms that have received an

[36] It may also be possible to use programme monitoring data to undertake additional analysis, for example estimate the optimal size of the loan that maximises the benefits. This will require Innovate UK to maintain an up to date and accurate records on beneficiaries.

Innovation Loan. Due to these gaps, the following **proxy indicators for turnover** were agreed with the Steering Group and used in analysis: **shareholder funds and cash.**

Key findings

C.13 PSM allowed us to successfully identify businesses similar to Innovation Loan beneficiaries on key observable characteristics providing a high-quality comparison group. The list of observable characteristics that were important for selecting suitable comparator businesses is presented in Table C-1. Characteristics highlighted in red are available in Beauhurst but not in other considered databases, confirming Beauhurst as a good data source for the final evaluation. A good balance was achieved on all of these characteristics as well as on additional proxies for size: total assets and net worth.

Table C-1: Statistically significant matching characteristics

Matching characteristic
Age
Location
Sector
Credit Rating
Effects of Covid-19 on the business (as a proxy for characteristics which were unobservable at the time of IL competitions)
Stage of business development (seed vs venture)
Target client group (businesses, consumers, government, third sector)

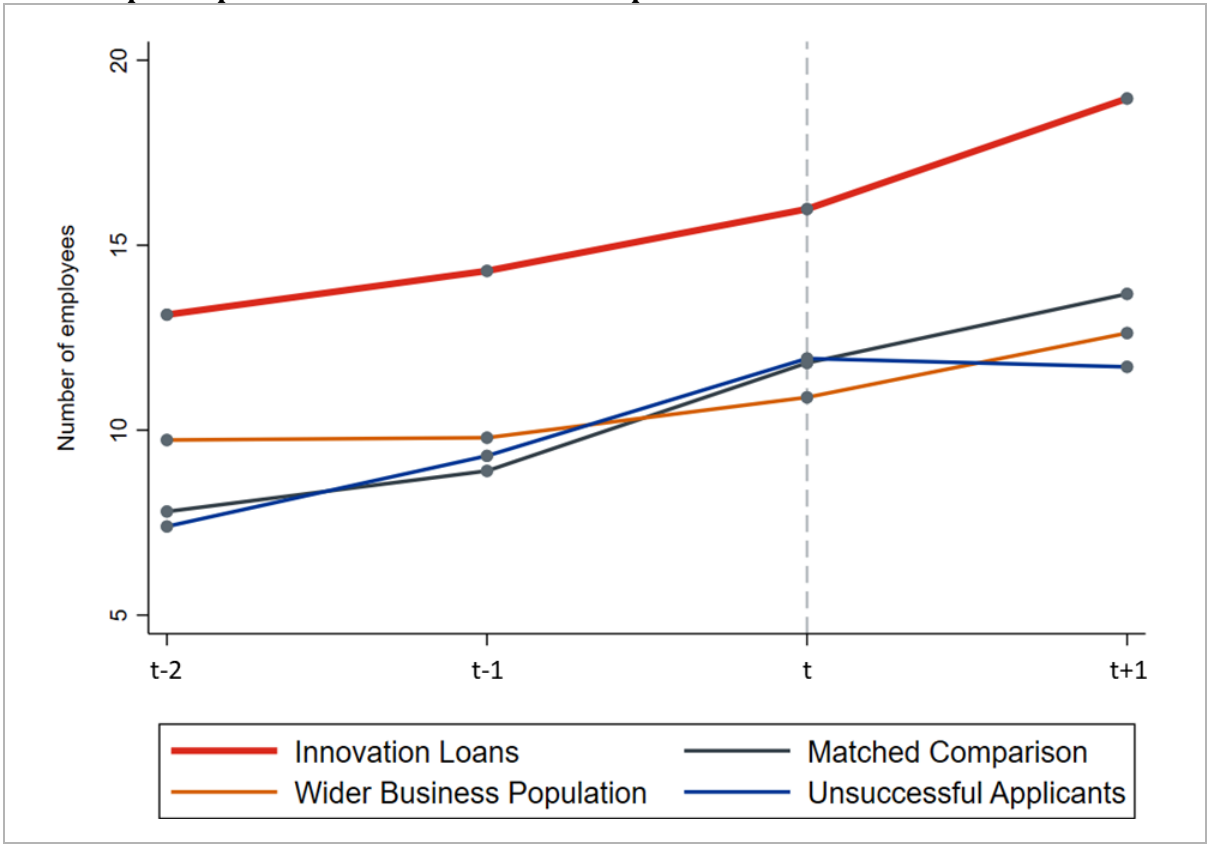
Note: Information on characteristics highlighted in red is available in Beauhurst but not in BSD or Fame. Source: SQW

C.14 A graphical analysis of pre-support trends revealed that the parallel trends assumption was broadly satisfied, though some pre-existing differences in trends between Innovation Loans beneficiaries and the matched comparison group identified with PSM may have remained after matching, potentially due to the influence of unobservable characteristics. The differences were also present when compared to UAs.

C.15 For example, as shown in Figure C-1, over the year before support (i.e. between '*t-1*' and 't'), matched comparator businesses and UAs on average were increasing the number of employees slightly quicker than the beneficiaries. If this is not taken into account, the effect of the programme may be underestimated. This highlights the importance of using a statistical model that allows for deviations in trends between the groups even when PSM is used to establish the comparison groups.[37]

[37] Alternatively, one could 'force' the trends to be parallel by using past growth trends as one of matching characteristic in PSM. However, this approach may lead to selecting comparator businesses that were growing beyond or below their potential in the years used to determine the trends for matching. If those businesses revert to their natural trajectory, the estimates of the effect of the programme will be imprecise.

Figure C-1: Pre- and post-competition trends. 't' represents the financial year in which business participated in Innovation Loans competition



Note: Due to differences in the timing of support, data is presented in 'ts' i.e. relative to the competition in which the businesses participated rather than in financial or calendar years. Source: SQW

Recommendations for future final evaluation

C.16 Our work has confirmed the feasibility of using DiD methodology combined with PSM to estimate net impacts of Innovation Loans during the final evaluation. However, we also identified challenges associated with: a) the quality and amount of available data, and b) ensuring the results are robust to violation of assumptions behind the method.

C.17 Therefore we make the following recommendations for the final evaluation of Innovation Loans:

- Adopt a mixed methods approach with econometric analysis being one of the strands of research
- Investigate the possibility of combining Beauhurst data with administrative data on turnover available in BSD
  - The time frame of the evaluation should allow enough time for securing access to BSD and take into account longer time lags in availability of administrative data
  - We note that turnover data may still be 'patchy' even when BSD is used since some of supported businesses may be pre-turnover or not be registered for PAYE and would not appear in the database

- Apply PSM to establish appropriate comparison groups and reduce the influence of selection bias
- Use a difference-in-difference specification that: a) allows for potential variation in pre-existing trends between supported and unsupported companies, b) accounts for differences in the timing of treatment, and c) controls for any remaining differences in observable characteristics between the beneficiaries and comparison groups.

Annex D: Innovation Loans delivery model and customer journey

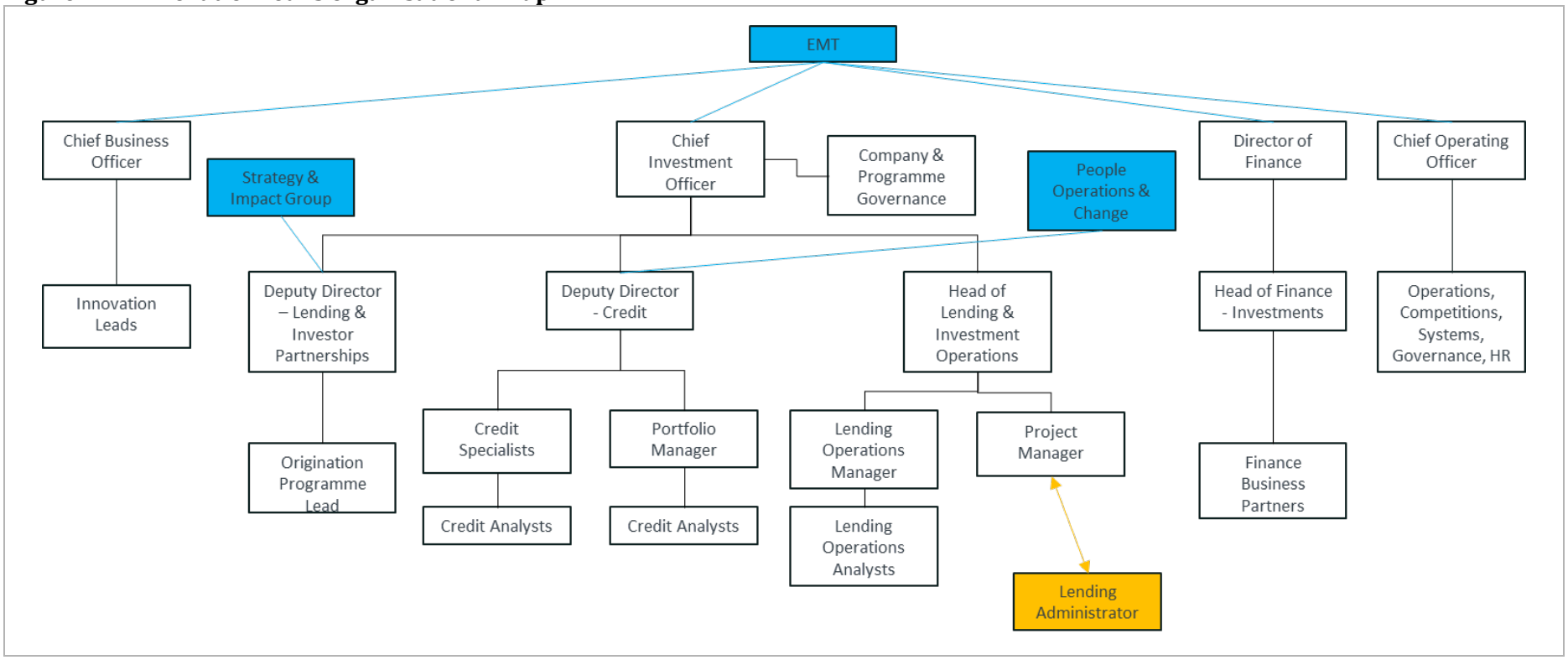
Delivery model

D.1 Within the overall organisational structure described in section 6, Figure D-1 illustrates how the Innovation Loans delivery team is set-up. This organisational chart maps the connections between the Innovation Loans team and the Innovate UK operational teams.

