



# Luxembourg Startup Ecosystem Assessment and Benchmarking

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Prepared by Startup Genome

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THE GOVERNMENT  
OF THE GRAND DUCHY OF LUXEMBOURG  
*Ministry of the Economy*

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*Note: All startup related terms used in the report are based on definitions from Startup Genome's Methodology. For more reference, please visit [www.startupgenome.com](http://www.startupgenome.com)*

## Executive Summary

This document presents an analysis of the startup ecosystem in Luxembourg. This has been prepared by Startup Genome on behalf of the Ministry of the Economy, based on new research undertaken during 2022 using qualitative interviews, surveys and quantitative data analysis and leverages the methodology developed by Startup Genome, based on more than a decade of independent research with data on three million companies in over 280 ecosystems worldwide.

The research finds that there has been a significant increase in the performance of some metrics (such as number of venture capital deals) over the past decade. There also remain several obstacles to ecosystem growth, which act as deterrents in realizing its potential as a highly productive engine for economic impact. Addressing such persisting success factor gaps is critical for the Luxembourg Startup Ecosystem to move into the next phase of ecosystem maturity; a phase marked by more conducive environments for technological and business model innovation, increased rates of startup success (i.e. scaleup production), and eventually, the development of a more resilient and competitive economic fabric.

It is worth noting that the unique characteristics of Luxembourg mean that certain measures of ecosystem performance are ‘outliers’ in comparison with larger ecosystems. For example, we estimate there to be around 521 startups in Luxembourg: as an absolute number, this is consistent with many less-developed ecosystems, but normalized by *residential population*,<sup>1</sup> this is consistent with much more highly-developed ecosystems. This suggests that support mechanisms at the early-stages by way of formation, programmatic and capital support have been effective. The fact that individual metrics may be thus skewed in comparison with peers means that it is important to take a holistic view of the ecosystem, rather than relying upon a few individual indicators.

Taking all data together and applying Startup Genome’s proprietary Ecosystem Lifecycle Model, we conclude that Luxembourg is at the middle of the ‘Activation Phase’ — the first of four phases in the Model. For the ecosystem to progress to the later stages (Globalization, Attraction and then Integration), Startup Genome’s research has identified several gaps which should be filled. We estimate that, if barriers are addressed and strengths are built upon such that Luxembourg can develop to the Globalization Phase, then it would be realistic to expect the creation of an additional 130 startups (~25% growth) and reaching a scaleup rate representing 1,75% of the total number of startups present in the ecosystem.

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<sup>1</sup> Residential Population refers to the population of people who reside within the political borders of the country and does not take into consideration the population that move between ecosystems

## Observed Success Factor Gaps

As is characteristic of other Activation-phase ecosystems, we note a lack of startup and scaling experience amongst entrepreneurs, mentors and investors in the Luxembourg startup ecosystem. Ecosystems that have limited startup experience (i.e. have not yet witnessed a regular production of outsized startup success stories and exits) often suffer various resource gaps. These resources include but are not limited to startup-specific skills and knowledge among the community and venture capital deployed to local startups, which is not yet available for reinvestments within the ecosystem. Limited experience also translates into behaviors that act as barriers to ecosystem growth, including an aversion to engaging with ventures that have high-risk, high-growth profiles. Consistent with other Activation ecosystems, founders are often focused on building the first-generation of successful technology businesses in Luxembourg. Notably, research also identified significant gaps in support for scaling, with little dedicated support for later-stage firms, and relatively low levels of later-stage funding. Support mechanisms for scaling can help bridge the Startup Experience gap by injecting knowledge and resources into the ecosystem and triggering the reinvestment of resources once more scaleups are born in the ecosystem.

There are also gaps in Local Connectedness. Surprisingly given the small geographic size and close proximity of the ecosystem, founders in Luxembourg reported fewer connections with other founders, investors and experts in the Ecosystem as compared to the phase average. Furthermore, founders also received less support<sup>2</sup> from such stakeholders – a critical success factor for the development of the startup ecosystem.

We found very significant problems in accessing experienced engineering talent for startups. Interviewees reported a limited pool of engineering talent locally and expressed difficulties in the ability of startups to attract these individuals, exacerbated by the difficulty in competing with salaries offered by other local organizations. As a consequence, many founders rely on attracting talent from outside of Luxembourg to support requirements, which can also be difficult. In comparison with other ecosystems, startups appear to be less able to make use of equity-based compensation initiatives as a means of supplementing their limited resources in providing cash-based salaries.

## Notable Strengths

Startup Genome's research has also highlighted key areas where the Luxembourg startup ecosystem performs better than other ecosystems in its phase and in some instances, better than others that are far more advanced.

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<sup>2</sup> Referred to as Sense of Community, measured by the hours of support received by founders in the last two working weeks without any financial exchange

For example, we find that both the percentage of founders in Luxembourg with a business background and the percentage of founders with a technical background are higher than the average.

Additionally, we found that startups in Luxembourg show strong connections with their peers in top global ecosystems like London, Berlin and Silicon Valley. Startups in Luxembourg also reported a relatively high proportion of foreign customers, with ~67% of startups' revenue coming from outside of the Greater Region. Majority of the founders in Luxembourg also have high motivation and claim to have a differentiated product.

Our analysis finds high potential for sector-specialization within several areas: Fintech, Blockchain, Artificial Intelligence and Big Data (AI & BD) and Advanced Manufacturing & Robotics (AMR).

The Seed-funding environment for startups in Luxembourg is competitive when compared to its peers. Startups in Luxembourg receive relatively large seed rounds on average (median of ~EUR 523K) and the proportion of startups receiving seed funding in the last 5 years is much higher than in peer ecosystems. Additionally, 32% of seed rounds raised between 2019 to H1 2021 were larger than EUR 1M, indicating that the proportion of startups receiving the best seed rounds is much higher than other ecosystems.

# 1. Introduction

## 1.1. About this Study

In order to further develop and establish Luxembourg as a startup hub, the Ministry of the Economy commissioned Startup Genome to undertake a comprehensive assessment. The aim of this assessment was to provide an evaluation of the local startup ecosystem; to give an indication of how its performance compares with European and global peers at a similar stage of development and with similar characteristics; and to provide an analysis of major barriers, which may be inhibiting the growth of startups within Luxembourg.

## 1.2. Methodology

The primary research for this study was undertaken via a mixture of qualitative interviews with stakeholders and quantitative data analysis of a survey of founders. In addition, we also undertook secondary research, using existing databases (both within Startup Genome, and making use of data held by sources such as Pitchbook and Dealroom).

Specifically, Startup Genome's ecosystem assessment for Luxembourg included:

Primary research via Founders Survey ('Voice of Entrepreneur'): This survey of founders was undertaken online, with assistance from intermediary organizations (e.g. accelerators) to support dissemination. The content of the questionnaire was based on a standard list of questions which Startup Genome has applied to numerous other ecosystems globally, thus enabling a comparison of results with peer ecosystems. The questions have been built over 10 years, and contain 60 metrics, which have been validated against startup and ecosystem performance with 90,000 startup leaders across 85 ecosystems. Through the efforts of Startup Genome, the Ministry of the Economy and the startup community in Luxembourg, we received a total of 66 valid responses from startup founders and executives in the ecosystem.

Primary research via Interviews and Group Discussions: In addition to the survey, we undertook over two-dozen interviews with local stakeholders, including founders, investors, support organizations and policymakers; these interviews were undertaken via video calls as well as through two in-person meeting days. We also conducted a roundtable discussion with local startup founders to capture their views and experiences of the startup ecosystem.

Secondary Research for Sub-Sector Assessment ('Innovation Edge'): Using databases of funding deals and exits, and other sources, we undertook secondary research to examine Early Stage Funding (i.e. understanding which tech sub-sectors have had the most success raising Early-Stage Funding in the past); Exits (i.e. a timeframe of which tech sub-sectors

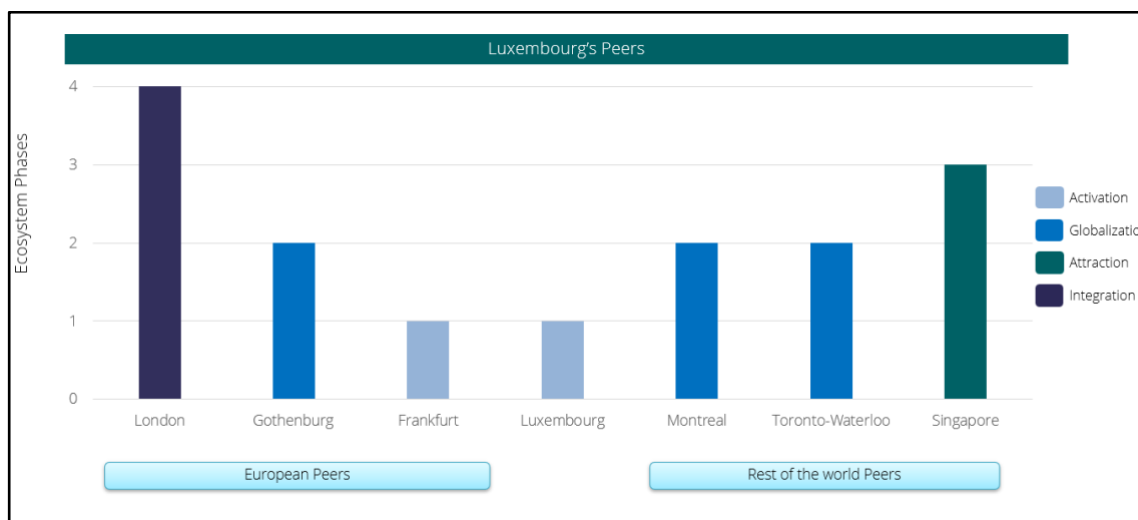
have had the most liquidity events in the form of exits as evidence for *resource recycling*<sup>3</sup>, (detailed on page 2) and an overview of the existing economic fabric in Luxembourg and its potential to impact technology-focused sub-sectors.

Estimation of the Number of Technology Startups<sup>4</sup>: Using a statistical technique known as Multiple Systems Estimation (also known as Capture-Recapture Estimation), we estimated the number of technology startups in Luxembourg. This is an established technique often used to estimate 'hard-to-reach' populations.

### 1.3. Analytical models

Following this research, we then undertook several analytical steps:

Peer Benchmarking: The data for Luxembourg was compared to other relevant peers as decided upon by the Ministry of the Economy and Startup Genome. For the purpose of the study, most metrics studied were benchmarked against the Activation Phase average i.e. the average value of other Activation phase ecosystems for specific metrics. To add more context, we also examined the performance of metrics against specific peers that are more advanced and globally-leading (London and Singapore), those that are similar in context to Luxembourg (Gothenburg and Frankfurt) and those that are in the next phase of the Lifecycle i.e late-Globalization (Toronto-Waterloo and Montreal).



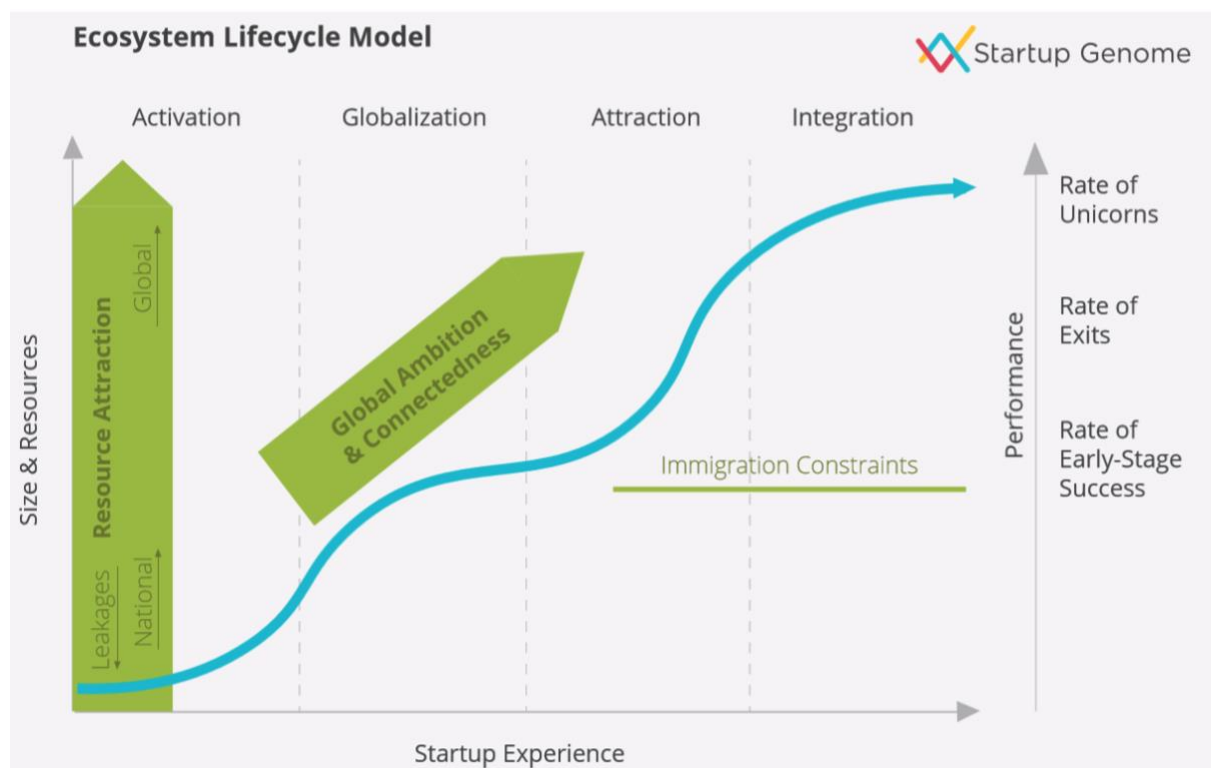
<sup>3</sup> Resource recycling refers to resources like funding, talent, infrastructure and startup experience being reintroduced in the ecosystem as more startups succeed (successful funding rounds and exits)

<sup>4</sup> Luxembourg-based technology startups are defined as young organizations with technology as a core element of their business models, with the majority of their executive team based in the ecosystem



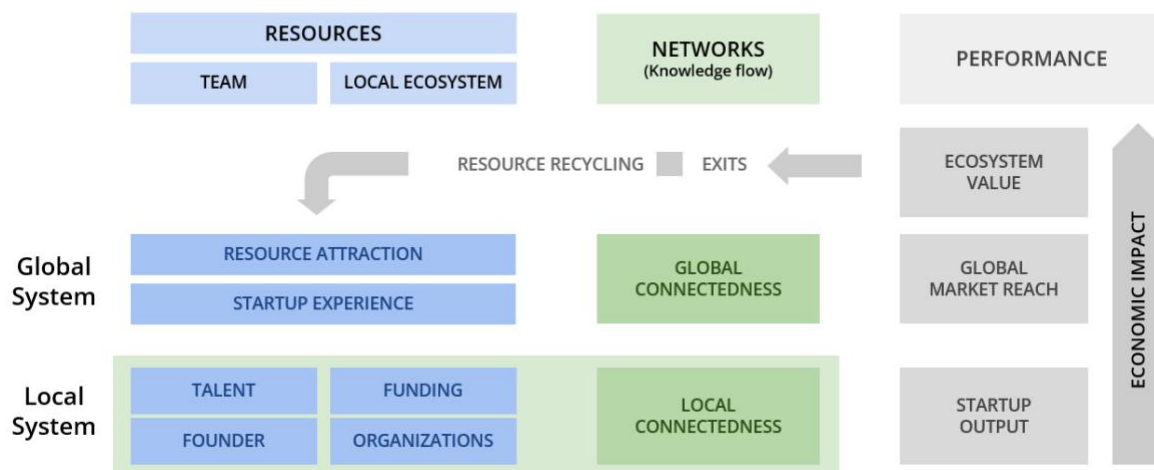
Relevant datasets (both internal and external) were examined to compare particular metrics, such as Global Connectedness and to correct for Covid-19 Pandemic effects. Additional European peers were used for Funding metrics to provide more detail.

