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BANKS' PROGRAMS FOR START-UPS: A MULTIPLE CASE STUDY ANALYSIS OF POSSIBLE STRATEGICAL TRANSFORMATION OF EUROPEAN BANKS WITH THE HELP OF NEW PLAYERS

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Acronyms

AFD: Autonomous FinTech Developer

AI: Artificial Intelligence

API: Application Programming Interface

B2B: Business to Business

B2C: Business to Customer

CVC: Corporate Venture Capital

DIS: Disengaged

DLT: Distributed Ledger Technology

EBA: European Banking Authority

EDT: Expectation Disconfirmation Theory

EEA: European Economic Area

EG: Ecosystem Grower

EU: European Union

FE: FinTech Enthusiast

GDPR: General Data Protection Regulation

IACP: Idea and Artifact Creation Pedagogy

IoT: Internet of Things

M&A: Merger and Acquisition

PAM: Partition Around Medoids

PoC: Proof of Concept

PSDx: Payment Service Directive number x

ROE: Return On Equity

SD: Skewed Diversifier

SLT: Situated Learning Theory

SME: Small Medium Enterprise

TD: Total Diversifier

TST: Tester

VaCP: Value Creation Pedagogy

VeCP: Venture Creation Pedagogy

WSED: Worldwide Scouter with Ecosystem Development

WSN: Worldwide Scouters with No ecosystem development

WSS: Within Sum of Squares

Abstract

Banks have historically had scarce interest toward start-ups, resulting in the lack of engagement with them. However the increased competition, caused by new European Union regulation combined with the diffusion of advanced digital technologies and the subsequent accelerated trend in digitalization of activities that during the past decade led to the emergence FinTech start-ups, is somehow urging banks to revise their strategical plans: during last years, more and more initiatives and programs targeting innovative venture in which the banks were directly involved were created across all the European Union.

Considering only banks following a universal business model due to the completeness of service offered on the market, the analysis conducted aimed at shedding some light on possible innovation strategies that could be pursued by these organizations according to the start-up programs in which they were involved. Leaving aside Corporate Venture Capital activities, corporate intrapreneurship programs and the creation of digital innovation units, few researches have been done on the classification of activities oriented to start-ups and possible strategic implications that led banks to create them, especially in terms of the typology of knowledge that could be generated and of dynamic capabilities that could be developed while engaging in different typologies of programs while pursuing various strategical aims.

Framing all the thesis under an innovation management point of view, this work examines which could be possible reasons for banks to intervene in start-up world: considering the typologies of programs in which these financial intermediaries are involved, are they carrying out these initiatives with an interest in re-shaping their business models? Are these institutions morphing from financial intermediary into knowledge intermediary? Answer to these questions have been investigated considering banks operating across the European Union.

Looking into organizations with headquarter in the 27+1 European Union states, a first screening to identify the ones following universal business models has been performed, and subsequently a thorough research of available programs for start-ups has been done through archival research. Identified the possible programs, for each a detailed analysis of its main characteristics was performed to identify similarities in services offered to start-ups. An in-depth description of the main characteristics of different typologies of programs is included in the thesis, as also a description of possible strategical benefits and limitations of each of them. Since most of the banks were involved in different start-up programs, clustering algorithm have been implemented to recognize possible patters among different financial institutions; resulting clusters based on program engagement were then commented considering also other qualitative and quantitative data regarding the sponsoring organization.

Analysing the involvement in start-up programs of 74 different European financial institutions, with a multiple case-study analysis performed at bank-level applying different clustering algorithms for researching a structure within the dataset, 9 different groups (8 + 1 of banks with no programs) with clearly different strategical objectives emerged.

Being engaged in different mix of program implied the fact that different banks are adopting different approaches to developing innovation capabilities and knowledge regarding the markets in which the supported start-ups operate, which could reflect in the underlying development of possible different innovation strategies for rejuvenating the bank ecosystem of products and services, and consequently the financial institution business model. For each different cluster therefore a thorough analysis of possible innovation competencies that could be developed has been performed, taking into account also qualitative data regarding the bank actual business model, their dimension in terms of total assets and information regarding the geographical activities of the financial institution itself to identify possible commonalities and main differences in approaches adopted.

While considering the overall strategical direction resulting from the engagement in identified programs, it has been found that across Europe there exists groups of financial institutions which behave very differently, fact that is enabling the banks to develop somehow a differentiated set of innovation capabilities necessary to evolve and transform banks' products and services offered to both their corporate and physical customers. Inside these groups, banks following similar strategies tend to have some common characteristic, especially in terms of total assets and typology of business model followed, while geographical information seems to be relevant just for some specific cluster, highlighting the fact that apart few regional focuses across Europe there is a great heterogeneity regarding strategical objectives pursued by financial institutions while engaging with innovative start-ups. Each of these different strategies could possibly enable the specific bank to better develop a unique set of innovation capabilities that could provide specific advantages in dealing with certain typologies of upcoming challenges and opportunities emerging from the fast-changing and rapid-evolving industry in which they operate.

Introduction

Due to the uncertain nature of start-ups, banks have historically had scarce interest toward them, and consequently no specific services aiming at satisfying some of their needs has ever been implemented apart from traditional services offered at favourable condition. Nevertheless, due to increased competition caused by new European Union regulation, the diffusion of new digital technologies, the accelerated trend in digitalization of activities and the subsequent emergence of retail bank-alike competitors and FinTech start-ups, something has changed: during past years more and more initiatives and programs for start-ups were created across all the European territory.

Leaving aside Corporate Venture Capital activities, corporate intrapreneurship programs and the creation of digital innovation units, for which bank strategic aims and benefits are easily predictable and have been extensively investigated, few research have been done on the classification of the other activities oriented to start-ups (from here on defined as programs and/or initiatives) and possible strategic implications that led banks to engage into them.

The scope of this thesis will be therefore to categorize, looking into organizations with headquarter in the 27+1 European Union states[1], the initiatives directed to start-ups (both already established and still not) that universal banks set up throughout last five years, from 2016 till mid-2020, and consequently to build a multiple case study analysis at bank-level to identify possible innovation strategies that could be pursued by the different financial institutions according to the start-up programs in which they were involved. All the analysis will be developed under an innovation management point of view, trying therefore to understand if with these programs the banks are trying to build new capabilities to strengthen their actual role or re-shape their activities while facing an increasing competition provided by the FinTech outburst.

Starting with a classification of the different typologies of bank based on their business model, this thesis will proceed first introducing the FinTech phenomena and then showing possible threats imposed by this new wave of innovation enabled by the combined effect of a strong deregulation and increased adoption of digital services that are somehow threatening banking activities all around the world.

In the second chapter the research method is presented, and a quantitative analysis of the EU banking sector will provide some descriptive statistics about the overall number of banks in the economic area, identifying the groups relevant to this work and consequently analysing the availability of start-up programs. Descriptive statistics regarding overall characteristics of the phenomena will be provided at the end of the same chapter to enrich subsequent analysis.

In chapter three, after an in-depth screening of the initiative supported by the banks, a description of the main typologies of programs available will be provided in the form of a short

[1] Countries members of EU are in alphabetical order: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. United Kingdom will also be considered even if since 31st January 2020 the country left EEA due to its relevance in the banking sector.

review of the most important characteristics of each typology of program, also considering the role of the bank as service provider or service recipient and the interconnection of these activities. Some additional statistics regarding the evolution of the involvement in the different typologies of programs will also be provided. The full list of programs on which the analysis is built will be available in Appendix A to help the reader to have an overview of the wide variety of programs available.

In chapter four these programs will be analysed under an innovation management point of view, trying to identify possible strategic aims that a generic bank could pursue while engaged in this kind of activities, and resulting innovation capabilities and market knowledge that could be built while participating into different typology of initiatives.

In chapter five a clustering analysis will be performed to identify common patterns of involvement of banks into start-up programs: for each bank, taking into account the overall number of programs in which it is involved and related characteristics, different clustering algorithms were applied. Resulting groups were then analysed to find a suitable structure in the dataset collected to perform this study, working at bank level as unit of analysis. Qualitative results of the clustering analysis will be reported in this section.

Obtained a classification of main strategical aims and benefits in chapter four and a classification banks based on involvement in different programs in chapter five, the last logical step to conclude the thesis was to link the last two chapters and identify which typology of innovation capabilities these banks could build with specific mix of programs and resulting possible innovation strategies pursued by organizations pertaining to the same cluster. Results were analysed integrating also complementary qualitative and quantitative characteristics of the banks under analysis, like the typology of business model, geographical information regarding the headquarter and the countries of operation, and bank dimension characteristics, with the aim of recognize possible additional commonalities not identified with the clustering analysis among banks which are operating in similar ways.

To conclude, a list of limitation of this research and a description of possible further developments will be discussed, presenting to the reader the shortcomings of the work and the possible ways to overcome them, integrating other kind of innovation activities into the analysis to present a comprehensive overview of the possible strategies of capability development pursued by European banks.

Banking sector in Europe

Banks have always been a core element of corporate and household finance in every country economy since centuries. Born during the Middle Ages as private entities of commercial companies who lent their profits, since the “Italian Risorgimento” period they started to play the role for which we know them better today: financial intermediation, that is connecting borrowers with savers to facilitate the access to liquidity[2]. Traditionally collecting deposits from households and companies, banks use these funds to facilitate, via credit instruments, new investments for all the actors in need of liquidity: this process, as theorized by both Neoclassical and Keynesian students, is able to contribute to speed-up economic growth.

[2] https://www.bancobpm.it/magazine/privati/vita-quotidiana/storia-delle-banche-dallantichita-ad-oggi/

Throughout the centuries, most of the banks evolved adding different type of services and products into their offerings, sometimes becoming specialized on some vertical market, and sometimes enlarging the scope of their activities toward new segments. Based on the main customer segment served, according to the European Banking Authority (EBA) in their study published on June 2018 by Cernov and Urbano (Cernov and Urbano, 2018) on European financial institutions, banks can be classified in four broader categories:

1. Retail-oriented
2. Corporate-oriented
3. Universal
4. Specialized

Considering the main activities carried out and the prevailing sources of funding further specification have been made for each of these categories, leading to a total of eleven different business models identified.

The cited paper shows that for Retail-oriented banks five main business models are followed:

1. Consumer credit banks, whose main purpose is to manage consumer loans granted to retail clients.
2. Cooperative banks and savings & loan associations. Their main activities are originating and servicing loans to individual and businesses members of a local community. These banks are funded via retail deposit.
3. Saving banks are involved in traditional banking activities: managing payments, offering saving products, credits, and insurances both for individuals and for SMEs. Mainly founded with retail deposits.
4. Mortgage banks, focused on originating and servicing mortgages for general customers, mainly founded by retail deposit.
5. Private banks, offering specialized wealth management services to well-off individuals.

Corporate oriented institutions are, as suggested by the name, focused on providing complex financial services to businesses: from leasing to factoring, to bank guarantees and collection and discounting of bills other than all fundraising services and M&A advisory typical of a merchant banks[3].

For universal banks two types of business model have been identified: “Cross-border universal” or “Local-universal”. These banks are engaged in several activities across different markets (like retail, corporate and capital market) and their main difference is their geographical operational focus and the source of funding: the former has major cross border operations and significant part of its funding can come from foreign investors, while the latter is funded by and focused on their domestic market.

The last category (Specialized banks) include custodian institutions (banks which offer security-holding services and transaction settlements other than account administration and collection of dividends and interest payments), pass-through institutions (financial institutions not holding any retail deposit and built with the purpose of issuing bonds and other securities), and a variety of other specialized banks, like public development banks and Islamic banks, that

[3] https://www.investopedia.com/terms/m/merchantbank.asp

operate with completely different aims respect to the afore mentioned typologies financial institutions.

Since the financial crisis of 2008 the number of credit institutions across all the 28 European Union states (27+ UK) has constantly decreased, reaching a minimum in 2018 of 5981 different credit institutions with a total reduction over the period of more than 2500 entities. The number of EEA and non-EEA branches has grown to a maximum of 422 institutions in 2014 (+138 respect to 284 in 2008), showing a little contraction after 2014 till reaching 290 institutions in 2019. Since the establishment of the Single Supervisory Mechanism in 2012 and the relative principle of single authorization that enable European banks to passport their activities to other European countries with a single authorization valid for all the EU territory[4], a slight increase of branches of EU banks operating in different country has occurred (+139 to reach a total of 661 on top of 522 of 2012). The overall contraction of EU credit institutions is partially due to consolidation strategies pursued within banking groups, operated since the beginning of the crisis with the objective of reducing overcapacity and enhance profitability. In parallel to the reduction of credit institutions, also the number of branches available on the territory has reduced significantly in the last decade, passing from more than 238.000 offices in 2008 to 163.000 in 2019, marking a reduction of over 30% of the overall capacity. This reduction nevertheless is not completely attributable to the reduction of overcapacity, but also to the increased adoption and use of digital banking services (up to 58% usage in 2019 respect to 25% in 2007), that somehow made the physical channel less important for an always increasing variety of financial activities. The average Return on Equity (ROE) of the sector in 2019 was 5,4%, lower from the 6,1% of the previous year, but recovering from the previous period even if still far from pre-financial crisis values, when ROE was higher than 10,6%. For the first time since 2007 all the 27+1 countries marked a positive ROE, but dispersion among these values is still high (around 4%), meaning that in some countries the profitability of services provided is way higher respect to other ones[5].

As we can see from Figure 1[6], in different countries of the European union the distribution of banks' assets based on the business model followed varies greatly but excluding few cases universal banks (both cross border and local, in blue and yellow colours from the top of the figure) tend to manage more than 50% of the total assets of the respective banking industry of their country. More than half of the total asset of the European banking industry, precisely 62% as per data of 2015, is concentrated in banks following universal business models, even if the number of credit institutions following these business models represent around 10% of the total number of credit institutions. For comparison purposes, retail-oriented bank represents more than 70% of the institutions, but cumulatively manage less than 20% of the total assets of the sector. Due to the prominence of these institutions, the thesis will be focused only on banks following universal business models for further analysis.

[4] https://eba.europa.eu/regulation-and-policy/passporting-and-supervision-branches
[5] https://www.ebf.eu/facts-and-figures/banking-sector-performance/
[6] Even if the research from Cernov and Urbano has been published in 2018, data are referred to balance sheets presented in 2015. Since no significant activity of infra-bank consolidation (or merger) has occurred in the past 5 years, for the purpose of the thesis it is hypothesized that the relative percentage did not varied substantially in the subsequent years.

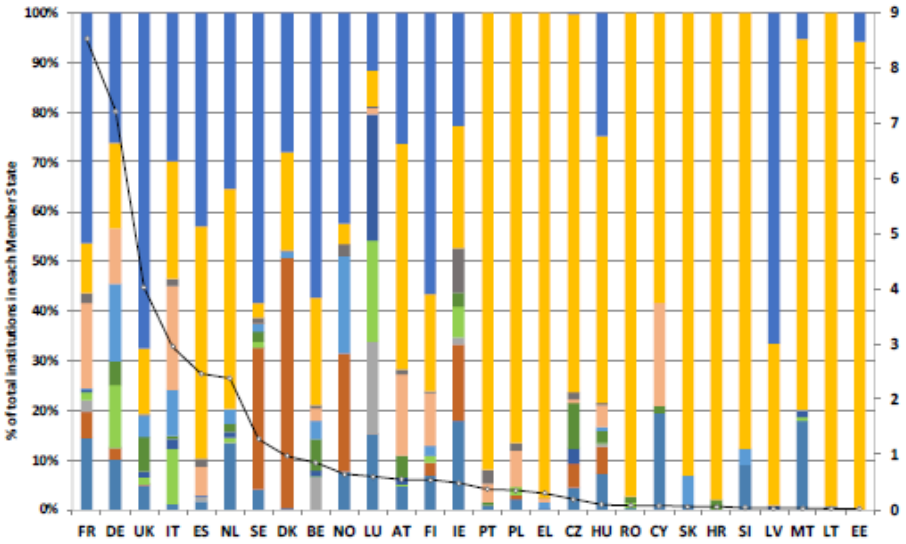

Figure 1 Distribution of assets between banks following different business models across Europe

(Adapted from Cernov and Urbano, 2018)

The emergence of a new paradigm

During the last two decades, the economics of a digital start-up have improved considerably due to different major megatrends able to reduce tremendously the costs of set-up and multiplicate both the channels to reach the customers and the possibilities of revenue streams generation (NESTA Report, 2011a). Advancements in electronics, in information technologies and in telecommunications made the cost of storage to fall by a large magnitude, making easier and cheaper than ever to set-up a digital company while using cloud storage and cloud software services as basic resources of the new venture. At the same time these advancements enabled a faster diffusion and adoption of mobile devices as smartphones and tablets, that provided with internet connection were able to create a set of new channels to reach potential customers, like via e-commerce, social networks, and smartphone applications. Moreover, in the same timeframe, two other technologies related to the back end of the applications started to gain legitimacy by being incorporated in an increased number of commercial products: these are blockchain technologies (or more generally Distributed Ledger Technologies - DLT) and Artificial Intelligence (AI), by many considered revolutionary technologies due to possibilities of new product creation and process improvement that they open-up. Inside this favourable process of accelerated digitalization of services and new technological infrastructure, from the early 2000 more and more start-ups started providing innovative financial services, even the one that once were exclusively supplied by banks, giving rise to the FinTech industry.

Before defining properly what FinTech is, it must be clarified what could be considered as a *financial innovation*: following Nejad (Nejad, 2015) a financial innovation is the combination of innovative processes, products, and business models to fulfil the needs of the financial industry. Companies based on digital infrastructures that combine innovative business models and technologies to enhance, enable and disrupt services in the financial industry, replacing traditional financial structures with technology-based processes could therefore be defined as FinTech companies (Ernst & Young report, 2019).

From here on, FinTech word is used interchangeably to represent both the typology of services provided by the venture and the industry in which these companies operate.

This phenomenon, accelerated by the rapid and parallel development and adoption of a set of enabling technologies, did not went unnoticed by the innovation industry: since 2010, worldwide more than 510 billion US dollars (corresponding to 430 billion €) were invested in FinTech start-ups, with a sharp increase in the last two years, as shown in Figure 2. Most of the capitals were invested since 2014 (92,5% of the total capital invested) especially in the USA, but along the years the prominence of the European market increased, now reaching-up to 42% of the total investment in FinTech technologies and products worldwide.

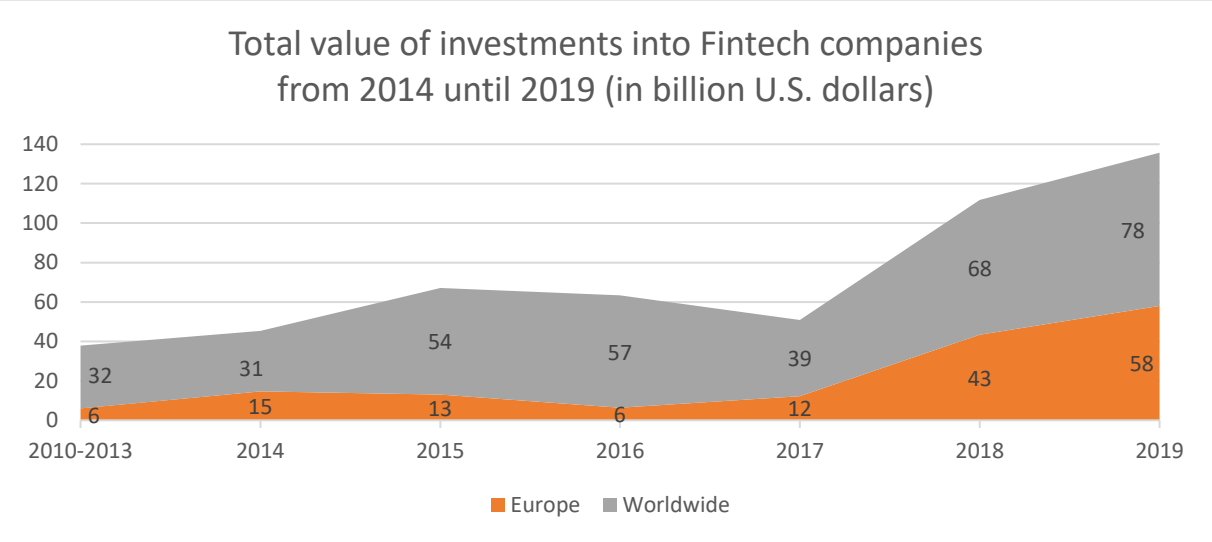

Figure 2 Total value of investments in FinTech companies over time (Data source: Statista)

Inside Europe, as expected from the increasing amount supplied of capital supplied, also the number of investment deals increased, growing from 303 in 2014 to more than 750 in 2019 with an increase of +250% over 5 years. During this period of time in Europe even mergers and acquisitions started to become more prominent, covering always at least 60% of the total yearly investment in FinTech companies, but remarkably most of the times banks were not the acquirers of the technologies, marking the fact that relatively-new players in the field were consolidating their position on the markets or new players were trying to enter into the financial sector, as happened with "Tech Giants" of Silicon Valley and other big multinational companies operating in the most disparate sectors.

This accelerated process, nevertheless, has been enabled not only by the technological revolution but also by a set of policies released by the European Union with the objective of opening-up the competition in the financial industry to new ventures and an increased adoption of these new typologies of services, enabled by the parallel digitalization of the customer base (being persons or companies), highlighting the emergence of a paradigm shift in the financial sector.

Since 2007 with the Payment Service Directive 1 (PSD1) and especially in 2018 with PSD2[7] the European legislators established rules for all the financial providers regarding payment services with the goal of making cross-border European payments easier, more efficient, and

[7] https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A32015L2366

highly secure while providing a greater choice in term of services to citizens. Together with a stronger protection of customer data and new rules on their transferability enabled by GDPR[8], these directives lead the creation of an ecosystem of services denominated *Open banking*, a condition under which all institution that offer payment accounts must offer access to the data of their own customers to controlled third party, usually via Application Programming Interfaces (API) that could be easily implemented in external applications. These laws created therefore the possibility to external providers to securely access the data of actual banking customers and build nimbly on top of them a plethora of innovative service with the help of the technologies mentioned in the previous paragraphs. Moreover, an increased awareness and worry regarding tech giants' power and resulting potential imbalances in the financial sector that could be created if they assume a prominent role as financial institutions, is pushing the European Union in modernizing the assessment criteria for anti-competition practices in digital markets. Due to different economics, data infrastructure and business models, the outcome of their free entry in the market could be disruptive in terms of market competition and subsequent stability of the area, therefore new regulation is in the direction of treating them as effective credit institutions at the same level of banks (BIS Annual Economic Report, 2019). This comprehensive set of new European rules and regulations covering market competition, data protection and financial service provision seems therefore to set favourable conditions for the creation of innovative financial services by new entrepreneurial initiatives, rather than opening the market to tech giants.

High mobile phone ownership has allowed more and more people to be able to access to digital financial services, starting from mobile banking: in 2019 on average more than 50% of people in Europe were using internet banking, with a constant growth since the last decade but with substantial discrepancies in adoption across different countries, as highlighted by Figure 3 below.

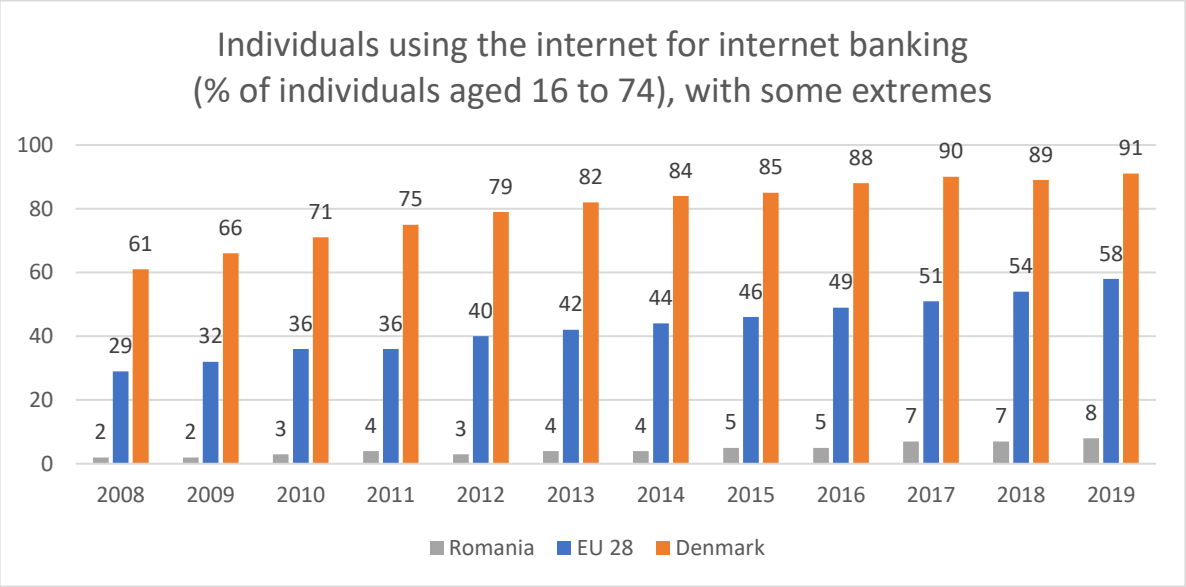

Figure 3 Adoption of internet banking services across different countries (Source: Eurostat)

[8] https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A32016R0679

During this timeframe, customers started to adopt massively also services provided by FinTech companies, as demonstrated by the study created by Ernst & Young in 2019 (Ernst & Young, 2019) interviewing more than 27.000 customers from 27 different countries all around the world, as reported in Figure 4. This trend is accelerated in some countries (like China), but the trajectory of adoption for each typology of service is upward sloping for each country. On top this, the actual pandemic and the related restrictions on movements accelerated even further the usage of digital financial services.