D.2 In interpreting the above chart, the following key aspects are worth highlighting:

- All the operational teams have their own direct lines of management which are not fully shown in this diagram.
- It is the role of the Lending Operations Manager to work closely with these operational teams and to be the first point of contact regarding the delivery of Innovation Loans - this includes managing the relationship with the external lending administration partner.
- The Innovation Leads are expected to work closely with the Head of Lending to develop the competitions in their technical areas and to ensure the relevant Monitoring Officers and Innovation Assessors are used.
- Monitoring Officers are expected to work closely with the Credit Specialists as they will both maintain a close relationship with companies. The monitoring focuses on the following three key areas: financing for the R&D project; progress of the R&D project; and the financial health of the business.
- The successful companies will have direct relationships with the Credit Specialists and Monitoring Officers throughout the project period. Credit Specialists are expected to maintain relationship up to repayment of the loan.

Figure D-1: Innovation loans organisational map



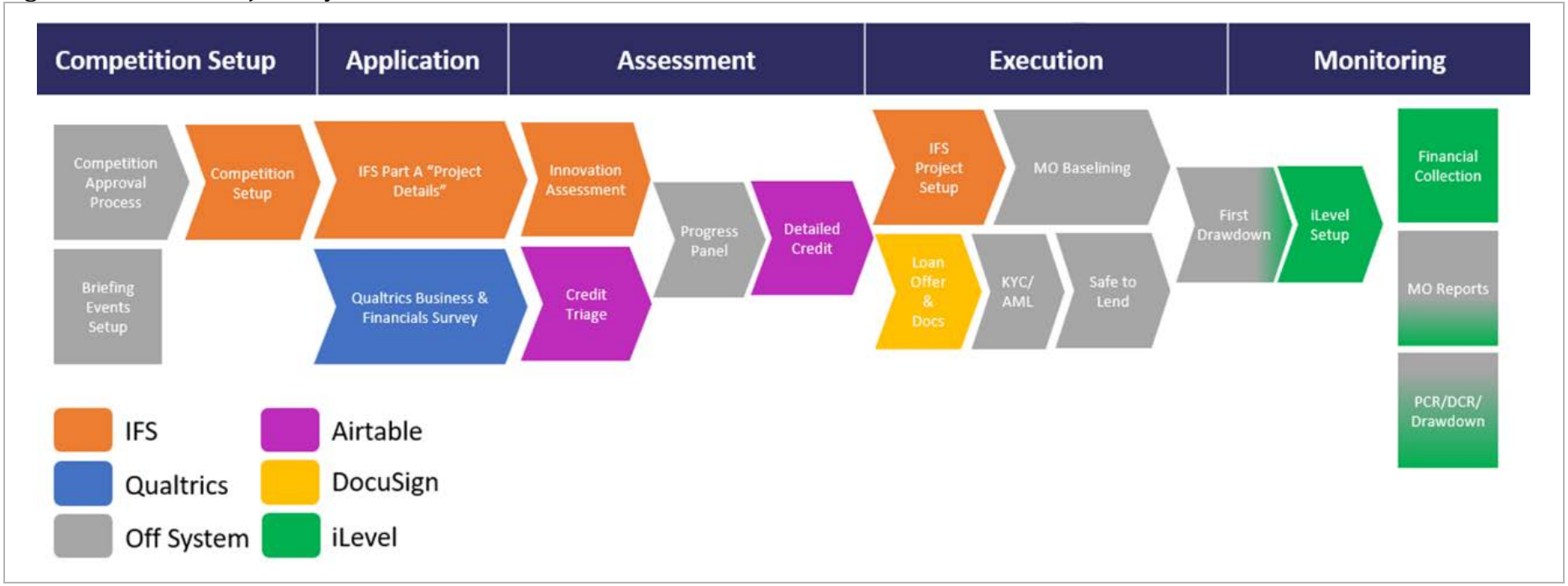
Source: Innovate UK

Customer journey

D.3 Figure D-2 on the following page summarises the five main stages of the Innovation Loans customer journey – competition setup, application, assessment, execution and monitoring:

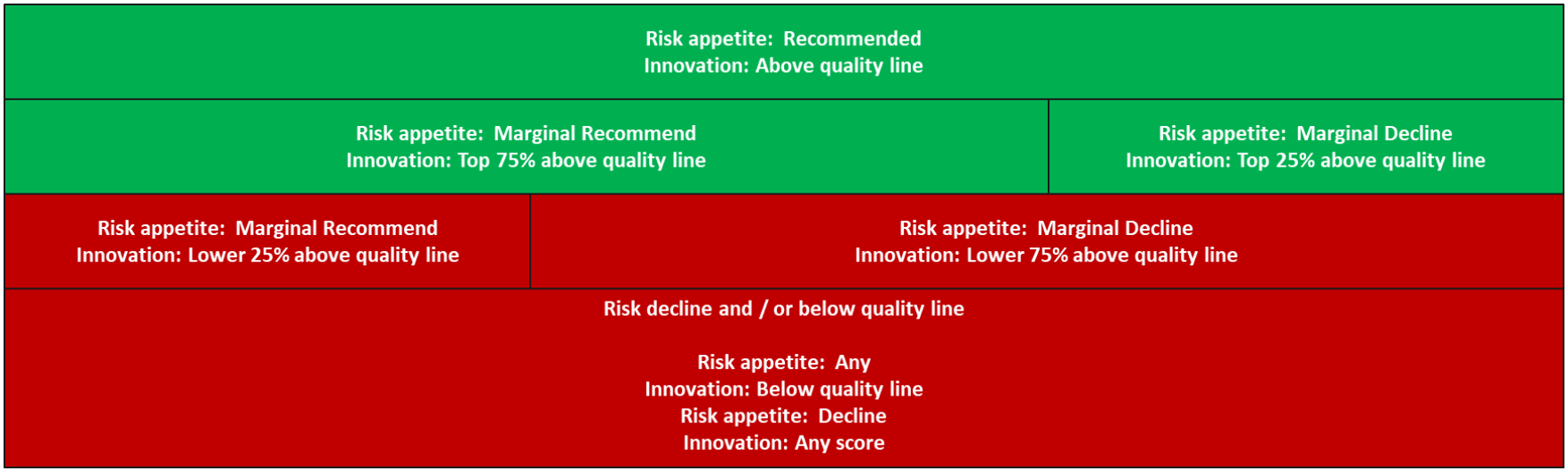
- Competition setup includes the publication of a competition brief, which filters out firms who are out of scope or that do not find the terms and conditions of the product suitable. Competitions are advertised through various marketing channels to raise awareness (e.g. newsletters, social media, roadshows, intermediary organisations).
- Following from this, applications are submitted and, based on 'innovation' and 'credit' assessments, some are progressed to detailed credit analysis. The former filters out 'weak' and ineligible innovation proposals using an established innovation scoring approach and the latter filters out firms that do not meet the credit criteria (the decision matrix is depicted in Figure D-3).
- Detailed credit analysis involves direct contact with applicants to obtain information necessary for the IUKL credit committee to decide whether or not to make a conditional loan offer. Once the loan offer has been accepted, documentation completed and any loan conditions met, the business starts to draw down loan funds and start their R&D project.

Figure D-2: Customer journey of Innovation Loans



Source: Innovate UK

Figure D-3: Progress panel decision matrix



Source: Innovate UK

D.4 Further detail on the delivery of the Innovation Loans programme is summarised in Table D-1. This identifies seven main stages: 'onboarding' (i.e. applications), initial assessment, decision points, post award, monitoring and reporting.

Table D-1: Description of key processes within the Innovation Loans process

Process	Summary description
Onboarding	
Application	Application for a loan completed by companies interested in the product
Part A: Innovation Questions	Innovation questions asked to the applicants which are aligned to the standard Innovate UK application and relate to the proposed project
Part B: Business and Financial Questions	Additional questions and historic and forecast financial information about the business focused on the business and its ability to repay the loan
Initial Assessment	
Innovation Assessment	5 assessors review Part A to score the level of innovation
Credit Triage	Credit Specialists review the application to decide whether the business is suitable for the loan product and further evaluation
Decision Point 1	
Credit Triage Approval	Presentation of the credit recommendation on each application to the credit committee and agreeing a credit recommendation
Line Draw	Summarising which projects have been deemed the most innovative by assessors and ensuring scoring has been completed correctly. Deciding what projects are suitable for progression from an innovation point of view
Progress Panel	Bringing together the Innovation and Credit recommendations to show which projects should progress to the detailed analysis stage
Detailed Analysis / Decision Point 2	
Customer Engagement	Asking customers questions highlighted in the credit triage stage and holding initial discussions regarding next steps
Credit Papers	Completing final credit papers based on all the information collected so far and deciding on a final credit recommendation
Credit Committee	Meetings to discuss each application taken forward from progress panel to decide whether to offer them a loan and what conditions should be included.
Post Award	
Management Presentations	Meeting between the applicant and credit committee and the final sign off of the application process
Legal Execution	Meeting any conditions set out in the loan offer and completion of legal documents
Monitoring	
Monitoring Officers	Person assigned to monitor the project with regards to the project baseline plans

Baseline documents	Documents completed within 60 days of project start to outline the steps involved in the completion of the innovation project
Credit Specialist	Relationship manager for the business
Management accounts	Accounts provided quarterly to the credit specialist to ensure the business is meeting financial covenants
Reporting	
CRM / Tracking	Tracking progress of projects /businesses to assist and inform portfolio management
Portfolio Management	Reviewing how the portfolio is performing as a whole and any issues that have arisen.

Source: Innovate UK

D.5 An important step in the process is the completion of the separate innovation and credit assessments. Table D-2 summarises the topics covered in both these forms.

Table D-2: Innovation and credit assessments

Part A: Innovation Assessment (Project)	Part B: Credit Assessment (Business)
A1: Need or Challenge	B1: Preferred loan conditions
A2: Approach and innovation	B2: Business management team
A3: Project team and resources	B3: Business ownership structure
A4: Market awareness	B4: Business plan
A5: Outcomes and route to market	B5: Business risks
A6: Wider impacts	B6: Private finance
A7: Project management	B7: Business financials
A8: Project risks	
A9: Additionality	
A10: Costs and value for money	
Other funding from public sector sources	
Project finance summary	

Source: Innovate UK

Annex E: Case studies

E.1 This annex contains eleven case study summaries for companies that have received an Innovation Loan.