Application of Lifecycle Model: To structure this data, we then applied Startup Genome's Ecosystem Lifecycle Model (see figure below). This Model has been developed following a detailed study of 100+ startup ecosystems. Based on characteristics observed within a startup ecosystem, we classify startup ecosystems into four distinct Lifecycle phases: Activation, Globalization, Attraction and Integration. As ecosystems grow, they accumulate Startup Experience (x-axis) and support the local development and attraction of more Resources (y-axis), eventually furthering their development into subsequent phases. This is positively correlated with higher rates of exit, scaleup production and economic impact.



Application of the Startup Success Factor Model: Our principal analytical tool to study the Luxembourg Startup Ecosystem is the Startup Success Factor Model, which helps measure different dimensions of what supports the performance of local startups. We look at multiple factors for our analysis: one measuring actual performance, with other Success Factors associated with performance, each composed of sub-factors and metrics.

## Success Factor Model



The Startup Success Factor Model differentiates between the Local and Global System perspective. The Local System describes the performance within Luxembourg and can be influenced locally; e.g. by means of investment, programmatic activity and policy action. The factors that the model assesses as part of the local system include:

- Local Connectedness: Assessment of quality and quantity of relationships within the local community
- Talent: Measurement of access to quality talent for the ecosystem
- Funding: Analysis of the funding opportunities available for startups in the ecosystem. This includes metrics like proportion of startups getting seed funding, attrition rate from seed to series A and later funding rounds, etc.
- Founder: Looks at issues intrinsic to the founding team and that are under their control including mindset, ambition and know-how

The Global System focuses on the connectivity of Luxembourg with the most relevant tech ecosystems and markets globally as they are a hugely valuable source of knowledge (regarding technology development and the emergence of new business models). Performance scores on the Global System factors also inform about the ability of Luxembourg's startups to tap foreign markets, investment and mentorship; all of which are a precondition for successful scaling. The factors that the model assesses as part of the global system include:

- Global Connectedness: Measuring the connectedness of founders with the global fabric of knowledge
- Global Market Reach: Startups' ability to reach customers outside their country and continent

- Startup Experience: The pool of experience startups can draw in
- Resource Attraction: Gravitational pull of an ecosystem towards external founders and startups

This report presents the results of these analyses as well as our conclusions about the major barriers to ecosystem growth.

## 2. Ecosystem Overview

### 2.1. Unique Characteristics

Luxembourg is distinguished by multiple unique characteristics, including its relative affluence, size, geographic access to large markets, and the outsized impact of its larger companies.

Economic activity in Luxembourg stands out at a unit level. The country's industrial mix is unique, being dominated by Financial Services accounting for more than 35% of GDP, with Luxembourg acting as a hub for a variety of cross-border activities.<sup>5</sup> The GDP per capita (GDP divided by residential population) is the highest within the EU-27, and there is significant financial capital that flows through the country. This creates both positive and negative effects for the startup ecosystem, ranging from relatively generous grants to entrepreneurs, to relatively higher costs of living.

Possibly as a result, we note that Luxembourgish entrepreneurs are significantly more likely than other European entrepreneurs to be motivated by opportunity rather than necessity (51.1% opportunity-driven compared with 37.8% for Europe).<sup>6</sup> (Necessity-driven entrepreneurs relates to individuals being motivated to start a business out of necessity because they have no better option available for employment; this is more common in ecosystems with higher levels of unemployment, and also among immigrant communities which may lack resources or else suffer problems in gaining conventional employment. However, there is some discussion as to whether necessity-driven entrepreneurs have smaller impact compared with opportunity-driven entrepreneurs, who are more driven by having spotted an interesting growth opportunity).

Another perhaps obvious but relevant characteristic is its small size. Luxembourg is the second smallest of the EU-27 in terms of both land area and population. Size affects many aspects of the ecosystem, from the presence and visibility of role models, the ability to

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<sup>5</sup> CIA World Factbook

<sup>6</sup> Global Entrepreneurship Monitor

develop startup experience, the policy-making process (e.g. relative ease of consultation, increased potential for 'joined-up' government, and navigation of institutions), policy objectives and the sub-sector strategies, which the country adopts.

Luxembourg is also uniquely positioned in its proximity to Europe's most productive economies. As a landlocked country, it receives significant daily commuting from the neighboring countries (around 46% of the total workforce are cross-border commuters – estimated at 116,500 from France, 51,200 from Germany and 50,400 from Belgium).<sup>7</sup> It has historically also received significant immigration from other European countries, especially Portugal. In addition, the capital, Luxembourg city, acts as one of the four official capitals of the European Union (with Brussels, Frankfurt and Strasbourg) and hosts several EU agencies. As a result, it is a very multilingual country, with 80% of the population speaking English.<sup>8</sup> Globally, we observe that the presence of a large foreign population acts as a boon in accessing knowledge and expanding global market reach for the startup ecosystem. Globally, a wide range of research has covered the contribution of immigrant populations to ecosystem success, including one from the National Foundation for American Policy highlighting that 55% of unicorns have been founded or co-founded by immigrants in the United States<sup>9</sup>.

Many interviewees perceived the economy as dominated by large firms, especially financial institutions. Whilst the percentage of employment in large businesses is actually relatively on par with the rest of Europe (Lux 34.5% / EU 35.6%), the value-add of SMEs to the economy is slightly lower than average (37.4% / EU 47.7%).<sup>10</sup> Perhaps as a result, several interviewees felt that the economy was not geared towards startups and that policymaking processes did not pay enough attention to small firms from their point of view.

It is also worth noting that, although Luxembourg remains a strongly innovative country, according to the EU Innovation Scoreboard, its innovation performance has decreased relative to the EU since 2014.<sup>11</sup> In particular, business expenditure on R&D as a proportion of the GDP is relatively low, likely due to the high contribution of the financial services sector to Luxembourg's GDP and its low R&D intensity compared to other sectors<sup>12</sup>

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<sup>7</sup> Source: LUSTAT, Domestic payroll employment by citizenship and country of residence Q1 2022

<sup>8</sup> <https://luxembourg.public.lu/en/society-and-culture/languages/languages-spoken-luxembourg.html>

<sup>9</sup> National Foundation for American Policy, 2018

<sup>10</sup> Source: Eurostat business demographics dataset sbs\_sc\_sca\_r2, 2019

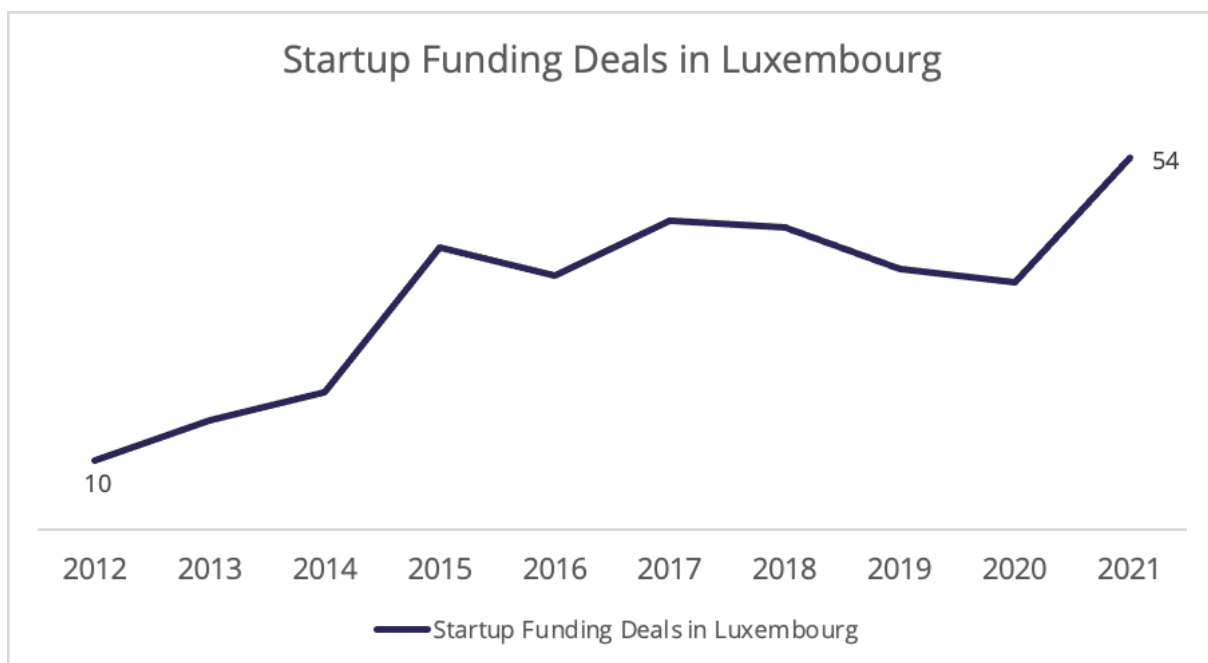
<sup>11</sup>

<https://ec.europa.eu/docsroom/documents/45924/attachments/1/translations/en/renditions/native>

<sup>12</sup> Delano: <https://delano.lu/article/luxembourg-rd-spending-estimat>

## 2.2. Recent history

This study did not specifically aim to be a longitudinal study of the ecosystem. However, it is appropriate to comment on recent history. We note that there has been significant change in the ecosystem in the past decade. In 2012, the Luxembourg ecosystem was relatively emerging in its development, with little startup activity. However, it has witnessed rapid growth in the last 10 years. This has been accompanied with a dramatic improvement in the startup funding environment.



Data from Pitchbook

Considering the little activity that took place in Luxembourg's venture funding landscape, we suggest that this positive trend indicates that recent initiatives — such as the Fit 4 Start programme<sup>13</sup> and the existing accelerators and incubators — are having a positive impact.

## 2.3. Estimated Startup Output

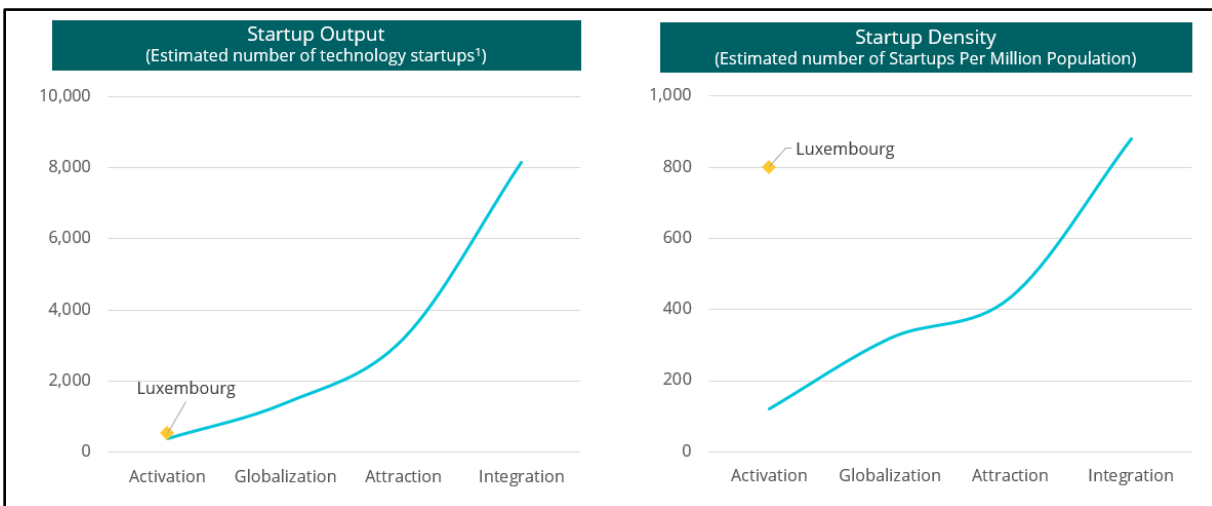
Startup Output refers to the estimate of the number of technology startups that exist within a given startup ecosystem, calculated using the Multiple Systems Estimation<sup>14</sup> method. This statistical technique was originally developed in ecological research and is often used where a complete census is infeasible.

<sup>13</sup> Fit 4 Start is an acceleration programme dedicated to high potential startups, providing entrepreneurs with coaching and investment grants (<https://www.startupluxembourg.com/fit-4-start>)

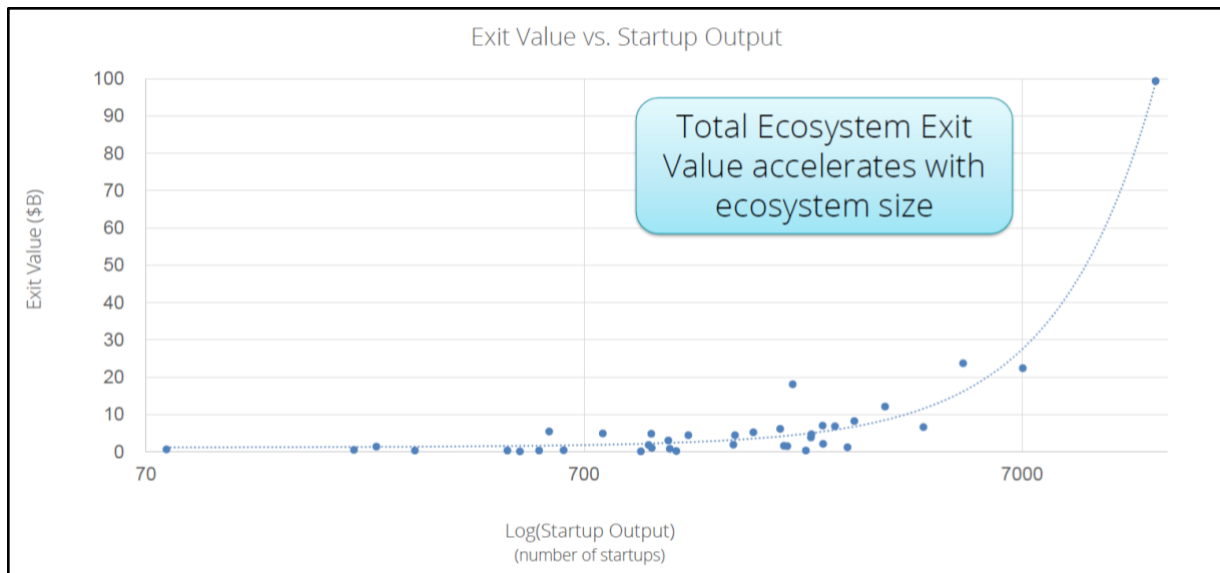
<sup>14</sup> MSE refers to a family of techniques for statistical inference. Estimation of the local startup population involves using the overlaps between several incomplete lists of startups from secondary databases and local startup support organizations

Using this technique, we estimate Luxembourg to have approximately 521 tech startups, which is consistent with the findings of Luxinnovation's startup ecosystem mapping. This is in line with the average of ~400 startups in the 'Activation Phase' of Startup Genome's model. While certain highly productive ecosystems such as Gothenburg, Sweden have advanced to the next phase of the Lifecycle with a similar number of startups (500-600), most usually advance onwards of 1,000 tech startups.

To normalize for Luxembourg's relatively low population, we also assess Startup Density, which is the calculation of the number of startups per million people (who reside in Luxembourg). With a Startup Density of ~800, Luxembourg performs higher than the phase average. Again, this suggests that support mechanisms at the early-stages by way of formation, programmatic and capital support have been effective:



However, whilst it may be natural to assume that the normalized data (i.e. density) is more relevant than absolute numbers, our research shows that 'bigger is better' in the world of startup ecosystems. That is to say, ecosystems with higher (absolute) Startup Output witness higher value creation. Having a larger community and higher (absolute) number of startups creates value at an increasing rate, as shown in the chart below:



Ecosystems with a higher absolute number of startups enjoy many advantages, including learning effects from a relatively higher collective accumulation of startup knowledge and best practices, stronger deal flow for programs and venture capital investors, and more avenues for skilled talent to join startups, driving attraction from other more established companies, higher education institutions and even from other ecosystems.

Whilst high Startup Density highlights a great propensity for tech entrepreneurship within the population, our global research of nearly 100 ecosystems highlights that a similar positive relationship observed between Startup Output and Ecosystem Performance (exit value or other measures) is unfortunately not observed between Startup Density and Ecosystem Performance.

One reason for the closer relationship between performance and absolute rather than relative numbers is that the founder's experience matters. As startup journeys are often marked by high rates of failure, higher absolute numbers of startups in the ecosystem lead to a higher probability of successes in the ecosystem, triggering cycles of resource recycling that support all stakeholders.