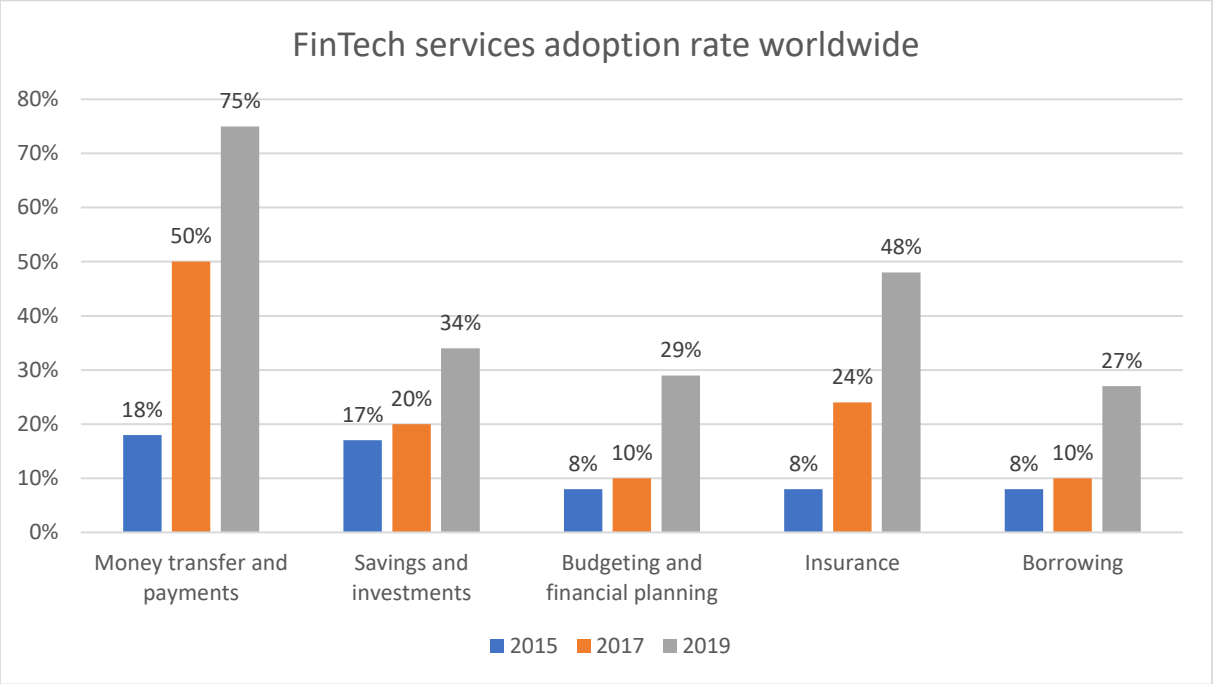

Figure 4 Evolution of FinTech service adoption worldwide (Adapted from E&Y report)

The same trend holds for adoption among businesses: nowadays more than 17% of the companies[9] are integrating FinTech solutions in their product and services or in their back end. It must be noted that this type of adoption in B2B is a signal that FinTech are effectively addressing specific business problems with sound solutions; moreover, the research found that adopters are more likely to be high growth ventures with global outlook, relying on online payment and billing also for invoice management, seeking therefore FinTech solutions to increase efficiency and decrease costs.

Drivers of adoptions

This surge in adoption is caused by many mutually reinforcing factors all enabled by the trends identified in the previous sections; these low regulated[10] internet-based companies with few geographical limitations leverage on digital technology to provide to customers new typologies of procedures regarding lending, investment strategies and payments, often at cheaper rates and more transparent prices compared to traditional financial sector products. Being digital first, FinTech companies are able to combine products based on huge amounts of standardized data backed by nimble and technological advanced back-end infrastructures with interesting value propositions for customers, resulting in personalized, frictionless,

[9] Based on a pool of 1000 replying companies across 5 markets (Ernst & Young, 2019)

[10] Low regulated respect to banking activities. FinTech start-ups usually do not own banking licenses, therefore are referred sometimes as non-banks.

transparent and cost-effective products able to change customer behaviour regarding financial services (Romanova and Kudinska, 2017; Erns & Young Report, 2019).

Ernst & Young consulting company, with the research of 2019 on FinTech adoption (Erns & Young Report, 2019), have identified different drivers of the two main categories of customers of financial services, meaning people and companies, regarding adoption. For people these services are usually delivered via mobile applications, with a strong focus on customer service, user experience and customization, and frequently they leverage on network effects. The easiness of setting up an account, the availability of multiple products and services inside the same space, the awareness of the functioning of the procedures, attractive rates and fees, an excellent customer experience and an overall increased level of trust for this kind of applications are the main declared drivers of adoption by customers. Moreover, what was new few years ago, now by many is considered as a standard requirement, indicating an overall maturation of the industry and evolving customer priorities. From the research emerged that now people tend to pay more attention to prices and fees rather than functionalities, eventually adopting services from multiple providers; this fact confirms the overall improved quality and subsequent commoditization and disaggregation of some FinTech products, even when provided by incumbent firms. Regarding businesses, the FinTech services provided usually cover back-end applications that link business units, both within the company and with the external customers (like payment processing services). Customers adopt these services based on the range of functionalities and features that match their business needs and relative easiness of setup, the availability of around the clock support service and lastly taking into account rates and fees, even if substantial differences in the ranking of priorities is present in different markets, where some elements are already taken for granted by corporations adopting the services.

Challenges for banks

Due to the trends just described which are influencing the spread of FinTech solutions in the market, several threats for banks could be identified: potential loss of market share and market segments, increased pressure on product and service margins, increased operational risks due outpaced offering and growing dependence of banking services on new technologies (Romanova and Kudinska, 2017). Considering all these facts together, FinTech companies seems that could endanger seriously the sources of profitability of these institutions, reducing the future revenue streams on incumbents by a minimum of one third respect the actual revenues[11].

These risks are mainly caused by different business model adopted by challengers, which are able to capitalize on data analytics, on technological edge, on infrastructural advantages, and on different customers segments to compete against financial institutions. Challengers in fact are not relying on any physical asset and engage in minor or nil front-end customer service, are based on extensive and standardized data collection and advanced technological infrastructure, and point at offering low financial risk, high margin activities[12] (McKinsey report, 2019). These risks are intensified when Tech Giant corporations are considered, since

[11] Estimations provided by Accenture and McKensey analysis shows that this reduction could be up to 45% or actual revenues.

[12] Like retail deposits and payments, Asset management, wealth management and consumer finance.

these companies, on top of being data driven, already have a huge worldwide customer base, brand recognition and could easily cross-sell financial services on top of their actual offering due to the high switching costs created by the platform economics (BIS Annual Economic Report, 2019). This mix of Data analytics capabilities, Network externalities created by the platform business model and the interwoven Activities (identified as *DNA characteristics*) are actually mutually reinforcing each other and could provide a competitive advantage in the improvement of financial products, enabling the charge of lower fees due to the increased capability of data analysis regarding customer behaviour, and the extension of financial services to new customer segments that are actually somehow overlooked by the traditional financial institutions.

Nevertheless, banks have different advantages at least over smaller FinTech companies: they still have a big pool of customers, they are still not constrained with capital resources, and they have usually a good brand reputation, providing a trust factor that FinTech up to now were still not completely able to build (Ernst & Young report, 2019; BIS Annual Economic Report, 2019). What is still certainly underdeveloped is the capability of leveraging digital technologies and data analysis to provide further value to their customers (BIS Annual Economic Report, 2019), and due to the progressive fragmentation of the services the risk of losing their relationship with actual clients is increasing. Paying attention to product characteristics that customers consider as prerequisites, like friction, transparency, personalization, and usability, on top of rearranging their back-end while building on the existing customer pool could therefore be a suitable solution to remain relevant in the market.

Taking in to account also the new European regulation, these market entering companies poses risks not only at modular level[13], providing the possibility to expand financial services to a market through the creation of renewed and innovative services on the existing infrastructure, but also architectural and radical innovation threats, that as theorized by Henderson and Clark are the most difficult typologies of innovations to be managed due to the need of reconfiguration of the existing relationships within the organization on top of the need of creating new products with attracting value propositions (Henderson and Clark, 1990).

Due to the stressing context in which banks are operating, these organizations started developing new capabilities and knowledge through a variety of initiatives that until twenty years ago were difficult to find in financial institutions: many organizations during the past decade set up Corporate Venture Capital arms (CVC), internal autonomous divisions focused on digital innovation and corporate intrapreneurship programs to foster innovation: for all these typologies of programs the possible strategical aim and the capability building functions that they provide have already been covered extensively by the research.

At the same time these organizations get more and more directly involved with start-ups, even non in the FinTech panorama, providing them a great variety of services and programs.

[13] Following Henderson and Clark model, taking into account the impact of the innovation on the architectural knowledge and the impact on component knowledge, four different types of innovations are possible: incremental innovation when there is limited innovation in both components and infrastructure; modular innovation when there is innovation on components, but the relationship with the architecture on which this component is embedded do not change; architectural innovation when there are big changes in the underlying architecture of the products without great variations in the product itself; and radical innovation when both the architecture and the components changes.

Following the reasoning carried forth up to now, with increasing pressure provided by the industry challengers, maybe financial institutions decided to involve start-ups in their strategies to develop new capabilities or new products to leverage on during next years of turmoil. Little research has been performed in this regard, especially considering the aggregation of all the initiatives at bank level and the comparison of possible strategies across organizations coming from and operating into different territories.

How could banks benefit from these initiatives?

To be able to characterize the behaviour of these financial institutions regarding their engagement with start-ups, first and foremost the difference between programs/initiatives and services must be addressed, since services will not be considered for further research. There are two main differences between these categories: first, services are a set of activities delivered by the bank that have a direct cash outlay for start-ups toward the bank, while programs and initiatives do not; second, the outcomes of the activities performed in one case are clear and defined regarding possible economical returns of the bank (for services), while in the latter case are uncertain and difficult to quantify and measure ex-ante, making the bank return not straightforward. Two different subsets of initiatives could be therefore identified: programs directly organized by the bank (sometimes with the support of third parties) and programs which the bank is sponsoring but for which is not directly involved in the organization of the activities. From this point on, in the former case the bank will be identified as the program "provider", while in the latter case will be identified as the program "recipient". It must be noted that in both cases, somehow, the banks are going to benefit from the involvement in these initiatives, therefore the word "beneficiary" has not been used purposefully in the definition of these two categories; moreover almost every program is completely cash-free for start-ups, regardless of the organizer, making this subject even more interesting in terms of identification of the value created and captured by the respective parties in the unfolding of the activities.

How the banks are able to benefit from the variety of initiatives available is therefore a central building block of the work, upon which the analysis of the strategical aim will be framed throughout the lenses of innovation capabilities development in order to understand possible strategical implications regarding the evolution of the banks business models and the subsequent need of building new capabilities to overcome possible limitation in the ability of creating new products and services for their heterogeneous customer base that, we must remember, do not only comprehend physical persons but also a plethora of companies and corporations working in the most disparate industries and markets.

Based on the analysis of the programs in which each bank is involved and possible dynamic capabilities and market knowledge that could be built while participating in different programs, the work will be developed as a case study research with multiple units of analysis (each different bank) to identify potential clusters of banks following similar strategies of capability building. Even if with some limitations, described in the conclusive chapter, the thesis aims at enriching the actual research performed on the strategical activities carried out by banking institutions, focusing on the new phenomena of increased start-up involvement in their institutional activities that has emerged in the recent past, as demonstrated by the surge in programs created in the period of the analysis.

Descriptive statistics

To provide a sound characterization of banks innovation strategy carried out with the creation or sponsorship of programs for start-ups, detailed descriptive statistics have been collected, first identifying banks relevant to this study, then the set of programs targeting start-ups in which these financial institutions were involved during the timeframe of the research.

Bank identification

The identification of the banking institutions relevant for this thesis and the relative classification has been done utilizing different instruments and resources and for each bank a sequential process made by three steps has been followed. First of all the European Banking Authority (EBA) *credit institutions register*[14], the official regional database of organizations to which authorisation to operate to operate within the EU and EEA countries as a financial intermediary has been granted, was consulted. Within the register two out of three categories or organizations were taken into account: *Credit institutions*, legally defined as an undertaking whose business is to receive deposits or other repayable funds from the public and to grant credits for its own account, and *EEA Branches* defined as branches of credit institutions authorised in another EEA country which have the right to passport their activities. *Non-EEA Branches*, defined as branches of credit institutions having their Head Office in a third country, were left aside due to the thesis' focus on European Institutions. Below the Table 1 reporting the number of legal entities registered, divided by country.

[14] https://eba.europa.eu/risk-analysis-and-data/credit-institutions-register consulted between 31st August 2020 and 22nd September 2020

Table 1 Number of credit institutions in each European country

Country	**Credit Institution + EEA Branches**
Austria	526
Belgium	81
Bulgaria	23
Croatia	24
Cyprus	17
Czech Republic	56
Denmark	103
Estonia	16
Finland	238
France	366
Germany	1484
Greece	33
Hungary	36
Ireland	60
Italy	474
Latvia	17
Lithuania	18
Luxembourg	114
Malta	22
Netherland	82
Poland	599
Portugal	160
Romania	71
Slovakia	27
Slovenia	16
Spain	189
Sweden	154
United Kingdom	281
Total	**5287**

These data are representing the number of different companies with banking license registered in each country, but not all of them represent a different financial organization: this statistic do not take into account the fact that even if these companies have different legal entities, in a substantial number of cases they belong to a bigger financial group that owns or controls them. As a second step, for each organization present in the register, there was therefore the need of identifying if it was part of a larger group or an independent organization. To perform this classification and to start cleaning the data the web-directory *TheBanksEU*[15] (an independent public directory of information regarding banks operating in Europe) was deployed. With the data provided by this directory it was possible to aggregate the banks into their relative group, and since some information regarding the business model was also available, it was possible to eliminate from the research space also some organization following business models completely out of scope for this work (like for example groups focused on providing mortgage loans or private banks).

For the scope of the thesis, only universal banks have been considered due to the relevant role that they operate in the markets, holding more than 60% of total assets[16] of all banking sector across Europe (Cernov and Urbano, 2018). To conclude the process the third and last step, that is the identification of universal banks as defined by Cernov and Urbano, has been carried out browsing directly into the bank websites to check for the services offered. Identifying basic products has been quite straightforward since all the websites point out clearly which are the basic services for their retail customers, while for corporate offerings a more structured research process has been set up.

Through archival research performed with Google search engine, different keywords were utilized in conjunction with the bank name to recognize banking groups relevant for this work, and the first thirty (30) results obtained by the research engine were analysed. The keywords used were “bank name” + “corporate services” / “m&a” / “corporate finance”.

The assignment of these groups to the different countries have been done based on the physical location of the headquarter of the group and banks belonging to the same group have been counted once below the parent organization name.

Following the steps described above for all the countries in the European Union plus the United Kingdom, a final list of 74 different credit institutions has been drafted for further analysis. 41 Banks were classified as institutions following Cross border universal business models, being active as universal bank across different European countries, while 33 were labelled as local universal banks, providing universal services just in their home country.

[15] https://thebanks.eu/ consulted between 31st August 2020 and 22nd September 2020

[16] Data are referred to the total asset owned at the end of 2015, summing up at 21.726,159 Billion € for universal banks out of 35.141,928 Billion € for all the institutions, as per data collected by the report of Cernov and Urbano.

In the subsequent illustration (Table 2) it is represented the distribution of institutions among the different countries, subdivided by business model[17] and with relative data about total asset at 31/12/2019[18].

Table 2 List of European banks operating with universal business models

Country	Bank group name	Business model	Total Assets (B€)
Austria	Erste	Cross border	246
	Raiffeisen	Cross border	170
Belgium	Belfius Banque	Local universal	172
	KBC Group	Cross border	291
Bulgaria	Central cooperative bank	Cross border	6
	First Investment bank	Cross border	5
	Investbank AD	Local universal	1
	Municipal Bank	Local universal	1
Croatia	Agram Banka	Local universal	1
	HPB Harvatska Postanska banka	Local universal	3
Cyprus	Astrobank public company ltd	Local universal	2
	Bank of Cyprus Public company	Cross border	20
Denmark	Danske Bank	Cross border	505
	Jyske Bank	Local universal	87
	Nykredit	Local universal	30
	RINGKJOBING LANDBOBANK	Local universal	7
	Sydbank	Local universal	20
Estonia	AS LHV Pank	Local universal	3
Finland	Aktia Bank Abp	Local universal	10
	Nordea	Cross border	555
	Op-Pohjola Group	Local universal	147
France	Bnp paribas	Cross border	2164
	Credit Agricole	Cross border	2011

[17] Universal banks are engaged in several activities across different markets (like retail, corporate and capital market) and their main difference is their geographical operational focus and the source of funding: the former has major cross border operations and significant part of its funding can come from foreign investors, while the latter is funded by and focused on their domestic market.

[18] Data collected from different sources, like www.statista.com, financial reports of 2019 of the different banks and from other resources available online.

	Credit Mutuel	Cross border	667
	Group BPCE	Local universal	1338
	Societè Generale	Cross border	1356
Germany	Bayerische Landesbank	Local universal	235
	Commerzbank	Cross border	463
	Deutsche Bank	Cross border	1298
	DZ BANK Group	Cross border	559
	Landesbank Baden-Württemberg	Local universal	257
	Norddeutsche Landesbank	Local universal	121
	OLB Wustenrot	Cross border	20
Greece	Alpha Bank	Cross border	64
	Eurobank	Cross border	62
	National Bank of Greece	Cross border	64
	Optima Bank	Local universal	1
	Piraeus Bank	Cross border	61
Hungary	Budapest Loan and Dev. Bank	Local universal	4
	GRANIT Bank	Local universal	1
	MKB Bank Nyrt.	Local universal	5
	OTP Bank	Cross border	28
Ireland	Allied Irish Banks	Cross border	99
	Bank of Ireland	Cross border	132
Italy	Banca Sella	Local universal	15
	Banco BPM	Local universal	167
	BPER BANCA	Local universal	79
	CREDITO LOMBARDO VENETO	Local universal	1
	Intesa Sanpaolo	Cross border	816
	Monte dei Paschi di Siena	Cross border	132
	Unicredit Bank	Cross border	855
Latvia	Citadele Bank	Local universal	3
Luxembourg	Banque International a Luxembourg	Local universal	26
Netherland	ABN Amro Bank	Cross border	375
	ING Bank	Cross border	892
	Rabobank	Local universal	591

Poland	PKO	Cross border	76
Portugal	Millenium BCP	Cross border	81
	Caixa Geral de Depositos	Local universal	72
	Novo Banco	Local universal	45
Romania	Banca Romanesca	Local universal	1
Slovenia	Nova Ljubljanska banka	Local universal	10
Spain	Banco Sabadell	Cross border	234
	Banco Santander	Cross border	1572
	Bankia	Local universal	218
	BBVA Banco Bilbao Vizcaya Argentaria	Cross border	754
	Caixa Bank	Cross border	446
Sweden	Handelsbanken	Cross border	293
	SEB Skandinaviska Enskilda Banken	Cross border	273
	Swedbank	Cross border	230
United Kingdom	Barclays Bank	Cross border	1261
	HSBC	Cross border	2267
	Lloyds Bank	Cross border	921
	NatWest	Cross border	1021

Czech Republic, Lithuania, Malta and Slovakia are not represented in the list since no universal bank based in these countries have been identified with the research process.

Geographical information

On top of collecting data regarding the business model and total assets, some data regarding geographical aspects of the financial institutions were identified and stored to perform further analysis after the classification of strategies. First, the country in which the bank has its own headquarter has been identified, and its specific European region has been associated, following the classification reported in Figure 5 and in the list below. Then, for banks following cross border business models, with the classification just provided a mapping of the regions in which they operate has been created.

Mapping of European countries:

- North: Sweden, Finland, Denmark, Latvia, Lithuania, Estonia
- Central: Germany, Netherland, United Kingdom, Ireland, France, Austria, Czech Republic; Belgium, Luxembourg
- South: Portugal, Spain, Italy, Slovenia, Croatia, Greece, Cyprus
- East: Poland, Slovakia, Hungary, Bulgaria, Romania

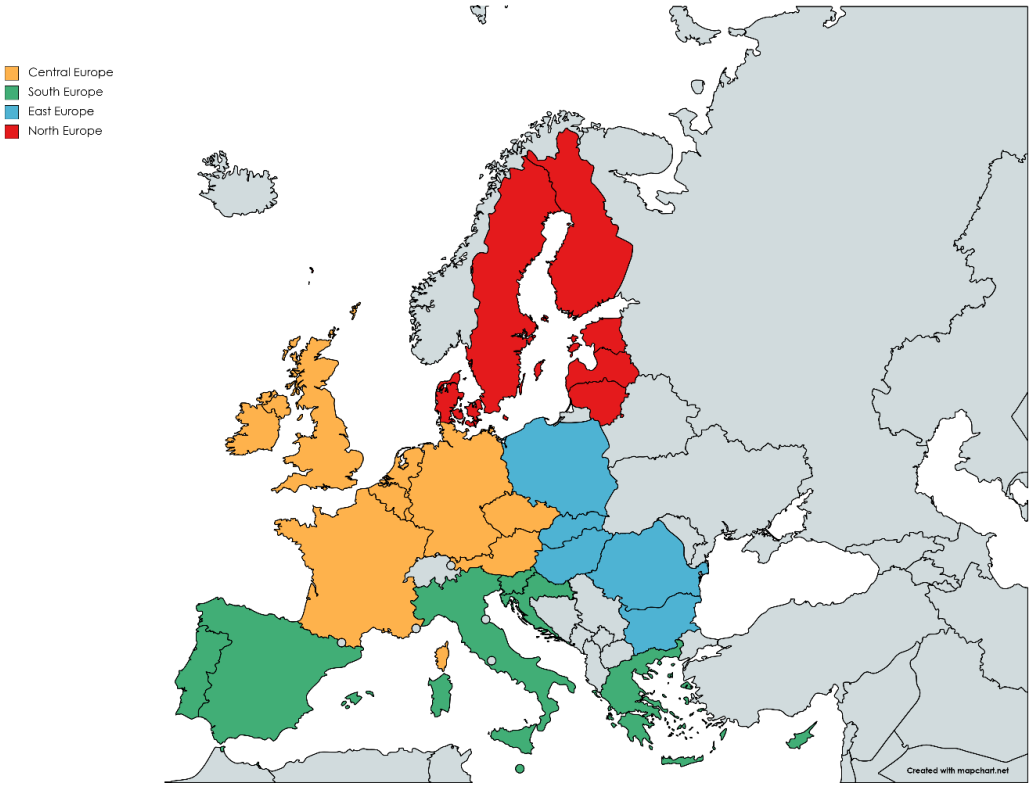

Figure 5 Representative map of Europe divided by Geographical region

Program identification

For each group the identification of start-up programs has been carried out throughout archival analysis of proprietary websites, integrated with other information coming from external specialized websites. For each banking group, to provide a solid screening, ten different keywords were used, and the first thirty (30) results provided by the Google search engine while typing "bank name" + "keyword" (example Barclays start-up programs) were analysed. In the case of multiple brands belonging to the same group, the screening was extended to each one of these sub-organizations. Programs available during past 5 years (from January 2016 to September 2020 included) were considered for research purposes.