Table E-1: Summary of case studies

No.	Company name
1	Catagen Ltd
2	The Forever Project
3	Hexigone Inhibitors Ltd
4	Keit Ltd
5	Korn Wall Ltd (trading as KwickScreen)
6	NanoSUN Ltd
7	NuNano Ltd
8	Sciencesoft Ltd
9	Spiro Control Ltd
10	The Electrospinning Company Ltd
11	Utonomy Ltd

Source: SQW

Case Study: Catagen

Catagen was established in 2012 as a spinout company from Queen's University, Belfast. The mission of the company is to clean and decarbonise the air through the provision of advanced emissions aftertreatment testing and development services. Catagen, who has displaced 1,100 tonnes of CO_2 from the environment, has 19 employees primarily based at its premises in Belfast.

The search for external finance

Up until 2016, Catagen provided emissions test equipment to manufacturers, whilst also undertaking significant R&D into the energy efficient gas reactor technology at the centre of its offering. Then, in 2017, the firm pivoted to provide services and expertise to the industry, rather than the equipment itself. The new business model brought with it a significant degree of scalability, for which Catagen required external finance to undertake late-stage R&D to develop equipment and software. This was a necessary step to scale the proposition and so fully demonstrate the capability of the test process and data generation to potential customers.

Previously, Catagen's R&D work had been funded by Invest Northern Ireland grant funding and a group of "*highly supportive*" angel investors (2014-2016). However, the firm did not want to seek further equity investment for three key reasons. First, venture capitalists would have undervalued the company due to lack of proven scale at that point. Second, equity investment brings with it stringent terms and greater pressure to reach profitability, which may have had negative implications for the business:

"It would change the culture of the business for the worse – things would be more onerous and pressure-driven. A start-up/scale up culture is about teamwork, innovation, creating and doing new things and that early process has a natural pace that cannot be forced to meet numbers."

Finally, a greater degree of equity investment may disincentivise the original founders. It was therefore decided that debt financing was the preferred option. Commercial loans, however, were not available to Catagen due to the lack of traditionally recognisable company assets.

When the company's CEO heard of the Innovation Loans programme at an Innovate UK event, it seemed **an attractive option due to the relatively low interest rates available and the "*forward thinking*" nature of the repayment structure:**

"The structure of the Innovation Loan means that you can avail of the money for the late stage R&D, and allow time for the market development to happen. This gives the business enough time to mature and become successful. Other loan products on the market are not suitable for the scaling journey."

Catagen therefore applied for the programme in 2018 and received a Loan of £1m in June of that year. **The company would not have been able to secure the same level of finance elsewhere at that time**, and so Innovation Loans provided a high degree of finance additionality

"In terms of filling a gap in the finance market, I don't have enough praise for the programme – there was a real gap for late stage R&D companies and the Innovation Loans programme is successfully filling it."

Project progress

Catagen used the loan funding to build and develop test reactors and develop their internal software. The technology was progressed through the Technology Readiness Levels. This allowed Catagen to demonstrate scale to potential customers, and so brought about impressive growth: in FY 2019/20 and FY 2020/21, Catagen was the fastest growing technology company in Northern Ireland as recognised by Deloitte. Progress made with the Innovation Loan funding also resulted in several accreditations from industry bodies, including the UK Vehicle Certification Agency accreditation in 2019.

The company's growth was curbed by the Covid-19 pandemic, which caused significant disruption to the project. Revenue "dropped off" significantly with the imposition of the tight restrictions during the pandemic which forced Catagen's customers to cut spending. As a result, project activity was brought to a halt. At the end of 2020 Catagen secured a Covid-19 Continuity Loan from Innovate UK which allowed them to restart project activity, and the firm expects to resume its growth trajectory:

"As a result of the Continuity Loan we have been able to weather the storm. We're now looking forward to 2022 when the scaling journey can recommence."

Outcomes and impacts

The most important outcome of the Innovation Loan-funded project, which proved to be the stimulus for many follow-on benefits, was to "*fully demonstrate, in the eye of the customer, the capability of CATAGEN processes".* This led to extensive customer acquisition, and the firm grew its pool of customers from five to 20 between 2018 and 2021. Catagen provide high end services to 20 of the world's leading and most prestigious vehicle manufacturers. To support this growth, Catagen hired more employees. The number of staff increased almost 10-fold from two employees at the start of the loan period, to 19 in 2021. Of the additional jobs created, most (around ten) are R&D oriented roles, with the remainder being split across revenue generating activities, sales and export marketing.

Turnover also rose significantly until the Covid-19 pandemic, which reduced the company's turnover by 40-50% of its forecast for FY 2020/21. Despite this, the firm expects turnover to return to pre-pandemic levels by Q4 of FY 2020/21 and to grow by £3.5m within the next

three years. Looking forward, the Innovation Loan-funded project has opened up new opportunities for Catagen, beyond its core proposition. For example, the firm is currently exploring three market opportunities focused on the hydrogen economy and the government's ongoing drive to meet Net Zero. These opportunities are unlikely to have surfaced without the proven track record that Catagen developed through its Loan funded activities.

Importantly, securing the Innovation Loan also increased Catagen's confidence in raising and using further finance. Indeed, since 2018, the firm has successfully applied for and received: a £700,000 bank loan; £1.25m from UKRI Future Leadership Fellowship Award; a £180,000 Sustainable Innovation Fund Grant; and a Continuity Loan to the value of £1.6m. The Innovation Loan was crucial to securing this additional finance due to the role it played in improving Catagen's finance applications, and also in demonstrating the commercial viability of the technology and ensuing customer acquisition. Due to the pre-pandemic growth in turnover, Catagen became profitable in 2017 and was also able to re-invest all of its profits into further R&D. In total, Catagen increased R&D spending by £2.5m.

More widely, Catagen's suppliers have indirectly benefited as a result of the Innovation Loan:

"Our supply chain has greatly benefitted from the success of Catagen – there have been millions of pounds funnelled through us to suppliers"

This has led to suppliers building their capabilities. For example, Catagen's equipment requires specialist welding which previously had to be done in Sweden. Since experiencing significant growth in demand from Catagen, a local Northern Ireland-based supplier has learned this skill. Catagen has a total of 60-70 suppliers in industrial services and professional services, 95% of which are located in the UK.

Additionality and contribution

The Innovation Loan was highly additional to the achievement of outcomes and impacts:

"Without the Loan, none of those things would have happened within the same timescale or at the scale that it did, the Loan was the bedrock and the foundation for demonstration, which led to customer acquisition, which led to more revenue and employment, more investment, more development, more turnover and ultimately more profit"

Without the Loan, Catagen would have taken three years longer to achieve the described benefits. Moreover, the firm would have "*missed some opportunities*" in that timeframe and so benefits would be of a smaller scale (50% to 75% smaller). The growing market demand for Catagen's services was also a factor in achieving outcomes but the Innovation Loan was considered to be the "*critical contributory factor*".

Reflections on the programme

Catagen's experience of the Innovation Loan has been extremely positive. The company rated each aspect of the programme very highly (five out of five), from initial communication with Innovate UK during the application process to the monitoring of the loan-funded project. The success of the programme can be put down to *"the people behind it",* who are experienced and motivated individuals. The Loan team were able to develop a true understanding of the business and see the potential it offered. Going forward, Catagen reflects that more "*tangible promotion"* in the form of case studies and success stories should be provided, to attract more businesses with the potential for scaling.

Case Study: The Forever Project

Established in 2017, The Forever Project creates one-to-one voice interactive visual media experiences with "*people you would like to meet but might not get the chance to*". The technology integrates voice recognition, AI and video to facilitate in-depth question and answer sessions using digital projections of real public figures. These immersive exhibitions and experiences can be accessed both online and in arts, sports and leisure venues. The firm currently employs six people and operates remotely in London.

The search for external finance

Before receiving the Innovation Loan, The Forever Project drew on a several funding sources to finance its initial growth and development. Alongside internal business investment, the firm received a grant from Innovate UK, external equity finance, and customer funding. However, the company required additional finance to develop and improve the efficiency of the technology. The Forever Project faced barriers to accessing additional finance due to the novelty of the technology under development and the need for the firm to make what they "*were doing more efficient to get more experiences out there*" to ensure customers and investors could see the various applications of the technology. For example, The Forever Project did actually apply for an Innovate UK Accelerator Programme, however, was unsuccessful in gaining finance partly as a result of what they are trying to achieve being "*so innovative*".

The Forever Project found out about the Innovation Loans programme through the Innovate UK mailing list, and given the firm's prior engagement with Innovate UK it was seen as a valuable opportunity to gain the finance required:

"The Innovation Loan programme provided a good facility with reasonably low risk to enable us to create the back platform for our work so as to put us in a good position to deliver a very cost effective product for customers and be in an excellent position for investment"

Consequently, the firm applied for Competition 6 in 2020 and **secured a loan of £402k in June 2020**. Without the Innovation Loan, The Forever Project would **probably not have been able to obtain finance elsewhere for innovation activities.**

Project progress

Prior to the Innovation Loan funded project, processes the firm used to develop voice interactive encounters required extensive manual processing. As such, one of the key barriers for scaling up the technology was being ablet to develop their experiences quickly, cost-effectively, and ultimately in a way that would potentially allow the firm to license out the platform to others to allow them to create their own experiences. Therefore, the Innovation Loan was required to *"develop a platform that would be built to improve the*

process of [the firm] developing experiences, but with the aim being to allow partners to potentially develop their own in the future."

In August 2021, the firm was nearly at the end of the project, with the platform now largely complete, and plans over the coming weeks expected to include the platform being used to "*produce experiences directly".* Indeed, **the project has moved through Technology Readiness Levels:** from being validated or tested in a real but controlled environment to now being partially commercialised. Overall, the Innovation Loan has been used as expected, with the core project remaining the same, nonetheless several additional activities have taken place, including adding in additional features that are beneficial to potential customers.

Outcomes and impacts

A key outcome of the project is the **introduction of new and improved processes** as a result of the Innovation Loan. At the start of the project the firm identified core business processes which could be recreated automatically using software. This process allowed the firm to develop a deeper understanding of its own processes and replace those most important with more efficient, cost-effective processes. This increase in efficiency of processes was also noted to have resulted in **productivity benefits**, whilst also making the firm **more commercially and investment ready.** The firm also **expects to secure follow-on funding** in the future due to the Innovation Loan, with plans to fundraise from September 2021:

"The Innovation Loan will probably make an impact in future rounds of investor fundraising. This platform developed through the project is a key part of our offer. We can now be more efficient and can show that the platform is there."