Unlike other Activation phase ecosystems, growing Luxembourg's Startup Output will not be easy due to the high levels of Startup Density. However, it is worth noting that addressing existing barriers to starting a business can help budding founders in the journey to creating more startups.

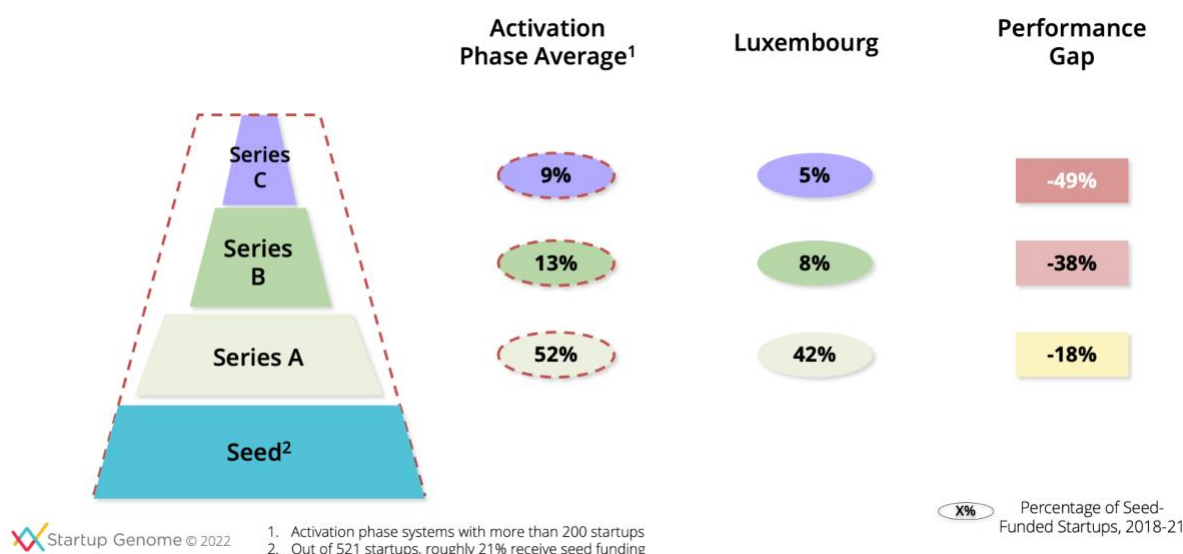
Interviews with founders in Luxembourg highlighted that an existing hurdle in founding a technology startup is the opening of a bank account, which can prove to be difficult and delaying company creation or relocation for some founders, mainly for those moving-in from outside of the EU.

We strongly believe that the next phase of Startup Output growth will be derived from addressing Success Factor gaps and driving scaleup production to further encourage technology entrepreneurship in the ecosystem.

## 2.4. Stages of Startups

Examining the stage of existing startups, and comparing the distribution of stages with that found in other ecosystems, the ecosystem seems to be missing a segment of scaleups, which is critical for driving economic impact from the startup ecosystem.

The chart below — Luxembourg's 'Ecosystem Pyramid' — highlights this gap, which stems from as early as Series A:



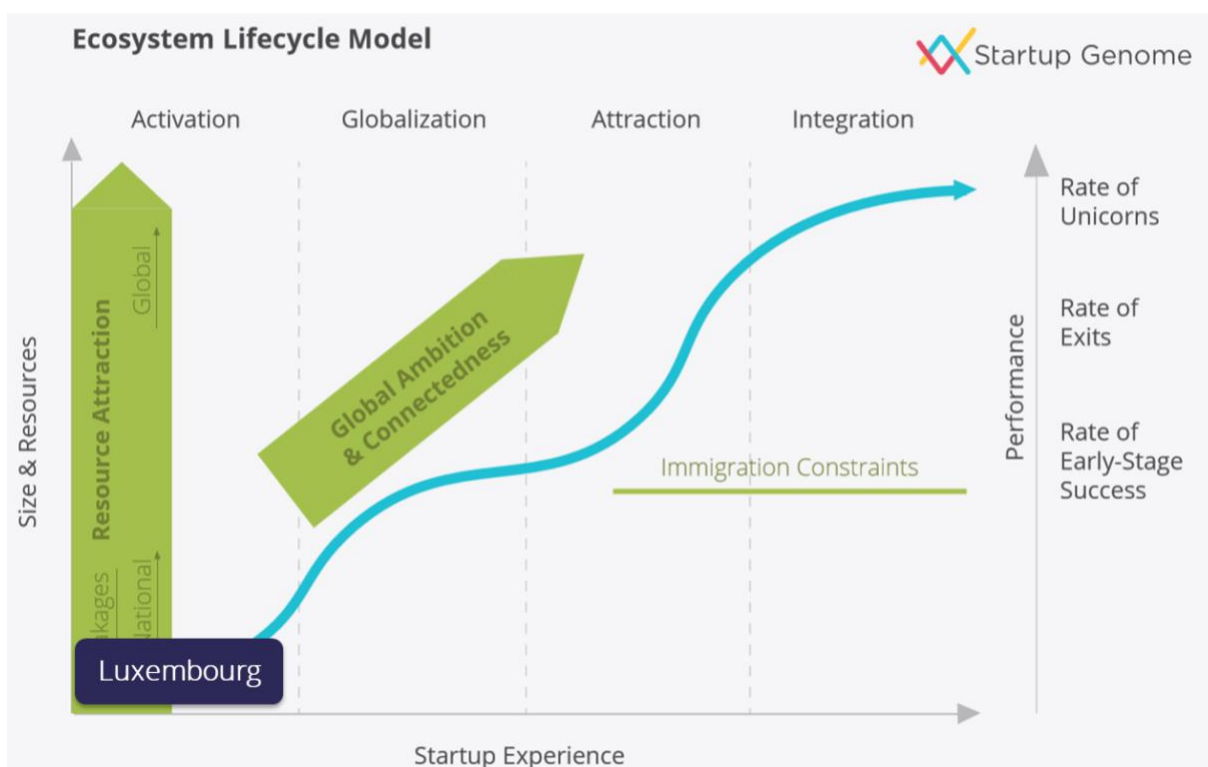
A declining trend towards later stage funding rounds in Luxembourg and the increasing gaps in performance suggest that, whilst initiatives to encourage early-stage ventures were successful, there is now a need to shift slightly towards support for scaling ventures. Addressing gaps at the top of the pyramid has a far-reaching cultural and economic impact, including the attraction of resources from both outside the startup ecosystem (but within Luxembourg) as well as outside the country, accelerated resource recycling, increased opportunities for employment and overall wealth creation.



## 2.5. Stage of Ecosystem Lifecycle

We conclude that Luxembourg currently sits in the mid-Activation Phase of Startup Genome's Lifecycle model. This classification is important since development strategies and support mechanisms fundamentally change as ecosystems evolve throughout the Lifecycle phases.

Broadly, the focus of Activation Phase ecosystems should be growing the connected community, increasing the early-stage funding and accelerating startups to become scale-ups to trigger resource recycling.



## 3. Findings of Success Factors

This section presents the main findings related to the Startup Success Factor Model.

### 3.1. Local Connectedness

Local Connectedness refers to Startup Genome's multi-variable assessment of the local startup community, aiming to quantify and benchmark the degree to which stakeholders in the ecosystem know and support each other.

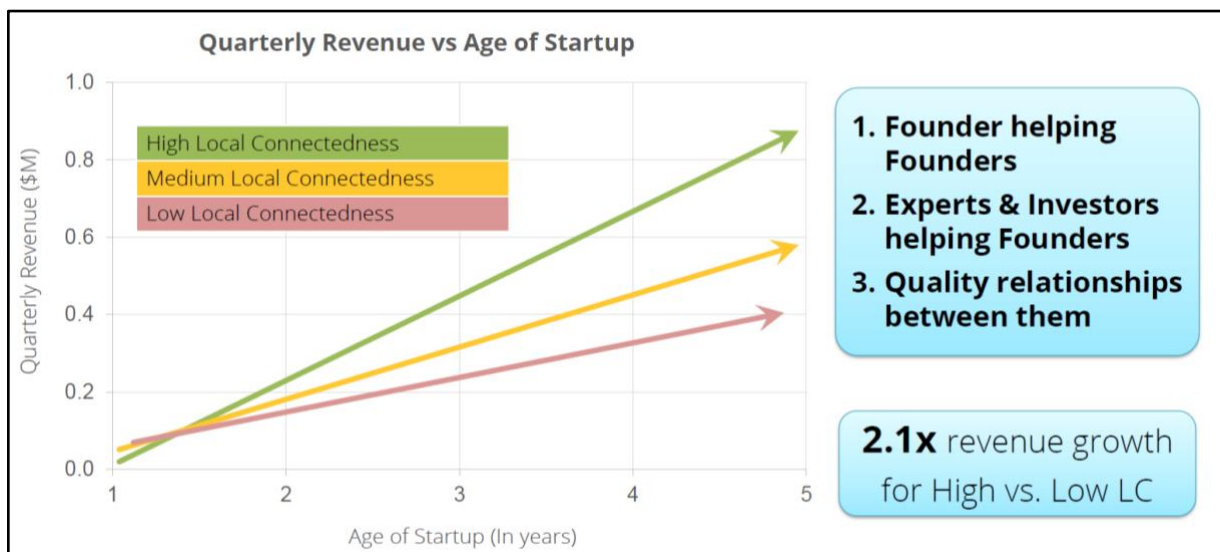
The two core components of Local Connectedness are Founder Relationships, or relationships that founders have with other local ecosystem stakeholders, and the Sense of Community, the degree to which founders informally receive help from investors, experts, and fellow founders.

#### The Role of Founder Relationships and Sense of Community

**Relationships:** Relationships with other founders, investors and experts function as conduits for knowledge transfer, source of introduction to partners, customers and future employees.

**Sense of Community:** Early-stage founders in the ecosystem are often resource constrained and require tactical support on their (often first) entrepreneurial journey. A supportive community plays an important role in helping founders navigate the complexities of entrepreneurship, especially from those that have done it before and/or wield deep experience

Startup Genome's research on thousands of startups across the world has shown that higher Local Connectedness is strongly associated with higher revenue from startups. Startups with high Local Connectedness see revenue growth at over double the speed compared to startups operating in a community with low Local Connectedness (see figure below).

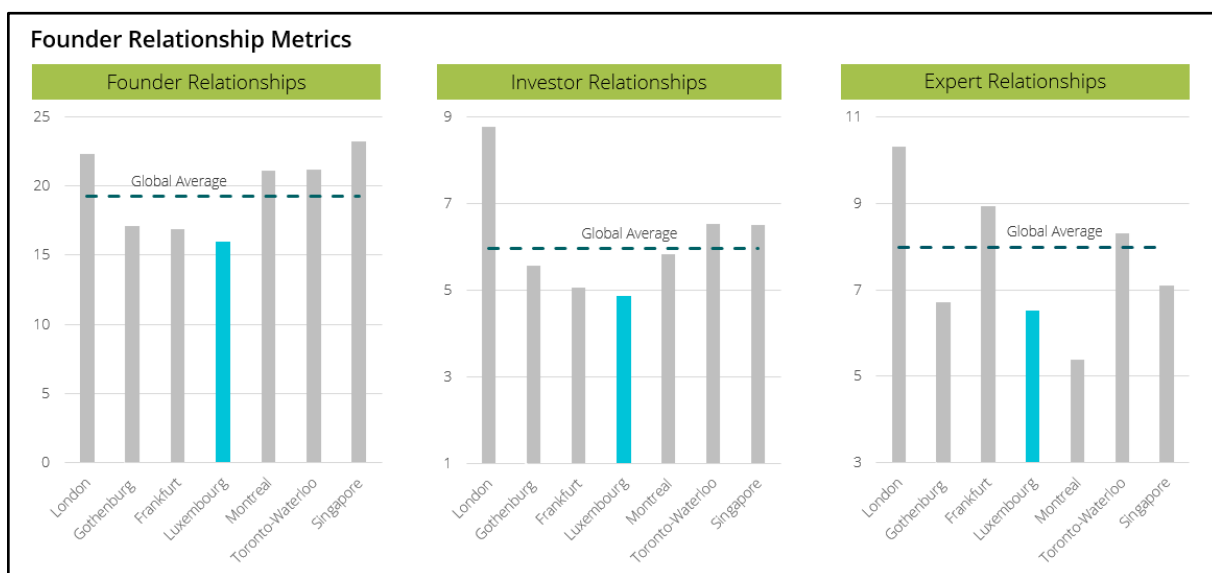


In our research, Local Connectedness as a measure for the quality of the ecosystem community has proven one of the most influential levers for Activation Phase ecosystems which deserves close attention and where culture change initiatives can make a decisive

difference. (Note that, unlike the other metrics analyzed in this study, Local Connectedness is benchmarked against the global average as opposed to the phase average. This is because we have found there to be very little correlation between Local Connectedness and Ecosystem Phase.)

### 3.1.1. Founder Relationships

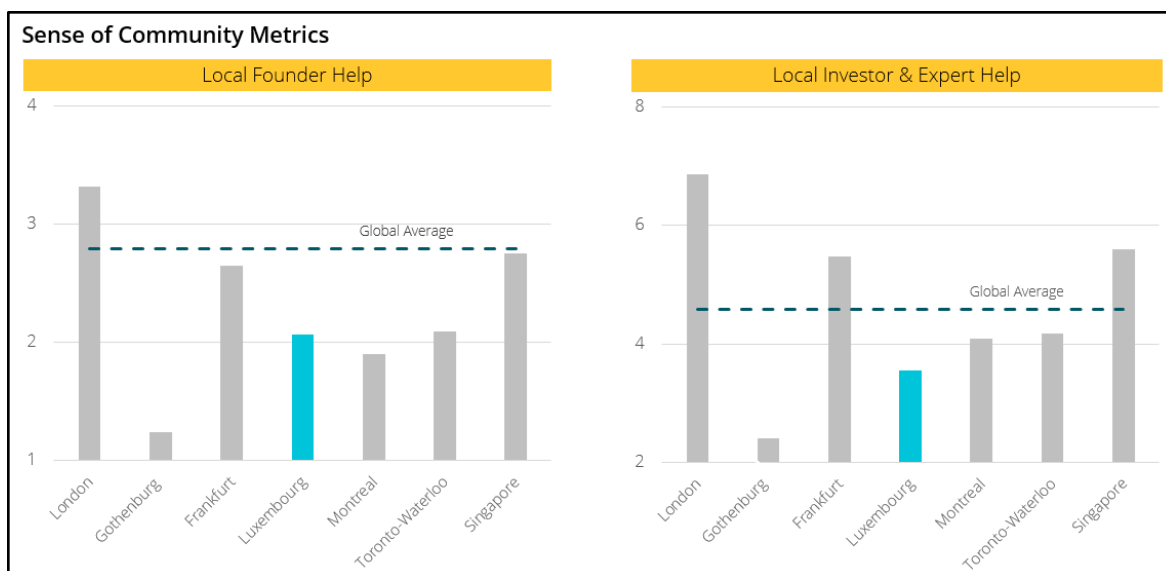
With specific attention to Founder Relationships, we find that gaps persist across all three sub-factors measured – Founder Relationships with Other Local Founders (Founder Relationships), Founder Relationships with Investors (Investor Relationships) and Founder Relationships with Experts (Expert Relationships). While Luxembourg founders exhibit a lower number of relationships, this trend is common in Activation phase ecosystems. These numbers increase as the size of the ecosystem grows and it sees more success.



*Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.*

### 3.1.2. Sense of Community

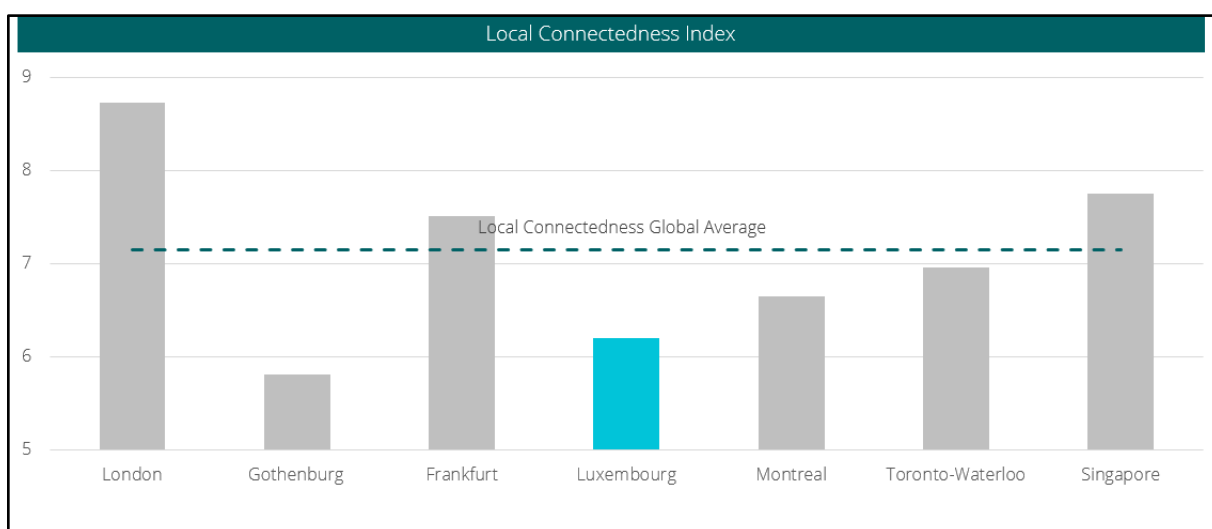
A detailed breakdown of the Sense of Community Index highlights gaps in both Local Founder Help and Local Investor & Expert Help. Local Founder Help measures the hours of help received by founders from other local founders in the last two weeks, whereas Local Investor & Expert Help refers to the number of hours of help received by founders from investors and experts within the community in the last two weeks. We believe this to be a key gap to address early to reduce resource leakage in the ecosystem.



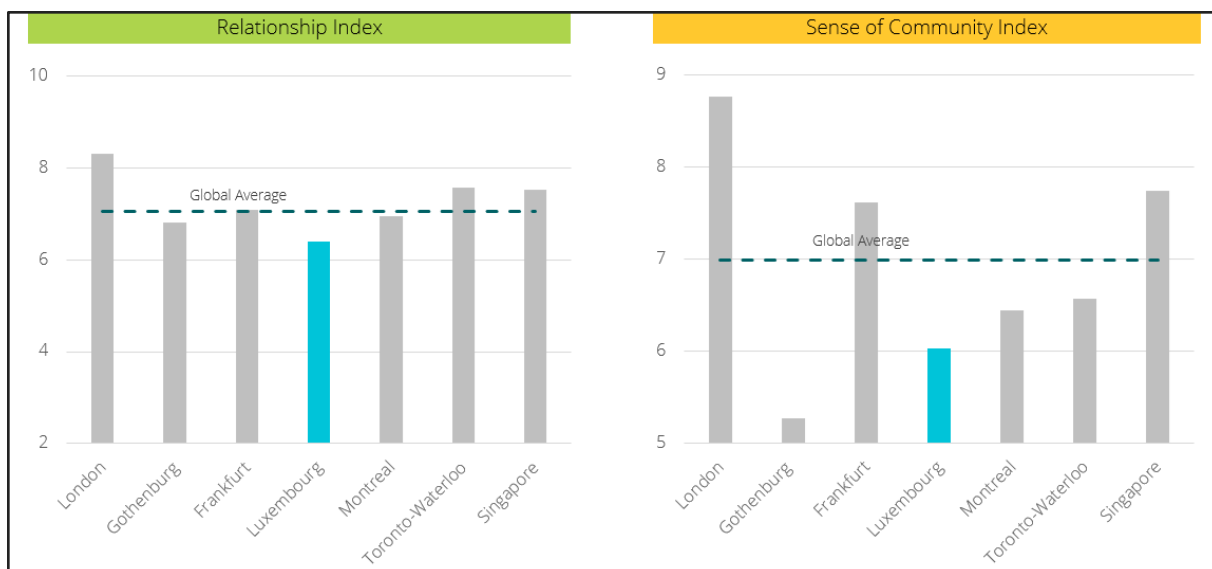
Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

### 3.1.3. Local Connectedness Index

Combining the two components, we find that Luxembourg's Local Connectedness Index as a whole lies below the global average, and lags behind most peers, especially due to a lower Sense of Community. Working together and building a strong local community can help startup ecosystems grow. Local Connectedness acts as a multiplier by increasing access to local resources, knowledge and connections.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.



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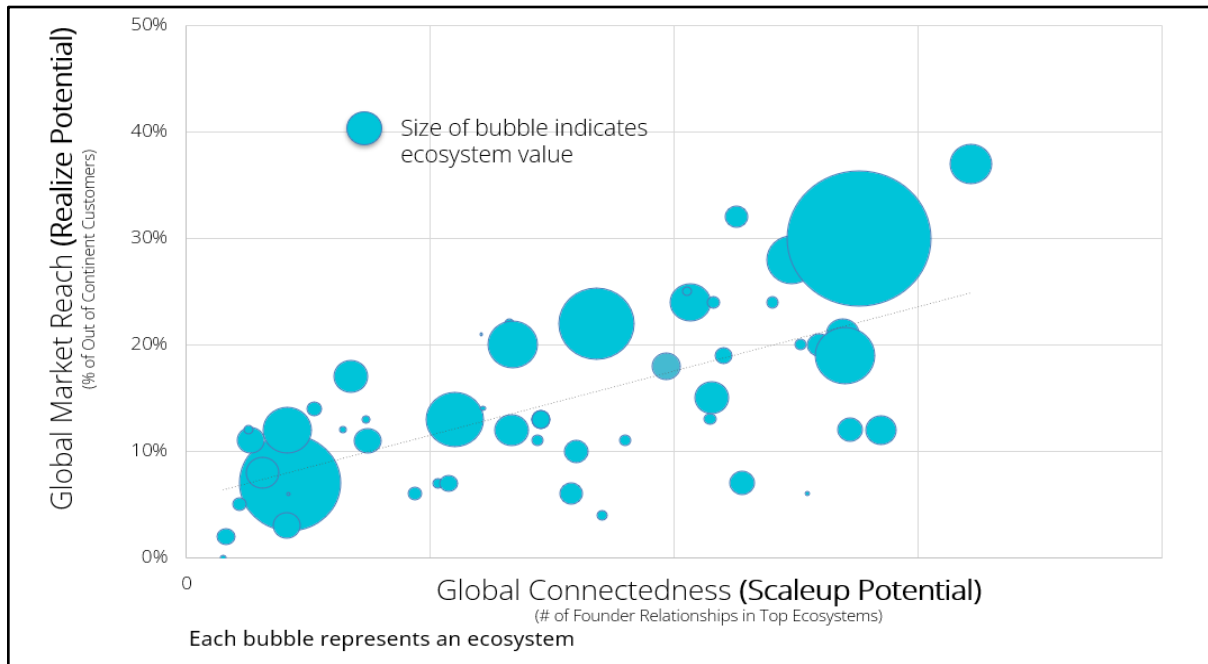
Whilst the poor performance of this metric was surprising to some interviewees (who considered that, as a geographically small ecosystem, it was relatively easy to navigate), it was considered unsurprising to other interviewees. In particular, younger, first-time entrepreneurs seemed more likely to feel that the ecosystem was cloudy and siloed. Based on round-table discussions, there would appear to be some opportunities to improve communication between support organizations. We also note that, until very recently, there was no association focused on representing the voice of startups and helping them address the gaps by connecting them to the community and decision makers. Positively, progress is being made to address this gap in the ecosystem, including through the initiatives of Startups.lu, Luxembourg’s first association for startup founders.

### 3.2. Global Market Reach and Global Connectedness

Many early-stage ecosystems tend to be almost exclusively focused on the local or national environment. Startup Genome research has shown that startups that focus on the global market early on tend to achieve higher revenue in a shorter time frame. Global Market Reach helps startups to scale and to reach revenue at a much quicker rate.

Notably, another important determinant Success Factor as ecosystems evolve is their connectedness with globally-leading startup ecosystems (Silicon Valley, New York City, London, Berlin, Shanghai and Tel Aviv). Global Connectedness is determined by how well local founders are ‘meaningfully connected’ to founders in other ecosystems, with a focus on the global top startup ecosystems. Connections to global top markets allow founders to benefit from the leading edge of business model design and the most up-to-date developments in tech, allowing them to stay ahead of the curve. Global Connectedness is

a precursor to Global Market Reach, measuring the ability of local startups to develop sales markets abroad. With the top-performing 10% of startups providing roughly 80% of gross revenue and job creation, scaleup production should become a main goal of startup ecosystems with Global Connectedness and Global Market Reach being the key indicators.

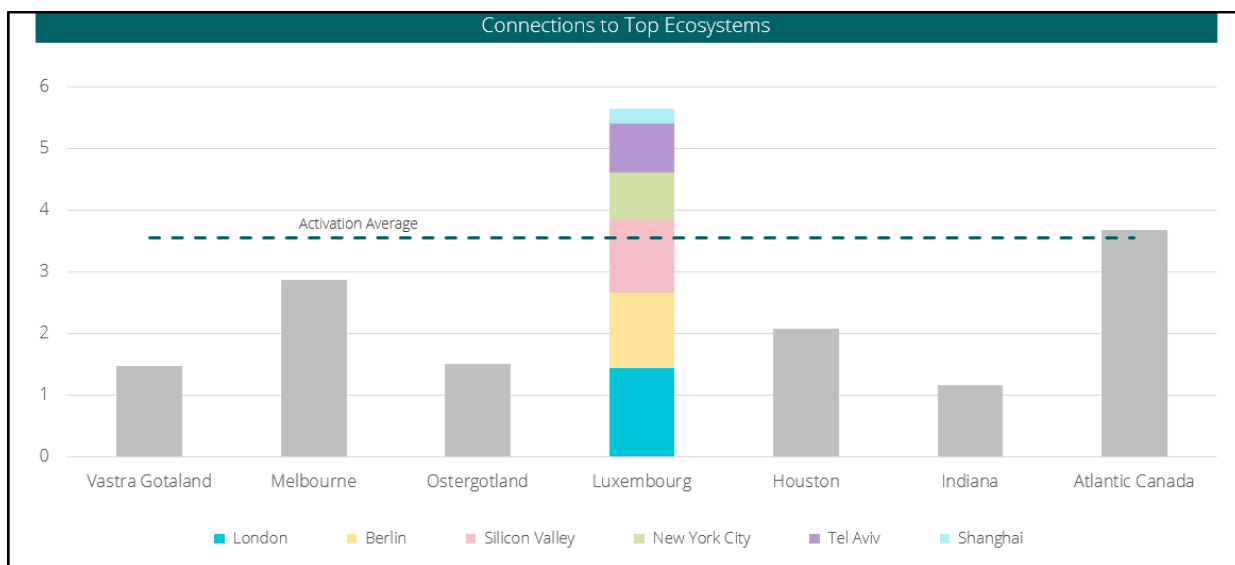


As the Global Connectedness of an ecosystem improves, its potential to develop more scaleups also increases. At the same time, Global Connectedness is correlated with Global Market Reach, thus starting the virtuous cycle of international connectivity for the ecosystem being realized in the form of more scaleups, higher rounds raised and more exits. Furthermore, our research has also found a strong positive relationship between Global Market Reach and revenue growth of startups, with globally-focused startups growing nearly 2 times faster.

In interviews, many stakeholders commented on their perception of Luxembourg as well-connected internationally, partly as a consequence of its substantial cross-border flow and a highly multilingual population, its role within international finance, and its role within the European Union. Several interviewees commented on the potential role of Luxembourg as a 'launchpad into Europe', given that a number of startups aim to operate and expand in Europe choosing Luxembourg as their starting point. This is in line with the [attraction strategy and marketing efforts of the Luxembourg startup ecosystem](#).

We find that these perceptions are supported by the data. Luxembourg demonstrates a strong performance in Global Connectedness when compared to other ecosystems who were assessed after the beginning of the Covid-19 pandemic. When taking into account

the effects of the Covid-19 pandemic, founders were able to maintain a strong level of connections with their peers in top ecosystems virtually. Startups in Luxembourg have the most number of connections with founders in London, Berlin and Silicon Valley.



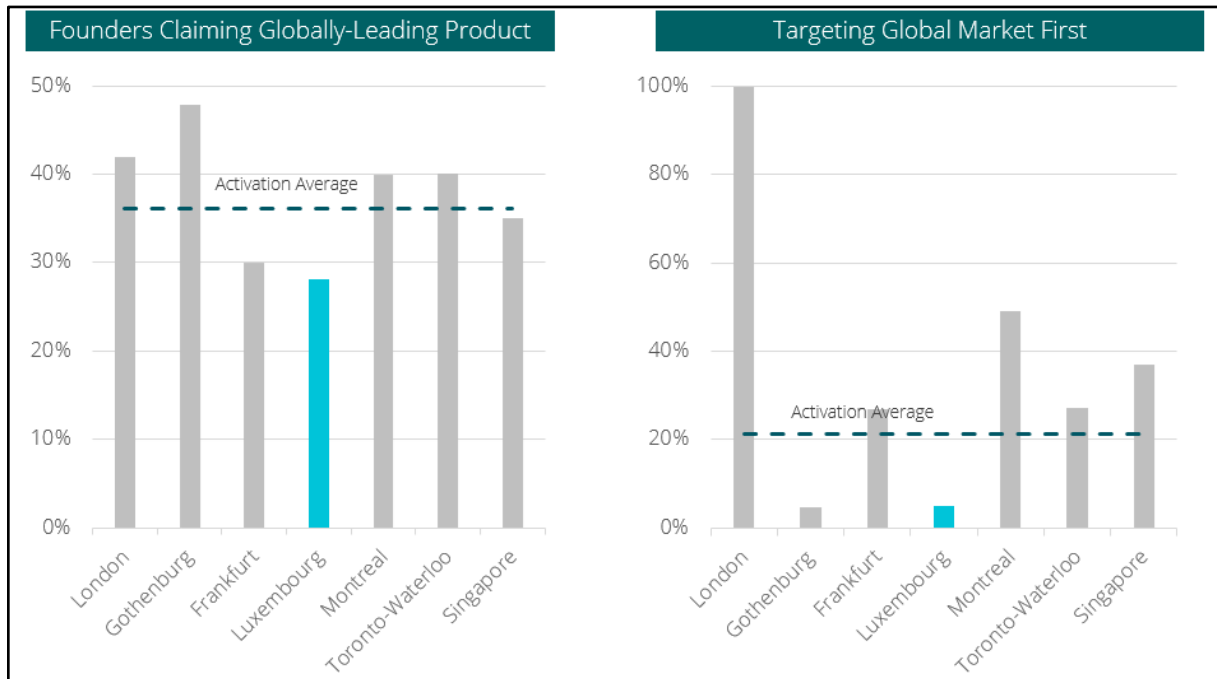
*Note: The ecosystems on the right side of Luxembourg are from North America and the ones on the left are from the rest of the world. Global connections and meetings were affected due to the COVID-19 Pandemic, so to do a more accurate analysis Luxembourg was compared to only those peers who were analyzed after the Pandemic hit.*

Digging into the data in more detail, some strengths and weaknesses become apparent:

In terms of strengths, it is notable that there is a higher number of Global Connections than seen in other peers assessed during the pandemic. That is, founders in Luxembourg seem to have a higher level of connections to top global startup ecosystems like London, Berlin and Silicon Valley than their peers who were assessed after the pandemic started. We also note that meetings are getting back to pre-pandemic levels: founders in Luxembourg are meeting their counterparts from top global ecosystems more often both locally and internationally. This indicates that the pandemic related restrictions are being lifted and the level of meetings is slowly getting back to pre-pandemic levels. In addition, we note a high proportion of foreign customers: Startups in Luxembourg have a very high proportion of customers outside the country and continent. Having a higher global market reach helps startups to scale and to reach revenue at a much quicker rate. Interestingly, over 1/3rd of the revenue generated by Luxembourg based startups comes from within the Greater Region.