List of keywords used:

- Program for start-ups
- Start-up programs
- Call for start-ups
- Accelerator
- Incubator
- Idea competition
- Hackathon
- Open Innovation programs
- Start-up services
- Start-up resources
- Entrepreneurial programs

A total of 51 banking institutions are promoting at least one program tailored for start-ups (Figure 6). Among them, 37 offer universal services across different countries, while 14 are focused exclusively on providing these services into their home countries.

A total of 23 banks following universal business models identified with the research (31% of our sample), seems to not be involved in any start-up initiative in the last five years. Regarding this sub-group, 4 credit institutions could be considered cross-border universal banks (10% of all the banks following this business model), while the remaining 19 local universal (58% of all the banks following this business model).

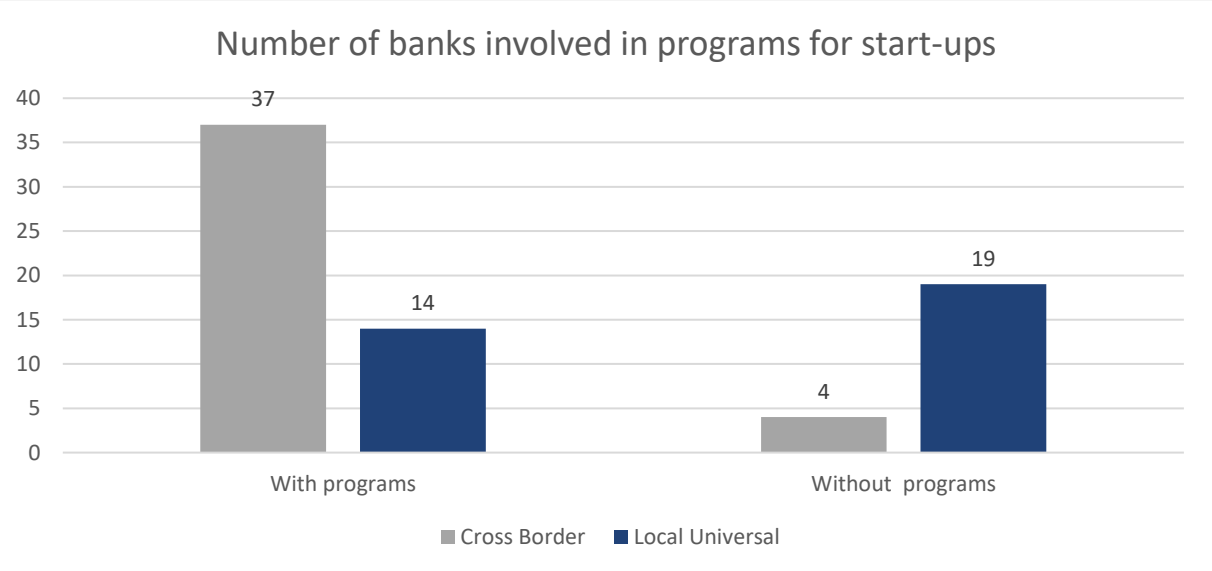

Figure 6 Banks involved in programs for start-ups

Another trend of increased interest from the bank into start-ups could be detected analysing the number of banks which provide this kind of programs throughout the years: as it can be easily seen in the graph below (Figure 7) during the past five years more and more financial institutions started to provide initiatives oriented toward innovative companies.

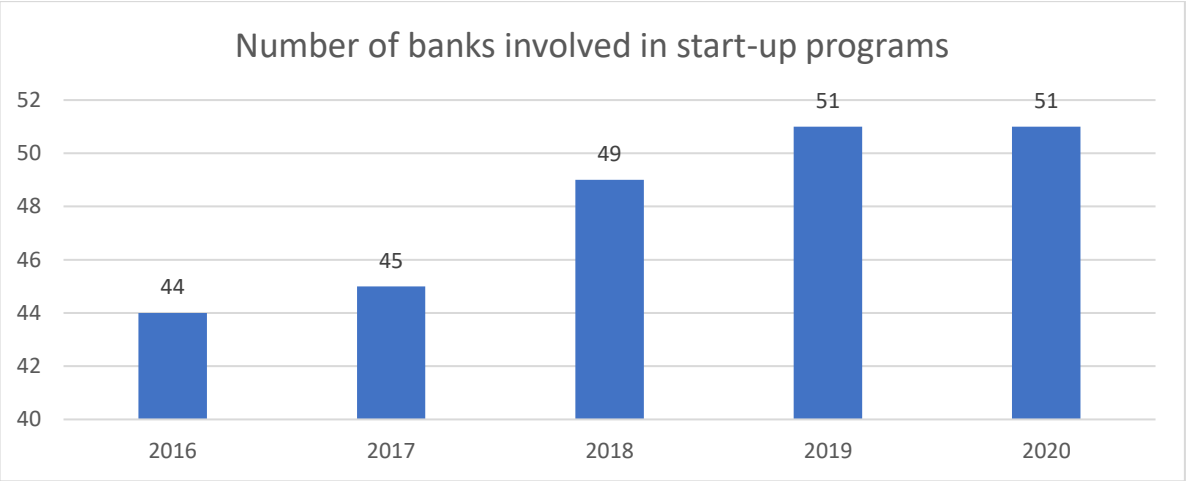

Figure 7 Number of banks involved in start-up programs

Evolution of engagement

From the chart below (Figure 8), it emerged that the involvement of banks in these kinds of programs is growing over time, with a total overall increase year over year always exceeding 10%, more pronounced during the first years (+26% 2017 over 2016, +18% 2018 over 2017). The year 2020 saw a little halt in growth of the initiatives, partially due to the limited timeframe taken into account for the research (limited to 30th of September), and partially due to the pandemic situation that emerged which limited the possibility of organizing specific kind of activities for most organizations.

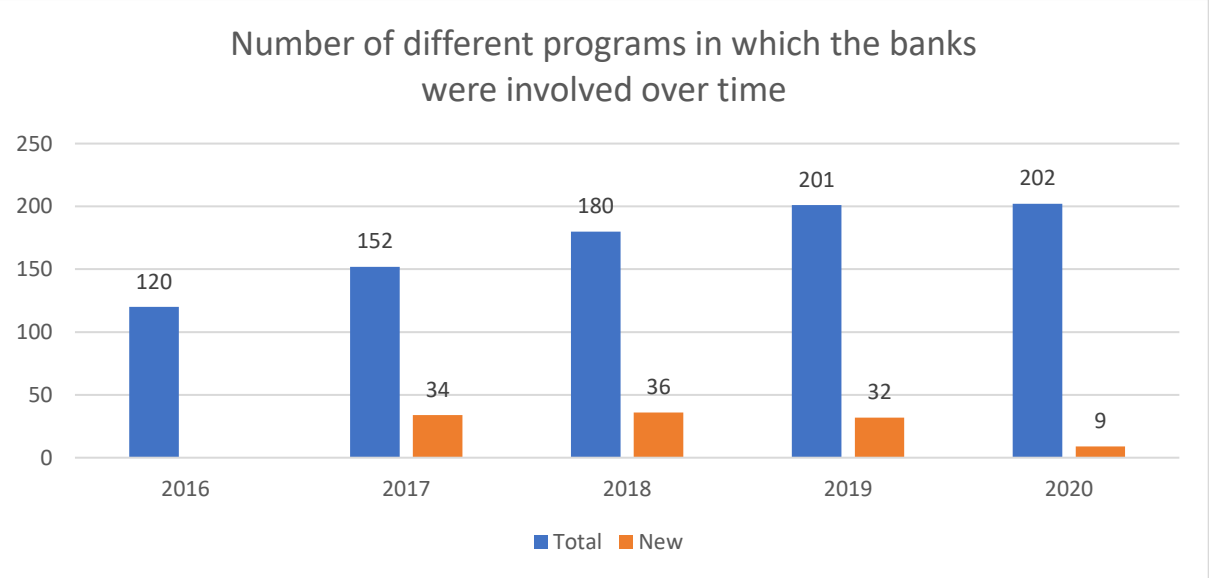

Figure 8 Number of different programs in which the banks were involved over time

As we can see from the table below (Table 3), most of the programs were repeated over time, showing somehow a prolonged commitment from the sponsoring institution toward the organization of the program, with a minimum of 90% of survival rate year over year[19].

[19] Calculated as number of program continuing from year X at 2020 date divide by total number of program of year X. For example, for 2016 the calculation has been 114/120. For 2017 142/152, and so forth.

For example, out of 120 programs supported in 2016, in 2020 114 of them were still available to start-ups, and similar patterns can be seen also in programs activated in subsequent years.

Table 3 Program availability and continuity over time

	2016	2017	2018	2019	2020
Total	120	152	180	201	202
New		34	36	32	9
Continuing from 2016	-	118	116	114	114
Continuing from 2017	-	-	144	142	142
Continuing from 2018	-	-	-	169	167
Continuing from 2019	-	-	-	-	193

More than 50% of the banks with programs were involved in five or less programs for start-ups over the course of the years, with 16 banking groups (an astonishing 31% of credit institutions that have been involved in start-up programs) involved in just one or two programs during the timeframe of the research (Figure 9).

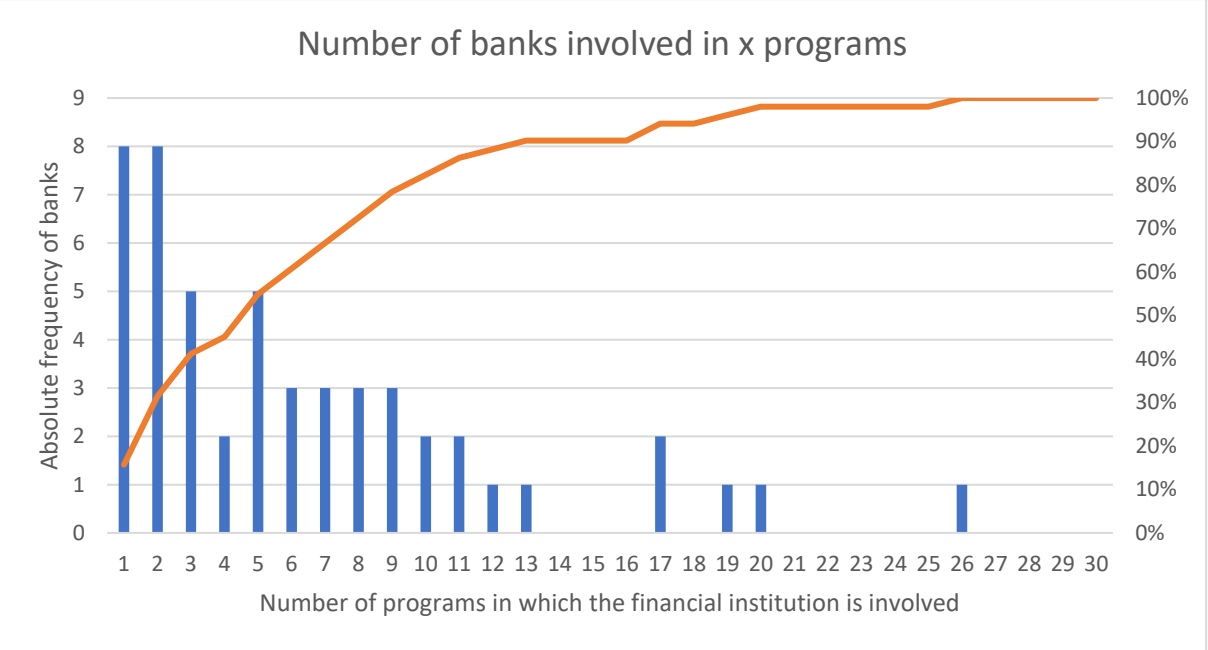

Figure 9 Counter of banks involved in X different programs

A total of 26 out of 33 banks following local-universal business models have been involved in less than 3 initiatives for start-ups, while the remaining seven ranging from 3 program to a maximum of 10 programs for Rabobank. Concerning banks following cross border business models, participation is more dispersed, resulting in 24 banks with involvement in less than 6 programs, 8 banks with 7 to 10 programs and the remaining 9 banks with more than 10 programs (for a maximum of 26 for BNP Paribas).

Taking into account also the data regarding the dimension of the bank, from the graph below (Figure 10) we can see that banks following local universal business models, on top of being

involved on average in less programs, tendentially have a lower amount of total assets respects to cross border ones, with few visible exceptions (ABN Amro with more programs and Group BPCE with greater total assets).

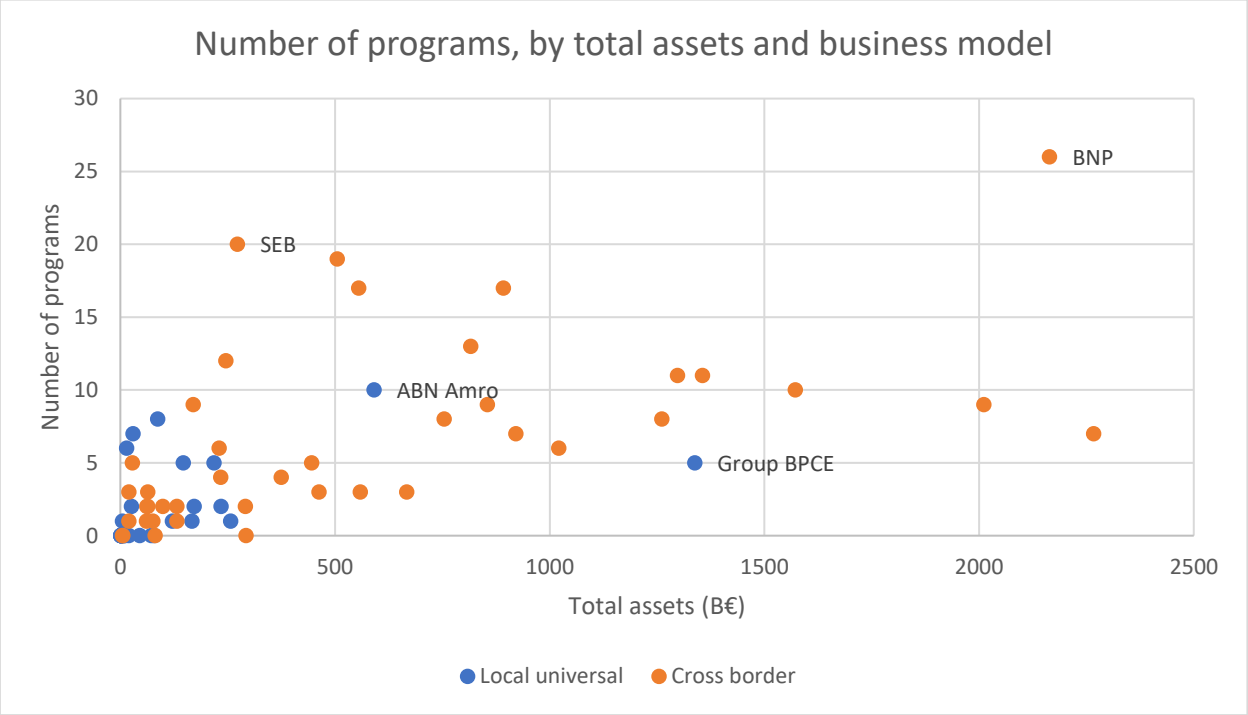

Figure 10 Number of programs, by total assets and business model

Cross border universal banks instead are really scattered on the graph, but some differences based on the dimension could be spotted: smaller banks (<500 B€, representing the first, second and third quartile of banks based on total assets dimension) have been involved in few programs, but again exceptions were present (Erste Group and Skandinaviska Enskilda Banken - SEB). Middle tier banks (500 B€ < asset < 1500 B€, representing the first part of the fourth quartile) are very dispersed, meaning that some banks are more engaged with new venture respect to others, but all of them have been involved in at least 3 programs in the last 5 years. Finally, bigger groups (> 1500 B€ of assets, very few institutions representing the top of the fourth quartile) have been involved in at least 7 programs during the timeframe of the research, marking a tendency in increased involvement the bigger the financial group. Data about banks without programs have also been added to this graph and they are showing that they tend to be smaller credit institutions, even if someone has activities across different European countries.

Program analysis

Program providers, involvement, and industry focus

The banks that are involved in program for start-ups not always are the direct providers and organizer of the initiative: a consistent 15% of the different programs identified with the research process was organized by third parties, with the bank among the main stakeholder for which the program was organized. It must be clarified that these programs, organized by external organization like consultancy firms and innovation platforms, are usually open to multiple financial institutions, and therefore that the overall number of different programs found with the research process must be specified in more depth. Considering the commonalities described above, the overall number of different programs identified for the research purposes is 228. Among them, as said before, 15% are provided by external organizations, while the remaining 85% (corresponding to 193 programs) were directly provided by the different financial institutions (Figure 11).

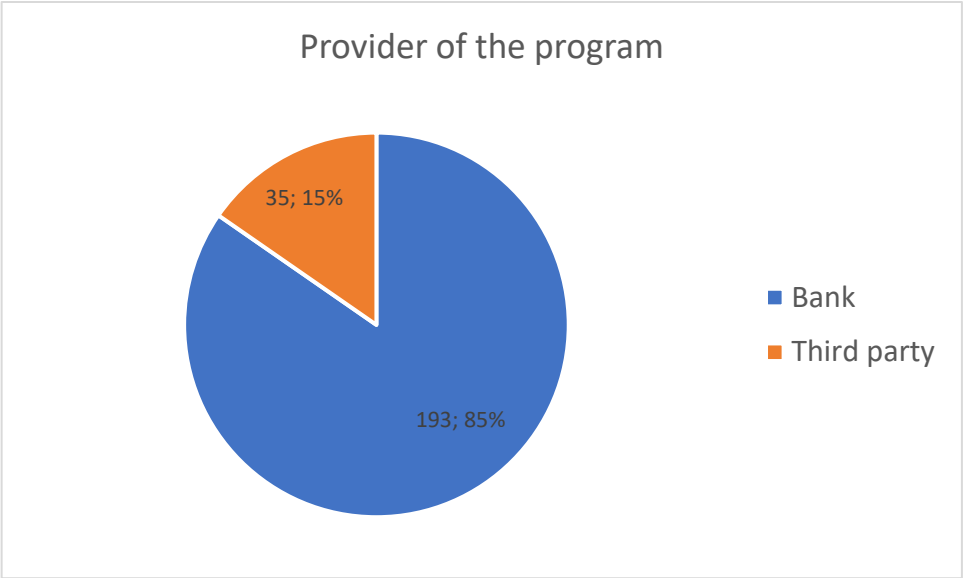

Figure 11 Provider of the program

Even if the overall number of different programs provided by third parties is relatively low respect to the total number of different programs found, while taking into account the effective participation to these programs from the different financial institutions, the relative weight or externally organized programs increases (Figure 12).

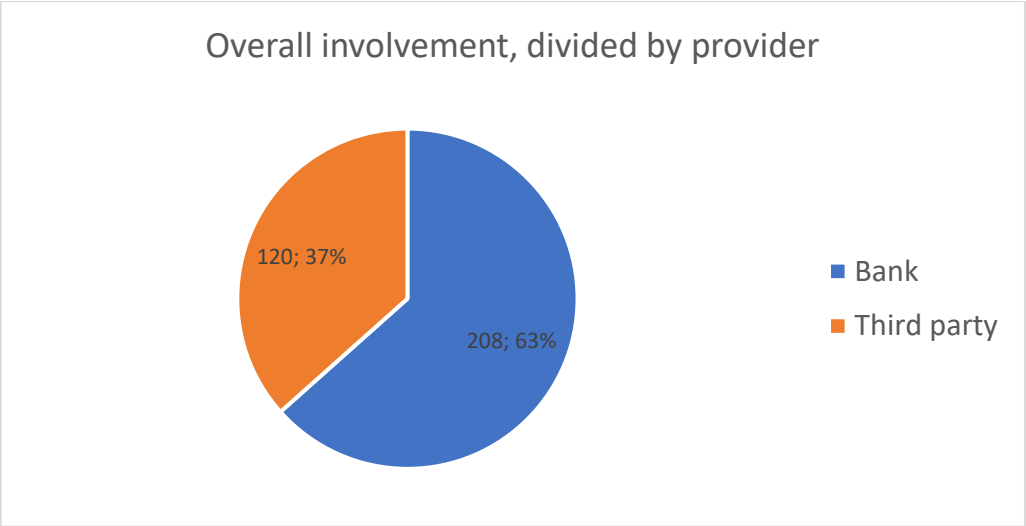

Figure 12 Overall involvement, divided by provider

As shown in the subsequent graph (Figure 13), many of these programs have seen participation from multiple financial institutions, up to a maximum of 11 banks participating to the same initiative. However, almost 40% of programs provided by third parties have been utilized by a single bank, with a median of 2 participants each program. “Famous” initiatives are also present, highlighting the fact that trusted third parties are having a prominent role for multiple banks across all Europe.

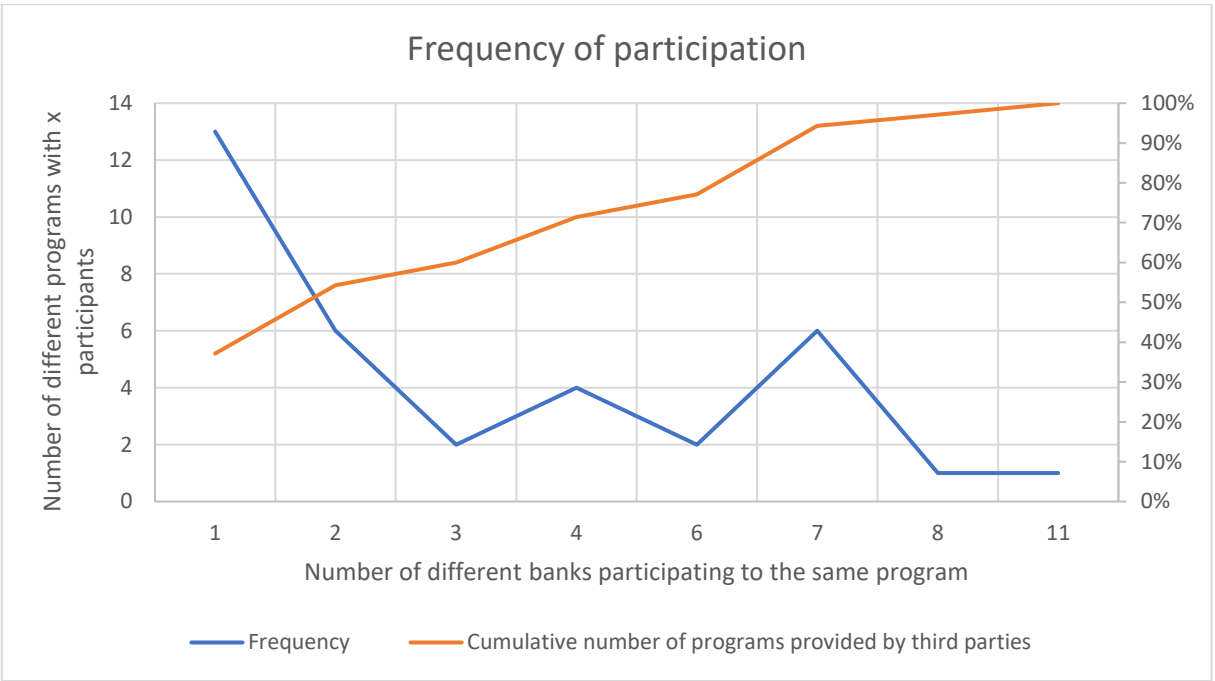

Figure 13 Frequency of participation

This phenomena of multiple participation to the same program is almost nil while the program is organized directly by the banks, showing therefore that there is still low collaboration in the

creation of joint programs directed to start-up. From the overall number of programs organized by the financial institutions, just few programs were jointly organized and delivered by collaborating financial institutions[20].

A note must be made regarding the programs provided by the banks: not all the programs were organized in autonomy, meaning that sometimes external organizations were involved in the organization and delivery of the service. This specification could confuse the reader about the classification just provided, therefore further explanations are needed: an initiative is considered organized by the bank not only when it is the only provider of the program, but also when the program is created by an external organization in exclusivity for the aforementioned financial institution (like the program provided by Plug & Play only for BNP, or the one powered by Techstars for Barclays Bank), and therefore are counted as if they are organized by the bank.