In terms of business performance, The Forever Project has **increased its staff numbers** from three to six as a result of the Innovation Loan, with these new roles in R&D and innovation. It is expected that in three years' time due to the Innovation Loan, the firm will experience **an increase in turnover of £1.5m** (including from exports) and **increase the number of staff by 20 people**. Additionally, the Innovation Loan has enabled the firm to **develop its innovation capacity and skills**, with this having recently informed their decision to restructure their innovation team in the future to include a technical development team and innovation lab to maintain "*a competitive edge*".

More widely, receiving the Innovation Loan has **led to benefits for the firm's suppliers** in film and production who will benefit from increased business as a result of the company being more efficient. The Forever Project's **customers will also benefit** from the provision of increased and improved experiences, while it is expected that new businesses will also be created which might use the technology developed through the project.

Additionality and contribution

This case study demonstrates strong additionality overall. Without the Innovation Loan, it is unlikely that the business would have been able to secure sufficient finance to fund the project activities:

"The appetite for doing it would not have gone away, but I am not sure how we would have moved from not having the product to getting ourselves in the better position of being more efficient and having a stronger offer for the marketplace."

Two other factors were identified has having contributed to the outcomes achieved through the project: a pre-existing or new business plan/strategy being implemented and market demand and external sector and economic conditions. However, relative to these **the Innovation Loan was considered to have been the critical contributory factor.**

Reflections on the programme

Overall, **the business has had a positive experience with the Innovation Loans programme.** Three key aspects were identified as working particularly well: the transparency of the decision-making process and feedback; the terms and conditions offered relative to other finance providers in the market offering similar products; and the programme's monitoring processes. The firm also identified the benefits associated with the Innovation Loans programme being a loan product:

"With the funding being a loan, we were very clear that we needed to make sure that it would put us in a good commercial position going forward, and that we needed to ensure value for ourselves as a business."

Only two minor suggestions were raised to improve the programme: ensuring the Innovation Loans programme is visible to those outside of the 'Innovate UK ecosystem'; and the potential role of Innovate UK in facilitating relationships between investees and potential investors through their networks.

Case Study: Hexigone Inhibitors

The most commonly used corrosion inhibitor, hexavalent chromate, was banned in the EU in 2017, resulting in the need for a safe alternative for industry. Hexigone Inhibitors was spun out of research undertaken at the Swansea University Corrosion Research Group, and now develops and manufactures corrosion inhibitors which are chromate, phosphate and heavy metal free. Founded in 2016, the company is located in Port Talbot, Wales, and employs around 12 people.

The search for external finance

Prior to receiving an Innovation Loan, Hexigone Inhibitors drew on a range of funding sources to finance its development and growth. Alongside internal business investment, the firm received equity finance, whilst also successfully applying for feasibility grant funding in 2017/18. This funding was used to support the initial R&D stages of product development; however further investment was required to purchase required manufacturing equipment and progress the product towards commercialisation.

The limited number of funding calls for R&D and innovation in the area of manufacturing and materials was noted as a barrier in securing funding for capital equipment, alongside limited interest from investors in investing in such equipment. Therefore, when Hexigone Inhibitors became aware of Competition 2 of the Innovation Loans programme 'Manufacturing and Materials Readiness', through Innovate UK's website, it was seen as a good opportunity to secure the funding required. The low interest rate and flexible terms were also seen as attractive. The firm applied for **Competition 2 in 2018, securing a loan of £547k** in February 2019. At a similar time to applying for the Loan, the firm completed a round of fundraising, securing an additional £450k. The Innovation Loan was considered to have played an important role in securing this funding, de-risking the investment for investors. Indeed, **without the Innovation Loan, it is unlikely Hexigone Inhibitors would have been able to obtain finance elsewhere.**

Project progress

The **Loan was intended to "*scale the firms manufacturing processes*",** to progress the product towards commercialisation. Specifically, the Loan was intended to enable the firm to buy the necessary equipment and resolve any technical issues prior to scaling up manufacturing processes. As mentioned previously, the ability to utilise the funding for capital expenses was highly important and distinguished the loan from other funding options. Overall, Hexigone Inhibitors have used the funding as intended, to scale manufacturing activities, however it was noted that after determining that the milling equipment they originally planned to use was not suitable the firm reworked their plans with the Monitoring Officer to instead use an external milling company. Through this they have now achieved cost-effective milling at scale.

The project is **progressing slightly behind schedule due to Covid-19**, particularly as a result of the target industries for the product having been in "*survival mode*" during the pandemic. This was noted to have limited interest amongst customers in investigating new products, whilst also limiting the level of scale up achieved by the project to date. Nevertheless, **the project has moved through Technology Readiness Levels (TRLs):** from developing proof of concept or testing in lab conditions, to the product now being fully commercialised and brought to market. Additionally, with support from Innovate UK, Hexigone Inhibitors pivoted to produce hand sanitiser during the pandemic, appreciating the value of the flexibility and support from Innovate UK during this period.

Outcomes and impacts

Although the project is ongoing, the Innovation Loan has already enabled the business to **improve the efficiency of its manufacturing processes and techniques**, in order to scale up production. At the time of receiving the loan, Hexigone Inhibitors had two employees, with the firm now having recruited an additional 10 staff in roles across both the technical and commercial teams to support growth. Of these, **five jobs to date** can be attributed to the Loan, with an **additional 35 jobs expected** by 2024. The Loan has increased the firm's **innovation capacity and skills**, alongside increasing internal investment in R&D by £60k to date and enabling the firm to **apply for relevant patents and trademarks**. As the project progresses, the Loan is also expected to lead to the creation of new or improved products/services, including secondary products and the provision of consultancy services.

A further **key benefit of the Loan to Hexigone Inhibitors was the role it played in securing additional finance** and improving confidence in raising further finance. For example, since securing the Loan, the firm has secured a further £900k of investment, with the fact that capital investment is no longer required encouraging investors. The Loan is also reported to have **changed the mindset of the firm in relation to sources of external finance**:

"Before we did this when there is a loan being offered to you for £547k, if you are doing it personally it is pretty scary, but I think the Innovation Loan has just changed our mindset to know debt isn't bad and can be a good thing. It has changed our viewpoint from constantly searching for grants"

In terms of business performance outcomes, the enhanced manufacturing processes have resulted in **improvements in productivity**, including significant increases in product output. The Innovation Loan is also expected to result in an **increase in turnover of £500k by year end,** with it expected that it will lead to a further **increase in turnover of £3m by 2024.** The Loan also **contributed to greater diversity within the business**, with one of the main roles funded being a female in the male-dominated role of head of manufacturing.

More widely, the Innovation Loan funding has resulted in **spillover benefits to the firm's suppliers and customers.** Hexigone Inhibitors is a new company with a demand on new raw materials, providing suppliers with a "*new set of business*". For customers purchasing the product, the developments will result in cost savings whilst also removing the need for them to use the environmental regulatory labels required with other corrosion inhibitor products.

Additionality and contribution

Overall, **this case study demonstrates strong additionality in terms of finance and achieved and expected outcomes.** Without the loan, Hexigone Inhibitors would not have been able to secure sufficient finance to fund the project as the company would have been unable to demonstrate the *"capacity, ability or knowledge of how to make the product at scale"*. Consequently, it would have been unlikely that project activities would have taken place, nor the benefits achieved, with the only alternative options being to use an external contractor for manufacturing or to have licensed the technology.

Regulatory or policy changes, in the form of the legislative ban on the use of hexavalent chromate, also played a role in the achievement of outcomes, having resulted in a need and demand amongst businesses for an effective, safe alternative corrosion inhibitor. Relative to these, **the Innovation Loan was considered to have been the critical contributory factor.**

Reflections on the programme

Overall, **the firm has had an extremely positive experience of the Innovation Loan programme**, with this expected to continue:

"From my experience it has been great from the beginning. We have had further opportunities flagged to us by the team at Innovate UK who are really happy and supportive. The monitoring meetings are great and help keep us on track. Generally, it has just been a really good experience for us"

One particular strength identified was the focus of Competition 2 of the programme being on manufacturing and materials, with this target area and the ability to use the funding to purchase capital equipment encouraging the firm to apply more than a general competition call. Only two minor suggestions were raised: ensuring the message as to what the product is (i.e., not a grant) and its place in the funding landscape is clear and succinct for businesses; and the potential provision of support relating to finances for businesses during the application process.

Case Study: Keit Spectrometers

Keit Spectrometers was established as a spin-out from the Rutherford Appleton Laboratory (RAL) in 2013. Now based at the Harwell Oxford Science and Innovation Campus, the company is developing a new generation of spectrometers that are compact, lightweight and robust, and are configured to work in the infrared spectral regions. Spectrometers have applications in a range of industrial settings, including biotechnology, oil and gas, chemicals, and pharmaceuticals.

The search for external finance

The firm has received early investment from a range of equity investors, including venture capital (VC) funds and business angels, as well as the government-funded UK Innovation & Science Seed Fund. Following industry feedback, **Keit identified an opportunity to modify its existing spectrometer product to work in a wider range of more demanding environments and therefore appeal to a wider range of customers**. For this, they required additional funding but as an early-stage and, at the time, pre-profit company, options were limited. In order to maximise value for its shareholders, the firm was hoping to avoid taking on equity from new investors and issuing new shares. They had some brief discussions about commercial loans, but it was clear that there was little chance of success. The firm would have been interested in grant funding, but its activities do not neatly fit into the usual competition themes because spectrometers are targeting a very specific type of customer and application.

When Keit found out about Innovation Loans from an Innovate UK newsletter, they decided to apply – it was an opportunity to borrow *"substantial amounts"* of non-equity funding. In September 2020, **the firm received a Loan for £954,000 through Competition 7.** Alongside this, Keit received £600,000 in further equity funding from its existing investors. The Innovation Loan was considered to have contributed to securing this equity investment by reducing the amount of equity required (and therefore making investors more likely to put in further funding), and adding credibility.

Without the Loan, the firm would probably not have been able to access finance elsewhere for the R&D activities because existing investors had already provided most of the money that they had allocated to the company, and so would have been unlikely to provide further funding to cover the total cost of the project.