In terms of weaknesses, we note that, compared with peers, fewer founders claim to create globally-leading products: Founders claiming to build unique products is a sign of fewer companies repeating globally successful business models for the local context. However, fewer founders in Luxembourg claim to be creating a globally leading product, compared with peers. We also observe fewer startups targeting global markets early

compared with peers: while startups in Luxembourg have higher market reach, very few of them targeted the global markets from the starting. Our research has shown that startups that focus on building for the global market early-on tend to achieve higher revenue in a shorter time frame. Thus, in order to produce more scaleups, startups in Luxembourg should ideally be encouraged to target global markets early on and focus on creating globally leading products.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

### 3.3. Funding

Early-stage funding (which we define as Seed and Series A) is one of the main fuels of ecosystem growth. It is very important to ensure that an adequate level of early-stage funding is available to startups; without this, startups will either fail to thrive or relocate.

Some important sources of early-stage funding are Angel Investors and Family Offices. Several interviewees commented that despite the significant presence of High Net Worth Individuals and Family Offices in Luxembourg, their full funding potential for startups seems not reached. It is unclear whether this is because of a lack of awareness or a lack of incentives. Several interviewees added that returns on property in Luxembourg were often more attractive than venture investments.

Several interviewees commented on the lack of tax incentives for investors. There are no schemes for tax relief comparable with, for example, [Belgium's Startup Tax Shelter](#), which encourages their taxpayers to invest in startups, in return for a tax reduction of 25 to 45%

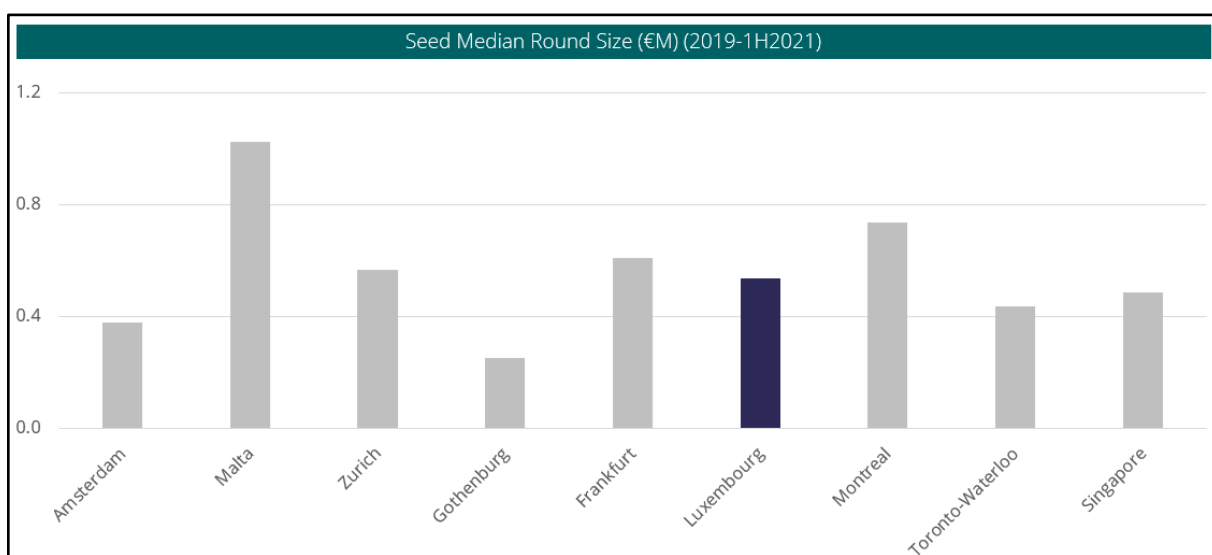


of the investment. Interviewed investors noted that the propensity to invest in the Luxembourg startup ecosystem would likely go up with the introduction of more tax advantageous initiatives, eventually allowing more early-stage funding to be available to entrepreneurs.

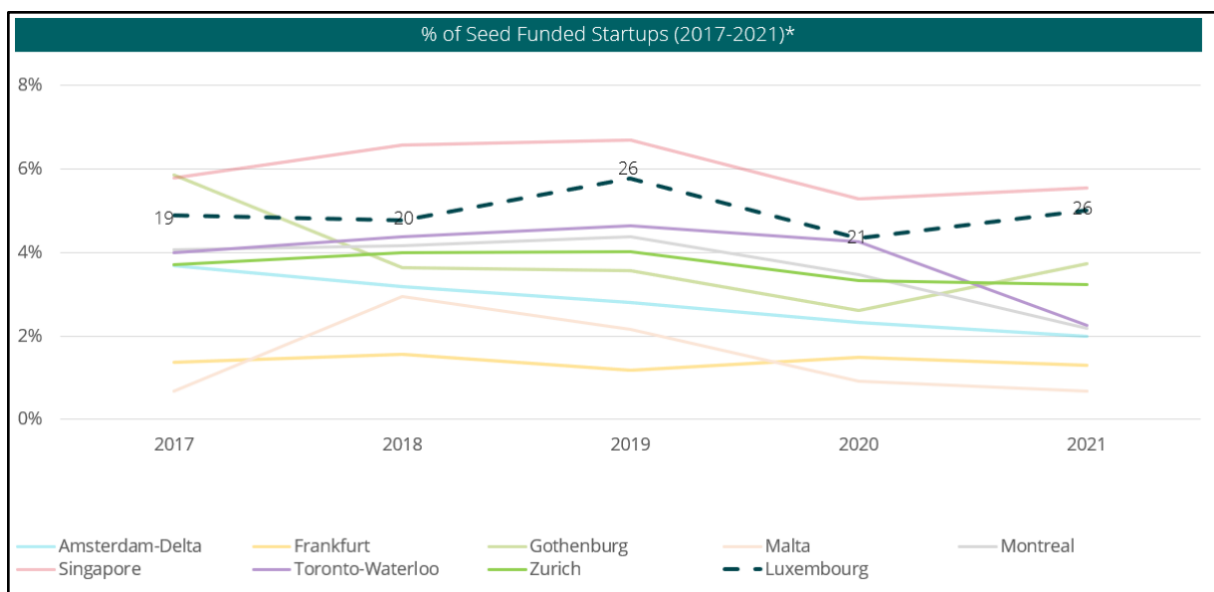
Our data-led assessment of the early-stage funding landscape involved examining three variables across both Seed and Series A funding: Size of Rounds, % of startups receiving large rounds (EUR 870K+ for Seed and EUR 8.7M+ for Series A), and % of startups receiving early-stage capital. These are detailed below:

### 3.3.1. Seed Funding

We find that startups in Luxembourg not only raise similarly-sized seed rounds compared to advanced peers, but also a high proportion of them receive such rounds. At ~EUR 523K, the median size of a seed round in Luxembourg is similar and sometimes higher compared to those in ecosystems that are further along the lifecycle, including Singapore, Toronto-Waterloo and Amsterdam. The proportion of startups of the overall startup ecosystem that receive seed funding is also considerably higher in Luxembourg. This indicates that - despite some concerns having been expressed about the number of Angel Investors - investors typically are open to investing in early-stage startups

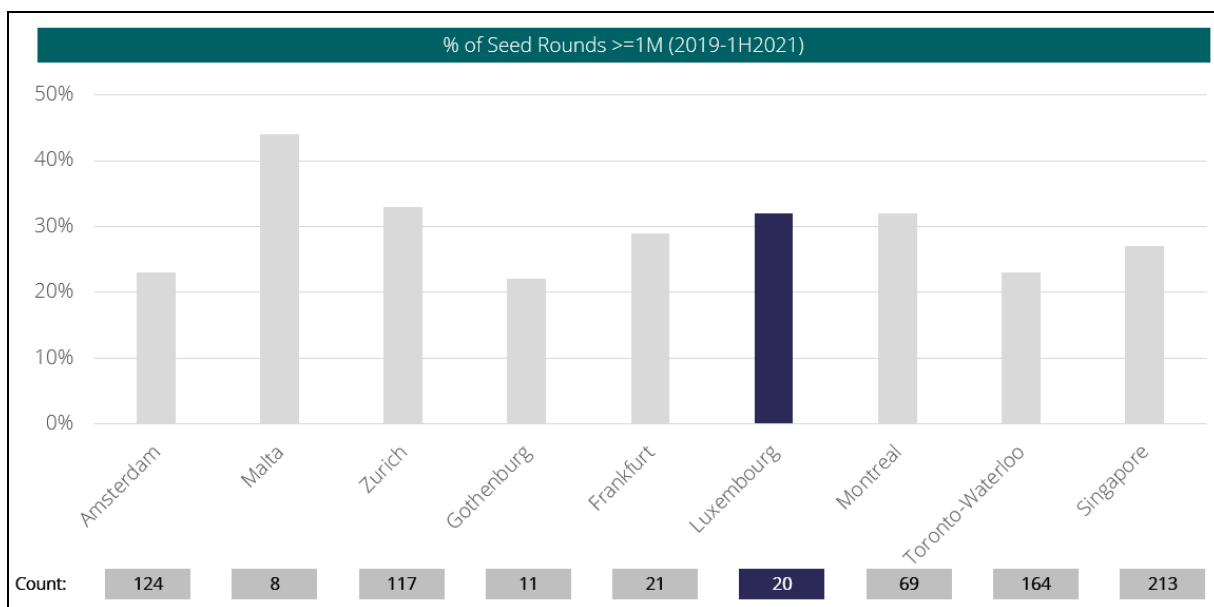


*Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to "Analytical Model" in the Introduction section. The metric is not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data.*



\*Not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data

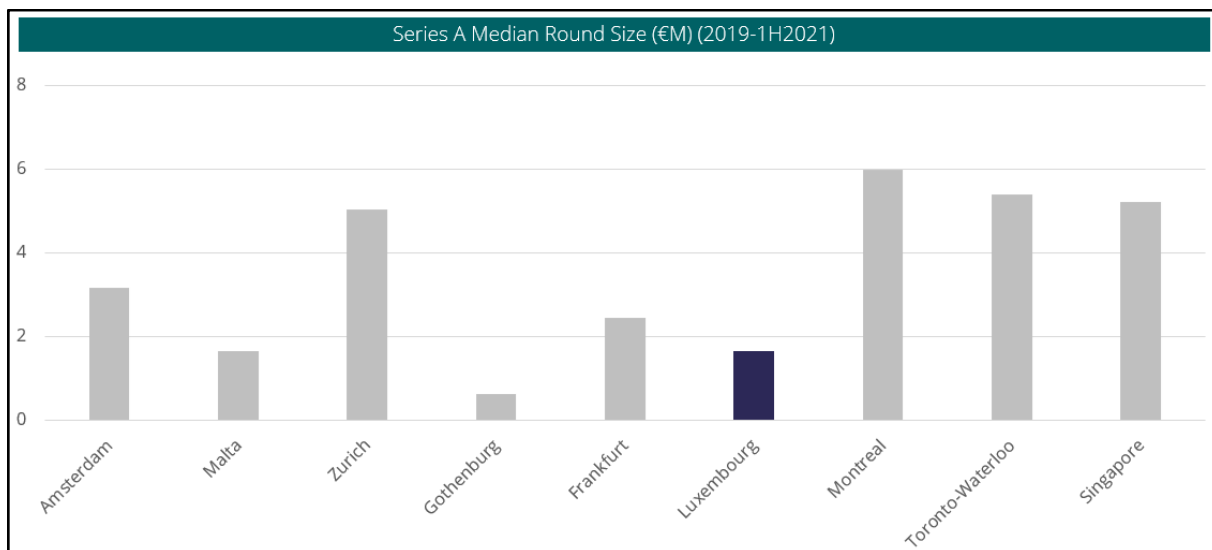
We also note that there is a high number of large seed rounds (EUR 870K+): With 20 seed rounds equal to or larger than EUR 870K, the proportion (32%) of large seed rounds in Luxembourg is higher than most of its peers:



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to "Analytical Model" in the Introduction section. The metric is not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data.

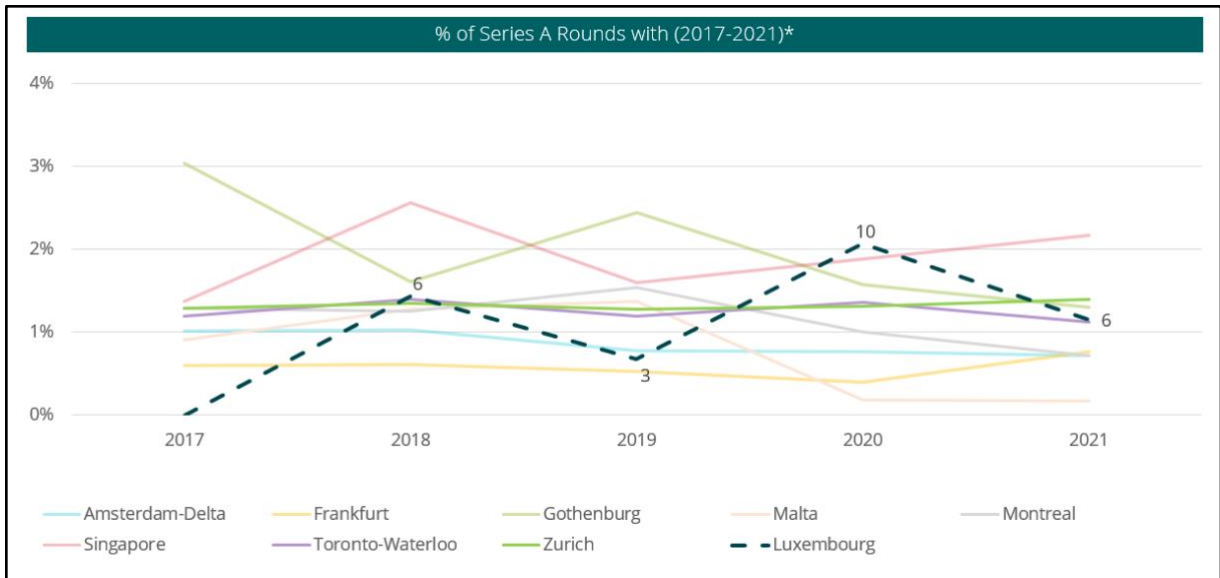
### 3.3.2. Series A+ Funding

In terms of Series A funding, however, we find a small average size of Series A funding rounds: The average size of series A rounds raised in Luxembourg is smaller than that of its peers. For startups to scale, it is vital to raise additional funds. It is also important to recognise that fund-raising itself can be a time-consuming process, so that small rounds may mean that more time is spent fundraising as opposed to working on other productive activities within the business.