A further specification of these programs could be provided taking into account the typology of industry targeted with the initiative: from the research it emerged that not all the programs are exclusively organized for FinTech companies, but a considerable share of initiatives are targeting the most disparate sectors (like AgriTech, FoodTech, Commerce, DeepTech & Hardware, ICT, Mobility, Manufacturing a so forth). For simplicity all the programs pertaining to this last category, from here on, will be labelled as *"non-FinTech"* or *"other domain"* programs. The programs for which the bank was the main recipient, meaning the programs for start-ups organized by third parties with banks as main stakeholders, were exclusively focused on FinTech start-ups, while the programs directly provided by the bank presented a more heterogeneous focus: only 36% of total number of different programs found in the research directly targeting the start-ups in the FinTech domain are provided by the financial institutions (Figure 14).

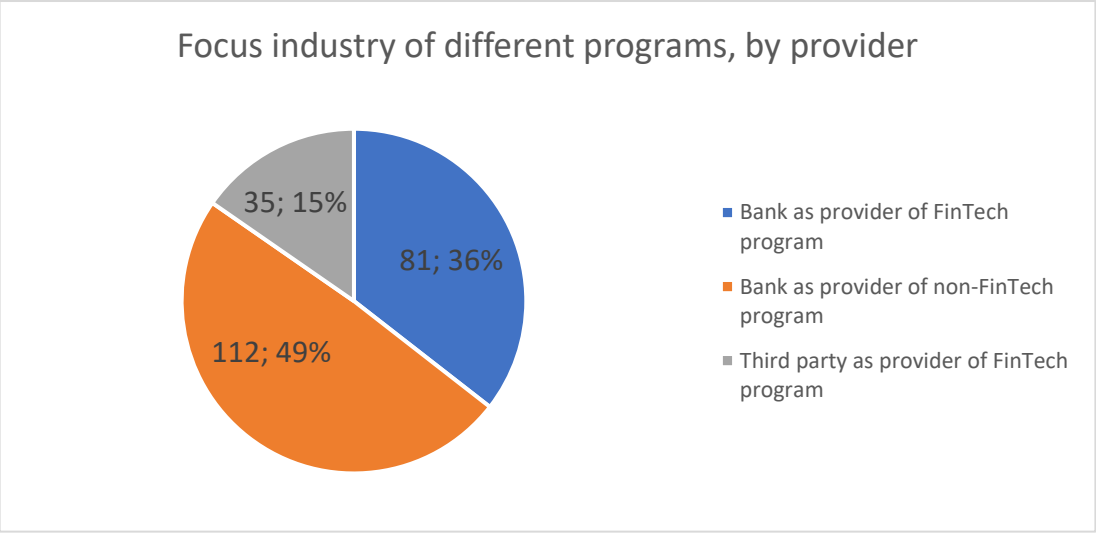

Figure 14 Focus industry of different programs, by provider

[20] From graph X the situation seems different, but in reality it is a distortion of the data. Of 15 initiatives repeated (208-193), only a few were actually real repetitions: most of these cases refer to a program for non-FinTech start-ups in which the banks are participating concurrently.

Translated in relative numbers respect to bank-provided programs, the number of initiatives created for FinTech start-ups amounts to only 40% (81/193) of the overall number of programs directly provided by financial institutions. A Huge 60% of programs provided by banks are not directly focused on FinTech start-ups but rather on developing the overall innovation ecosystem, pointing out that these financial institutions are not only pursuing innovation in the services that are being stressed by the emergence of FinTech companies but maybe are trying to build new products and services involving different and new customer bases.

Considering the evolution over time of the phenomena, in Figure 15 can be easily detected that both the number of programs provided by banks and by third parties is increasing over time, with peaks of over 20% year-over-year growth in 2017 (over 2016) and 2018 (over 2017). Similar patterns, even if with a smaller relative growth, could be seen also for programs provided by third parties.

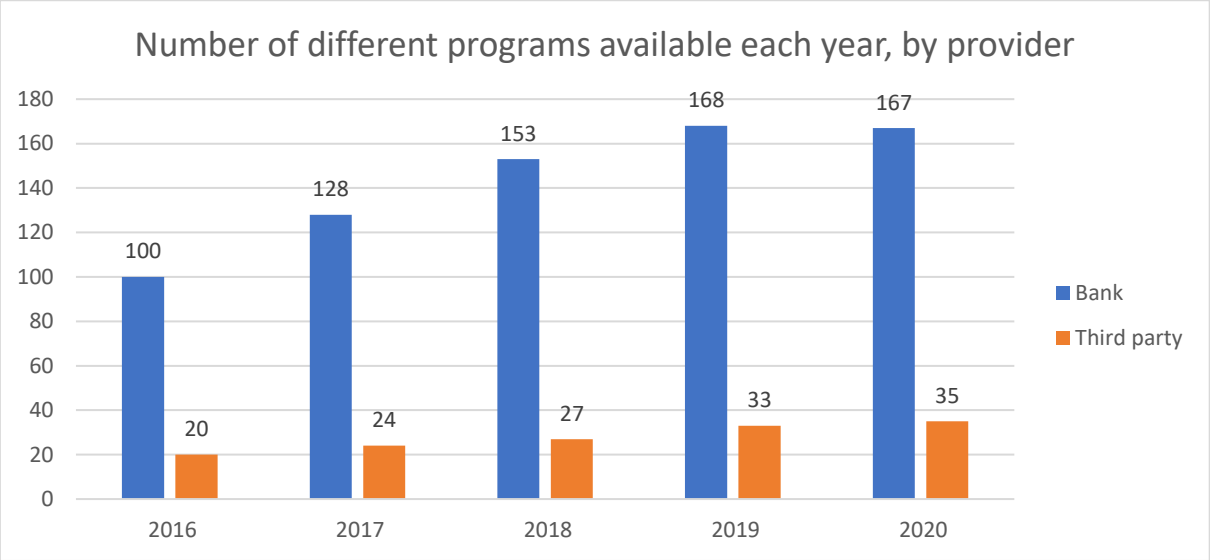

Figure 15 Number of different programs available each year, by provider

Even if the number of programs organized by third parties seems really small compared to the ones organized by the bank, it must be noted that they are usually open to all the financial institutions that are willing to contribute. Taking into account the data about the effective involvement in the different programs, it emerges from the data that banks are still heavily relying on programs organized by third parties (Figure 16).

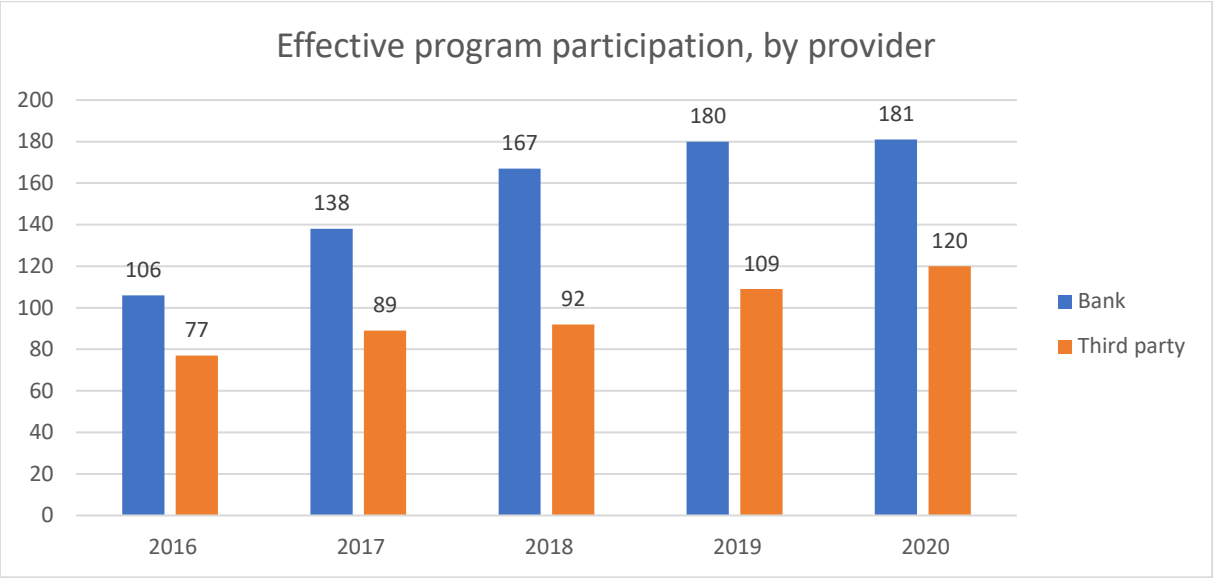

Figure 16 Effective program participation, by provider

As stated before, all the programs organized by third parties are focused exclusively of FinTech, while the ones provided by banks have multiple focuses. Integrating this information in the distribution of programs over time, it can be noted from Figure 17 that the number of programs focusing on both domains have grown constantly over time. A little decrease in the number of programs organized by banks has been detected in 2020 irrespectively from the industry focus of the initiative, probably due to the same motivations cited in the previous chapter.

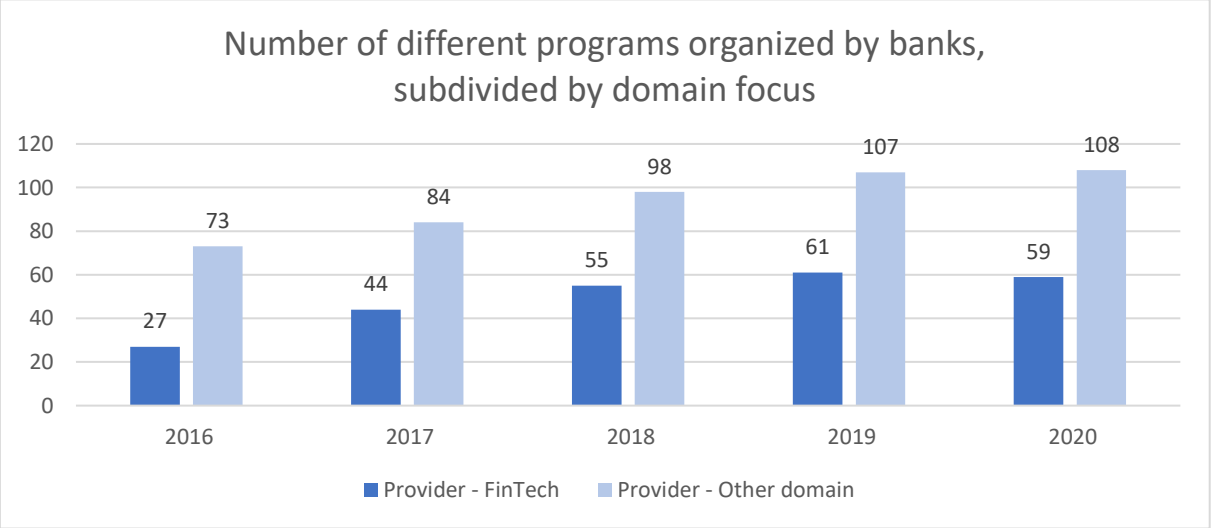

Figure 17 Number of different programs organized by banks, subdivided by domain focus

Program characteristics identification

To conclude the characterization of the programs, a meticulous analysis has been performed to identify the main typologies of initiatives provided to start-ups. The classification of these initiative in the relative category has been performed with a parallel process, analysing simultaneously the main characteristics of each program and comparing it with reference academic and sectorial literature: this approach was useful to create a better classification of typologies of initiative because it provided a stronger knowledge base upon which to classify the different programs and allowed the refinement and reclassification of initiatives denominated with titles that were not reflecting the real activities carried out. This analysis process could be schematized as in Figure 18.

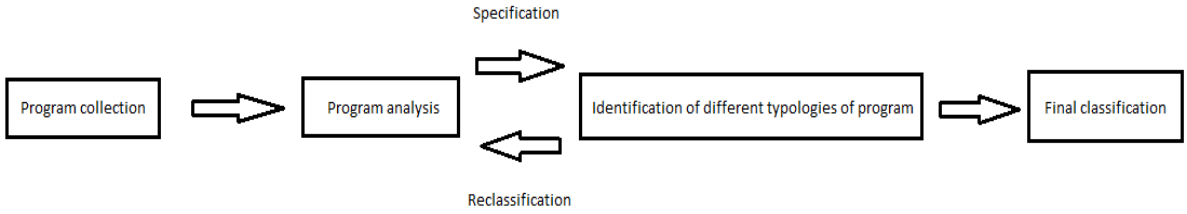

Figure 18 Typology of initiative identification process

Following this iterative step of specification and reclassification, the whole process has been repeated three times to refine the analysis and to conclude with a suitable number of different programs to be described. The final classification, which also considers the role of the organizing company in consideration of the typology of reference industrial sector of start-ups targeted with the program, led to the identification of eight different typologies of initiatives, as listed below:

1. **Accelerator**: comprising programs provided by the bank for start-ups in sectors different from FinTech (other domains) and programs provided by third parties for which the bank was a main beneficiary.
2. **Incubator**: comprising programs provided by the bank for start-ups in sectors different from FinTech (other domains) and programs provided by third parties for which the bank was a main beneficiary.
3. **Entrepreneurial development programs**: knowledge building platforms dispensed only by the financial institutions toward both FinTech and non-FinTech ventures.
4. **Networking and matchmaking**: events organized both by banks and by third parties to facilitate interaction of different stakeholders.
5. **Challenge**: programs provided by both banks and third parties to solve specific banking challenges.
6. **Corporate Incubator**: provided by the bank, targeting FinTech start-ups.
7. **Corporate Accelerator**: provided by the bank, targeting FinTech start-ups.
8. **Test laboratory**: provided by the bank, targeting FinTech start-ups.

Resulting from the analysis of the programs found with the research process, a total of 14 different combinations of programs + provider + industry focus has been identified, as reported in the subsequent Table 4.

Table 4 Different typologies of programs identified

Typology of program	Program provider	Sector Focus
Networking and Matchmaking	Bank	Other
Entrepreneurial dev. resources	Bank	Other
Incubator	Bank	Other
Accelerator	Bank	Other
Challenge	Bank	FinTech
Corporate Incubator	Bank	FinTech
Corporate Accelerator	Bank	FinTech
Networking and Matchmaking	Bank	FinTech
Formative resources	Bank	FinTech
Pilot experimentation	Bank	FinTech
Challenge	Third party organization	FinTech
Accelerator	Third party organization	FinTech
Networking and Matchmaking	Third party organization	FinTech
Incubator	Third party organization	FinTech

On top of highlighting the fact that the same typology of service is offered by different actors, this classification will be used in the next chapter to better contextualize the typologies of benefits that the bank could obtain from being involved in specific initiatives.

Typologies of programs excluded from the research

Not all the programs supported by banks aiming at entrepreneurial development or targeting start-ups were considered for the research purposes, therefore before continuing the analysis the typologies of programs and the relative motivation for the exclusion will be provided:

- Hackathons organized for talent acquisition scopes, excluded due to the focus on individuals rather than team with ideas to be tested.
- One-day long networking events for start-ups never repeated over time, excluded due to the occasional nature of it.
- Programs and initiatives organized and/or supported by banks' foundations, like university POC financing, due to the different scope that private foundations are pursuing respect to public listed companies linked to these foundations.
- API portals and API access since by regulation banks must provide this kind of applications to third parties.

Theoretical building blocks

After a deep analysis of available literature regarding the typologies of programs included in the research, a series of "building blocks" of business assistance activities upon which different initiatives are build have been identified (Rice, 2002; Hallen et al, 2017). After providing a short description of these blocks, the main typologies of programs will be described, presenting in this chapter a general review about main characteristics of the different typologies of initiatives into which financial institutions were engaged.

- **Knowledge intermediation**: Organizations acting as nodes and links between actors with different roles inside a reference value network, with the objective of facilitating the exchange of information and resources that could lead to a faster development and diffusion of an innovation, mediating the creation of the relationship and bridging their respective knowledge gap, therefore generating value for the clients (Howells, 2006; Edler and Yeow, 2016).
- **Community building**: set of actions perpetuated over time to be able to create a vibrant community of practice around a specific topic or industry. Based on the concepts of Situated Learning Theory (SLT) developed by Wagner (Wagner 1998), the creation of an environment within a certain community that enable and empowers productive learning should be able to facilitate the development of new competencies (Brown, 2004; Wegner, 2010).
- **Shared spaces and facilities**: provision of a common spaces in which office resources and services are shared between the program tenants. On top of lower expenses for all beneficiaries, the sharing of same physical resources also creates proximity and more occasions to exchange ideas and information, therefore being one factor that could heavily influence the learning process following SLT.
- **Artifacts**: organic set of formative and informative material, spreadsheets, tools, checklists, videos, and other educational resources like blog posts and business suggestions made available to affiliates, sometime also in self-service mode (therefore without the direct involvement of personnel from the organizing entity in the learning process of beneficiaries).
- **Specific problem-solving**: identification of a set of needs and challenges to be solved and creation of a tailored program for the ultimate beneficiary involving external actors of the value chain to try to co-develop and/or integrate a suitable solution.
- **BIP (Broad-Intensive-Paced) consulting** (Hallen, Bingham and Cohen, 2017): typology of interactive consultation regarding a broad variety of entrepreneurial topics provided by a large pool of external stakeholders and experts during a condensed timeframe following a strict set of deadlines to drive discussion and improve decision making processes of new ventures.
- **Project experimentation**: small-scale implementation of an innovative project used to prove its viability inside the actual infrastructure of the corporation; this kind of implementation allows the organisation to manage the risk of new ideas integration, identifying possible limitations before that a higher investment, both in term of time and resources, is committed. Usually a small investment is conceded to selected start-ups, in the form of a free grant without requiring equity.

Figure 19 shows how these building blocks are arranged while considering the different typologies of programs taken into account for this research. As will be explained in detail in the subsequent sections, the role played by the bank in the initiative may be different, therefore further explanations able to clarify the content of this graph will be found in the upcoming descriptions.

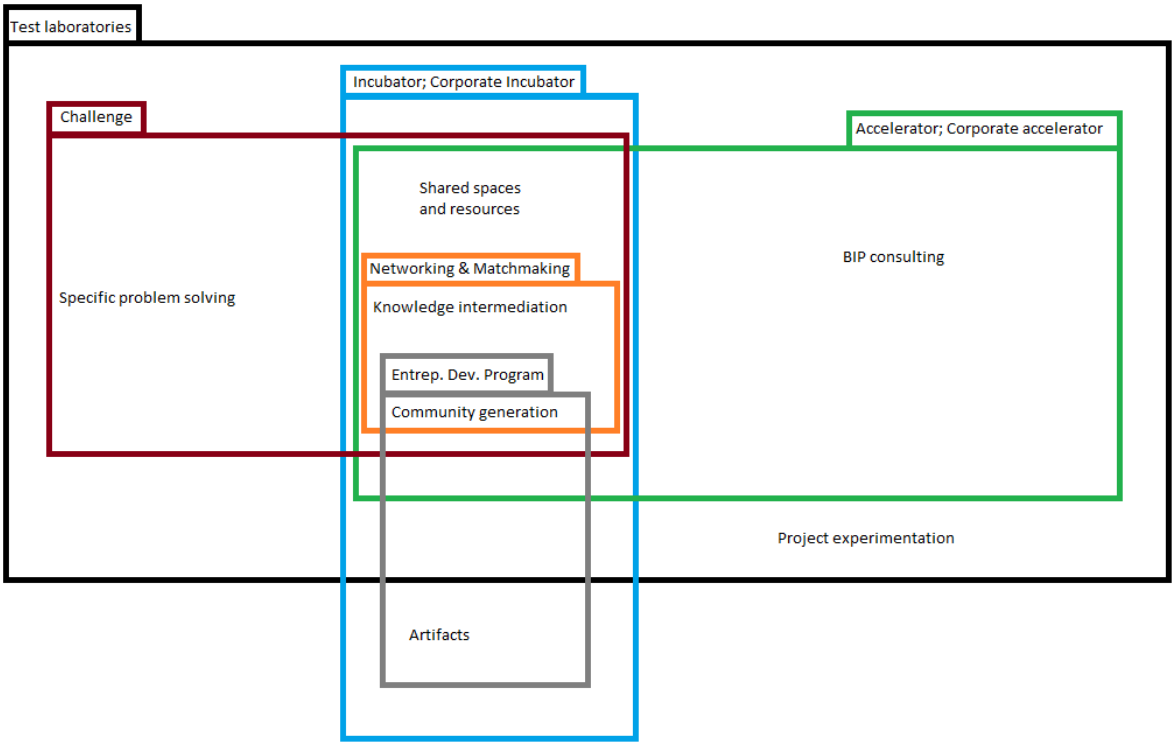

Figure 19 Representation of different typologies of programs by building blocks

Entrepreneurial development programs

Building blocks: Artifacts, Community generation

Technological advancements are not only reshaping the industry of the future, but sometimes are even disrupting the workplace environment in which people are operating. To overcome these challenging obstacles a greater focus on entrepreneurship education, both of current employees and future workers, is being posed. Teaching to people how entrepreneurship works not only could nudge them to launch and run their own initiatives, but due to the comprehensive skillset that ought to be developed could also enable people to better understand innovation processes and thus enabling them to build on opportunities and face challenges while working for someone else. Continuous learning, both personal and organizational, will become a must to remain innovative, flexible, resilient, and adaptive. The British Council state that as "securing and creating employment becomes a key priority for learners and governments for the foreseeable future, the growth of economies around the world will be supported by entrepreneurial thinking and enterprise from the next

generation"[21], and accordingly with European Commission evidence, entrepreneurship education is positively impacting both local labour market and economies (European Commission, 2012).

Considering the ecosystem development role that banks fulfil through their financial intermediation role, it seems somehow logical that this kind of entities during last years started to develop entrepreneurial development programs to positively impact their ecosystem of reference. As found during the research process, currently more than one third of banks considered are offering this kind of services[22]. Entrepreneurial development programs consequently refer to educational initiatives provided by banks to increase the entrepreneurial capabilities inside the countries in which these programs are operated.

These formative programs are usually sector-agnostic, and most of them are supplied exclusively through e-learning platforms where standardized online resources are available to interested learners. The opportunities of asynchronous and modular learning provided by online platforms could therefore attract a larger pool of people with wide differences in entrepreneurial level of knowledge. The content provided is somehow different for each of the program provided, with initiative created to attract beginners but also more skilled people which miss just some competence to start their businesses.

Among others, these programs are providing resources, tools and formats to draft entrepreneurial documentation (like business plans and cashflow projections), checklists and common mistakes to be avoided, how to make market researches and raise funds, advices on legal form to choose and how to incorporate in the reference market, how to draft legal documentation, courses on how to pitch, and articles regarding entrepreneurial matters and case studies, with relevant differences in terms of content offered among different courses. Soft skills development material useful to build entrepreneurial attitude is also provided in some cases.

Few platforms are also focused on creating a social network of like-minded people, providing their online portals with opportunities to access peer and mentor support as needed and to collect network feedbacks, and others are even offering the possibility to post job offers into the community to search for candidates.

On top of formative material, also "informative" resources are provided: opportunities to raise funds and lists of financial aids to which start-ups could access are usually presented, early access to participate to bank-sponsored events dedicated to entrepreneurship, cost comparison of locations to evaluate where to establish the activity, among other content.

Moreover, some banks are using the learning platform to provide to students additional services, some bank-related and some focused only to benefitting the entrepreneurial initiative itself: most of the time these platforms are used as advertisement tools to attract entrepreneurs to utilize start-up tailored banking services (like cheap current accounts and

[21] https://www.britishcouncil.org/education/skills-employability/what-we-do/vocational-education-exchange-online-magazine/october-2017/value-enterprise-entrepreneurship-education

[22] Precisely, 19 out of 51 banks with at least a program for start-ups are currently providing entrepreneurial development programs.

favourable long-term repayment loans), but sometimes they offer also to start-ups the opportunity to access to banks' partners services at advantageous rates, or allow these entrepreneurial teams of benefitting of a predetermined amount of bank consultancy hours regarding their venture proposal.

This mix of formative resources are targeting a heterogeneous group of potential users: with different level of experience regarding entrepreneurial matters and different educational needs, providers of the service should consider different elements and pedagogical instruments to build a platform able to have a positive impact on their learning (Zeng and Honig, 2016).

Entrepreneurial education is considered by many authors an active, evidence-based, self-reflective, and experience-based learning process which put in evidence the importance and the value of practicing to learn (Berglund et al, 2007; Biesta, 2007; Cope, 2003; Gibb, 1997; Higgins and Aspinall, 2011; Sullivan, 2000). This practicing however needs to be based on a strong theoretical basement to allow the framing of situations in which they could operate and to consequently help them in decision making processes (Zeng and Honig, 2016).