Project progress

The Innovation Loan was required to help the firm modify the product in order to target a wider range of customers. Specifically, the Loan is intended to be used for producing plans and designs of the product; developing prototypes and pilots; and experimental production and testing of the product in live customer use cases. In August 2021, the firm was over half way through the 18-month project and commercialisation was expected by March 2022. **Despite the Covid-19 pandemic somewhat slowing down progress, the project had moved through Technology Readiness Levels (TRLs)** – from 'being validated or tested in

a real but controlled environment' to 'being tested and scaled in an operational environment' – and there were a number of trials underway with target customers.

Outcomes and impacts

The Loan has enabled the firm to prioritise R&D activities, preserving the existing team by providing a stream of work for them. However, given that the project is still going, the majority of financial benefits were expected in the next few years. It was expected that in three years' time**,** commercialisation of the new product will bring in **additional sales of £1 million** (including from exports) and **increase the number of staff by two people**.

More broadly, the Loan had helped to make the firm more commercially and investment ready. The experience of going through the "exhaustive and exhausting" application was a useful experience for the management team – different from raising money from the existing investors – and gave the firm confidence in raising further finance. In the longer term, the firm is hoping to reach a point at which it becomes self-sufficient and no longer requires external funding.

Additionality and contribution

There is partial additionality for this case. Without the Innovation Loan, the benefits would probably have taken 1-2 years longer to achieve due to a likely delay in securing funding for R&D, either internally through sales from existing products or from external sources: **"***We would have had to wait to do this R&D until we could afford to do so***",**

In addition to the Loan, there were some other factors that may have contributed to achieving these benefits, including a pre-existing business plan, management team and favourable market demand.

Reflections on the programme

On balance, the business had a positive experience with the programme. However, two areas of potential improvement were identified:

- **Timings between application and drawdown**: Whilst the firm applied in September 2019, it was not able to begin the activities until October 2020 – just over a year after the project had been devised. Over this period, the firm's understanding of customer requirements evolved, and so the original scope had to be revised.
- **Level of monitoring:** The process for Loan recipients involves extensive monitoring and reporting requirements – very similar to grants. It was considered that the level of scrutiny is justified for grants where the companies are at a much earlier stage, whereas less could be required from Loans recipients that are typically more mature.

Case Study: Korn Wall Ltd (Trading as KwickScreen)

Established in 2009, KwickScreen is an innovative space management solution business delivering retractable screens as a flexible alternative to curtained partitions for hospitals to allow for infection isolation. The screens can be easily cleaned, facilitating high hygiene standards; and can be customised with calming pictures/patterns, to deliver health benefits to patients facilitating their recovery. The company is located in London and currently employs around 55 people.

The search for external finance

In the three years prior to applying to the Innovation Loans programme, KwickScreen had some involvement in later stage R&D but had no experience of securing external finance (public or private) for R&D. Due to the early stage of the company, private equity would have attributed a very low valuation, thereby making an equity raise very costly or unlikely. KwickScreen also found that commercial sources wanted to "*charge considerably more and ask for more security*". Consequently, the Innovation Loan-funded project had been funded through internal business investment.

KwickScreen discovered the Innovation Loans programme at an Innovate UK event. The firm applied to **Competition 2 (focused on manufacturing and materials) in 2018, securing a loan of £350k September 2018**. The Innovation Loan was needed to offset the risk associated with the R&D. It enabled KwickScreen to broaden the scope of its research to include higher-risk, more experimental testing. **The Innovation Loan filled a gap in existing finance provision in the market,** without the Innovation Loan it is unlikely that the firm would have been able to obtain the funding elsewhere.

Project progress

The Innovation Loan was intended to "*redesign the core manufacturing process"* to *"stop it from being an artisan process to a scalable one"*. The Innovation Loan-funded project aimed to improve the efficiency of the manufacturing process of the composite bi-stable tubes, the costliest and most innovative part of the production process. It was intended that this would improve the affordability of future KwickScreen products. The funding was used to cover material and personnel costs. Securing the Innovation Loan has enabled Kwickscreen to improve its manufacturing processes, **progressing the technology through Technology Readiness Levels:** from being tested and scaled in an operational environment, to the product now being fully commercialised and brought to market.

Overall, the project is **progressing on schedule,** and the **Covid-19 pandemic has actually increased project activities.** As a result of the pandemic, *"the need for flexible places in healthcare was greater than it has ever been",* dramatically increasing demand for the product. Kwickscreen received an Innovation Continuity Loan (ICL), which although not in

scope for this evaluation, was seen as more of a "*change in the scale*" of the existing Innovation Loan. Therefore, using the ICL funding, the project is progressing through the same milestones identified in the initial Loan but "*at a bigger scale*", with the resulting outcomes and impacts linked to both the Innovation Loan and the ICL.

Outcomes and impacts

As a result of the Innovation Loan, KwickScreen is now **more investment ready and has progressed towards commercialisation:**

"Having the loan has enabled us to scale quite significantly and therefore get our product price/costs down to develop a more commercial offering. Previously unable to manufacture at a cost point that would have enabled us to scale but we now have a gross margin that is sustainable and scalable"

In terms of business performance, KwickScreen has **increased staff numbers** in R&D and production roles as a result of the Innovation Loan. Indeed, at the time of receiving the Innovation Loan, KwickScreen had 15 employees, with the firm now having recruited an additional 40 staff to support growth. Of these, 15 jobs can be attributed to the Innovation Loan**,** with a further 10 jobs expected by 2024 due to the Loan. Additionally, the Loan has been seen to have already **increased turnover levels by £7.5m**, with an additional £12m increase expected by 2024. Furthermore, KwickScreen's **exports are also expected to increase** over the next two years.

As mentioned previously, the focus of the project was on enhancing manufacturing processes, with the resulting improvements in quality and consistency viewed to have resulted in **productivity enhancements**. A range of other benefits to the business were identified, including increased **innovation capacity and skills and greater investment in R&D.**

More widely, the Innovation Loan has led to **spillover benefits to the firm's suppliers.** The improvements and scale up of KwickScreen's manufacturing processes will have increased demand as they "*have been able to make more product*", which in turn will have increased business and potentially "*contributed to the need for jobs to keep up with processes"* amongst suppliers. The Innovation Loan also **facilitated new activity to address net zero within the firm**, with the redesigned manufacturing process using "*a fraction"* of the energy previously used.

Additionality and contribution

This case study demonstrates strong additionality in terms of finance, as without the Innovation Loan, KwickScreen would have been unlikely to have secured sufficient finance elsewhere for the project activities. The firm also demonstrates good additionality in terms

of activities and outcomes, with it unlikely that either would have occurred to the same extent without the Innovation Loan:

"I think the activities would have had to happen because we had to scale up, but it would not have been able to happen as well as it did. Maybe would have achieved 50% of what we have"

The Covid-19 pandemic was noted to be an important contributory factor, accelerating project activities, with the "*need for flexible places in healthcare greater than it has ever been".* Relative to this, **the Innovation Loan was considered to have been an important contributory factor.** As mentioned previously, it was noted that both the Innovation Loan and the ICL have contributed to the outcomes and impacts described, with it challenging to separate the two. Nevertheless, the Innovation Loan was considered important in achieving the outcomes and impacts outlined.

Reflections on the programme

Overall, **the firm has had a positive experience with the Innovation Loans programme**. The programme's application process was seen as "*straightforward and moved fairly quickly*", while the fact project monitoring processes have been "*light touch*" has allowed the business to focus more on R&D activities. A key strength highlighted was the **flexibility of the programme** in light of its focus on innovation:

"The flexibility was great throughout; Innovate UK were pragmatic and understood that in innovation you don't know what will happen. That is a limitation with grants – sometimes you say in application you will do certain things and then the monitoring will expect you to follow that, however the nature of innovation means you should not know what to do at the start. Nature of the loan was different, they were flexible"

The only suggested improvement related to the monitoring process, specifically the financial monitoring requirements. It was suggested that such requirements, including various forecasting activities, could be reduced to limit the amount of administration work for the business.

Case Study: NanoSUN Limited

NanoSUN develops and manufactures hydrogen refuelling products for customers in the oil and gas, industrial gases and transport sectors. The firm was founded in 2017 and now employs 40 people at its site in Lancaster. The company's primary aim is to facilitate hydrogen mobility with innovative technologies that bridge the gap between the hydrogen supply industry and the end users' need for low-cost, simple to use and safe fuelling systems; paving the way for hydrogen to "*become the major energy vector in a decarbonised world*".

The search for external finance

NanoSUN started out developing refuellers for small applications, such as drones and bikes. It then became apparent that there would also be demand for low-cost hydrogen refuelling solutions for heavier transport. The firm secured a modest amount of seed funding (c. £350,000) which enabled it to begin developing a prototype mobile hydrogen refuelling station – the first of its kind for the industry. This product would reduce the cost of hydrogen refuelling (by up to 50%) and the time needed to install a refuelling station (by up to 75%). It was therefore considered to have significant potential to accelerate the uptake of hydrogen technology.

NanoSUN required more funding to complete the prototype and transition the new technology towards commercialisation. However, continuing with equity investment was considered to be costly at that stage. The firm explored the possibility of applying for a commercial loan, but this was not a viable option as the technology was too early stage and too high-risk a proposition for banks. The Innovations Loans programme, however, seemed willing to accept the risk associated with investment in R&D. NanoSUN had heard of the programme at an Innovate UK event and submitted an application in September 2019. A Loan of £1m was secured later that year, with the initial drawdown taking place in June 2020. Without the Loan, NanoSUN would have had to raise the funding through equity, but this would have taken between 1-2 years longer and been more costly overall.

In the period between applying for the Loan and the initial drawdown, NanoSUN successfully entered the technology into the New Energy Challenge competition[38] (run by Shell, Rockstart, YES!, Delft and Get in the Ring), securing a grant of €100,000 to contribute towards the project.

Project progress

At the start of the Loan period, NanoSUN's mobile hydrogen refuelling technology was at the 'proof of concept design' phase. The Loan funding was to be used mainly to further develop the prototype. In particular, a lot of work was required around safety and ensuring compliance. Despite project activity being hampered by Covid-19, the first major milestone was reached with the delivery of a technology demonstrator – the Minimal Viable Product (MVP) – in early 2021. This was then delivered to prospective customers for demonstration

[38] https://newenergychallenge.com/about/

in the field.[39] Based on the feedback from these field-based trials, the technology is undergoing further development to enable the manufacture of a more enhanced product; scheduled for delivery by the end of 2022.