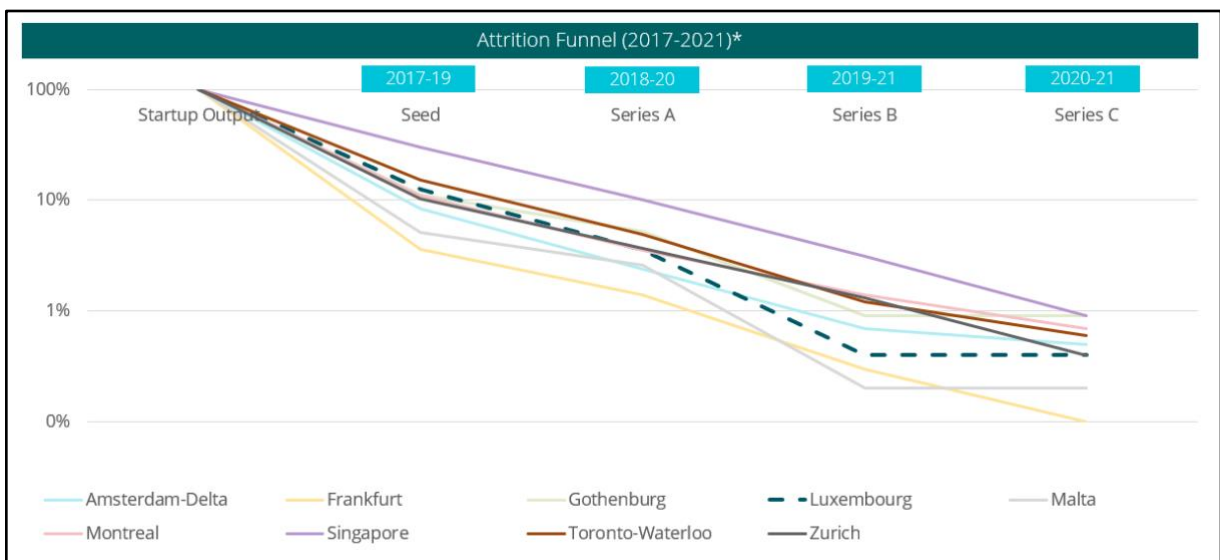
*Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section. The metric is not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data.*

We also note a relatively low proportion of Series A Funded Startups: Even with a relatively high proportion of startups raising seed funding, the gap in follow-up rounds is apparent. Lack of funding beyond seed rounds can act as a barrier in scaling. While the proportion of Series A funded startups increased in 2020, it continues to be low and its effects are observed downstream in later stage rounds:



\*Not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data

In addition, there are few late-stage funding rounds: While startups in Luxembourg are able to raise seed rounds relatively quickly, the size of Series A rounds and proportion of startups raising large ticket Series A rounds are smaller than its peers. The gap in the funding widens in the later stages of funding with Luxembourg observing very few Series B or later rounds:

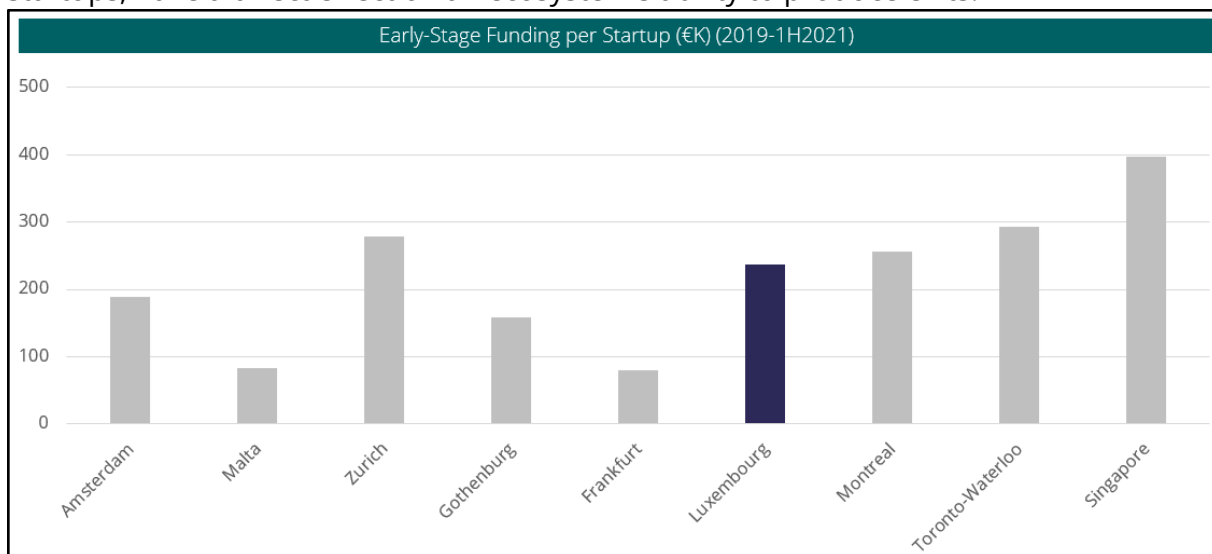


\*Not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data

### 3.3.3. Early-Stage Funding per Startup

Taken together, we find that the Early-Stage Funding per startup in Luxembourg is relatively higher than other European peers (although slightly lower than international

peers - see diagram below). Availability of Early-Stage funding, and its availability to startups, have a direct effect on an ecosystem's ability to produce exits.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to "Analytical Model" in the Introduction section. The metric is not based on Startup Genome data -- Based on Pitchbook, Crunchbase and Dealroom and subject to normal issues with funding data.

However, the funding picture seems worse at later stages. This is summarized in the diagram below, which shows a color-coded breakdown of the funding factors considered:

		Seed	Series A
Large Rounds	Median	Median Amount & # of FTEs Funded	Median Amount
	Best	% of EUR 870K+ rounds	% of EUR 8.7M+ rounds
Many Rounds		% Seed-Funded Startups	Survival Rate

<span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Above Phase Average	<span style="background-color: #FFFFE0; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> At Phase Average	<span style="background-color: #F08080; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Below Phase Average
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### 3.4. Talent

Just like in other ecosystems, availability of and access to talent, particularly engineering and business development talent, is a key success factor for the development of startup ecosystems. Hiring talent ranks as one of the most challenging aspects of founders' jobs, further exacerbated by the sharp rise in employee salaries globally.

Competition for startup talent exists both within and outside the geographic boundaries of the ecosystem. Luxembourg not only competes with other European and global hubs for talent, but also with large corporations within the country that are known to pay competitive salaries commensurate with a high cost of living.

Access to talent for startups is a function of culture, ecosystem experience and incentives. Startup ecosystems that have accumulated experience through past success are better positioned to attract experienced talent from outside the startup ecosystem. Ecosystem experience also supports the collective knowledge and skill sets of the talent pool within the startup ecosystem and thus is a key driver of talent quality. Incentivizing startup talent is another key factor, with talent having to be commensurately compensated for taking on higher risk, often for lower cash compensation when compared to larger technology companies.

Talent was repeatedly highlighted as one of the top concerns by virtually every interviewee. Even with very high cross-border flow, it was reported that recruitment and retention was very difficult for startups. In particular, it was reported that low unemployment rates, coupled with high living costs and high salaries in other firms make it very difficult and expensive for startups to find talent. Interviewees commented specifically on a lack of technical expertise (e.g. lots of knowledge about data regulations, but few data scientists) as well as gaps in sales & marketing. This was supported by the wider survey (see box):

**Founder POV:** We asked founders which talent profiles they had the most trouble sourcing. The overwhelming majority of startups reported that software talent – developers and engineers, were the hardest to find locally.

There were also difficulties (real or perceived) reported by firms in outsourcing or recruiting talent outside of Luxembourg. In particular, several startups reported that they were required to build substance and development activities in Luxembourg in order to qualify for some support schemes. Labour laws were also highlighted as imposing a time limit on temporary workers, meaning that, for example, postdocs were unable to continue working part-time within a university spinout after a period. Some interviewees

considered strong employee protections as a reason they were reluctant to hire (since it would be difficult to fire people in case of a downturn).

Startup visas do not exist in Luxembourg in a formalized way as it can be the case in some other countries. A third country national - entrepreneur is considered as self-employed worker if several conditions are fulfilled. Thus, the amended law of August 29, 2008 on the free movement of persons and immigration has no section referring to a fast startup or creation process.

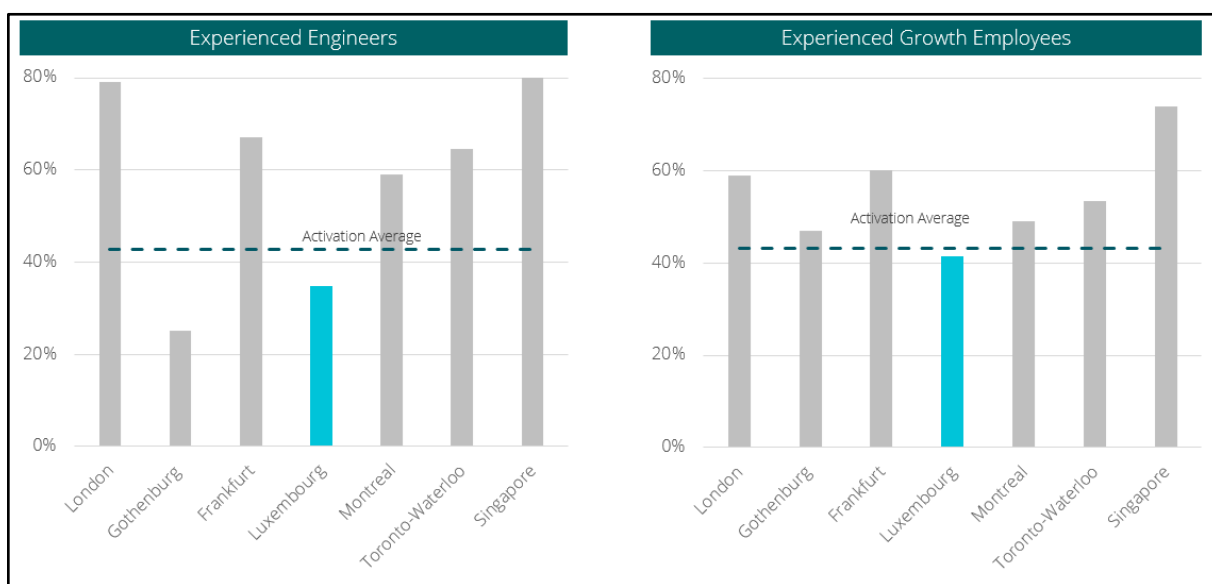
An Advisory Board of experts ("commission consultative travailleurs indépendants") advises and decides on the applications to obtain a residence permit as an entrepreneur introduced by third country nationals. The Advisory Board is composed of representatives of the ministry of immigration, economy, middle classes and labor & employment. External experts are advising and represented in the Board, too.

Luxembourg residence permits as self-employed workers are valid for a maximum period of 3 years and renewable as long as the conditions for obtaining the residence permit remain fulfilled.

We note that other European countries have implemented startup visa schemes (for example, in [Estonia](#) and [France](#)) relying on the support of key ecosystem players.

In terms of our data-led assessment, Startup Genome's 'Talent Success Factor' is a measure based on the availability and access to experienced employees, particularly software engineers and business development and growth experts in the startup ecosystem. We investigate the availability of talent with experience in previous startup and scaleup roles.

Our data analysis agrees with the qualitative research interviews, finding a gap compared to the Activation Phase peer average for access to experienced software engineers.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

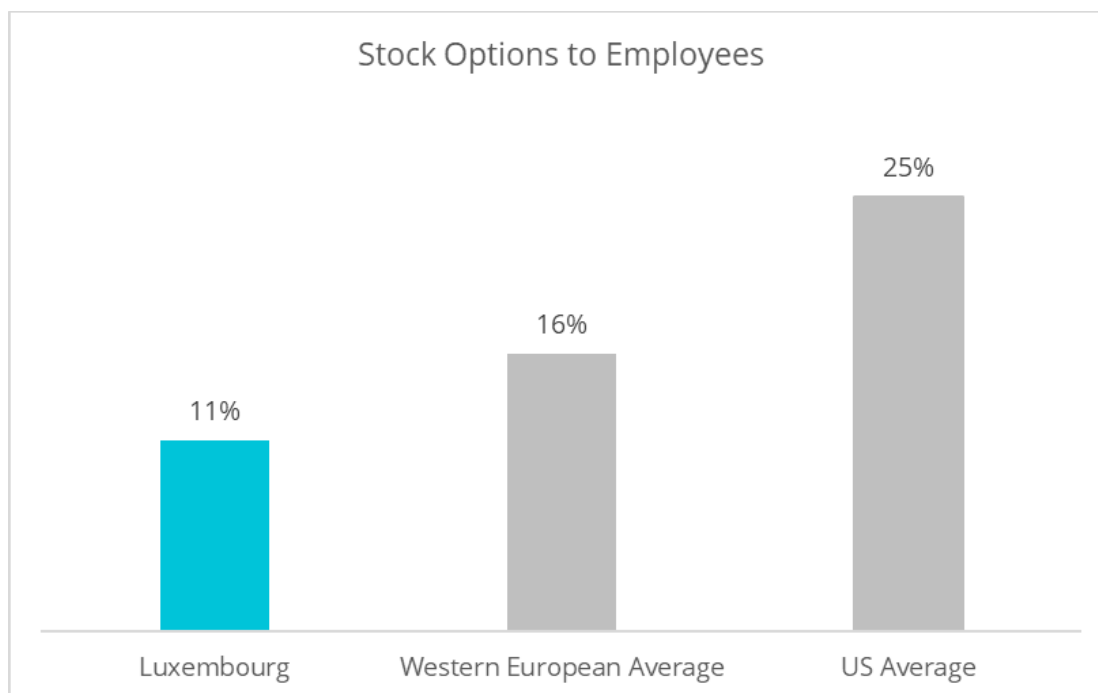
### 3.4.1. Equity-Based Compensation

In many ecosystems, startups are able to compensate for their inability to offer competitive salaries by the use of equity - often in the form of stock options. However, many interviewees felt that this was too difficult in Luxembourg, due to (i) a lack of clarity about how to interpret the law, incurring legal fees; (ii) potentially poor advice having previously been provided to many firms (which, if true, also under-scores the first point); and (iii) the fact that, under any possible interpretation, options are taxed at point which creates an unaffordable tax bill for employees, and thus makes it very difficult for startups to use these as an incentive for early employees.

Our survey found that relatively fewer startups reported using stock options in their remuneration plans<sup>15</sup>, thus supporting the qualitative findings from interviews.

<sup>15</sup> Compared to the Western European average as this metric is heavily influenced by both culture and regulation



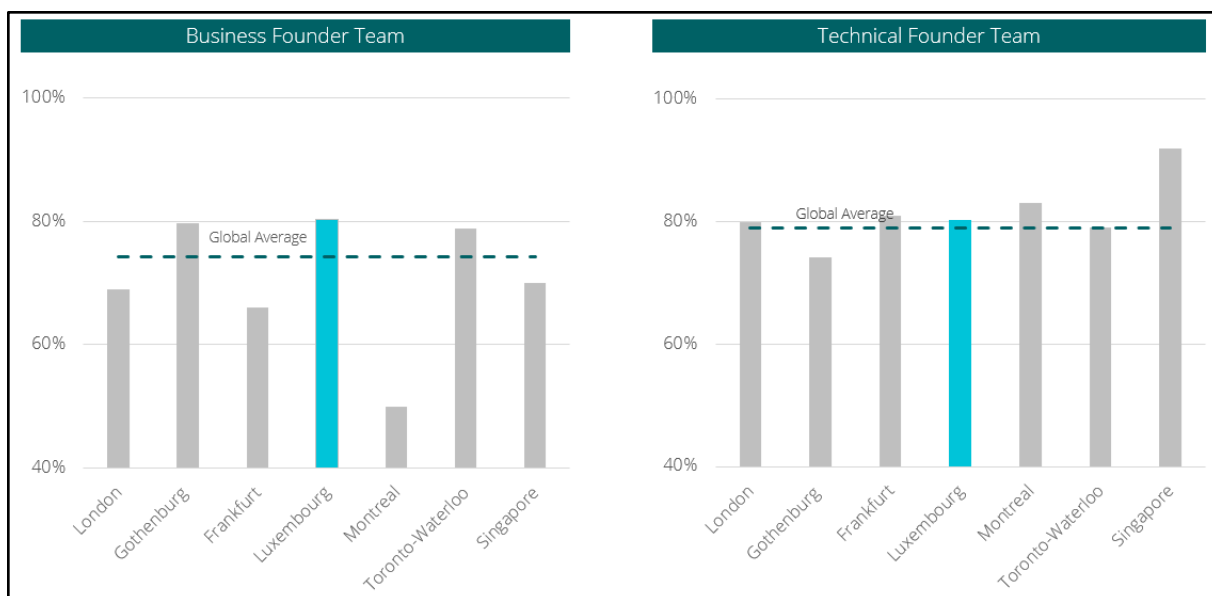


Source: Startup Genome Survey. The average for Western European and the US has been calculated using the values for 12 and 28 ecosystems respectively that we have surveyed in the past

### 3.5. Founders

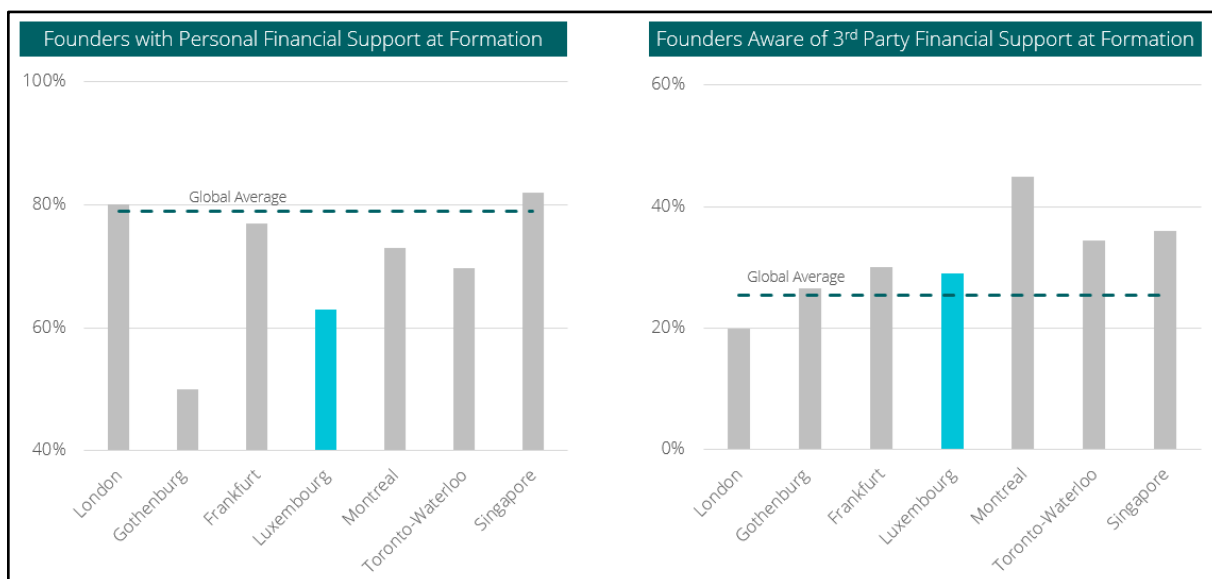
Every startup begins with one or more founders. Understanding this human capital — who Luxembourg founders are, their skills, what motivates them, what kind of resources they have at their disposal, and their previous experience — is important in proactively assisting the ecosystem.