Students with no entrepreneurial knowledge should be provided with content that explains and clarify the multifaceted role of the entrepreneurs in society (Zeng and Honig, 2016): since one of the functions of education is to prepare students for particular roles, providing a clear picture of what being an entrepreneur means is a fundamental element on which to base all subsequent learning. For someone who lacks experience with the subject matter it could be difficult to have a clear picture of the interrelated roles that entrepreneurs cover in society, and this lack of clarification, if not correctly assessed at the beginning of the learning process, could generate inflated expectations that could lead to subsequent disenchantment about the subject (Harrison and Leitch, 2005; Kempster and Cope, 2010; Zeng and Honig, 2016). Relevant know-how must also be taught to beginners to provide these students with a theoretical framework on which to base their learning processes and decision-making: venture financing, innovation management, strategy development and marketing are among topics important to know to develop an entrepreneurial mindset and related capabilities. Third learning component useful for beginners is *entrepreneurial simulation*, that is the development of capabilities to participate and deal with group and stakeholders' interactions, also called *social control capabilities* (Dewey,2007; Zeng and Honig, 2016) or more generally soft skills. Students should be encouraged to experience social control processes to help them to learn how to interact, to communicate, to manage and support all stakeholders, fact that has been demonstrated by Acs and Muller that could have a positive impact on venture creation (Acs and Muller, 2008). Last component suggested for an effective learning by beginners is entrepreneurship participation, or said in other words experiential learning: as demonstrated by different authors, taking actions contribute to the development of entrepreneurial experience and serve as a base for subsequent learning (Cooper et al, 2004; Gentry, 1990; Neck et al, 2014; Pittaway and Cope, 2007b; Zeng and Honig, 2016). By applying what they have learnt students could receive feedback about the quality of their actions, establishing consequently a self-reflection process that could facilitate further learning and developing contextually the ability to adapt their knowledge while facing new information.

Other category that could possibly enrol in entrepreneurial courses are student that somehow have had previous entrepreneurial experience. These students are already accustomed to entrepreneurial topics, but maybe they gave up on their initiative due to negative experiences. First learning component for this target of users is therefore *entrepreneurial reflection* (Zeng and Honig, 2016): since negative experiences could distort and discourage further learning and development, the content of these lectures should be focused on providing guidance in understanding where failures happened and how to recognize value in the negative experiences through reflection processes in order to complement the student knowledge with relevant material to transform experience in knowledge (Baker et al, 2005; Dewey, 2007; Kolb, 2014). Reflection on mistakes, intended as errors made due to lack of competences, allows students to develop awareness of the entrepreneurial processes and the capability of reframing relevant knowledge, elements that could lead the entrepreneur to pursue different actions and to generate improved ideas (Jarvis, 1992). Following what written above, supplementary knowledge could be needed to overcome limitations in actual capabilities and students should be encouraged and supported to pursue (again) the creation of an entrepreneurial project (Zeng and Honig, 2016), offering them modularity of content to better match individual needs.

Finally, entrepreneurship courses are offered also to people who are currently running their businesses. For this category *problem-based learning*, *advanced knowledge and skills* and *experience sharing opportunities* are the most important elements that should be present in the syllabus of the course. In problem-based learning students are guided into reasoning about real-life situations and case studies to improve their problem-detection capabilities (Hanke, 2009; Krueger, 2007), developing consequently critical thinking skills (Hoffmann and Ritchie, 1997; Morales-Mann and Kaitell, 2001). Also in this case courses should be tailored to students' needs and the provider of the content should be able to discriminate and uncover each participant business-related problem that could potentially be addressed (Hanke et al, 2005). Advanced knowledge regarding organizational aspects, like human resources management, organizational learning and new venture growth are among the topics that could be taught to this category of users (Ireland et al, 2001), always within the framework of providing tailored knowledge to whom needs it to overcome potential blind spots and lack of awareness (Zeng and Honig, 2016). Last but not least, these courses should enable participants to share their experiences to leverage on collective social and intellectual capital, element that could be useful to overcome personal weaknesses through the exchanges of personal knowledge related to particular topics, transferring each other relevant information on personal entrepreneurial journeys (Zeng and Honig, 2016).

Having identified which content should be provided to each category of users, a brief analysis of how this teaching should be carried out is now presented through the explanation of different pedagogical models that could be utilised to teach entrepreneurship. Studies regarding pedagogical choices are carried out to try to uncover the cause effect relationships of the teaching method utilized and desired outcomes, enabling therefore the comparison of the effectiveness and the efficacy of different teaching methods (Fayolle, 2013). Even if assessing the value provided by different teaching methods is particularly difficult (especially for entrepreneurship courses since competencies acquired could be also applied in other different work-related situations and not only through the creation of a new organization),

providing a guidance on which pedagogical method to adopt to reach desired outcomes would be useful to get a first hint on how to structure the learning process (Lackéus, 2020). From this statement it follows that different pedagogical approaches could potentially lead to different desired effects (Lackéus, 2020).

Lackéus, in a study of 2020, identified three main pedagogical approaches, all of them falling below the category of experiential learning: *Idea and artefact creation pedagogy* (IACP), *Value-creation pedagogy* (VaCP) and *Venture-creation pedagogy* (VeCP) (Lackéus, 2020). In IACP, VaCP and VeCP, the teaching is respectively focusing on opportunity creation and identification (Shane, 2003), value creation (Bruyat and Julien, 2001), and organizational creation (Gartner, 1989) definitions of entrepreneurship.

These approaches have been studied and compared respect to the development of entrepreneurial competencies by students, the learning of the subject matter knowledge and related soft skills, and the engagement and motivation of participants to the course, with the objective to produce guidance for teachers in choosing a pedagogical model tailored to reach specific aims and effects.

These elements could be described respectively as:

- Development of entrepreneurial competencies: competencies that have been considered typically entrepreneurial include, among others, the knowledge on how to find and create value, skills in marketing, competencies in resources acquisition and opportunity identification and a set of soft skills that could be identified in passion, proactivity, resilience, tenacity, and self-efficacy (Bacigalupo et al, 2016; Fisher et al, 2008).
- Learning of the subject matter knowledge and related soft skills: intended as a deep learning of the curriculum content of the course proposed.
- Engagement and motivation of participants: measure of how much the students were feeling involved and motivated while experiencing entrepreneurial learning.

An emotion centric approach has been utilized by researchers to assess the outcomes on entrepreneurial education generated by the three different models, since as theorized by different authors, “all learning contains and thrives on emotions” (Boakaerst, 2010; Jarvis, 2006; Postle, 1993), suggesting that emotions are helping students learning more effectively while engaged, at the point that the presence of emotionality may be viewed as an indicator for learning (Jones and Underwood, 2017). Critical highly emotional learning events were identified with the help of participants through a quantitative app-based data collection of more than 10000 replies from 1048 participants in 35 different entrepreneurial education programs and 291 interviews of teachers and students involved in these programs. Collected data gave the researchers the opportunity to identify moments in the learning journey in which something “significant and impactful” was going on.

Entrepreneurial education could be identifies as including *entrepreneurship education*, defined as learning about and through business start-ups, and *enterprise education*, that is aiming at educating students to develop competencies necessary generate and realise ideas (Hannon, 2018; Jones and Iredale, 2010; QAA, 2012; QAA, 2018).

The authors, analysing the different approaches defined before, are proposing a four-step pedagogical framework (simplified to three for the purpose of the underlying work, as represented in Figure 20) progression model, illustrating the importance of tailoring teachers approaches to desired outcomes in students' learning process.

Draycott and Rae, following the opportunity creation definition of entrepreneurship embedded in IACP, state that "enterprise education is about the development of self-efficacy to be able to investigate, develop and act on ideas and opportunities" (Draycott and Rae, 2011). The first step of the learning journey therefore involves the opportunity identification and creation process in which students could came up with ideas and create artefacts (like business models, reports, presentations, etc) to frame the new idea and analyse its feasibility. Value-creation pedagogy (embedded in VaCP), where entrepreneurship is seen as a new value creation activity, involves a much broader activity than merely recognizing and acting on opportunities and/or building organizations: with this approach students can learn how to conceive, create, and capture value from a new business idea (Breslin and Jones, 2014). The second step therefore requires to students to apply their ideas and artifacts in an attempt to create value for real-world potential stakeholders residing outside their working group. Organizational-creation approach, seen as the last step in the educational process and part of VeCP pedagogy, is defining instead entrepreneurship as an educational tool taught with the objective of developing competencies on how to establish a new organization, thus the third and last step wants students to practice in the establishment a new organization around the value creating endeavour (Gartner, 1989).

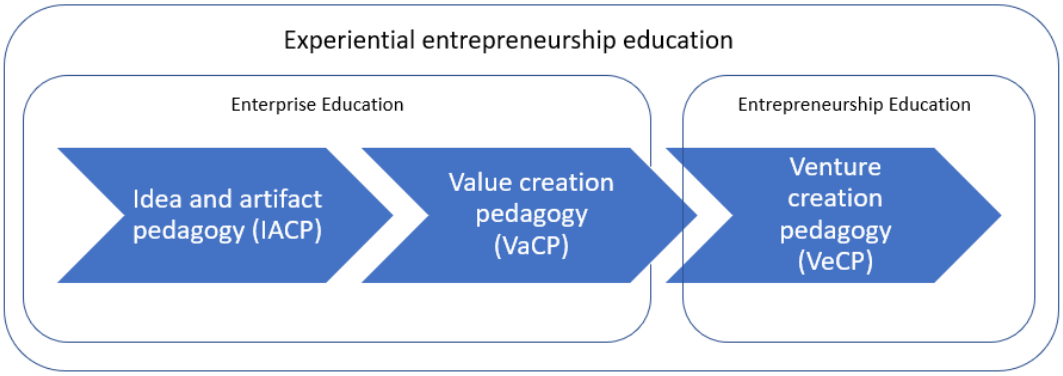

Figure 20 Experiential entreprenurship education process

The author of the study, building on its previous study (Lackéus and Sävetun, 2019) is stating that learning happens when specific emotional triggering events are happening to students, and therefore that the feeling related to these events could be utilized as proxy and estimation of specific learning outcomes. Lackéus and his colleague in fact identified, analysed and mapped the links among different pedagogical approaches, the emotional events triggering learning and the desired learning outcomes; with resulting mapping the authors were able to identify which kind of pedagogical approach is better suited for developing specific entrepreneurial capabilities, deepening the student learning and increase the student's motivation. In Figure 21 an exemplification of the three component-causal model is presented.

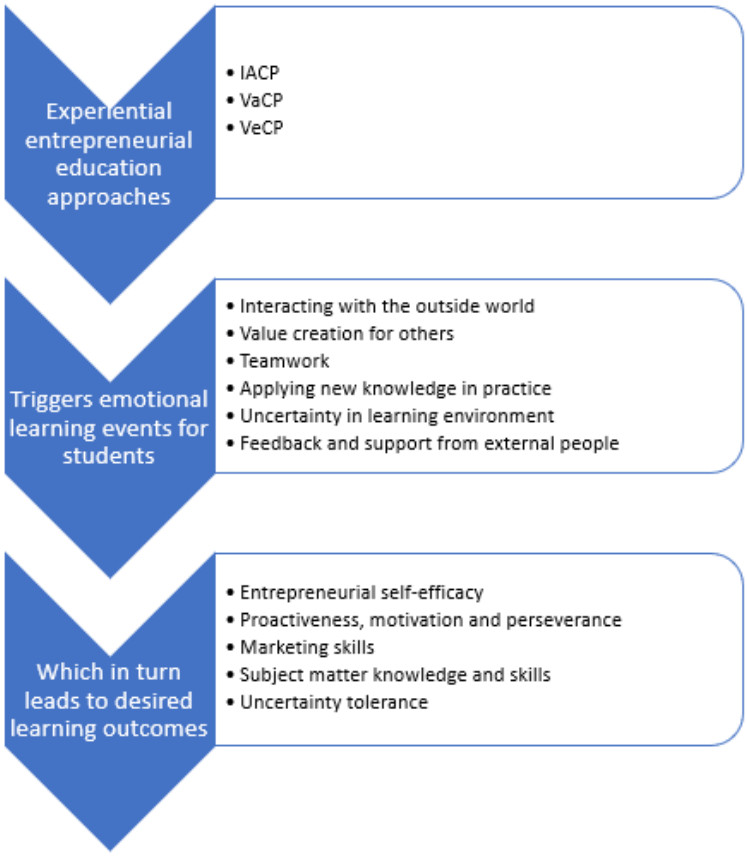

Figure 21 Three component causal model (Adapted from Lackéus and Sävetun, 2019)

Through the study, researchers observed different impact on entrepreneurship learning across courses taught with different pedagogical instruments. IACP courses, focused on idea and artefact creation, led to weak increase in personal motivation toward entrepreneurship, some development of curricular know-how and soft skills, but show a weak or no development of entrepreneurial competencies. VaCP, focused on letting the students learn while creating something of value for external stakeholders, show strong development of entrepreneurial competencies, strong increase in motivation and strong development of curricular knowledge and skills. VeCP, as VaCP, showed a strong increase in both motivation and development of entrepreneurial competencies, but weak or no development of curricular knowledge or skill outside entrepreneurship[23]. The differences of efficacy of the different pedagogical models found with the study were therefore attributed to the presence (or lack) of emotional and learning events and to the variation of purpose of the course as perceived by the replies collected from the enrolled students. The researcher concluded therefore that entrepreneurial education in which students have the opportunity to experience emotionally charged events throughout interacting with various stakeholders while creating value for them, and with the exchange of feedbacks and support from external people is more effective than other less emotionally charged pedagogical tools for entrepreneurial education (Lackéus, 2020).

[23] In our case this finding is irrelevant: what the organization wants to develop is exactly the entrepreneurial capability, not other type of curricular knowledge.

Asynchronous learning platforms provided by the majority of organizations taken into account by this study could potentially limit the development of capabilities obtainable throughout direct face-to-face engagement, but somehow if the provider is able to find the right levers to engage end-users, online learning platform could be considered a valuable alternative to build desired capabilities: Rey Moreno, Rufin Moreno and Molina, through their study on SME employees, tried to identify exactly what makes satisfactory for them to use on-line learning tools (Rey Moreno et al, 2013). This study is specifically tailored to SME's, but due to the blurred distinction between them and start-up (at least in their initial stages), and the focus of the paper on specific typology of knowledge intensive businesses, the results found by the researchers have been interpreted more generally speaking to be valid for all companies with few employees operating into knowledge intensive businesses, as start-ups (already founded or not) do.

In knowledge intensive businesses the intangible assets are essential part of the human capital, therefore knowing how to manage and integrate knowledge, and consequently to make it profitable through value generation activities, could be considered a fundamental element of value generation (Rey Moreno et al, 2013; Palacios-Marquez et al, 2011). These organizations are therefore in constant need of learning, and internet-based platforms for remote learning could provide this experience. E-learning could allow people to learn from anywhere at any time, enabling them to access to tailored content for each person need on top of (usually) cutting training costs (Chen, 2010; Chiu and Wang, 2008; Swift and Lawrence, 2003). But are these advantages enough to make people benefit from the content provided by the platform? As authors are explaining in their article, *Expectation Disconfirmation Theory* (EDT) plays a decisive role in the final satisfaction of users. EDT is a model that explains how and why users' reactions change over time when adopting an information system (Oliver, 1980). Following EDT, expectations can directly influence disconfirmation and satisfaction, but at the same time disconfirmation is able to mediate the relationship between expectations and satisfaction. Oliver theorized that even if the exposure to information about the product forms beliefs about its quality among customers prior to its purchase/usage, after using it for a period of time customers reformulate their perception about performance, making comparisons between expectations and current experience, which therefore leads to subjective measurement of disconfirmation; what is really going to determine satisfaction is therefore a combination of initial expectation and subsequent disconfirmation (Oliver, 1980). Effort expectancy (intended as the degree of ease in using the platform), social influence (as individual perception of peer pressure to use the service) and facilitating conditions (degree to which the individual believes that the learning platform is useful to him) are additional believes that could be included in the model as further predictor of satisfaction (Venkatesh et al, 2003; Venkatesh et al, 2011).

The work of the authors aimed to analyse the possible differences in how satisfaction is generated in users of e-learning services if expectations are measured before entering into contact with the product, or after having somehow experienced it. Results shows that if the variable that generate satisfaction is expectation, the organization willing to make users learn on a specific platform should focus on communication and promotion to highlight functions and learning opportunities provided by the service. On the other hand, if the fundamental role in generating satisfaction is played by disconfirmation of expectations, the platform should

focus on providing features that exceed users' expectations. Moreover, since perceived usefulness is able to influence the selection and utilization of the learning services, suppliers of the platform should advertise their offer stressing on explanations of possible benefits provided to the final users. Researchers have also found that interaction among peers is a critical for students' satisfaction, greater involvement, and higher learning achievement, therefore studying with the support from peers, with related opportunities to give and receive assistance, is regarded as a critical factor of the knowledge generation process (Slotte and Herbert, 2008; Rey Moreno et al, 2013). Different authors moreover emphasized the fact that the more there are opportunities to transfer the new knowledge and skills developed in the daily activities of the workplace, the higher the expectations of perceived usefulness of e-learning motivate users to continue to use the services. These findings are highlighting the point that e-learning experiences should be designed and distributed in a way that enables participants to directly implement the new information received into their practices (Cheng et al, 2012; Slotte and Herbert, 2008).

To sum up, close attention must be paid to providers of the learning services to target the right typology of customers to generate interest in their initiatives: clarifying which typology of content could be found on the platform and explaining to which categories of people are targeted could be a strategy able to attract the right users on the platform and consequently to create useful opportunities to effectively impact the overall innovation ecosystem in which banks that are providing this service are embedded.

Networking and Matchmaking

Building blocks: Knowledge intermediation + community generation

Knowledge intermediary organizations, as described before, act as nodes and links between different actors of a value network in order to provide them with access to valuable complementary sources of information, helping to compensate firms that lack of connections with relevant stakeholders. The creation of initiatives able draw value network participants together to incentivize the exchange of knowledge and the resulting connection of actors with complementary needs could be defined as networking and matchmaking activity. To create effective opportunities of fruitful exchanges of information upon which to learn and improve, the linking of companies participating to the same value network is not enough: the effectiveness of the interaction largely depends on the work performed by the intermediary organization in parallel with the mutual introduction. This work could be summarized in different functions, as reported below.

Function 1: Foresight and diagnostic for demand articulation

To be able to introduce the right partners to each other and to support the development of their relationship, first and foremost these intermediaries must own capabilities of identification of the needs and requirements of clients: this process does not only entail the identification of explicit urgent needs (diagnostic), but also of latent or future ones (foresight). To uncover these needs intermediaries must understand the value generation process of the specific industry, therefore they must know the available pool of competencies and resources available to each actor of the innovation system and the relative institutional framework in which they operate (Howells and Roberts, 2000; Kauffeld-Monz and Fritsch, 2013).

Function 2: Scanning and information processing

Intermediaries, though identification of stakeholders needs and the contextual collection of relevant information about their processes, products, markets and plans for the future are ableperform a scouting function for the parties involved identifying possible technological options (Watkins and Horley, 1986; Bessant and Rush, 1995). Thanks to the information acquired from both the sides of supply and demand of innovation, these organizations are able to identify, filter and select potential partners able to solve stakeholder's needs. This scouting function requires intermediaries to utilize the stock of *positional knowledge* built over time: these organizations in order to find solutions for partners do not need to know exactly how problems could be solved, but they need to know "where solutions are to be found", stressing the fact that a deep understanding of where competencies are stored in external partners is needed to provide suitable introductions. The finding proposed by Wagner with its seminar study on transactive memory (Wagner, 1986) could be easily generalized to knowledge intermediaries: the nodes owning positional knowledge inside a system of relationships play a role as important in knowledge generation and exchange as the nodes owning know-how about specific industries.

Function 3: Knowledge processing and combination/recombination

During the process of identification of needs, intermediaries are able to gather and collect information from a great variety of actors of the reference value network: developing knowledge related to the innovation ecosystem in which these organizations operate consequently enable intermediaries to acquire industry-specific knowledge from a wide variety of actors, building knowledge repositories able to advantage them in the identification of new opportunities for suitable collaborations among stakeholders (Kodama, 2008). By knowing early on about the activities of the different actors, intermediaries can introduce new ideas into the recipient knowledge base, helping them in uncovering potential *Knightian blind spots*[24], fact that can help in the identification of stakeholders' needs (Howells, 2006). Acting as a knowledge repository, the intermediary could also play a proactive role in knowledge generation and subsequent transfer if it is able to introduce new combinations of existing ideas (collected from the pool of different stakeholders) while collaborating with their clients (Hargadon and Sutton, 1997; Howells, 2006). In this favourable position the broker has therefore an opportunity to control the flow of information between partners, and it is more likely to be included in further discussions about future opportunities identified by interacting stakeholders due to the availability of many sources of input of information (Burt, 1992). Finally, due to these capabilities of knowledge integration and reconfiguration, intermediaries could help in adapting specialized solutions already on the market to the needs of partners (Carlsson and Stankiewicz, 1991), and could link institutions working at different levels of the innovation processes and technological systems (Stankiewicz, 1995).

[24] Here the reference is to Knight uncertainty, that is the lack of any quantifiable knowledge about some possible occurrence of an event, or in this case of the existence of a potential solution for a specific problem.

Function 4: Brokering and matchmaking to facilitate and support deal making

Network brokerage, as Izushi suggests, happens when there is a gap between suppliers and users of a technology (Izushi, 2003): the intermediary helps the involved parties in reducing the information gap, acting as a channel able to identify suitable solutions for partners, to compensate firms that do not have an efficient advice network or that lack of connections with other actors of the value chain (McEvily and Zaheer, 1999), therefore effectively helping partners in their decision making processes (Mantel and Rosegger, 1986). To be able to reduce this gap effectively, intermediaries need to bridge also cultural and cognitive differences between different actors, understanding their different languages, decision making processes, set of incentives and objectives, usually pertaining to completely different organizational cultures (Klerkx and Leeuwis, 2008; Howells, 2006). As argued by Nooteboom, this cognitive distance could cause learning problems and lack of coordination in the innovation process carried forth (Nooteboom, 2000), therefore intermediaries act also to shape interests and motivation of partners in order to increase mutual understanding and influence actions of potential partners (Tjong et al, 2015)

Function 5: Commercialization of the innovation

Last but not least, intermediaries could help partners in their innovation processes by helping them in better presenting the technology to be transferred (Watkins and Horley, 1986): being exposed to a variety of stakeholders and collecting their respective needs, intermediaries could help partners in develop and refine business plans, in identifying market opportunities and find potential capital funding on top of providing potential access to new markets through introductions to relevant partners in foreign markets.

Acting as knowledge repositories able to introduce new combinations of knowledge and connections within a specific ecosystem, intermediaries, through the articulation of needs of innovation and subsequent scouting of solutions, are able to build for their partners useful linkages with external providers of knowledge. This capability in linking relevant partners could therefore facilitate the development and the subsequent adoption of an innovation, benefitting not only the organizations involved in the exchange of information but also the intermediary; with their role of network brokers these organizations are usually able to enhance client's performances, building therefore long term capabilities of attraction that could lead to subsequent proficient interactions with the same partners in the future (De Silva, Howells and Meyer, 2016). This value generation capability is largely built on the absorptive capacity of the organization, that is the capability of exploring, acquiring, retaining, and exploiting the knowledge generated with internal and external exchanges of information (Gold et al, 2001). Due to their role as middlemen, intermediaries could be exposed to a plethora of different information coming from different actors and could therefore capitalize on this knowledge while interacting with other organization pertaining to the reference value network.

It must be noted that different organization could perform different subsets of the functions just described and therefore different kind of knowledge intermediation activities are available on the market. The mechanism with which value is retained largely depends on the kind of activities provided; for some type of intermediation value is generate through financial returns to compensate service provision, while for others the value generated lies in the acquisition of new information from different sources of the value network and the subsequent possibility to exploit this new knowledge for further service provision.

Incubation

Building blocks: Community generation + Knowledge intermediation + Shared spaces and resources + Artifacts

Incubators are a typology of services offered to new-born companies since the end of the 1950: the first business incubation center in fact it is said that opened back in 1959 at the Batavia Industrial Center in New York state (Kilcrease, 2012). Generally speaking, incubators are organizations providing a package of services designed to shield the start-ups from the external market forces, providing them with nurturing resources to promote their early-stage development, and therefore enabling them to grow and build their path to financial sustainability (Cohen and Hochberg 2014). The package of activities offered, referred to as the incubation activities, aim at helping start-ups to commercialize new products and services while simultaneously protecting the company evolution, increasing therefore their likelihood of survival and subsequent growth (Theodorakopoulos et al. 2014) while containing the potential cost of its failure (Hackett and Dilts, 2004).