Some of the Loan funding has also been used for activities supporting future commercialisation, such as market engagement. Indeed, NanoSUN has successfully built up a *"substantial"* orderbook for the product in 2022.

Outcomes and impacts

The Loan enabled NanoSUN to start to build its team, thus growing the firm's capacity for innovation. Since receiving the Loan, the company has grown from 12 employees to 40. Crucially, new employees (who are generally in highly skilled engineering roles) have generated ideas which informed further development of the product. These new ideas resulted in two important evolutions of the Loan-funded project:

- The firm decided to **develop an intermediate version of the product**, without the full functionality of the final one. This facilitated customer acquisition and also provided a product which could be pitched for further funding.
- Multiple novel approaches to chilling hydrogen (a key enabling technology for fast filling in hydrogen refuelling stations) were developed. **The firm has filed two patents on these and also secured additional grant funding** from Innovate UK, in the form of a £250K Low Carbon Innovation grant, to progress the most promising technology through the TRLs.

By building the innovation capacity of the firm, the Loan has enabled NanoSUN to *"accelerate the development activity of the product".* This, in turn, has helped the firm to become more commercially ready:

"The Loan funding that we invested to build the MVP has moved us massively closer to having a commercially ready product. We have an orderbook of six customers now, which we expect to be ten by the end of 2021. If it wasn't for the Loan, we would not have an MVP to prove the viability."

This progress towards commercialisation has also helped with investment readiness:

"If you have a product, it is much easier to convince investors to risk their money than if you have an idea."

Indeed, since securing the loan, NanoSUN has raised a further £1.65m in equity finance and secured two small grants to the total value of £150k. The firm also went on to win a €2.5m European Innovation Council grant under Horizon 2020.

Looking forward, the firm expects turnover to grow by £25m over the next three years, from August 2021. NanoSUN's ongoing growth is expected to have positive spillover effects for

[39] https://www.nanosun.co.uk/post/westfalen-ag-demo-pioneer-hrs-to-germanys-federal-_ministry-of-transport-minister-of-state

suppliers, who will benefit through increased sales opportunities. Moreover, some of the supplied components that are being specifically designed for NanoSUN's product are *"new to world innovations"*, demonstrating that the project is having *"trickle-down innovation"* effects. Competitors may also benefit as NanoSUN has had to do the *"trail-blazing work"* around certification, easing the path for those who follow in their footsteps.

Additionality and contribution

In this case, there was speed additionality associated with the Innovation Loan in achieving the benefits. Crucially, delays in progressing the project would likely have reduced the commercial opportunity for the company:

"At best, the outcomes would have taken 1-2 years longer to achieve; at worst, during this time someone else could have occupied the space and we would have missed the window."

By improving the commercial and investment readiness of the firm, the Loan provided the foundation for NanoSUN to go on to secure other investment. This other investment makes it difficult for the firm to clarify the exact contribution of the Loan. However, it is clear that the loan was important in initiating a virtuous cycle:

"The Loan has helped us with commercial progress, technical progress and operational progress – these have all helped with raising additional investment and building momentum."

Progress was also aided by the credibility which came with winning Shell's New Energy Challenge competition, considered to be an important contributory factor alongside the loan.

Reflections on the programme

The main drawback of the programme was the time taken between the application and first drawdown. NanoSUN would have benefited from a clearer timeline and reflected that there was up to four months of lost time before they could access the Loan funding, during which the company could have been making progress. However, overall, the firm's experience of Innovation Loans has been positive; it provided debt finance where none was available from commercial lenders and funded important product development which laid the groundwork for a wide array of business benefits.

Case Study: NuNano Ltd

NuNano is an advanced manufacturing company which specialises in the design and manufacture of probes for atomic force microscopy and cantilever-based sensors. It has premises in Bristol and Edinburgh, employing 10 people across the two sites. The firm was founded in 2011, to make bespoke parts for academics. In 2016, NuNano started to scaleup, and began selling its products to industry as well as academia.

The search for external finance

NuNano has drawn on a variety of funding sources to finance its development and growth. The firm successfully applied for an Innovate UK Smart grant in 2017, to the value of £216k. This funding enabled NuNano to undertake R&D into a new process for manufacturing probes, which would significantly reduce the costs of production. NuNano recognised that the development of this production process, together with other projects to improve product quality, represented a significant opportunity: reducing the cost of production would allow the firm to offer a better product with more flexible pricing, become more competitive in the international market, and thus gain market share

By early 2020, **NuNano had completed the R&D stage for the new process, secured a patent, and sought further finance in order to implement it on a commercial basis**, and so transition away from the older, less efficient process. This seemed well aligned to the criteria for an Innovation Loan, which one of the firm's non-executive directors had learned of at an Innovate UK event the previous year. NuNano applied for a Loan and secured £500k of funding in February 2020. At the same time as applying for the Loan, the firm was undertaking a round of equity investment, through which it secured an additional £140k. NuNano also considered the option of a commercial loan, but recognised that the company did not have sufficient "*financial stability*" for that to be a viable option. **Without the Innovation Loan, NuNano would therefore have been unlikely to obtain equivalent finance elsewhere.**

Project progress

Soon after commencing the Innovation Loan-funded project in March 2020, activity was brought to a halt by the Covid-19 pandemic which forced the company's main facility (at the University of Edinburgh) to close. NuNano were able to adjust the terms of the Loan to account for this, delaying the drawdowns and the entire project by five months. In this context, the flexibility of the Loan terms was essential:

"NuNano would not have survived that period if the terms of the Loan had been applied rigorously, Innovate UK were very helpful in that respect."

The company was also supported during the Covid-19 pandemic with an Innovate UK Covid Business Continuity grant of around £145k.

Once the facility was able to open again, NuNano restarted work on the project. Initially, the focus went "*back into the development phase",* as the company made further improvements to certain elements of the process – the Innovation Loan allowed NuNano to prioritise further R&D. Through continued rigorous testing, the company proved the efficacy of the new process. The next stage was to bring it closer to commercialisation. To do this, NuNano is partnering with another technology company, INEX Microtechnology (based in Newcastle). This partnership will deliver the additional capacity that NuNano needs, in terms of specialist equipment, to bring the process to commercialisation, through further refinement and scaling-up. The Loan was also used to procure necessary equipment. Probes made using the new method are expected to be sold to customers from September 2022.

Outcomes and impacts

A key benefit of the Loan to NuNano was the role it played in securing additional finance. The Loan accelerated the progress of the new process towards commercialisation, meaning that raising further equity finance was possible:

"Without the Loan equity investors would have seen us as far too risky. The work we do is complicated, has a long development time, and is expensive. Going to an equity investor saying that you have the process up to a certain level, have market interest, and have filed patents, is much more attractive to them."

Indeed, NuNano has now secured a further £350k of equity investment, since receiving the Innovation Loan and expects to raise a further £200k by January 2022

Beyond attracting additional finance, the Loan also had an impact on employment at NuNano: **the company has retained R&D jobs that it may otherwise have lost**. It has also helped to build the company's capacity and capabilities through investment in new equipment and the developing partnership with INEX.

There have already been incremental improvements in productivity as a result of the project. However, **from September 2022 it is expected that the company will gradually start to see the substantial productivity and turnover benefits associated with the new process**. In fact, the new process could potentially allow NuNano to achieve a ten-fold increase in productivity, by significantly reducing the cost of production.[40] Reducing the cost of production will afford NuNano greater pricing flexible and allow for a highly competitive offering against overseas competitors in terms of pricing, quality and service levels. Ultimately this will enable NuNano to gain more of the market share, and so grow in both turnover and number of employees.

[40] The manufacture of probes involves the use of thin slices of semi-conductor, known as wafers. The previous process for manufacturing probes allowed NuNano to make 400 probes per wafer, and the new one achieved 4,000 probes per wafer.

This case study demonstrates strong additionality in terms of finance, and also in relation to expected outcomes. Without the Loan, NuNano would not have been able to secure sufficient finance to enable commercialisation of the new process. The company's only other option would have been to delay the commercialisation of scale up, and continue to focus on the core business (of selling probes). However, this would have meant continuing to trade without a competitive advantage (using the "*old-fashioned"* process) and so NuNano would not have been able to grow and invest in the process commercialisation. Therefore, the benefits associated with the project, both achieved and expected, would not be realised. Without the Innovate UK loan scheme, it would not have been possible for NuNano to develop such complex technology against well-funded competitors.

The external market environment has also played a role in the achievement of outcomes. For years, the market for probes was largely confined to academia. However, in recent years the probes are increasingly being used for process controls and diagnostics in the semi-conductor market, bringing about an increase in demand. Supply has also changed: one of the major producers of the probes (based in Japan) has recently announced an exit from the market. These market conditions have increased demand for probes globally, to the benefit of NuNano. Whilst the changing market conditions undoubtedly played a part, **the Loan was the critical contributory factor**.

Furthermore, with the help of the Compound Semiconductor Application Catapult (CSAC) NuNano is exploring applications for its novel MPA process for other compound devices, such as semiconductors, MEMS, Optical Integrated Circuits and micro LED displays

Reflections on the programme

From the benefits described above, it is clear that NuNano has already significantly benefited from the Innovation Loan, and will continue to do so:

"It is a good programme, it works well and has been fantastic for NuNano – it is up to us to deliver on it now."

In particular, the company valued the flexibility of the Loan terms, especially in the context of the Covid-19 pandemic. The only suggested improvement related to the monitoring process. For NuNano, the monitoring process was too rigid and rigorous. It reflected Innovate UK's tendency to grant-fund projects and may limit the ability of companies to adapt their spending as their project evolves. Streamlining this process to reduce the burden on Loan recipients would be beneficial.

Case Study: Sciencesoft Ltd

Sciencesoft specialises in the development of reservoir engineering simulation software, primarily for the oil and gas sector. Established in 1995, Sciencesoft has grown to offer a full suite of products which allow engineers to analyse the results from reservoir simulators.[41] The company is located in Glasgow, Scotland, and employs 18 people.

The search for external finance

The history of Sciencesoft has been shaped by constant innovation to keep up with the evolving needs of the oil and gas sector. In 2019, the company was nearing commercial readiness with a new addition to the simulation suite, in the form of a chemical enhanced oil recovery simulator.[42] The initial R&D stages of this project were complete, funded through a combination of internal business investment and Scottish Enterprise grant funding. Sciencesoft therefore had a viable prototype and sought further funding to progress the software towards the market.