Examining founders' backgrounds through our survey, we find that the percentage of founders in Luxembourg with a business background and the percentage of founders with a technical background are both higher than the average. The existence of technical founders in the ecosystem is crucial to develop deep technologies like Blockchain and AI.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

Interestingly, the percentage of founders in Luxembourg with access to personal financial sources is below the global average, which means that even founders with lower personal financial means are able to embark on an entrepreneurial journey at a higher rate than in other ecosystems. This may partially be attributable to the higher-than-average awareness of third-party financial sources, and the relatively healthy seed funding environment (discussed above).



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

We also examined Founder Ambition, which quantifies the degree of founders in an ecosystem that *claim* to be highly motivated<sup>16</sup>, building a unique product, and targeting sizable markets. While the proportion of founders in Luxembourg with High Ambition is close to the phase average, few of them claim to be targeting large (>EUR 28 Bn) markets compared to those in other peer ecosystems.



Note: The ecosystems on the left side of Luxembourg are from the same region i.e. Europe and the ones on the right are from outside the region. For more context on peers, refer to “Analytical Model” in the Introduction section.

## 3.6. Organizations

### 3.6.1. Startup Support Organizations (Accelerators and Incubators)

As part of our qualitative research, we spoke with a number of support organizations, as well as founders who had experience of these.

Founders’ experience of accelerators and incubators was typically very positive, with organizations such as LHoFT viewed as making a very beneficial contribution. However, a few interviewees commented on what they perceived as relatively siloed or fragmented communities, with a lack of interaction between startups within different support organizations, and hence a missed opportunity to increase peer-learning.

<sup>16</sup> We classify founders as being highly motivated if they claim their motivations for starting their startup are to A) Change the World B) Make large financial returns or C) Make a significant impact on the world

Determining the ‘right number’ of support organizations for an ecosystem is not straightforward, since it depends on the size, sectoral focus, and typical duration of the support programmes, as well as the other types of support available. However, Luxembourg’s performance at the early-stages of startup creation suggests that the current provision is adequate and working well. For reference, London, an Integration phase ecosystem, has around 2.7 accelerators and 1.1 incubators per 10,000 firms (of all types, not just startups); given the stage of that ecosystem and the fact that this appears to be the highest density in the UK, this is likely to represent an upper-limit of what is possible or desirable.<sup>17</sup>

Perhaps more important is whether the support is appropriately targeted. We note that most existing support is directed towards early-stage startups; Tomorrow Street appears to be the only support organization dedicated to later-stage firms. There may therefore be a need to take a portfolio view of such support, and optimize this for the next phase of ecosystem development.

### 3.6.2. Public Research Institutions

In successful startup ecosystems, public research institutions such as universities play multiple roles in encouraging entrepreneurship – from the direct production of spinouts, to entrepreneurial education and mindset development, developing talent, providing research support, and acting as a ‘connector’ which contributes towards overall ecosystem network density.

The academic sector within Luxembourg was seen as a potential strength, although at present the rate of spinout production remains relatively low.<sup>18</sup> Our research did not attempt an in-depth review of technology transfer and commercialisation. However, it may be possible to provide an estimate of ‘best case’ spinout production by examining the total research funding, and applying the rate of startups per unit research funding which are found in the best-performing institutions elsewhere.

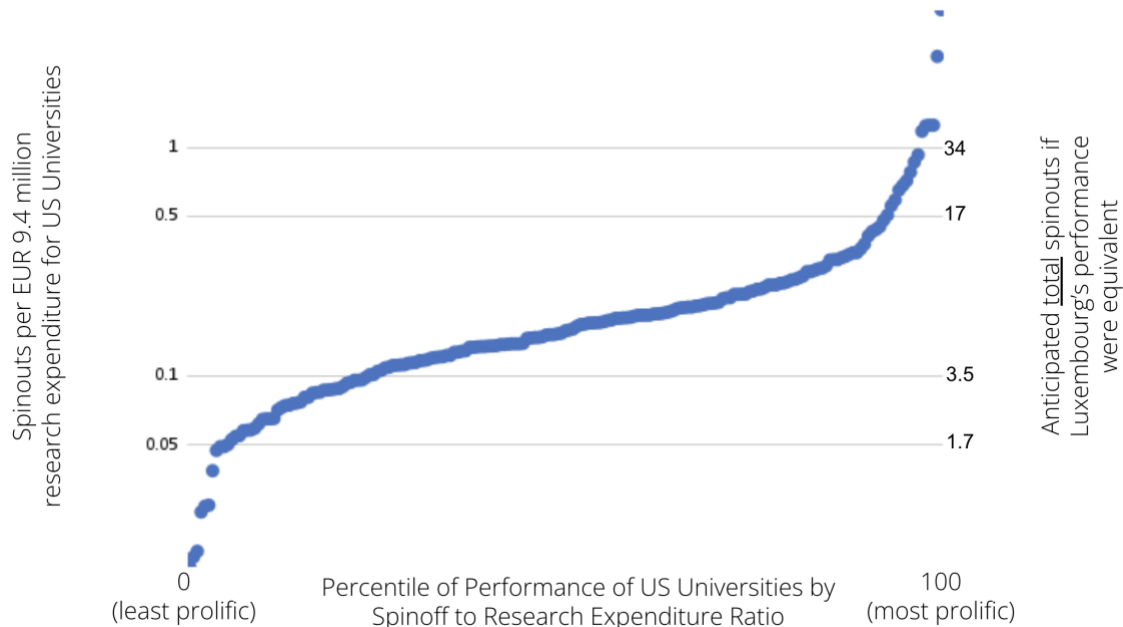
If one looks at the US, for example, one can see that median-performing universities produce one spinout for every ~EUR 63M (ca. 0.15 per EUR 9.4M of research expenditure), whilst the most prolific universities may form spinouts at ten times this rate, and the least prolific at one-tenth this rate. This is shown in the chart below, which plots annual spinouts (averaged over the past 5 years) for US institutions, divided by their research expenditure,

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<sup>17</sup> Haley, C (2022) ‘Incubation Nation: The acceleration of UK startup support’, London: Centre for Entrepreneurs, available at: <https://centreforentrepreneurs.org/cfe-research/incubation-nation/>

<sup>18</sup> We note that the University of Luxembourg is ranked 201–250th in the Times Higher World University Rankings, 25th in the Times Higher ‘Young University’ Rankings 2022, and 701–800th in the ‘Shanghai Rankings’ - although specific faculties, such as Telecommunications engineering, scored much higher.

and arranged by percentile. (The reason for choosing US institutions is not only that there is more complete data available, but also that technology transfer processes are widely considered to be more developed in the US than elsewhere):



Distribution of Spinouts Per Research Expenditure (Log scale) across US Universities

Left axis shows spinouts per € 9.4M for US Universities (top right is more prolific);

Right axis shows annual spinouts which might be expected for Luxembourg Public Research Institutions if performance were equivalent.

Source: AUTM, Startup Genome Analysis

Assuming a research expenditure by the Luxembourg Public Research Institutions of around €350M per annum, we can then make some approximate calculations about what spinout output might be possible, if the Luxembourg Public Research Institutions (and the ecosystem in which they are embedded) performed on an equivalent basis to US institutions.

In our view, it is unrealistic to seek to replicate top US performance, since most universities in that category have had many decades of experience in developing their technology transfer capabilities and, importantly, are also situated within well-developed ecosystems (which enable the university to be relatively 'hands-off' and hence facilitate a much higher throughput). Rather, a realistic 'stretch target' would be to aspire to median to upper-third-quartile performance; if one did this, then based on research expenditure estimated

around €350M <sup>19</sup>per year, one might expect to generate in the region of 5-8 spinouts per year.

This is a relatively crude estimate, which ignores the fact that many institutions make a conscious trade-off between licensing and spinout creation, and also ignores that there are often significant differences between subject areas (i.e. a university focusing on humanities will tend to produce fewer spinouts; an institutional focus on science & technology subjects will tend to produce more). It also says nothing about the *value* of the spinouts created (some universities tend to produce fewer, but higher value, spinouts: in the UK, for example, the University of Cambridge produces numerically more spinouts than Imperial College, but their combined value is estimated to be substantially less).<sup>20</sup> However, based on these estimates, we suggest that – although improving technology transfer in Luxembourg Public Research Institutions remains an important and worthwhile goal – this is unlikely to generate a step-change in ecosystem performance. A focus on embedding entrepreneurial education and enhancing ecosystem connectivity might produce a larger impact.

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<sup>19</sup> Research expenditure has been estimated based on data from Budget de l'Etat 2020 and data provided by Public Research Institutions

<sup>20</sup> Source: <https://www.govgrant.co.uk/university-spinout-report/>

## 4. Luxembourg's Sub-Sector Strengths ('Innovation Edge')

Startup Genome's Innovation Edge framework aims to identify which sub-sectors are performing well, based on two-levels: local and regional ecosystem potential, and global growth.

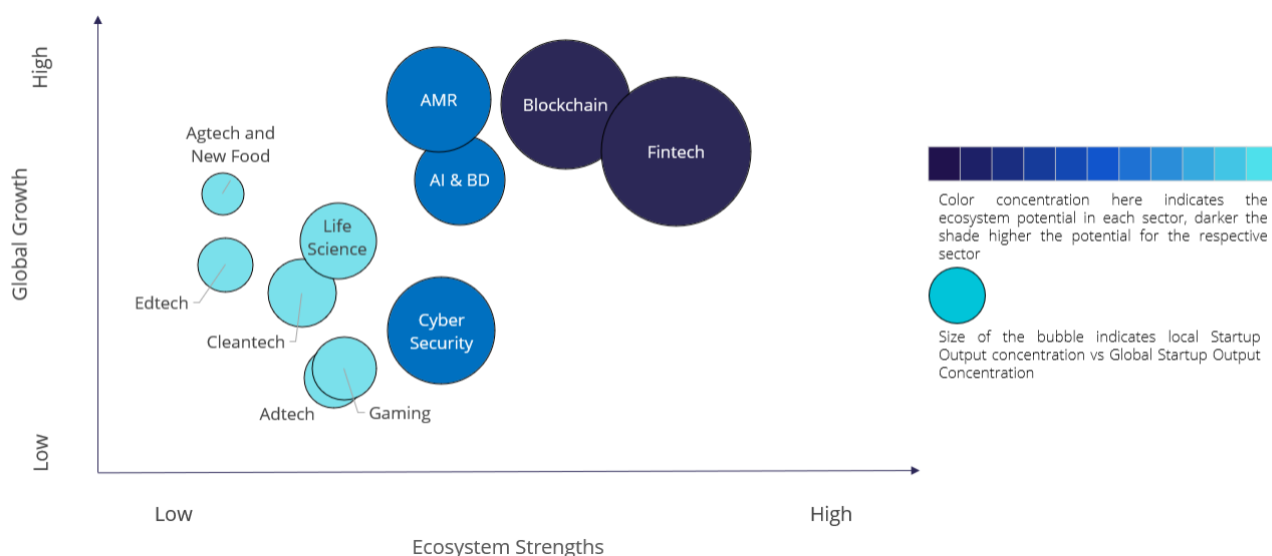
### Ecosystem Potential and Global Growth

**Ecosystem Potential:** A composite measure of the strengths that are observed within the startup ecosystem and potential drivers within the traditional innovation ecosystem. Existing startup ecosystem metrics include startup concentration, early-stage funding, late-stage funding, and exits (M&A, IPOs) by sub-sector. Drivers within the traditional innovation ecosystem refer to assets that can help accelerate a sub-sector, including relevant corporations, patent development and universities. Strengths in the traditional innovation ecosystem are mapped to sub-sectors based on industry or knowledge area.

**Global Growth:** A composite measure of startup growth performance globally, indicating the sub-sectors that are observing faster growth than others. This metric includes growth in the volume of Series A rounds and growth in the number of startup exits per sub-sector

With the rise of Deep Tech as the primary driver of ecosystem growth globally, it is important to be aware of the Deep Tech strengths of an ecosystem and to consider strategies (including connection with the academic sector, as both a source of technology and talent) to enhance this. This applies to basic technology development as well as accelerated commercial and societal uses.

Our analysis finds high potential for sector-specialization within several areas: Fintech, Blockchain, Artificial Intelligence and Big Data (AI & BD) and Advanced Manufacturing & Robotics (AMR).



The table below illustrates how, in our analysis, tech startup sub-sectors in Luxembourg rank against other startup ecosystems globally. The **Startup Ecosystem** refers to factors that directly show the growth of a particular sub-sector like Funding, Performance and Startup Experience and Focus.<sup>21</sup> **Traditional Innovation Ecosystem** on the other hand refers to existing drivers which are core assets responsible for accelerating the sector, this includes Corporations (“Legacy”), Universities (“Talent”), Patents and Research & Development (“Knowledge”).

<sup>21</sup> Definition of Startup Ecosystem Factors:

- Performance: Captures the actual leading, current, and lagging indicators of ecosystem performance like current number of large exits, total exits and startups.
- Funding: Quantifies funding metrics important to the success of early-stage startups including count of Seed, Series A and Series B deals.
- Startup Experience: Captures historical Series A deals and exits as a proxy of experience the ecosystem has gained over time
- Focus: Shows the concentration of startups in a specific sub-sector in the ecosystem



Global Rankings for Sub-Sectors in Luxembourg												
		Adtech	Agtech & New Food	AI & BD	AMR	Blockchain	Cleantech	Cybersecurity	Edtech	Fintech	Gaming	Life Sciences
	Overall Rank	135	195	76	77	35	163	75	222	25	127	140
Startup Ecosystem	Performance	181	206	113	161	72	100	92	195	55	142	173
	Funding	77	167	103	80	57	140	102	195	48	112	138
	Startup Experience	52	206	117	116	78	146	104	151	51	57	117
	Focus	176	172	24	26	8	178	16	211	1	165	92
Traditional Innovation Ecosystem	Knowledge	95	73	104	97	103	175	100	103	110	110	98
	Talent	144	183	183	169	149	176	176	141	129	141	
	Legacy		Very low		44		Very low			37		

Each of the highlighted sub-sectors, especially Fintech and Blockchain, display significant potential to be developed into competitive strengths through investments and utilization of Luxembourg's existing assets. Developing a strategic sub-sector specialization strategy involves choosing 2 to 3 sub-sectors based on existing local strengths in the region and the alignment and support from the startup community, universities and corporations.

Many of the high-potential sectors identified through data-driven analyses and the voice of global databases align with the prioritized sectors in Luxembourg's industry innovation and digital strategy development plan outlined across multiple documents, including the *Roadmap for a Competitive and Sustainable Economy 2025*, the *Data-Driven Innovation Strategy for the Development of a Trusted and Sustainable Economy* in Luxembourg, and *Luxembourg's Research And Innovation Smart Specialisation Strategy*.