From the early days till the eighties the phenomena was not widespread enough to catch academia interest, but since the beginning of that decade, with the publication of the seminar research of Temali and Campbell in 1984 entitled "*Business Incubator Profiles: a national survey*" it started to gain widespread recognition and subsequent thorough investigation (Temali and Campbell, 1984). As stated in the previous paragraph incubation entails different activities, therefore scholars along the years have identified different generations of incubators, evolving in the time with a trend of inclusion of more and more service shifting from a generation to the next one (Pauwels et al, 2015). First generation activities, identifying services offered in the 1980's, included the provision of affordable spaces to the tenant start-ups, obtained by sharing a facility in order to cut costs not directly related to the new venture activity, like office rent and administrative support services (Allen and McCluskey, 1990). Incubators soon became more than mere providers of coworking spaces, adding during the nineties a variety of intangible high value-added support services like business advisory and networking opportunities: incubators started to help their tenants in accessing knowledge intensive services at controlled prices (as legal and accounting professionals) while occasionally helping them in evaluating market opportunities, business development strategies and introducing them to relevant actors of their reference value chain. These roles of network builder and coaching provider have been further expanded and consolidated since the early 2000, with incubators' employees starting to support proactively their incubatees in the development of their entrepreneurial activities and of their networks (Clarysse and Brunnel, 2007; Soetano and Jack, 2013). The evolution of incubators over time is therefore marking a shift in their role into the innovation ecosystem, not anymore working only for

decreasing the downside risk of market survival of innovative ventures but also to add value to these start-ups through strategic value-enhancing monitoring system and business development assistance (NESTA UK, 2011; Hackett and Dilts, 2004).

Leaving aside the services offered, that somehow are similar for each type of incubator, and taking into account the main strategic objective of these organizations, five broader models have been identified in literature by Aernoudt (Aernoudt, 2004): *Basic research incubators*, focusing on high tech spin-offs, created by universities to bridge the discovery gap; *Social incubators*, focusing on integration of social categories for employment creation; *Technology incubators*, created to stimulate innovation and fill the entrepreneurial gap surrounding recently trending technologies; *Economic development incubators*, created to boost regional development to fill local disparities; *Mixed incubators*, born to create start-ups and employment where there is a business gap.

Since both activities and strategic interests are usually overlapping, from here on the dissertation will be focused on a general model of incubator, focused on producing self-sustaining start-ups. With the shift toward value-added services outlined in the previous paragraph, incubators since the 90'S started their transition toward the role of active knowledge intermediaries. From this statement it follows that the sources of value generated for incubated start-ups nowadays are tightly linked with the incubator personnel capabilities of brokerage and knowledge intermediation.

Incubators are able to access a great variety of external knowledge regarding the industries in which they are operating, therefore while start-ups are admitted into their programs, some degree of credibility to their ideas is built. Moreover, through the continuous monitoring of activities performed by the start-ups, incubator personnel could support start-ups by helping them in the diagnosing of business needs (both internal and from potential clients), enabling a faster learning process and a more effective identification of possible solutions to problems. This set of activities are carried out to reduce both start-ups knowledge gap and financial resource gap, providing introductions and networking opportunities with relevant industry actors and investors (Autio and Klofsten, 1998). Extensive research has been performed also to identify critical success factors of incubation activities, some identifying them with factors internal to the incubator organization - like the quality of the services provided by the management team - while others focused more on external (or locus-related) ones like community and entrepreneurial support, the general level of entrepreneurial education of the region and the link with university and academia (Smilor, 1987; Campbell at al, 1985, Merrifield, 1987, Hacket and Dilts, 2004; Hacket and Dilts, 2008). Focusing of the services supplied by the management team, it must be noted that while operational and support services are easy to provide, the network opportunities created and the business consultancy provided could be highly differentiating elements able to influence and enhance most of the key success factors of the incubation process (Hacket and Dilts, 2004, ; Hacket and Dilts, 2008). This fact led the researchers at identifying the quality of the management team itself as a viable measure of incubation effectiveness.

Taking into account what previously said about the role of incubators as intermediaries and the fact that success of the initiative largely depends on the managerial abilities of organizers to deliver value-enhancing services, it can be concluded that a considerable part of managerial

time should be therefore focused on designing interactions among incubatees and within incubatees and the overall industrial community of reference, as suggested by Theodorakopoulos, Kakabadse and McGowan (Theodorakopoulos et al, 2014). Following these concepts and building on the Situated Learning Theory (SLT), that states that the learning and the development of competencies take place inside communities of practices and therefore that what eventually really matters for learning is the creation of an environment that enable empowering and productive learning within the community (Brown, 2004; Wegner, 1998; Wegner 2010), the researchers have identified three different influencing factors and the relative roles that managers should fulfil while trying to create these favourable conditions for incubatees.

These factors are *strength of the community*, *quality of its boundaries* and *health state of the common identity* (Theodorakopoulos at al.,2014). The more members are engaged and socially participate for the achievement of a common purpose the more the community is stronger, therefore managers trough community membership, events and artefacts could play an important role in the creation of this shared identity: acting as relationship brokers, managers should facilitate interactions among members and within members and external stakeholders. Communal identity allows the creation of new knowledge via generative learning, built with the exchange of experiences and notions that challenge the teams' actual knowledge, allowing them to acknowledge and consider new perspectives. This identity is easier to build when members are not too heterogeneous (for example focusing on a single industrial sector) and when events with opportunities for the exchange of information and experiences are organized regularly in time. Artefacts, like templates for business plans, financial calculators, checklists, and the like, also play an important role since they could help in promoting the development of competencies inside the community. Finally, the boundary space quality refers to the quality of the links and connections that could be generated between the different communities operating in the incubator environment: managers should own enough knowledge to understand the requirements, needs and objectives of each different actor of the value chain of the incubated businesses in order to provide effective linking of parties while acting as intermediaries. This intermediation role could therefore enhance coordination, improve transparency among parties and help in the clarification of reciprocal objective, leading to better negotiation processes and consequently to improved chances to reach the final objective of every incubator, that is to introduce self-sustaining start-ups in the market.

Acceleration

Building blocks: Knowledge intermediation + community generation + shared spaces and resources + BIP consulting

Accelerators are a relatively new typology of organizations in the start-up development panorama. The first program clearly identified as accelerator[25] was Y-Combinator[26] (created by Paul Graham and Jessica Livingston) that started back in 2005 in USA (NESTA report, 2011a). Since then, this typology of programs grew constantly year over year, reaching the attention of researchers that were subsequently able to characterize them as a typology of program quite different from incubators.

The main distinctive elements for the start-ups participating into this kind of programs is the density of information[27] that they could access while enrolled: while for incubators the knowledge base of start-ups is developed across a wider time span, for accelerators all the learning is concentrated in a shorter period of time, usually around three months. As the name suggests, these typologies of entrepreneurial programs are designed with the objective to help new ventures accelerating their learning processes (Hallen et al, 2017), defined as the ability of processing information that enable an organization to change cognition or range of possible behaviour (Huber, 1991) .

Being focused on programs lasting few months, also the typology of business model of accelerators is completely different: the majority of accelerators do not get revenues from renting space and providing support services but by successfully exiting from investments made in the companies selected to participate in the program. Due to this fact, accelerators usually require to selected start-ups to sell part of their equity (normally between 5% and 8%) in exchange of seed capital or the acceleration program itself (in-kind investment) (Cohen and Hochberg, 2014). Moreover, since accelerators are focused on investments, usually the working capital is provided by shareholders that could be a group of private investors (mainly business angels or early stage venture capital) pooling their capital for de-risking activities, public entities or corporations with some strategic interest in supporting venture development (Pauwels et al, 2016).

Another consequence of the shorter duration of each program is the fact that start-ups are usually accelerated in batches (or cohorts), entering and exiting the program in groups (Cohen and Hochberg, 2014). Since usually the organization requires full time commitment from founders for the period of acceleration and provides them with coworking spaces, the experience of starting and living the program all at the same time and pace is reported to foster uncommon strong bonds and group identity between participants of the same cohorts (Cohen and Hochberg, 2014). Full time commitment usually imply that participating start-ups need to temporary relocate into the accelerator spaces, where they could continue to work on their projects. As already explained in the incubator section, the design of interactions among participants to the programs plays a great role in the overall growth of the knowledge

[25] The characterization of the program as an accelerator has been clearly performed subsequently its creation, when researchers started to identify the main elements differentiating acceleration programs from incubation.
[26] https://www.ycombinator.com/
[27] Could be defined as number of industry relevant information and knowledge gathered over a specific period of time

base of every participant, therefore the design and the provision of a proper environment capable to enable empowering and productive learning within the community is integral part of the acceleration process.

Taking into account the elements provided, accelerators could therefore be defined as business entities that (typically) invest in early stage start-ups in exchange for equity, providing to selected companies a fixed-term, cohort-based program including both mentorship and educational components in order to reduce the start-up knowledge gap, culminating in a public pitching event at the end of the program usually referred to as the *demo-day* where ideas are presented to panels of corporates and professional investors (Cohen, Hochberg, 2014; Dempwolf et al, 2014). Accelerators are therefore potential instruments that start-ups could use to address both the funding gap and the information gap. By attracting a network of information brokers, accelerators reduce the search cost and due diligence of professional investors and corporations while creating a pipeline of vetted technologies for the market as a whole (Dempwolf et al, 2014), creating real options for interested parties and enabling their learning regarding start-ups activities and new trends before taking a larger financial position into them (Cohen, 2013; Nesta report, 2011a).

Four different stages of the acceleration process could be identified: application, acceleration phase, demo day and follow on.

Application

Accelerators use on-line based open calls to collect applications from early stage tech scalable start-ups for which the cost of experimentation dropped substantially during the past years (Nesta report, 2011a; Pauwels et al, 2016). Forms used to collect information focus on questions able to clarify both which is the ideas proposed, but more important they are designed to make emerge the characteristics of the team guiding the start-up. Some criteria for selection are strong and committed founders with right technical capabilities, ability to adapt to changes in business concept (if necessary), innovativeness of the product, availability of a working prototypes and MVP; top quality technical expertise is also important, but not vital when selecting candidates for the cohorts (Hoffman, Radojevich-Kelley, 2012).

These programs could be highly selective: following a first skim, a little fraction of applicants, comprised between 15% and 20%, are invited for a first live interview, and subsequently selection could discard as much as 98% of applications (Nesta report, 2011a; Hallen et al, 2017). For example, highly successful accelerators (like Y-Combinator, Techstars or Plug&Play) receive thousands of applications for each batch, admitting to the acceleration program less than 1% of the overall number of applicants. Start-ups are then accepted holistically without the use of ranking for final admission (Hallen et al, 2017) and to be admitted they have to sign standardized (meaning equal for every start-up) contracts regulating the transfer of the small percentage of equity required to participate to the program[28].

[28] The contract could be structured as a equity investment, a convertible loan or a future option at pre-determined conditions (various sources)

Acceleration phase

Admitted start-ups during the acceleration program operate in a high-pressure environment created by design to foster rapid progresses on the development of entrepreneurial activities and learning of the reference industry and related market functioning (Nesta report, 2011a). Training programs are covering topics like marketing, finance, management, and communication with the aim of providing a solid base on which to build new ventures. Consulting instead refers to weekly check-in with accelerator management to evaluate acquired knowledge and next steps, useful for both sides to monitor and evaluate the progresses. Frequent and direct contact and exchange of information with relevant stakeholders, experienced founders, industry-specialized investors, and other highly qualified professionals is a core element of any acceleration program. It is therefore fundamental for accelerators to develop an extensive network of mentors to let founders tapping into their experience.

As identified by Hallen, Bringham and Cohen, it is exactly the mix of easy access and broad exposure to external knowledge, the high-pressure environment that require intensive exchanges of information, and time-paced weekly check-in by the management team that is driving learning by accelerated start-ups (Hallen, Bingham and Cohen, 2017). This kind of consultation, provided by both the network of experts and by accelerator management itself, relies on the fact that the knowledge source is directly and actively involved in transmitting and recontextualizing their experiences into the actual entrepreneur's situation in order to overcome some of their challenges. Consultation, as vicarious learning, requires learning from other's people experience; nevertheless these two types of knowledge generation and acquisition mechanism are quite different since learning is generated through interactive involvement of the knowledge source in the exchange of experiences and in the identification of connection with the founders situation, providing also private information about failed initiatives (Ingram and Baum, 1997; Kim & Miner, 2007), and not only through media consultation or indirect network connection as happens with external consultants (Hallen, Bingham and Cohen, 2017). On top of the learning-oriented discussion with external stakeholders, the programs are providing temporal structure for decision making, usually weekly or each 10-14 days, in order to encourage and force entrepreneurs to periodically transform accrued knowledge into actions (especially when these decisions end up being easily reversible) and to help them shift their focus to consultations about other aspects of venture development (Hallen, Bingham and Cohen, 2017; Gersick, 1994).

The mix of training, consultation with management and access to external knowledge, structured as *BIP* (Broad, Intensive and time-Paced) *consulting* enable and help the start-ups to fine tune their business model and their strategy (know what to do) and the overall process of company creation, improving execution both from product development and managerial perspective, including pitching for fundraising capabilities (know-how or procedural knowledge) (Hoffman and Radojevich-Kelley, 2012; Hallen, Bingham and Cohen, 2017). Accelerators could therefore lower the magnitude of experimentation cost of new venture since all the knowledge developed during the programs is not generated via direct and costly experimentation on the market, but it is provided via direct consulting experience accrued throughout the program (Hallen, Bingham and Cohen, 2017).

Demo-day

Demo-day is a common name used to refer to a program-conclusive networking event organized with potential investors to let accelerated start-ups present their entrepreneurial projects and put them in contact with capital providers potentially interested in investing in their start-ups. During these events also other relevant stakeholders (like corporations) are invited to provide feedback and sometimes accelerators fund managers decide at this moment if they want to exercise their option or invest more in the new venture (Pauwels et al, 2016). For participants, the opportunity to get access and spend time face-to-face with a wide pool of investors and mentors, all at the same time, is rated as one of the main advantages of the acceleration experience (Hoffman, Radojevich-Kelley, 2012).

Follow-on

Most of the accelerators, especially the ones that provided seed capital in exchange of part of the accelerated company equity, continue to follow-on and provide services to graduated start-ups from past cohorts. Most of the accelerators are focused in maintaining strong relationships with the alumni network, involving them in subsequent cohort to provide their experiences, suggestions and help in evaluating new applications. The chances that successful graduates are present in the alumni network increases as the acceleration initiatives mature over time, and due to strong community sense that has been generated participating in past cohorts usually alumni invest back (time and money) into the community that supported their growth in the first place. Some accelerators are even vertically integrated in the innovation industry, providing to start-ups further investment after that the cohort ended, acting as a classic venture capital firm.

Pauwels and his research team (Pauwels at al, 2016) have identified three main design themes that characterize accelerators, described as *Ecosystem builders*, *Deal-flow makers* and *Welfare stimulators*.

Ecosystem builder, when the accelerator is set up to match customers with start-ups and build corporate ecosystems. Mentoring is provided usually by internal corporate coaches, and no seed investment or equity is exchanged. Regarding sector focus, there is no a clear dominance of a characteristic, therefore there are both generalist and specialist program, but both of them are targeting start-ups at later stages with some track record, with no specific geographical limitation. Funding of the program is provided by corporate partners.

Deal-flow maker, when the main goal of the accelerator is the identification of valuable opportunities for investors. In this case standardized seed investment is provided in exchange of equity from start-ups, and mentoring is usually provided by serial entrepreneurs and business angels, even from the alumni network. Both generalist and specialized programs are available, with some of them focusing on local enterprises while others without limitations. Even here start-ups with some track record are preferred in the selection process. Funding is provided by private investors.

Welfare stimulator, when the main objective of the program is the stimulation of start-up activity and economic development. Targeting very early stage start-ups with sector-agnostic programs, these programs provide mentoring by serial entrepreneurs and business developers and provide seed capital in exchange of equity. Funding is provided by local, national or international schemes.

On top of this general characterization, the researchers have also found that several accelerators are following hybrid models, incorporating characteristics from different typologies of accelerators. These characteristics are largely determined by the objectives of stakeholders involved in the design and in the execution of the program (Powels at al, 2016), therefore hybrid models are emerging when these actors collaborate to provide a mutual beneficial initiative.

Different authors from literature support also the positive effect of accelerators on start-up survival rate, follow on investment and growth of the innovative firm. Due to networking and mentorship opportunities provided, around 60-70% of graduated start-ups received further funding after the program (Hoffman, Radojevich-Kelley, 2012), and participation correlates with a shorter timeframe needed to raise further capital, exiting from the company, or achieving customer traction as comparted to non-accelerated companies (Hallen et al, 2017). Questions remain open if accelerators are a certification of the start-up quality or of the quality the founding team, making therefore complicate to identify if the brand of the accelerator (able to influence the overall number of applications received), is a variable influencing the possible outcomes of the acceleration process (Nesta report, 2011a; Kim and Wagman, 2012). The observed relationship of positive outcomes of accelerators may be due to a selection mechanism since the accelerators could be selecting only the highest quality applications (Mindruta et al., 2016), but however it has been found that start-uppers select programs based on start dates or location (Hallen et al, 2017), not being so aware of quality differentials between the programs and mentoring network due the lack of experience, making sorting effects negligible especially for first time entrepreneurs (Hallen and Pahnke, 2015).

To summarize, accelerators could be considered as platforms linking supply and demand of innovation: targeting three different subsets of the innovation ecosystem industry (new potential ventures, professional investors and corporations) accelerators are able to link a pool of stakeholders from different markets, creating value with the social capital generated among parties (Dempwolf et al, 2014). To start-ups these organizations provide an opportunity to accelerate organizational learning at a relatively small cost though mentoring and network creation; to professional investors and existing companies the reduction of research cost, due diligence, investment risk and reduction of both product (reducing market and technological risk) and company risk (strengthening of teams, creation of supportive network, improving execution capabilities) (Dempwolf et al, 2014). Providing a program based on BIP consultation with access to a wide variety of stakeholders, start-ups are therefore able to learn not through media consultation or indirect network connection (as happens with external consultants) but trough interactive involvement of the knowledge source in the exchange of experiences and in the identification of connection with the founders' situation.

Challenges

Building blocks: Community generation + Shared spaces and resources + Specific problem solving + Knowledge intermediation

Business challenges, as the name suggest, are corporate backed initiatives in which a target group of individuals or organizations is invited to participate to try to solve pre-identified business issues. This panel could be composed by internal employees, but frequently these events are utilized to involve external people and organization with the purpose of capitalizing on the power of open innovation. One of the most used form of business challenge open to (or exclusively organized for) external participants are hackathons. The word hackathon is the crasis of the words hack and marathon. Born between the end of the past century and the beginning of the current one in software companies environments, hackathons are events in which computer programmers and other figures involved in software development tasks are collaborating over a few days on software projects without interruption, in order to showcase their talent, test their solutions and win prizes. Hacking here is not referring to criminal behaviour, but is used in the sense of exploratory programming, while marathon, as it could be easily understood by the structure of the program, refers to the uninterrupted effort put by participants in the few days of the event to be able to create and deliver some valuable prototype of solution at the end of the initiative.

Hackathon events could be described as challenge-focuses computer programming initiatives in which participants could develop, prototype and pitch digital-related innovations, competing for the opportunity of further funding or other forms of prototype-development support (Briscoe and Mulligan, 2014). Starting to gain widespread recognition in the early 2000, and thanks to the falling cost of the typologies of resources needed to develop and run digital applications with related explosion of digital enables start-ups, companies and even venture capitalists started to test this specific approach as an opportunity to develop new applications based on software technologies. Moreover, as the phenomenon grew and due to the typologies of sponsoring entities involves, hackathons have seen a rise in participation of professional figures different from programmers able to complete the product team, like product designers, marketers, and business developers (Briscoe and Mulligan, 2014).

Together with digitalization, other two trends are making hackathon an interesting phenomenon for an always increasing category of organizations: these trends are the emerging possibility to access to organization's Open Data and to utilize standardized Application Programming Interfaces (API) of the sponsoring party in order to develop new products and services. Providing an easier (and usually low cost) access to relevant industry customer information, Open Data and API are enabling external innovators to easily develop potential new business models, while providing to the owner of the data the opportunity to create an ecosystem of actors capable to develop new digital services at a fraction of cost and time required to large corporations (Kitsios and Kamariotou, 2018a).

Hackathon events based on Open Data and access to API could be therefore considered as a new instrument with the potential of encouraging business experimentation and creativity in an open innovation setting, that coupled with the challenge-oriented structure and the opportunities of further development offered to the best teams, could result in the creation of innovative start-ups right off the event (Kitsios and Kamariotou, 2018a, Kitsios and Kamariotou, 2018b).

Hackathons could be classified in different ways based on the focus of the program: initiatives which impose the use of a typology of technology to contribute to the organizer cause (like company API or a specific programming language) are identified as technology-specific hackathons, while hackathons targeting developers to address social issues of business-related objectives are defined as focus-centric hackathons. These two objectives however are usually coexisting in the same initiative (Briscoe and Mulligan, 2014).

Irrespective of the focus of the event, hackathons could be subdivided in specific moments common to all initiatives. After a brief introduction in which challenges are explained and rules and software requirements for the competition are set, participants form the team (if not yet established), sometimes pitching their ideas to recruit additional team members with complementary abilities, and start developing their prototypes. The main work of the hackathon than begins, and usually teams can access support staff (being it provided by the organization itself, by the sponsoring entity or by external experts involved), which help the participants in addressing arising issues and in adjusting the trajectory of the projects toward the sponsoring organization objectives. This part of the event can last from several hours to several days, up to a workweek. Events embedding a competition element usually function with a logic of "*demo or die",* meaning that participants must deliver prototypes to compete for possible prizes. Hackathons adopting this contest structure always plan at the end of the event a series of demonstrations in which each group present their solution in front of a selected panel of judges, composed by key opinion leaders, organization key decision-makers and even professional investors, in order to select the winning teams and assign available prizes. The reward (if available) is usually a small amount of money, but post-program support is often provided to interesting solutions. The rationale of the prizes is in fact to enable selected teams to continue to develop their application for exploring new possible configurations of products and services potentially useful for the sponsoring company (Briscoe and Mulligan, 2014).

Money offered to hackathon winners, following Lee et al, can result as a motivator factor for teams to establish a new venture particularly when they are paired with opportunities of further development of the application created during the program (Lee et al, 2015), therefore organizers of "easy data access" hackathons are starting to add digital entrepreneurs and investors with relevant industry knowledge as mentors and/or members of the judging panel in order to offer to the teams opportunities to get critical feedback on the idea while being developed (Briscoe and Mulligan, 2014; Kitsios and Kamariotou, 2018b), and consequently better information to decide if expanding the project to start-up level or to give-up once the program is over (Kitsios and Kamariotou, 2018b).

From the perspective of a start-up with limited resources, the ability to access for free or at a negligible cost to relevant industry data and to work on them could help these innovative companies to overcome part of the knowledge gap that every new venture has got, creating consequently greater opportunities to build new product and services (Kitsios and Kamariotou, 2018b). Moreover, accessing the data from organization prevent the new venture the need of collecting again similar information from the market and the need of establishing their data infrastructure, enabling consequently a faster and cheaper development of innovative solutions (Janssen et al, 2012). On the other side organizations enabling external start-ups to access somehow their data could benefit by new combinations of data elaborated that could enable better understanding of the proposed issues, and consequently the improvement of actual product and services or the development of complementary applications (Janssen et al, 2012).

Due to the aggregative nature of this typologies of events, hackathons are viewed by both the sponsoring organization and participants as a good opportunity first to learn about respective needs, and second to network with potential partners. The opportunity of launch products through rapid prototyping is also considered as one of the main factors that encourage people and teams to participate to these events, even if just for 25% of people surveyed by the study of the authors (Briscoe and Mulligan, 2014). Creating a place where ideas regarding potential new application are developed and recombination of existing organizational data is experienced could therefore be identified as one of the most important output of the hackathon: as people experiment with each other, the organizer of the competition can in the meanwhile harness on the collective intelligence and experience of personnel from outside the organization. Providing an opportunity to someone external to collaborate and to create new links with decision-makers of the corporations could generate a community able to provide further value in the medium-long term, being it the increased awareness of the digital environment surrounding an industry or the direct development of complementary product and services running on the organization data, fostering in this way the entrepreneurial spirit of all the parties involved (Briscoe and Mulligan, 2014; Kitsios and Kamariotou, 2018b).