Sciencesoft had previously been unable to secure a loan from commercial lenders: as a result of the 2016 oil price crash, the oil and gas sectors were considered "no-go" areas by banks. Other options, such as equity investment, were considered too costly and restrictive. Therefore, when Sciencesoft's Director of R&D came across the Innovation Loans programme via an Innovate UK newsletter, it seemed like a good opportunity to secure the funding that the business needed, without the additional ties and cost associated with raising equity. The firm applied for **Competition 5 in 2019, securing a loan of £750,000** in June of that year. Without the Innovation Loan, it is unlikely that Sciencesoft would have been able to obtain affordable finance elsewhere.

Project progress

With the prototype already developed, **the loan was intended to be used to "*ringfence employee time*"** to bring the product closer to market. In fact, securing the loan meant that Sciencesoft could vastly expand its target market at an earlier stage than it would otherwise have been able to. Over the course of two years**, Sciencesoft used the funding to add additional features to the software which meant it could be used for larger scale simulations**. Therefore, what had been an initial target market of small-scale laboratory testing customers, expanded to include customers that required the software for larger simulations of active oil fields.

[41] Reservoir simulators are the main prediction tools used by engineers in petroleum companies to forecast for future oil and gas production.
[42] Chemical enhanced oil recovery involves the injection of specific chemicals into oil reservoirs in order to recover bypassed oil and residual oil trapped in reservoirs.

With the funding being available to part finance new development **the company was able to launch the first version of the product last year** and has continued to incrementally add new elements to it. Rather than wait for the complete product to be finished, Sciencesoft opted for a more agile approach, taking each iteration of the software to the market once specific elements have been added and tested. This process was accelerated by the Covid-19 pandemic as employee time was freed up by the cancellation of various international conferences, which usually take up several weeks of the year.

Outcomes and impacts

The Innovation Loan **supported Sciencesoft in developing improvements to its existing software** prototype. These improvements have opened up a larger target market. As a result, the firm expanded its sales pipeline: **over the next six months the company expects to increase its turnover on this product by over 50%.** In addition, the product that they are offering is a more complete solution than it would have been at this stage without the loan. This **will lead to an increase in productivity** as the company can sell the new product at a greater price per unit, thereby saving employee time on supporting elements of the sale (e.g. licencing). Given that Sciencesoft is primarily an exporter, commercialisation will also lead to an **increase in the overall level of exports**.

Beyond these direct outcomes and impacts, the Innovation Loan has also **increased Sciencesoft's confidence in raising and using further finance**, should it choose to do so in the future.[43] Overall, the company is more investment ready because any money coming in would not be funding development, and so returns on it would be faster.

More widely, the Innovation Loan funding has led to **spill over benefits to the firm's competitors and customers**. The Loan allowed Sciencesoft to free up employee time to engage with competitor companies that sought to licence some of their technology. This resulted in licence agreements with competitors that otherwise would not have occurred. For customers purchasing the software, the developments made with the loan funding will enable productivity improvements.

Additionality and contribution

Securing a loan meant that the **outcomes described above were accelerated** by one to two years. This is primarily because the loan allowed the firm to prioritise staff time to work on this particular project – five or six people were working on the software at any one time as opposed to two that would have been otherwise.

[43] At this stage it is unlikely that the firm will seek any more external finance over the next three years as it increases turnover. However, in the short run there is a small possibility that Sciencesoft will seek additional finance to pay for an extra FTE to support new licencing agreements. Over a slightly longer timescale this role will be funded from the additional revenue created by these licencing agreements.

This did, however, lead to taking time out of some other development activities. For example, during the project, another product offered by Sciencesoft required updating to bring it in line with the latest generation of technology. Following a risk assessment, the firm decided to delay this update in order to prioritise the Innovation Loans funded project. In the short run, this shift in focus may lead to the loss of some customers and immediate revenue, although it should lead to longer-term benefits for the company as a whole.

Other factors identified as important to achieving the outcomes described included: the firms' pre-existing business plan; existing knowledge within the business; and other R&D activities. The **Loan was considered to be an important contributory factor** alongside these other influences.

Reflections on the programme

Aspects of the programme that were considered to be particularly good included the application and decision-making process and the lack of personal guarantee required. Overall, **Sciencesoft's experience of the loan has been positive**:

"The Innovation Loan has been very beneficial to us – it enabled us to ring fence people's time and get the project done."

Only two minor reservations were raised. These related to (i) the affordability of the loans versus commercial lenders: it was recognised that bank loans are not a viable option for many of the companies applying for an Innovation Loan, and so the higher rate of the Innovation Loan is potentially expected; and (ii) the burden of monitoring: it was flagged that businesses may find the monitoring process less onerous if they were informed in advance as to what would be required.

Case Study: Spiro Control Ltd

Established in 2012, Spiro Control develops and provides digital operations solutions for companies in the chemical, petrochemical, and oil and gas sectors. The technology is designed to improve customers' operating efficiency by lowering energy consumption and reducing raw material usage. Spiro Control runs its operations partly from an office located in Cheshire, although most employees are distributed across the UK, and one is based overseas.

The search for external finance

In 2017, Spiro Control secured a grant of £69k from Innovate UK to develop a new control system which improves the efficiency of industrial processes. The company sought additional finance to continue the *"evolution"* of this technology. Given the company's prior engagement with Innovate UK, this was the first port of call in the search for further finance. Spiro Control was directed to the Innovation Loans programme, the terms of which seemed *"very attractive"*. **In particular, the Innovation Loan allowed them to secure the loan against the Intellectual Property that they were developing, which a commercial loan would not permit.** Moreover, no commercial lender would provide as large a loan for an R&D project, due to the perceived risk. Equity investment was also considered, however this was not seen as an alternative to loan finance:

"We could put equity investment in the mix as well, but we have always considered it as a parallel activity rather than an either/or kind of thing."

As it happened, Spiro Control held discussions with equity investors but did not find anyone to invest at that stage.

The firm secured an Innovation Loan of £1m in December 2018. As part of the Loan agreement, £250k of shareholder investment was also committed to the project, alongside a director's loan of £124k. **Without the innovation loan, Spiro Control would not have been able to obtain the funding elsewhere.**

Project progress

At the start of the drawdown period, the new technology was still being tested in laboratory conditions. The Innovation Loan contributed to the development of a commercially usable prototype. The first milestone achieved under the project was the transition away from the software development phase to deployment with customers.

Having the Innovation Loan meant that Spiro Control could then fund loss leading projects with early adopters. These enabled further product development, informed by use in a real-world environment. Since customers in such arrangements are not receiving a polished product, they pay a discounted price, and the shortfall is made up by the Innovation

Loan. **Securing the loan therefore enabled Spiro Control to learn from these projects and advance the technology through the TRL levels, closer to full commercialisation.**

In August 2021, Spiro Control had completed the drawdown period. The project was delayed by around eight months as a result of the Covid-19 pandemic, which disrupted the operations of Spiro Control's customers. However, having regained some of that time, the firm expects to be proposing the new product to (full paying) customers by mid-2022, with the roll out of the fully developed product to follow in 2023.

Outcomes and impacts

As a result of the Innovation Loan, Spiro Control is now **more investment ready.** Indeed, they are currently exploring the option of equity finance:

"The two potential investors we are talking to now are as a direct result of the development programme funded by the Innovation Loan."

In terms of employment, Spiro Control has increased its staff numbers, including several "*key hires*" who have played an important role in improving the internal business processes around software development. This has, in turn**, improved the productivity of the firm's software development activity.** Other benefits to the business include **increased innovation capacity, improved innovation skills and higher investment in R&D**. For example, with the benefit of the loan, Spiro Control was able to assign R&D functions that are not directly revenue-generating and to focus more on the innovation process. This significantly improved the firm's R&D capability. Because the systems are now in place, the company is more likely to continue to invest in R&D in the future.

As mentioned above, the Innovation Loan funded project has brought the technology closer to commercialisation. Once the new product has been rolled out, **Spiro Control expects turnover to rise**, with an increase of £2m anticipated within the next three years. Most of the firm's market is overseas so **exports are also expected to increase**.

More widely, receiving the Innovation Loan has increased Spiro Control's engagement with Innovate UK. This led to the firm enrolling on a business growth programme through Innovate UK in 2019, which helped the business understand how to scale up. Engagement with Innovate UK has also been beneficial in terms of networking opportunities with like-minded companies.

Additionality and contribution

This case study demonstrates partial outcome and impact additionality (for both achieved and expected benefits). Without the Innovation Loan, outcomes would have taken at least three years longer to achieve and be of a smaller scale and lower quality. This is because Spiro Control would have had to self-fund the development activities using income

from other parts of the business (high finance additionality), with less resource overall to commit to the process.

Although the **loan was considered to be the critical contributory factor in achieving outcomes,** the company's senior team has also been important. Senior leaders provided essential direction to the business throughout the project and also supplied the necessary contacts and expertise.

Reflections on the programme

Spiro Control participated in one of the earlier rounds of the Innovation Loans programme, and so recognised that the procedures in place may well have evolved. Based on its experience, however, the key weakness of the programme lies in the application and monitoring process – this was considered to be better suited to grant funded innovation projects. In the application process, Spiro Control was required to set out the exact spending details for the project, which were somewhat inflexible once it began:

"A loan of £1m is significant to a small business, to have to stick to spending it on exactly what was decided at the start, and follow it to the letter, does not make business sense – you have to pivot and adapt as the market demand evolves. Throughout the programme I never felt that the monitoring process was reflecting that."

Overall, to distinguish more clearly between a grant-funded and loan-funded project, the application and monitoring process needs to focus more on business growth, and perhaps less on the originality of the innovation:

"The business has to be driven by customer needs, and not by innovation. The success of the business is around meeting customer needs, which change over time. There needs to be more emphasis on that aspect."

Despite noting this point for potential improvement, Spiro Control has generally had a "*very positive*" experience of the Innovation Loans programme. The Loan has enabled it to secure investment that otherwise would not have been possible, and so advance their technology closer to commercialisation; it has been a "*massive boost*" for the company.