## 4.1. Leading Sub-Sectors

An analysis of Luxembourg's funding and exits was undertaken in order to understand in which tech sub-sectors startups receive the most funding.

We find that AI, Fintech and Blockchain startups raise the most early-stage funding. The local nature of early-stage financing underscores the need to measure and quantify access and availability to Seed and Series A rounds. A look at Luxembourg's Early-Stage Funding shows the startups in the Fintech sector raised the most funding, followed by Blockchain and AI & BD respectively.

Startup Sub-Sectors	Early-Stage Funding <sup>1</sup> in €M (2017-21)	
	Volume	Value
Adtech	3	€1.6
AMR	15	€10.2
AI & BD	29	€23.6
Blockchain	21	€28.9
Cleantech	5	€7.2
Cybersecurity	6	€8.9
Fintech	29	€40.2
Gaming	3	€2.2
Life Sciences	4	€7.2

<sup>1</sup>Early-Stage Funding: Seed + Series A deals

We also observe the Highest Exits in Fintech, Blockchain and AI: Startup exits act as triggers that attract resources from other ecosystems and build local experience within the community. Following the trend of Early-Stage funding, most exits were observed in the Fintech sub-sector in the last 5 years, followed by Blockchain and AI & BD.

Exit: IPOs and M&As (#) (2017-2021)						
Startup Sub-Sectors	2017	2018	2019	2020	2021	TOTAL
AI & BD	1		1	1	1	4
Blockchain	1	2	1			4
Cybersecurity		1	2			3
Fintech	3	1		3	1	8

*Only sub-sectors with Exit activity between 2017 and 2021 are represented in this table*

## 4.2. Startup Collaboration with Legacy Industries

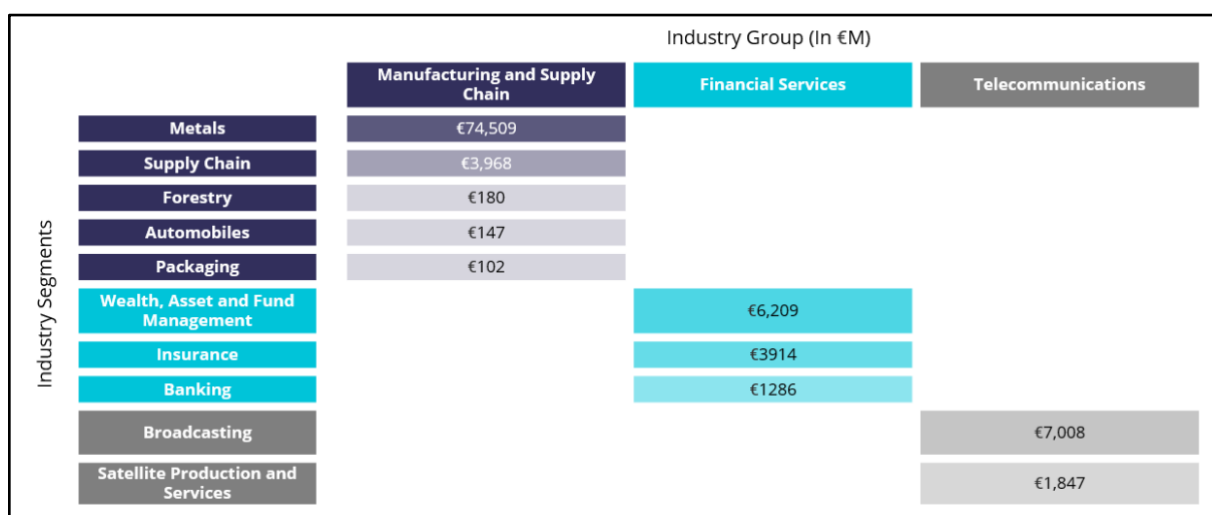
For younger ecosystems especially, there is huge value in closer collaboration between traditional industry and the startup segment, allowing for relevant problem definition, technical mentorship, proof-of-concept opportunities and ultimately accelerated market access. Traditional companies also benefit as they can accelerate their Digital Transformation strategies. We note that, on many measures (e.g. Corporate VC funding,

total numbers of Corporate Venturing units), corporate-startup collaboration has increased significantly in the past decade.

In interviews, many entrepreneurs welcomed the prospect of collaboration with existing businesses, but reported being unclear how to approach this. Most interviewees were aware of the Luxembourg Open Innovation Club (LOIC); however, many founders also noted that while it is an initiative in the right direction, there is more to be done to materialize it as a channel leading to cooperation between startups and established firms. The knowledge and openness of corporations to work with startups remains a key challenge and is likely to require more structured initiatives to facilitate coordination on both sides. There may be opportunities to promote collaboration and knowledge exchange with established firms in other ways, including mentoring, corporate venture capital etc.

In our data analysis, the top 100 (traditional) companies per ecosystem by revenue in FY 2021 were assigned for Luxembourg and its European peers. Corporations represent a primary opportunity for startups as customers, talent feeders, and knowledge bases of expertise.

We find that key segments within Manufacturing, Finance and Telecom capture the lion's share of Luxembourg's corporate base: within the top 100 companies by revenue in Luxembourg, key industry segments such as Metals, Broadcasting Services, Asset Management, Supply Chain and Insurance stand out as the largest segments



We observe that these large “legacy” industry segments in Luxembourg have strong potential to be strengthened by select technology sub-sectors. We identify these linkages to be the strongest in the Fintech, Blockchain, Advanced Manufacturing & Robotics and AI & BD sub-sectors. We believe that Luxembourg's large Financial and Manufacturing corporations can strongly support the growth of these sub-sectors.

Alignment of largest industry segments with technology sub-sectors  
Technology Sub-Sectors ordered by Ecosystem Potential >>

	Fintech	Blockchain	AMR	AI & BD	Cybersecurity	Cleantech
Metals			•	•	•	•
Supply Chain		•	•	•	•	•
Forestry			•	•	•	•
Automobiles			•	•	•	•
Packaging			•	•	•	•
Wealth, Asset and Fund Management	•	•		•	•	
Insurance	•	•		•	•	
Banking	•	•		•	•	
Broadcasting				•	•	
Satellite Production and Services			•	•	•	

The bubble sizes in the table above are a function of a) the number of global startups within each of the technology sectors listed – Fintech, Blockchain, AMR, AI & BD, Cybersecurity and Cleantech – that service the industries listed as rows (Metals, Supply Chain, etc) and b) the size (revenue in FY 2021) of the industry segments in Luxembourg. Larger bubble sizes, therefore, represent higher specialization potential for the ecosystem based on Luxembourg’s industrial strengths and the potential to apply new age technologies (sub-sectors) within such industry segments.

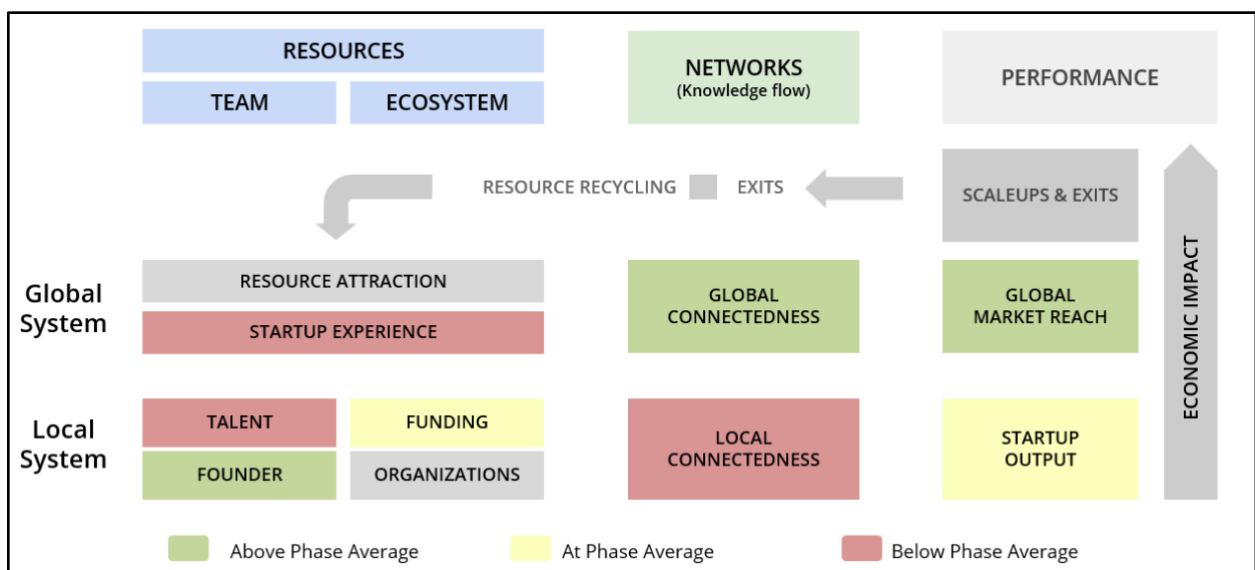
## 5. Conclusions

An assessment of the startup ecosystem through the lens of Success Factor strengths and gaps combined with an understanding of Luxembourg’s current phase of development can facilitate a more informed, data-driven strategy to accelerate startup performance. A recap of these findings will likely be productive for this discussion.

Positively, we note that Founders in Luxembourg have a higher number of connections and market reach which can be leveraged to access globally-leading startup knowledge and access to customers, particularly in the EU. Additionally, the seed funding environment in Luxembourg is robust, with high round sizes and a relatively high proportion of startups in the ecosystem receiving seed rounds.

On the other hand, the ecosystem also displays gaps that should be addressed to support advancement to the next phases of the Startup Ecosystem Lifecycle. Based on the performance of numerous Success Factors, we conclude that the Luxembourg startup ecosystem is in the mid-Activation Phase, witnessing few high-value exits and needing to grow additional startup experience over the upcoming years.

We suggest that in order to grow the ecosystem and move towards the next phase of the Lifecycle, there is a need for growing the local community, improving talent access and supporting scaleup production to drive economic impact. The color-coded Summary below shows the breakdown of Luxembourg's performance across each Success Factor, compared to the Activation Phase average.



## Key Conclusions of Assessment

- **Luxembourg is in the mid-Activation Phase; growing Startup Experience with key resource gaps**
  - The Luxembourg ecosystem exhibits characteristics consistent with the Activation phase of the Ecosystem Lifecycle., Startup Experience is growing but limited and founders are focused on building the first-generation of successful technology businesses in Luxembourg.
  - We estimate the number of startups in Luxembourg to be about 521, consistent with other Activation phase ecosystems yet very high considering the population of the country. This is represented by Startup Density, the

number of startups per million people. At a Startup Density of 800, we note a very high propensity of tech entrepreneurship in Luxembourg.

- **Gaps in Local Connectedness**

- Founders in Luxembourg have a lower number of connections with other founders, investors and experts in the startup ecosystem as compared to the phase average. Furthermore, they also receive less support<sup>22</sup> without direct financial incentives from the aforementioned stakeholders – a critical success factor for the development of the startup ecosystem.
- As the ecosystem grows, the focus should be on growing the Sense of Community. A stronger local community will help founders to transfer knowledge and experience among each other.

- **High Global Market Reach and Global Connectedness**

- Startups in Luxembourg show strong connections with their peers in top ecosystems like London, Berlin and Silicon Valley. Founders can utilize these connections to drive accelerated growth by attracting international resources.
- Startups in Luxembourg have a relatively higher proportion of foreign customers. Notably, ~67% of startups' revenue comes from outside the Greater Region.

- **Strong Seed Funding Environment; but gaps persist at Series A and beyond**

- When normalized by costs of engineers, startups in Luxembourg receive seed round sizes similar to or above peer ecosystems. The proportion of seed-funded startups in the ecosystem is also higher than peers.
- However, the average size of Series A funding rounds and the proportion of Series A funded startups in Luxembourg is relatively low. The gap goes downstream and is further exacerbated when it comes to Late-Stage funding. A steep gap in the attrition funnel is observed at Series B and beyond, indicating key addressable gaps in scaling.

- **Difficulty in Access to Talent**

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<sup>22</sup> Measured in number of hours of help received by founders for no financial exchange

- Startups in Luxembourg have less access to experienced engineers than the phase average and comparable startup ecosystems. Respondents noted that engineers & developer employees and marketing & sales employees are the hardest to access locally.
- A large population of startups in Luxembourg use their offices for product development and marketing & sales, underscoring the need to ease access to the high quality technical and growth talent.

## Way Forward

Based on the strengths and gaps observed and Luxembourg's current phase of development, we have identified three key themes for the Luxembourg startup ecosystem to build on – Community, Talent and Scaling



### Developing Local Community

The performance of startup ecosystems is strongly correlated with the strength of the connectedness and community within them. Startup founders are in the pursuit of building an organization with few resources, and rely heavily on the startup community for support. It can be argued that in the early days of a startup, the startup community serves as the "team" for the founder on the steep ladder of growth.

Despite its small-size, we observe significant gaps in the connectedness of the Luxembourgish ecosystem. Founders reported a fragmented startup community, highlighting more potential for them to integrate more closely with peers and other stakeholders. The disadvantages associated with small-size for Luxembourg underscore the need for a well-connected startup ecosystem to see the exponential effects derived from density and community.

A stronger culture of community often requires strong messaging and emphasis towards positive and supportive behaviors, often championed by influential individuals in the startup community.

In addition, we identify the difficulties in opening a bank account as adding complexity to both company formation and startup relocation, which can be an inhibitor to the development of a larger community.

Barriers to receiving support can also stem from not knowing the right people, observed in the fewer relationships that exist between founders and peers, investors and experts. Here again, a communications strategy in the form of startup portals and media can support information sharing in the ecosystem, supporting network connections and helping founders get plugged in. We strongly believe that the offerings of Startup Luxembourg and Silicon Luxembourg are valuable steps in this direction, yet more can be done to encourage information dissemination e.g. through job portals, event calendars, online matchmaking etc.

We identify the development of the local community to be a key priority, especially in Activation phase ecosystems where access to resources from outside the ecosystem poses more of a challenge.

## **Supporting Access to Talent**

Startup Founders in Luxembourg noted the difficulty in hiring experienced talent from within and outside of Luxembourg. Focused interviews and group discussions uncovered many of the underlying reasons behind difficulties in accessing talent, including perceived factors such as high costs of living, competition with larger corporations, gaps in understanding of the usage of equity-based compensation schemes, a limited local pool of technical talent, and challenges for hiring from outside of the European Union.

While challenging and multi-faceted, addressing gaps in this domain can strongly support the development of startups and reduce resource leakage to more developed ecosystems.



## Developing a Scaling Segment

Support mechanisms at the early-stages by way of formation, programmatic and capital support have strongly supported the Luxembourg startup ecosystem in achieving not only high levels of Startup Density, but also a strong seed funding landscape.

We note, however, that the ecosystem has a key gap in scaleup production, which is critical for driving economic impact from the startup ecosystem. As discussed earlier, gaps in the funnel stem from as early as Series A and go downstream to hinder scaleup production.

Accelerating scaleup production serves many purposes. Firstly, it helps support overall ecosystem positioning for resource attraction. Local and global resources are activated and deployed once there is a more proven record of success for the ecosystem. Additionally, it allows for the formation of startup experience, facilitating resource recycling and creating support for more behaviors that are conducive to the ecosystem. For example, Investor and Expert Help tends to be higher in ecosystems with more experience, with investors and experts being more keen to help startups for free at earlier stages in the hope of more meaningful relationships being formed later on.

In addition to accelerating scaleup production, a coordinated approach to attracting scaleups from outside of Luxembourg can also serve to inject startup experience in the ecosystem. Designing a portfolio of offerings for scaleups and communicating its value proposition through an aligned strategy will be critical in cementing Luxembourg's positioning as a hub for scaleups.

## ABOUT STARTUP GENOME

Startup Genome's mission is to enhance startup success and ecosystem performance everywhere. Startup Genome is the world's leading policy advisory and research organization for governments and public-private partnerships. Its impact is rooted in the world's largest entrepreneurship research with data on over three million companies across 280 cities.

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