Corporate incubators

Building blocks: Community generation + Knowledge intermediation + Shared spaces and resources + Artifacts

As the name suggests, corporate incubators are programs structured similarly to "normal" incubators, in fact these programs are created by companies to support early stage start-ups in the establishment of their value proposition on the market, and therefore are providing them a sheltered space in which to grow and learn while validating their ideas. What differentiate these two typologies of programs is however the motivations for which they are build and run: while standard incubation programs are usually created to support ecosystem development of a specific industry or geographical area, corporate incubators are instruments created to engage with potentially strategical interesting technologies and solutions. Becker and Gassmann with their study of 2006 on twenty-five different corporate accelerators were able to identify four main models (Becker and Gassmann, 2006), each one with its own combination of peculiar features:

Fast-profit incubators: incubation of internal ideas that lie outside actual corporate strategical aims but have market potential. These ideas are incubated to match them with market needs, and the creation of a spin-off able to generate profits quickly is the desired goal.

Leveraging incubators: incubation of internal ideas for growth and subsequent integration into core business. Ideas are matched with internal business units.

Market incubators: the scope of the market incubator is to nurture internal or external start-up ideas to develop the positioning of the company in new strategical markets. The exit strategy remains still the spin-off of the activity.

Insourcing incubators: the incubation process is set-up for evaluation of new opportunities, matchmaking is made with internal business units for integration potential.

These different models of incubators differ by mission, technology source and type of technologies incubated. Regarding technology source, the first two models are focused on developing internal ideas, while the latter two in tapping into external creativity. Moreover, Leveraging and Insourcing Incubators are usually focused in core technologies while Fast-profit and Market on non-core once. In particular it has been observed that Market incubators are pointing at incubating technologies and start-ups potentially able to support the demand of the corporation by increasing its demand for complementary products. Due to the nature of the programs considered for this thesis, only programs utilizing ideas coming from the environment external to the bank have been considered, therefore subsequent discussion will be focused on Market and Insourcing incubator types.

Eshun argues that "the economic future of firms depends heavily on their ability to create and preserve wealth by continuously advancing creativity, fostering innovation and promoting entrepreneurship" (Eshun, 2009), but tendentially large corporations, due to the mix of routines and processes, struggle in establishing a culture able to quickly capture opportunities arising from the external context; opening their innovation processes to external ideas and start-ups could be therefore a key ingredient in creating these capabilities and corporate incubation could therefore be considered as a strategical instruments to transform these start-ups in engines of corporate innovation.

As Weiblen and Chesbrough noted, corporation and start-ups are actually lacking what the other actor has got: corporations have resources, execution capabilities, scale and access to wide markets, while start-ups usually have promising idea paired with organizational agility, a fundamental risk-taking culture and an incommensurate drive for rapid growth. Corporate incubation, together with other instruments that are going to be described later[29], could be a good instrument to bridge respective gaps and leverage on complementarity of capabilities (Weiblen and Chesbrough,2015).

Corporate incubators open to outside ideas could be therefore defined as environments designed to assist and stimulate the growth of external start-ups by providing them industry specific know-how, competencies and resources residing and available only from within the company providing the program, with the aim of facilitating the development of innovative solutions. With this instrument corporations are tutoring early-stage start-ups, usually still to be validated on the market, providing them business assistance, market knowledge and network assets with the intent of gaining privileged access to emerging technologies and applications with commercial and investment potential in corporate-related industrial sector (Branstad and Saetre, 2014; Eshun, 2009; Weiblen and Chesbrough, 2015).

Together with Corporate Accelerators, Challenges and Test laboratories, these relatively new forms of start-up engagement models focused on strategically exploiting the complementary capabilities of both organizations differs substantially from Corporate Venture Capital. While CVC is based on influencing start-up development through equity ownership, these new models are rather focused on influencing these new venture troughs providing them resource, technology and markets access that start-up could not get anywhere else. This new form of lightweight engagement is enabling corporations to gain agility and speed in opportunity-discovery processes needed to survive in fast changing environments: single start-ups solutions are becoming less important for the strategical scopes of the firm but the whole ensemble of encounters might potentially help the corporation in building capabilities needed to shift their market positioning (Weiblen and Chesbrough, 2015).

Considered the definition provided by the authors just mentioned and the analysis of the programs performed to frame the typologies of initiatives provided, corporate incubators are focused exclusively on capitalizing on *outside-in innovation*: with these programs corporation are trying to attract a multitude of interesting innovative start-ups closer the sponsoring organization to enable them to elaborate and deliver on their ideas, creating therefore learning opportunities for the corporation itself about trending areas, new technologies and business models that are being developed.

These programs are usually time-limited (up to 6 months) and allow the participation of a multitude of start-ups simultaneously, but they are not properly structured in cohorts as happens with accelerators (both independent and corporate ones). Due to the lightweight structure needed to pursue scopes of speed and agility, start-ups are enrolled with standardized approaches, without the need to sell any equity to the corporation. Incubation then usually follows a standardized procedural approach to reduce the organizational burden of external to internal interface communication. This project-based approach is utilized both

[29] meaning Corporate Accelerators, Challenges and Test laboratories

to limit the risk of dependency of the start-up on corporate resources, but also to allow the incubator manager to interface effectively at regular time intervals with internal corporate business units in order to transfer the knowledge developed and to present emerging opportunities to them: these incubators in fact are usually scouting for opportunities rather than researching for start-ups able to solve specific needs expressed by departments (as could happen with Challenges and Test laboratories), therefore an internal reporting function is fundamental to get the most out of the program. Working at close contact with different start-ups simultaneously also implies that with this type of interaction corporations can explore different technologies and application in parallel, fact that could lead to improve both organizations adsorptive capacity and speeding-up mutual learning. However, dealing with more start-ups imply also that corporations must become able to scout, select, work with, and monitor a number of start-ups concurrently, requiring therefore a faster decision-making process (usually clashing with corporate culture) and the need to maintain and communicate internally accurate information on all the incubated start-ups (Weiblen and Chesbrough, 2015).

As different authors argue, business incubation does not only depend on the quality of the teams incubated, but requires the synergic utilization of resources, knowledge and technologies embedded and provided by different organizations, who must collaborate to co-produce the business assistance activity (Branstad and Saetre, 2014; Lewis, 2001). The co-production concept was defined by Parks et al in the early eighties and refers to situations in which partners inside an ecosystem jointly contribute to the creation of new products and services (Parks et al, 1981); in particular in service production systems the client of the service could be considered part itself of the production process. As defined by Rice and Reed (Rice, 2002; Reed, 2001) corporate incubation could be considered a dynamic co-production process between corporate incubator managers and selected start-ups in which the output, defined as business assistance, is the product of coordinated and shared knowledge and experiences of both parties. This mutuality, or said in other words the respective capacity of adding value through actor-specific competencies and resources, is therefore the element that is able to drive value-generation in co-production environments, and is largely dependent on the typology of consultancy provided by the managers of the corporate incubator (Rice, 2002).

Three different typologies of interactions have been identified: reactive and episodic, proactive and episodic, or continual and proactive. Defining and taking into account these typologies of interactions occurring during the incubation period to evaluate the incubator ability to generate valuable outcomes, Rice found that in less effective incubators the managing partners were focusing only on providing reactive intervention, and this situation was observed especially where a mutual resource dependency between incubator and tenants were in place due to the incubator business model. Considering the fact that corporate incubators rely on resources of the corporation itself, (and not on the rent and prices paid by start-ups for its services), managers of incubators could be relieved by the burden of financial sustainability of the program, and consequently have the opportunity to engage in a more proactive manner with selected start-ups.

This proactive engagement however needs to be balanced with the willingness to engage with more and more start-ups: incubator owners must balance time in scouting and recruitment with time for development of incubated businesses in order to exploit the benefits of co-creation processes, who ultimately are the drivers of positive outcomes of the incubation process for both parties involved (Allen and McCluskey, 1990; Rice, 2002).

Building on the thesis that time allocated by incubation manager influence the nature and the degree of value added from incubators to both the start-up and the corporation sponsoring the program, it must be noted this typology of proactive engagement however must be flexible: corporate incubators should not be only passive providers of consulting based on a standardized format, but should proactively work to understand each start-up development needs and adjust the business assistance provided. Incubator's managers should therefore build programs with effective co-production and advisory strategies able to identify start-up needs case-by-case, and on top of them create a structure able to effectively transfer the required skills and knowledge to incubated start-ups and to integrate the elements coming from the outside in relevant business departments inside the corporation. Due to this mix of situation-dependent variables, the true value added of the initiative, for both parties, could be identified only ex-post the incubation program (Rice, 2002).

To conclude, scouting through corporate incubations could save time and could avoid the locking of capital and resources in very risky investments, while at the same time providing an instrument able to create growth options for future investment on top of being a useful resource to build entrepreneurial mindset between employees that get to collaborate with incubator managers in providing the program (Becker and Gassmann,2006; Eshun, 2009). Corporations must be therefore able to offer compelling value propositions to targeted start-ups, clarifying how they can add value to the entrepreneurial project which cannot be found elsewhere in the innovation ecosystem, treating the incubatees as a new set of customers to which provide a different typology of service (Weiblen and Chesbrough, 2015).

Corporate Accelerators

Building block: Knowledge intermediation + community generation + shared spaces and resources + BIP consulting

Similar to accelerators, corporate accelerators are fixed term, cohort-based programs provided by corporations that are offering to start-ups (usually working in industries related to the one in which the corporation is operating) opportunities to receive entrepreneurial education and domain-specific expert mentoring (Cohen and Hochberg, 2014). These programs, sometimes organized by the corporation itself and sometimes by an external innovation intermediaries in exclusivity for the sponsoring company[30], are not necessarily investment driven but usually entail different set of strategical aims for which investment is not the best way through which exercise corporate influence (Heinemann, 2015; Hochberg, 2015). Referring to the seminar paper of Weiblen and Chesbrough (Weiblen & Chesbrough,2015), corporate accelerators are a relatively new form of program enabling the creation of start-up-corporate relationship through lightweight governance mechanisms, created with the goal of opening-up corporate innovation processes to leverage on complementary external innovation and speed-up the desired innovation strategy while profiting (broadly speaking) from the innovation capabilities present in start-ups.

Corporate accelerator could be therefore considered tout-court as a form of open innovation initiative created to help on one side innovative start- to grow, and on the other side to enable the sponsoring corporation to create a "portfolio" of complementary options able accelerate corporate innovation processes and potentially finding solutions able to grant some form of competitive advantage (Dempwolf et al, 2014). Portfolio here is put in brackets because the corporation usually does not require a minority stake in the start-up to accept them into the accelerator (nor they provide seed funding before the acceleration happens), but rather prefer to engage with them through a mutual trust relationship based on collaboration in order to create an innovation ecosystem surrounding the company (Euchner, 2013). This lightweight form of collaboration simplifies the establishment of relationships with a greater number of start-ups while at the same time reducing the resources committed for each innovative project, fact that in the medium-long run (in case of start-up survival and prosperity) could advantage the corporation in accessing potential suppliers, customers or commercial partners due to reciprocal knowledge of strategical, tactical and operative needs (Euchner, 2013; O'Connor and Rice, 2013). Since corporations are usually multinational companies, some corporate accelerator is even provided in more countries in which the company is present, or across the same country in different innovation hotspots (Kanbach and Stubner, 2016).

As highlighted by Weiblen and Chesbrough, corporations and start-up are usually lacking what the respective partner has got[31]: these new typology of initiatives are then designed exactly to overcome respective gaps, bridging together start-ups with innovative potential and specialist knowledge with corporations able to provide industry experience, market

[30] Meaning that the program is not directly organized by the corporation but by a third party, that however provide the accelerator exclusively for the sponsoring corporation. In this case, seed investments in exchange of equity is required by the intermediary to start-ups (Jackson, Richter and Shildhauer, 2015)

[31] meaning velocity and flexibility for corporations, and funding, resources, and industry expertise for start-ups

knowledge, facilities and guidance (Jackson et al, 2015), all packaged in an environment able to nurture innovation capabilities and harness entrepreneurial power coming from both start-ups and corporations (NESTA report, 2015).

Corporate accelerators are mostly established by information-related corporations as complementary programs for their CVC funds, and are created to scout, support and nurture seed-stage solutions for both explorative and exploitative purposes, with the aim of innovating along the company value network and distribution channels by bringing the corporation closer to the fast changing environment of start-ups (Heinemann, 2015; Jackson et al, 2015).

Even if the overall strategic aim of each corporate accelerator is to enhance the innovation capabilities of the firm[32], researchers have identified a handful of characteristics able to differentiate accelerators. These characteristics are strategy pursued and design elements, better specified in *proposition*, *process*, *people* and *place* (Richter et al, 2018; Kohler, 2016; Kanbach and Stubner, 2016). Regarding the strategy, usually both logic of exploration and exploitation of knowledge are in place in corporate accelerators, even if with a great variability respect to the specific program, the cohort and the place in which the acceleration is held (Kanbach and Stubner, 2016).

Richter, Jackson and Schildhauer, through a research conducted using abductive reasoning methods on a pool of case studies, identified different plausible strategical aims pursued by the corporation sponsoring the program. Companies are sponsoring corporate accelerators to improve their chances to recognize early potential disruptors, to scout and identify creative partners with which co-developing new products and services, and as an opportunity to position themselves as part of the innovation ecosystem of that specific reference industry. Additional objectives, sometimes considered as by-products of the interaction occurring during the accelerator, could be an increase in corporate entrepreneurial spirit, increase in absorptive capacity and agility for R&D, plus a positive impact on marketing and public relationships due to the framing of the company as a flexible and dynamic organization (Jackson et al, 2015; Richter et al, 2018) . Kanbach and Stubner, though another research structured as an inductive case study analysis involving 13 different corporate accelerators, based on the program strategical aim were able to identify four different models; due to their intrinsic characteristics, two are going to be presented in this section, and two are going to be completely discarded due to the absence of programs operating with these typology of model[33] (Kanbach and Stubner, 2016).

[32] Here for innovation capability it is intended the capability of an organization to revise and update their business model.

[33] One excluded typology of corporate accelerator was named “unicorn hunter” to remind of the activity carried forth: the corporation running this kind of program is adopting a “spray and pray strategy”, investing little amount on a multitude of start-ups with the hope of finding the next unicorn. These programs are purely exploitative, require a percentage of equity by start-ups and usually involve projects not related with the current core-business of the corporation. The second typology of programs excluded is identified as “test laboratory”, and is usually focused on providing small investments with minority holding to early stage start-ups in order to explore and test new business ideas with the objective of a future takeover by the sponsoring partner. These programs are mainly focused on identifying start-ups able to develop solutions with disruptive business models for future revenue creation opportunities.

The accelerator identified as *listening post* is pursuing a purely strategic aim, with no stated objective of financial returns. The main rationale of this typology of accelerator is to understand the development of the market in the corporate related industry to star to internalize the knowledge inside the company and to eventually start to collaborate with start-ups being accelerated. These corporate accelerators are exclusively focused on external start-ups, but do not require equity to participate, following an approach based on establishing fruitful cooperation with successful start-ups graduated from the accelerator. Listening post corporate accelerators are usually completely integrated into the parent company, highlighting the strong focus on collaboration that entails a proximity of organizational environments to better transfer knowledge between the parties. Companies adopting this type of corporate accelerator could theoretically make selected investments in promising start-ups once the program is over.

The second typology of corporate accelerator is instead identified as *value chain investor*. The main objective this type of corporate accelerator is to identify, assist and develop start-ups working on innovative products and services for which the corporation could directly benefit along its value chain, and might include also benefits in introducing on the market new or complementary products through the corporate infrastructure and distribution channels. This type of corporate accelerator can require a stake in the accelerated company to strengthen cooperation and to ensure their access to the start-up products and technologies in case of successful initiatives. This stake usually could be increased in case of development of useful solutions, and pilot projects could be granted to fine-tune mutual needs for integration of the accelerated solution. Start-up participating to the program are new ventures with at least some prototype already out in the market, in seed or post-seed stages, and could usually access proprietary resources of the partner (like customer data and company infrastructure) to validate their solutions. Due to more complex relationship that need to be set for a proficient collaboration this typology of program sometimes is run with the support of an external specialized accelerator.

Even if, as could be easily identified reading the description of these models, these typologies of accelerators require case-specific process and structures to reach desired aims (Richter et al, 2018), most of design elements are common to both typologies of initiatives and are going to be reported below.

Proposition

First of all, the program needs a clear and compelling value proposition in order to attract promising start-ups: due to the large availability of innovation-related support services provided by the most disparate organizations, clarifying which is the value offered to the start-up and the objective of the corporation is a prerequisite to establish fruitful collaboration commitments from both sides (Weiblen & Chesbrough,2015). However, differently from normal accelerators, corporate ones need to provide strategical value and insights to both parties. The “what” of the program is consequently the parameter that influences and frame the interplay among all the other design elements, meaning resources, processes and places: managers need to have a clear understanding of the purpose of the accelerator while establishing it to better choose the overall structure of the initiative (Kohler, 2016).

Corporations, due to the (usually) lightweight form of engagement with start-ups focused on cooperation, need to point out the mutual value generation possibilities, clarifying and aligning goals with these innovative ventures, especially regarding expectations about access to corporate resources (like network and infrastructure), and access to distribution channels and new (for the start-up) markets. Clear-cut propositions enhance the alignment of corporate goals with start-up expectation, and well defined policies regarding equity involvement in the start-ups, specifying also possible future round conditions, are heartily welcomed by new ventures as sign of trustworthiness of the quality of corporate intention (Kohler, 2016). By providing help in rationalizing execution of start-ups, corporations offering these programs could receive in exchange insight of the market trends and opportunities to develop innovation capabilities.

People

Companies running corporate accelerator are providing business assistance to start-ups usually through qualified and expert internal staff, hired with the goal of facilitating start-up and corporate divisions interaction and mutual learning. With this bridging role, accelerator managers must be capable of working both with start-ups but also need confidence with the internal structure, compositions and roles in the company in order to grant to start-ups the access to the right decision makers and knowledge holders inside the organization and to ensure that the knowledge generated is then transferred back to the right employees (Kohler, 2016). Different research moreover pointed out that both start-ups and the corporation thought that the commitment of corporate top management was one of the most relevant factors responsible for positive outcomes of the acceleration process for both sides. The involvement of top management, on to top of increasing the legitimacy and the credibility of the program among corporate employees and stimulating their participation and commitment, is considered also a positive factor for the start-up, that could therefore access quickly to the company main decision makers or relevant employees capable of accelerating the matchmaking process (Kanbach and Stubner, 2016; Standing et al, 2016; Kohler, 2016; Richter et al, 2018). Some corporate accelerators however collaborate with external companies specialized in acceleration processes to create exclusive accelerators just for the corporations and some are creating blended programs: starting with or being helped by an external unit could help corporations approaching this new type of interaction with start-up to gain experience before ruining an autonomous program, and to legitimize the initiative utilizing the brand of the partner who is helping in running the program. Other authors identified also the linking function that corporations could play while matching start-ups with external innovation ecosystem actors (like professional investors) of great importance for generating positive outcomes from the acceleration process. Providing these matchmaking services could potentially enable the corporation to set-up programs similar in structure as the ones usually developed by independent innovation platforms (Kupp, Marvan and Borches, 2017).

Place

For both the typologies of corporate accelerators described previously, a strong link with the corporation is needed to achieve respective aims; these programs require a strong exchange of information between start-ups and corporate divisions, therefore they are usually completely integrated (in terms of organizational ownership and physical location) into the sponsoring company (Kanbach and Stubner, 2016). Integration however does not mean that the accelerator is embedded completely in the corporate structure, since most of the time a strict organizational separation between the accelerator and the corporation is preferred to remove the start-up and accelerators managers from daily corporate bureaucracy and possible interference, allowing them to move in a nimbler way to accomplish desired goals (Chesbrough et al, 2006).

Process

Similarly to external organized accelerators, corporate ones structure their programs in time paced business assistance burst delivered throughout cohorts. Being able to interact with multiple start-ups in a time limited period of time is an expedient particularly useful for corporations, since it forces them to focus their efforts on providing substantial support to start-ups if they want to reach their strategical objective, enabling the acceleration of the time required for corporate innovation processes (Kohler, 2016). Time limits are also useful to give the program flexibility: as with accelerators, time pacing is important, but content must be tailored to enable effective co-development process. For corporation is therefore better to discuss and identify the start-up needs at the beginning of the program and agree on priorities of both parties to create a customized plan rather than letting thing evolve naturally on a longer time-scale.

Applications are usually open to start-ups coming from every corner of the world: not posing a declared limit on the number of start-ups to be admitted could provide to corporations the opportunity to capitalize on screening procedure and improving the recognition of potential opportunities, enabling the growth of the absorptive capacity and consequently the ability to internalize potentially radical and disruptive new ideas (West and Borges, 2014).

Due to the lightweight model of engagement adopted for this kind of programs, corporations must develop the capability of treating start-ups as partners, and not as subcontractors, to keep their engagement and commitment to the program high (Jackson and Richter, 2017). These programs in fact should be utilized to increase the *opportunity throughput* of the corporate innovation pipelines, therefore should be focused on relationship building. Potential opportunities of collaboration should be left outside the acceleration but are one of the main objectives obtainable after getting to know how start-ups operate during the program (Kohler, 2016). Early-stage investment consequently seems not to be a priority for corporate accelerators; since they are forced to strictly collaborate with start-up for a predetermined period of time, they could evaluate on what to invest after the conclusion of the program, where better signals about the quality of the innovative project should be available (Kohler, 2016). Regarding this topic, some corporation are asking to start-ups to sign contracts with future options to invest at predetermined clauses, while others offer them the opportunity to participate in corporate-backed testing laboratories to run pilot projects on banking infrastructure.

To improve the quality of the applications it is important to position the corporate accelerator as part of an innovation ecosystem, actively engaged with accelerated start-ups even when the program is over to establish a trust relationship able to increase both the knowledge of the partners and the attractiveness of the program itself (Kohler, 2016). Providing access to an external network of complementary partners is therefore perceived as a credibility sign of the program since it opens-up the possibility for start-ups to capitalize the public relationship value generated by the on-going relationship with the corporation, improving their access to funding and collateral services (Kohler, 2016).

Even if accelerators are short-term projects, the efficacy of these program should be measured not in the short run but regarding long-term objectives, adopting a set of KPI able to show to corporate shareholders that the program is not a complete waste of money (Kupp, Marvan and Borches, 2017). Actionable metrics, coming from the *lean start-up methodology*, should be used to identify the emergence of value rather than vanity metrics, which are usually tracking financial information for which is well known that start-ups, especially in the early stages, do not perform. Another set of KPI used by some accelerator are high level metric for goals, like the number of prototypes creates or the number of subsequent pilot projects and partnerships, but great differences among corporate accelerators are still present (Richter et al, 2018).

To conclude the description, close attention must be paid to avoid that the corporation overprotect or choke start-up agility through *corporate backing*: if start-ups are too much protected form market forces, they could fail to capture feedbacks that could have helped them to adapt to reach full product-market fit. Moreover, closer ties with corporations could imply that even if a start-up is able to establish itself on the market, the corporation could hinder further development of the venture limiting their capability of pursuing partnerships with competitors (Kohler, 2016).

Establishing a corporate accelerator requires therefore more than just deciding program features: contextual elements, innovation ecosystem involvement, structure of the program, and corporate culture and commitment could facilitate or hinder the efforts spent in setting up these new typologies of program (Richter et al, 2018). However, if properly designed and managed, corporate accelerators offer to the sponsoring company great opportunities to get to know and evaluate a multitude of new start-ups, creating therefore relationships that could unlock options for further collaboration, integration or investment, while at the same time creating an industry-related ecosystem growing around their offices and improving the entrepreneurial spirit of the company.