Case Study: The Electrospinning Company

Established in 2010 as a spin-out from the UK Science and Technology Research Council (STFC), the Electrospinning Company has developed a world-leading technology platform to supply electrospun biomaterials for regenerative medical devices. [44] Offering complete end-to-end services, the firm helps its clients develop innovative products from early feasibility stages to manufacturing. The company is based at the Harwell Science & Innovation Campus in Oxfordshire.

The search for external finance

In the initial stages, the firm's activities were funded primarily through grants and business angel investors. In 2018, the business started searching for venture capital (VC) funding in order to **speed up growth** through investment in equipment and upgrading of business processes. This would, in turn, offer an enhanced and faster service to more clients. Commercial loans were not considered to be an option for the business at the time:

"As a new emerging technology company, you can't borrow money in the UK from banks – your balance sheet is not strong enough."

Despite ongoing discussions with VC funds, the process of shifting from one source of funding to the next was intensive, time consuming and slower than expected. When the firm found out about the Innovation Loans programme from an Innovate UK newsletter, it seemed like a good option alongside equity. The firm applied for Competition 2 (focused on manufacturing and materials) and in October 2018, it **received a £714k Innovation Loan** alongside £750k of additional angel funding. The first round of VC funding followed in March 2019. Whilst the Innovation Loan was considered to have helped to bring in this VC funding by adding credibility to the business, it is likely that they would have been able to secure equity funding anyway – but this would have taken up to a year longer. In 2021 the company announced a further £4.5m equity raise, led by an American company as a strategic investor, which will be used to support scale-up by expanding cleanroom capacity and enhancing *"capability in automation and enhanced materials processing".*[45]

Project progress

The firm had developed a pilot production line to supply novel biomaterial components to one of its key clients for use in medical device products for shoulder repair – one of the first commercial applications to reach the market. **The Innovation Loan was intended to develop this manufacturing capability**, moving from pilot stage to being able to produce the components more reliably and at a larger scale.

[44] Electrospinning is an established method of producing nano- and micro-fibres from a wide variety of natural and synthetic polymers.
[45] https://ukinnovationscienceseedfund.co.uk/the-electrospinning-company-raises-4-5m-6-3m-with-participation-from-new-strategic-investor/

This was particularly important due to increasing demand for these products: developing this production line would enable them to keep up with the pace of growth.

Originally intended to be a two-year project, **progress has been held back by the Covid-19 pandemic** and timings have shifted back by around a year. Nevertheless, **the project has moved through Technology Readiness Levels (TRLs)**: from being validated/tested in a real but controlled environment, to being tested and scaled in an operational environment. To date, the majority of funding has been used for purchasing new equipment – the ability to use funding for capital expenses was considered to set the programme apart from many other funding options, including grants. Alongside this, the firm has developed different technical aspects which are now being consolidated into a final process.

Outcomes and impacts

Whilst the project is still ongoing, the Loan has already enabled the business to **improve its production processes** in order to scale up manufacturing. To support growth, the business has recruited an additional ten staff in R&D, marketing and project management roles since applying for the Loan. Of these, **one job to date** can be attributed to the Loan, with an additional **five jobs expected** by 2024. The project has increased the firm's **innovation capacity and skills**. Importantly, learnings from the project have been applied to other existing processes, resulting in **increased profitability and productivity**. Once the manufacturing line is completed, the expanded production capacity is expected to lead to **increased turnover** and further **productivity improvements**. The overall benefit has been in ensuring **business resilience**:

"Without this money to invest early, you would get to a point where you hit an obstacle and then you solve it; you hit another and solve that. The Loan has allowed us to predict what the obstacles might be and work on those in advance, so that we would not have to slow down when we hit them."

Beyond the Electrospinning Company, the Innovation Loan-funded project has led to **spillover benefits** to an equipment supplier that the company worked closely with to ensure that the purchased machinery was in line with their requirements. This helped the supplier to build its knowledge, and also strengthened the collaborative relationship between the two firms. The enhanced manufacturing capacity will also lead to direct benefits for clients by enabling more reliable, longer-term supply of components.

Additionality and contribution

There is partial additionality associated with the benefits reported. Without the loan, these benefits would still have happened, but they would have taken up to a year longer and been up to 50% smaller – primarily because the likely gap in finding other finance would have slowed down progress. Two other contributory factors were identified: the existing

business plan and market demand. Relative to these, **the Loan was considered to have been the critical contributory factor**.

Reflections on the programme

The firm's overall experience with the programme has been positive, despite some teething issues relating to monitoring which have now been resolved. Two particular strengths were identified: the two-sided communications at the application stage; and the flexibility of the loan product and payback period. It was considered that the **Innovation Loans programme *"has absolutely got a place"* in the wider funding landscape**, helping to fund later-stage R&D projects where commercial loans are not available and equity funding can take a long time to unlock.

Case Study: Utonomy

Founded in 2015, Utonomy develops technologies which help utilities minimise gas loss and reduce their operating costs through more automated and lower maintenance networks. Their products and cloud-based solutions assist gas utilities improve pressure control, optimise the feed-in of non-conventional gases including biomethane, and monitor their networks. The company is located in Southampton and currently employs around 22 employees.

The search for external finance

Utonomy has drawn on several funding sources to finance its development and growth. Alongside internal business investment, the firm received £100k of feasibility funding in 2015 to test the idea of their core technology focused on improving pressure control to reduce leakage on the low-pressure gas distribution network. In addition, the firm has secured equity funding, including venture capital (VC) investors, and an Innovate UK grant to develop their core technology. When developing this core technology, the gas networks identified an urgent problem for which the technology developed by Utonomy could be adapted and utilised: the need to enable and optimise the feed-in of biomethane to the gas network in light of the growing number of biomethane plants in the country.

Although the firm already had equity investors funding their core product, it was difficult for them to fund the additional biomethane R&D project before the core product was launched. This, combined with the fact the firm is early-stage and has a long R&D cycle (for practical and safety reasons due to the nature of controlling the gas network), limited their ability to gain funding for the new R&D project: "*not just that the R&D is very hard, but also proving that it is safe and reliable takes a long time*". Therefore, when Utonomy found out about the Innovation Loans programme through the Innovate UK website, it was seen as an invaluable opportunity to secure the funding required to develop the biomethane technology. The firm applied for Competition 1 and successfully **received a Loan for £488k in June 2018**. The firm would not have been able to secure the funding elsewhere at the time and would likely have had to wait 2-3 years until the core product had been fully launched before investing in the R&D, demonstrating **a high degree of finance additionality**.

Project progress

The Innovation Loan has been used for two main elements of project activity. As stated previously, at the time of receiving the Innovation Loan, the firm had been developing their core product focused on improving pressure control to reduce leakage on the low-pressure gas distribution network. Therefore, **the first element of project activity was to adapt the hardware from the core product for use in the medium pressure network** to optimise the feed-in of biomethane to the gas network. In addition, the project has involved the development of software to control the gas governor stations which control the pressure of

gas throughout the mains gas network. The **second element of project activity has been to establish a trial to test the technology with two gas networks in the UK**. To date, the project has identified the two trial partners and negotiated the terms of the trial, including identifying suitable sites, and getting the network equipped with the technology. The two trials will become live over the coming months and run for at least one year before the technology is commercialised and rolled out more widely.

Progress through the Innovation Loan funded project has been impacted by Covid-19, particularly in relation to arranging the trial. Indeed, as a result of the pandemic it has taken longer for the project to establish contracts for the trial and gain approval to access sites to install equipment due to safety implications. Nevertheless, **the project has progressed through Technology Readiness Levels:** from developing basic principles or formulating the concept to being validated or tested in a real but controlled environment.

Outcomes and impacts

Whilst the project is still underway, the Innovation Loan has resulted in Utonomy becoming **more investment ready**, particularly in light of the contribution biomethane is expected to make to the net zero agenda:

"I think we are much more investable as biomethane is clearly an area that is going to grow. There is a new government subsidy scheme, the Green Gas Support Scheme, which clearly will generate more plants. So, the problem we are trying to solve is only going to get larger - the problem holding biomethane back is how to inject it into the network. Our story is one that investors can understand."

The firm's technology can also be applied to hydrogen gas, which combined with the fact that the problem the technology is trying to solve exists abroad (further widening the market), further increases its attractiveness to investors.

Securing the Innovation Loan funding has also allowed Utonomy to **develop innovation capacity and skills** they "*wouldn't have otherwise*". Specifically, the project has enabled the firm to develop its mechanical engineering skills, whilst also improving their capability to work with the gas networks on new innovation and new products.

Several other key benefits resulting from the Innovation Loan relate to business performance. Utonomy has **increased staff** as a result of the Innovation Loan, hiring two new employees (a mechanical engineer and an expert in biomethane networks to project manage the trials), with a further 50 jobs expected by 2024 due to the Loan. Other expected benefits include **increased turnover**, with an additional £2m expected by 2024, as well as a **rise in the level of exports** over the next two years.

Importantly, the Innovation Loan has also led to **spillover benefits for the firm's customers.** Indeed, the project has "*helped with [the firm's] credibility with customers*", with

the technology developed solving an important problem for gas networks, making Utonomy "*a much more valuable supplier*". There are also associated benefits for the biomethane plants themselves, with improvements to the process of feeding-in biomethane to the network reducing wastage. More widely, these benefits not only contribute to the gas networks' decarbonisation goals but also national ambitions to increase the use of renewable energy sources.

Additionality and contribution

There is partial additionality for this case study in terms of activities and outcomes (experienced and expected). Without the Innovation Loan, project activities would likely not have commenced for at least two to three years due to difficulties associated with securing the funding for R&D:

"We would have had to wait because the business just would not have had the resources until we had finished first product and then launched it. We probably wouldn't even have started it now."

Two other contributory factors were identified: regulatory policy changes and the drive to decarbonise gas networks. However relative to these, the **Innovation Loan was considered to have been the critical contributory factor**. This was due to the fact that:

"Even though the requirement [for the technology] is obviously there and there are no competitors, actually getting the money to invest and spend on the development of the technology when you are at our stage is difficult".

Reflections on the programme

The firm's overall experience with the Innovation Loans programme has been highly positive. Two key strengths were identified: communications and engagement from the Innovation Loans team both during the application process and throughout the project; and the flexibility of the programme and its monitoring processes, particularly in light of the Covid-19 pandemic and the complexity of the project. It was also noted that **the Innovation Loans programme "*appears very logical as a process*":**

"You get the Innovation Loan to fund the technology and once that is successful, you start paying it back".

SQW

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