Test laboratories

Building blocks: Knowledge intermediation + Community generation + shared spaces and resources + BIP consulting + specific problem solving + financed experiments

Due to the accelerated trend in digitalization of services and an increasing amount of competition even among concurrent FinTech propositions, deciding the right horse on which to bet has become much more complicate for Corporate Venture Capital funds of industries that are subject to such rapid changes. The differences in planning horizons of start-ups and corporations and resulting implications in returns on investments expected by respective shareholders, plus the velocity with which the market shifts its attention toward new technological solutions makes investing in FinTech start-ups a very complex and risky activity for corporations. As Rudolf Freytag (CEO of Siemens Technology accelerator) puts, "for established companies with revenues in the magnitude of multiple hundreds of millions or even billions, the maximum direct contribution to revenue that successful start-ups could make is still far too little for a conventional growth strategy of a corporations given their planning horizon of 2-3 years", therefore careful considerations must be made before committing substantial resources into a small number of initiatives (Freytag, 2019a). One of the possible solutions to reduce corporate resource commitments and investment risks while in search for innovative solutions could be to rely on test laboratories initiatives to collaborate with innovative ventures with the objective to co-develop innovative products and services to be somehow integrated inside the corporate ecosystem. These instruments, run to reach similar objectives of CVC activities, could be defined as outside-in innovation programs (Weiblen and Chesbrough, 2015) created to cooperate with new market players with the intent to capitalize on current corporate assets for business development purposes while relying on the help of external players to reach new customer segments and markets (World Economic Forum, 2018).

Collaboration is feasible when parties could provide complementary assets and skills to each other for mutual advantageous objectives (Accenture, 2015): while corporations are offering to third parties the opportunity to collaborate in the development of new product and services, providing them the possibility to run their solution on corporate technological infrastructure, distribute it through their sales channels or granting access to customer data and information, start-ups on the other side could contribute providing agility, knowledge of new technologies and new markets, and an entrepreneurial mindset often not present in corporations (Weiblen and Chesbrough, 2015; Onetti, 2021). Consequently, throughout the openness toward collaboration with external innovative ventures, corporations could get the opportunity to access to external innovators able to develop and test new product and services based on innovative technologies at an higher speed and at a lower cost respect to internally developed ones, factors that compounding together are able to reduce the overall riskiness of the innovation process (Du, Leten and Vanhaverbeke, 2014; Nesta Report, 2015; World Economic Forum, 2018).

As other lightweight forms of collaboration identified by Weiblen and Chesbrough, also test laboratories are not relying on equity investments, but are rather focused on creating commercial partnerships to leverage on fresh ideas coming from the external innovation ecosystem. Companies are therefore searching for start-ups with a "leverage potential",

meaning that the collaborations must be able to over-stimulate incumbent core business revenues on top of the small partner financial contribution (if any), even in mid-term settings typical of strategical planning of corporations (Freytag, 2019a). This form of collaboration with new actors of the innovation ecosystem, oriented toward collaboration, creation of shared value and mutual trust could be the foundation of an ecosystem-based form of innovation, where risks and reward are shared between partners and in which platforms businesses could arise (Accenture, 2015).

From the research process it has been found that organizations proposing test laboratories are not open to run pilots with whichever typology of FinTech solution, since they are restricting the possibilities to collaborate only on challenges proposed by their internal business units. All these programs are therefore currently focused on the objective of finding useful solutions to solve corporate strategical objectives in the medium-term rather than hosting extensively a great number of solutions available on the market, element that makes remote in time the possibility of a transition toward a fully implemented platform-type of business models for these financial institutions[34], but that somehow opens possibilities of changes in that direction.

Since the objective of the program is to find solutions to be integrated into the bank product and service ecosystem or infrastructure, this typology of program is usually targeting start-ups at later stages that are already on the market. This collaborative approach however requires that corporations must validate the instruments proposed by start-ups before committing to integration, therefore test laboratories are designed to offer to start-ups the opportunity to develop and run collaborative pilot programs at corporate expenses. The goal of these activities is therefore to collaborate to search for proofs of market validation of proposed solutions embedded into the banking ecosystem, thus offering the opportunity to the corporation to reduce the risks and resources invested to obtain strategical results, while at the same time building a stricter relationship with the involved start-up that eventually could evolve in potential partnerships, commercial agreements, or in further investments through equity instruments. Test laboratories are usually run under the CVC arm of the corporation, but never require equity in exchange of the funding of the pilot project, that is dispensed as a grant. Standardized instruments (both contractual and procedural) are utilized to reduce the coordination burden that could emerge in dealing concurrently with different start-ups that collaborate with multiple business units, as noted by Weiblen and Chesbrough for similar typologies of programs (Weiblen and Chesbrough, 2015).

Before starting to collaborate, however both corporations and start-ups must pay attention to different elements to be able to obtain the maximum value from the initiative in which both are going to be involved. From corporate perspective, these organizations first need to deeply understand and decide for which scope the collaboration will be carried out: following Freytag classification (Freytag, 2019a), the company needs to decide if collaboration will have the objective of exploring a possible growth strategy, or if it will be started to execute a predetermined route. Based on the objective chosen operational configuration of the cooperation must be consequently adapted and tailored.

[34] Regulation in financial activities could also be a factor that is slowing down and inhibiting the development of financial platforms.

Collaborative projects carried out to explore the development of novel growth strategies, where companies aim at detecting new trends while developing and testing hypothesis about possible future directions, is carried out to be able to reduce technological and market risks before a future possible implementation into the corporate offering. Within this framework, multiple small projects focused on the same issue and lasting few weeks or months could be run in parallel to find interesting value propositions fitting into the company ecosystem of products and services; the projects with higher potential usually could continue with further experimentation. This approach permits to get in contact with multiple innovative start-ups with small investment of corporate resources in each of them (Freytag, 2019a). Collaboration to execute a predetermined growth strategy instead focus on collaborating with partners able to quickly generate (generally in 2, maximum 3 years timeframe) a revenue growth coming from the implementation of the innovative activity. Partners selected to help the corporation executing a strategy are therefore involved in implementing and validating their instruments into the corporation infrastructure. One (or few) project is selected for each challenge, and both organizations require long term commitment of resources to implement proficiently the proposed solution. The duration of these projects could be of multiple months, up to an entire year (Freytag, 2019a). Start-ups, depending on their life-stage, could fist be enrolled for exploration purposes, and then if they are able to provide convincing elements to the corporation, to establish a stronger collaboration though the co-development of exploitational strategies (Freytag, 2019a). Crucial element for corporations is therefore their ability to understand at which stage collaborating start-ups are when applications are presented, and to capitalize on the fact that depending on the stage these innovative ventures could offer (and require) different typology of support (Freytag, 2019a).

Moreover, corporations need to internalize the fact that start-ups operate differently from established players: the start-up mindset is exactly what make the collaboration valuable since it allows the company to accelerate their learning and their innovation process, consequently close attention must be paid to manage possible cultural clashes, to align intentions and expectations, and to simplify corporate processes and coordination structures in order to maintain a level agility required by start-ups and an adequate level of mutual trust that could enable these organizations to leverage on their collaboration efforts, without falling into the trap of making *Innovation tourism* (Accenture, 2015; Freytag, 2019a; Freytag, 2019b; Onetti, 2021; World Economic Forum, 2018).

According to the study conducted by Accenture in 2015, to increase collaborative efforts partners should try to carefully communicate and understand respective objective and needs: 29% of entrepreneurs that participated to the study stated that corporations were not perceived as committed to the collaborative project set-up between them, while on the other side just 7% affirmed so. Resulting lack of alignment must be somehow solved to avoid both organizations to waste effort and resources, factor that due to the time-commitment needed to run a pilot become especially critical for start-ups survival in case the project fails (Accenture, 2015; Nesta Report, 2015).

To facilitate cooperation, corporations should adopt start-up friendly flexible procedures: starting from qualification processes, but comprehending also intellectual property management, preferential payment conditions, resources committed and time constraints, and clear expectations should be provided to engage just with companies that could afford to undertake such conditions and that are indeed interested in collaborating (Onetti, 2021; World Economic Forum, 2018).

Knowing which typology of risks start-ups are usually facing at each stage of their life-cycle could also be a powerful instrument for corporations to avoid to chocking the innovative ventures: the need of generating cashflows quickly, summed to risk of getting blocked by a single customer (the corporation itself) could limit start-up potential both in term of product development capabilities and in terms of possible delays to the development of the project, wasting therefore both corporate and start-up resources (World Economic Forum, 2018).

Some other risks not related to start-up collaboration issues could be encountered by corporations: attention must be paid to possible resistance of middle management to change, to the correct engagement of all figures that need to be involved to carry out a specific project, to expectations of shareholders and to a possible lack of adsorptive capacity (World Economic Forum, 2018). Regarding middle management, if not engaged properly in the decision making processes or in the pilot project, there could be the risk of lowering their trust into the innovation process carried out with the external start-up: close attention must be paid by executive to commit resources and personal time to showcase to all the organization that what is being developed is of strategical importance, unless the project could be viewed as an image-enhancing experiment carried out with no change in mind. The message that executives must transfer to employees is that these programs are not spot initiatives, but programs part of a greater strategical objective backed by top-management, and therefore integrated with the overall company innovation strategy. In corporations there can be multiple stakeholders to be involved in each single project, from R&D to marketing, from legal to sales, from finance to product development and all their needs and priorities must be somehow cleared before the starting of the collaboration with the external start-up in order to avoid internal misalignment that could, at the end, have negative effects on both the project and more seriously on the start-ups involved. An intermediary function that mediates and coordinates between start-ups and corporate business units and keeps engaged key stakeholders could be solution able to overcome said limitations. Since these projects requires a higher level of due diligence to start collaborations, significant more resources (in terms of human-hours and monetary to sustain the pilot) are committed for each project: tracking and communicating to shareholders forecasts of synergies and benefits created by each picking could enable a smoother implementation of further projects in the future. Regarding last point of the list there exists a risk that the organization, once the pilot project is concluded, will not be ready or able to capitalize on results obtained by the collaboration: even if budget is allocated for running pilot, a risk exists if after a successful implementation of it there are not sufficient funds or capabilities in the organization to integrate the solution and scale it. Not budgeting for these possible extra efforts required could block innovation and create mistrust inside start-ups regarding the real capabilities of the corporation to leverage on the innovation proposed, generating a bad image of the corporation within the start-up environment (Accenture, 2015).

To conclude, it must be remembered that these pilot projects are executed under a signed contract between parties, usually even before to know if the proposed solution is a suitable one for the corporation. This fact implies that agreements regarding commercialization and intellectual property management must also be managed carefully to split evenly benefits obtainable by the collaboration without unbalancing too much toward corporate interests and should be linked to milestones and suitable innovation metrics, therefore flexible to change as the project evolves (Accenture, 2015).

Evolution of programs over time

Taking into account the classification described in the last paragraphs, this section will provide a further specification of the phenomena under examination; different analysis about the typology of programs offered are going to be reported, together with a study of the evolution of these programs over the years taken into account for the research. Figure 22 is reporting the overall division of the different program available based on the program organizer and the relative industry focus of the project; among the 35 programs provided by third parties, half of them are acceleration programs, 23% are incubation initiatives, and another 23% networking programs, while it seems that few challenges have been provided by external entities. Remaining in the FinTech domain, it seems that financial institutions are highly focused on providing services to start-ups in their early-stages, providing a total of 16 corporate incubation programs and 13 corporate accelerators, amounting to circa 35% of the overall number of FinTech programs offered. However, since these institutions could better define their internal needs of innovation, they are providing an higher number of challenges respect to third parties, and most notably a total of 28 tests laboratories initiatives pointing at testing and validating external products and technologies to be integrated in the banking ecosystem. For programs addressing start-ups operating in sectors different from FinTech, the prevailing typology of program offered is the facilitation of the linking of these ventures with relevant stakeholders (networking & matchmaking events), and the provision of educational resources and tools useful to help entrepreneurs reasoning about their venture ideas. A great availability of incubation and acceleration programs are also offered to the start-ups operating in the most disparate sectors (a total of 11+12 programs respectively).

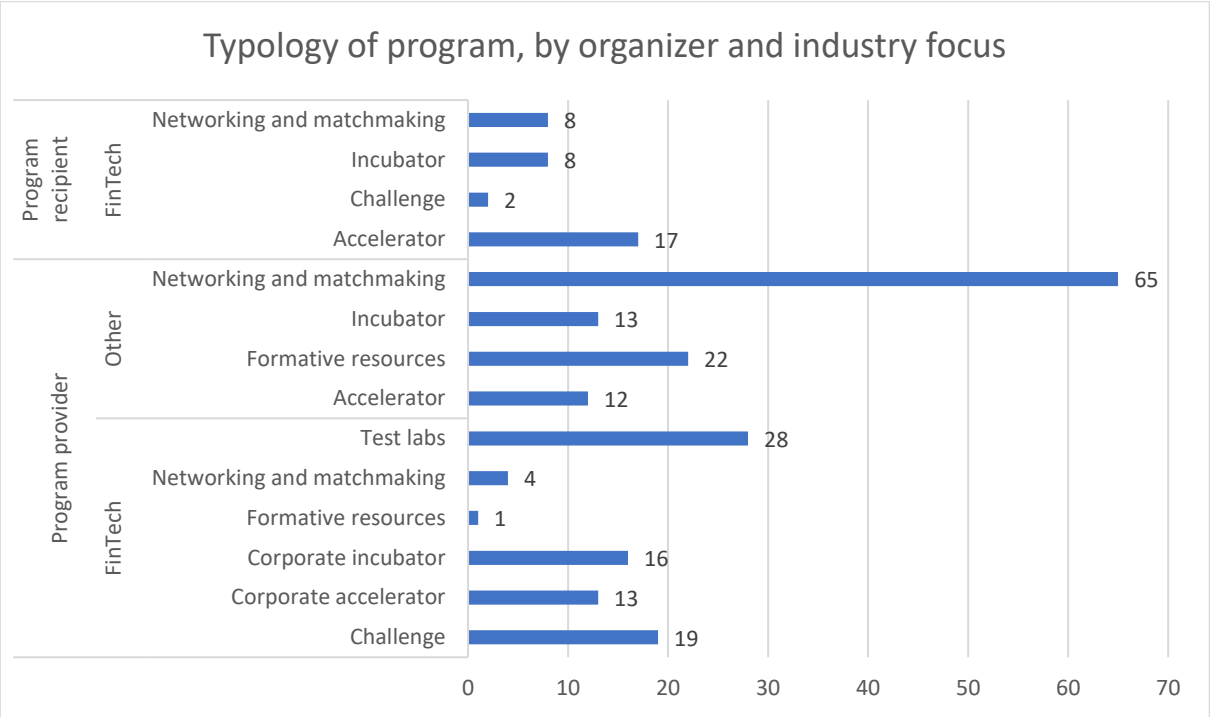

Figure 22 Typology of program, by organizer and industry focus

Regarding the distribution of program along the years, some trend could be spotted among the different categories of programs offered[35]. Regarding the FinTech industry, initiatives provided by third parties have raised in number since 2016, and apart from accelerators that are growing constantly, as today other initiatives seem quite stable and not growing anymore, as reported in Figure 23.

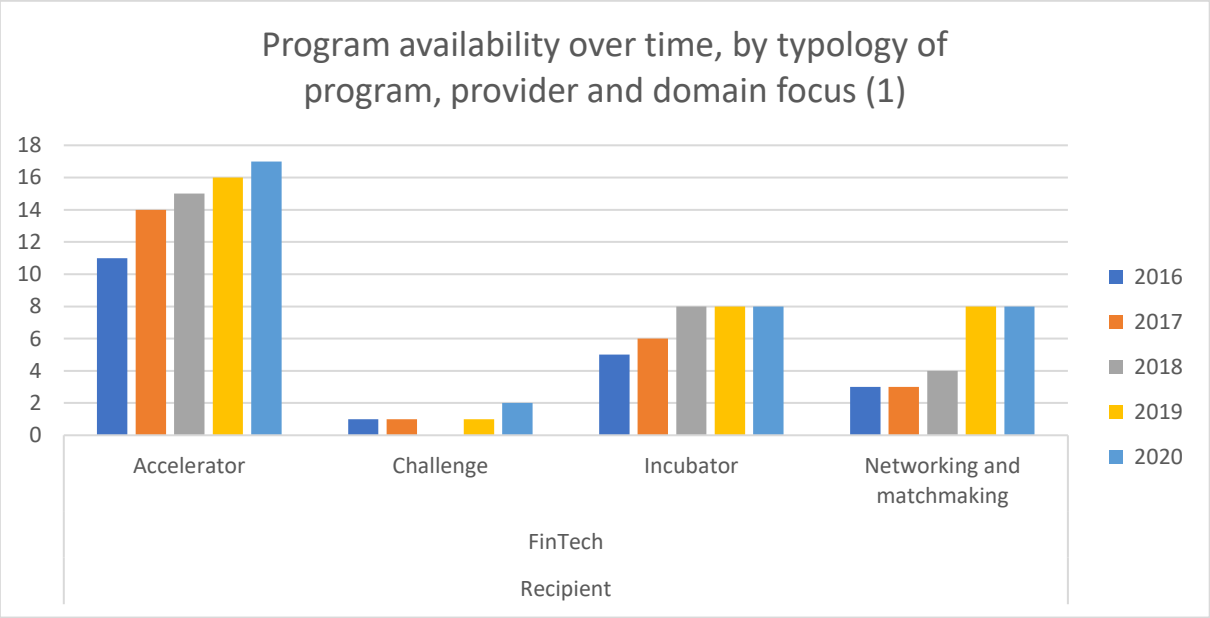

Figure 23 Program availability over time, by typology of program, provide and domain focus (#1)

[35] Numbers may differ between the graphs, but these differences are due to the activation and closing of different programs along the years. The first graph was counting the overall number of different programs activated in the period of the analysis, while subsequent yearly graphs are taking into account the number of programs active each year.

What can be observed regarding programs provided by financial institutions and directed to FinTech start-ups instead is more various and interesting: leaving aside the provision of formative resources and the few initiatives of networking and matchmaking, there has been a steady increase in the provision of corporate incubation programs, but most notable of test laboratories, that grew from 12 program in 2016 to 27 of 2020. Regarding the challenges, also focused on solving banking problems but with a lower investment of time and resources from the bank, the number has been reduced in 2020 even if in the past years there was a positive trend: this effect probably is due to Covid-related restrictions, since one of the main strengths of these program is the cross pollination of ideas provided in shared spaces during the short timeframe of the event while trying to solve proposed challenges. Last but not least, an interesting trend could be observed with corporate incubators: after a first increase in popularity, since 2019 the number of these programs seems to stabilize. The number of corporate accelerators after a first increase, started to decrease in 2019 (Figure 24).

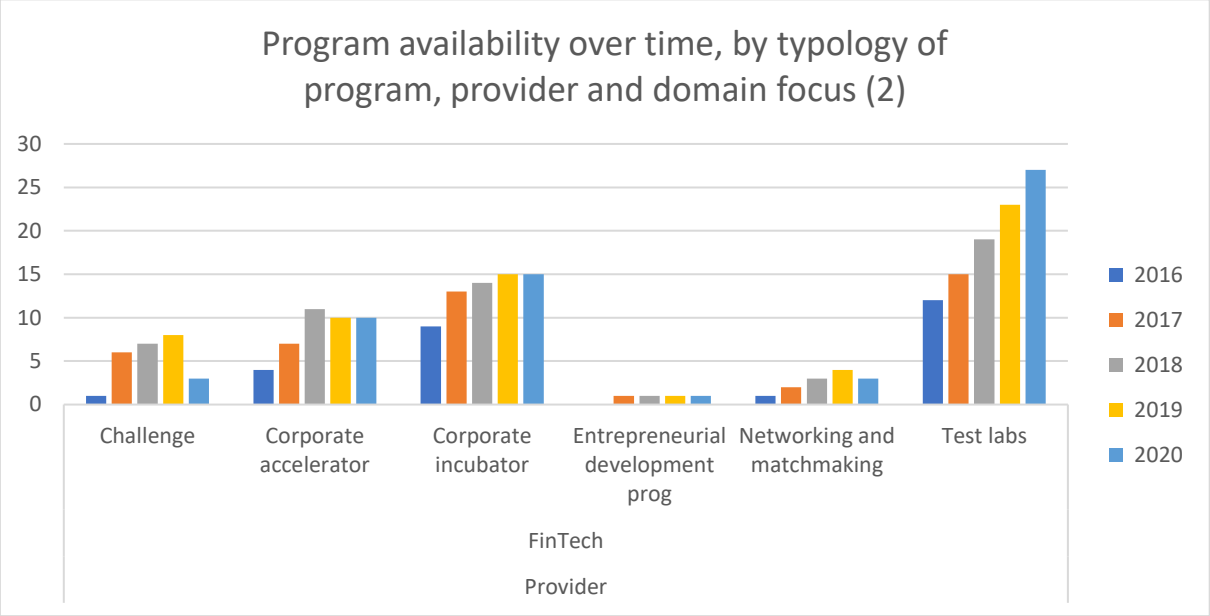

Figure 24 Program availability over time, by typology of program, provide and domain focus (#2)

At the same time, participation in programs offered by third parties, for almost all the typologies of initiative offered, grew year by year. Comparing the data, it could be stated that banks over time tended to rely more in acceleration programs organized by third parties rather than by themselves, but also that they are increasingly expanding their offering of incubation services one to the detriment of the ones offered by external organizations. Another interesting point is that no intermediaries are involved while banks are scouting for start-ups willing to implement pilot projects with them.

The great majority of programs offered by banks toward start-ups operating in industries different from the financial one are networking and matchmaking initiatives: these programs usually are also provided in incubation projects provided by third parties participating as a "service" supplier, introducing incubated start-ups to relevant stakeholders. The number of programs of this type have grown constantly over the past years, but in 2020 have seen a little reduction. Regarding the other typologies of programs, the offering provided by the financial institutions toward non-FinTech start-ups has been stable over time (Figure 25).

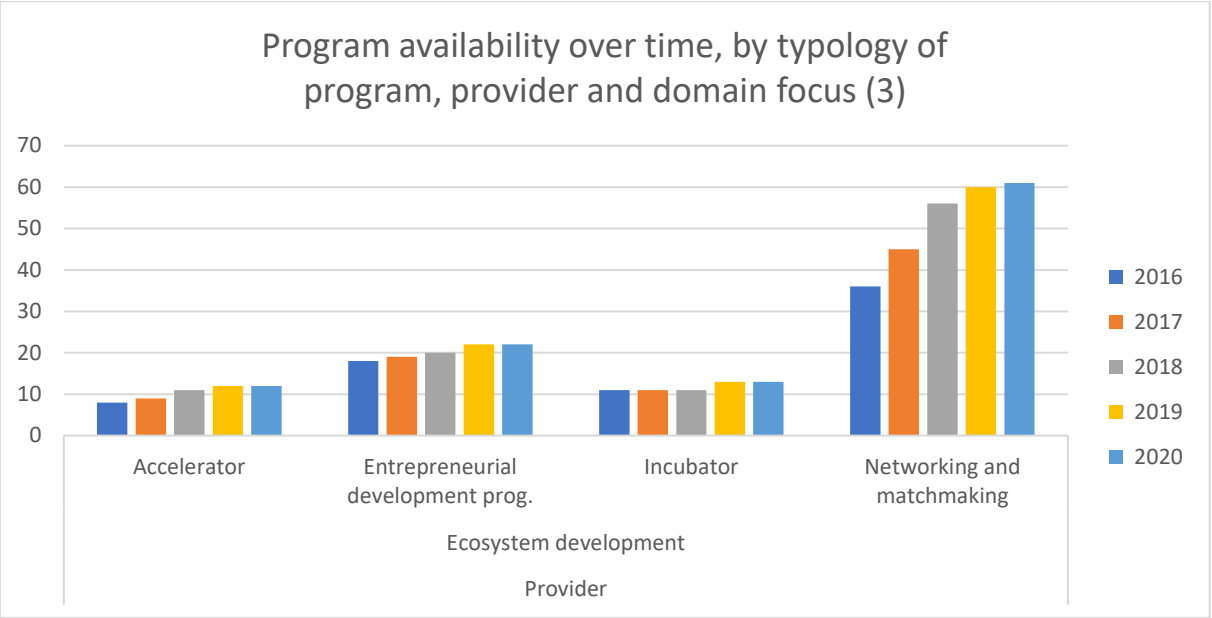

Figure 25 Program availability over time, by typology of program, provide and domain focus (#3)

Visualizing the data with absolute frequencies is useful to highlight the general trend of programs activated, but nevertheless it does not provide useful information regarding possible shifts in utilization of specific type of programs. In order to better understand if there has been a shift in interest regarding the typologies of programs, a different type of visualization taking into account relative frequencies could be utilized, as shown in Figure 26, Figure 27 and Figure 28. Data will be analysed taking into account again the overall number of different programs identified in order to provide a clearer overview of the evolution of the offering.

Regarding programs provided by third parties, over time the relative number of challenges and incubation activities remained quite stable (even with some spike in 2018), while the relative number of accelerators decreased to leave space to more matchmaking and networking services.

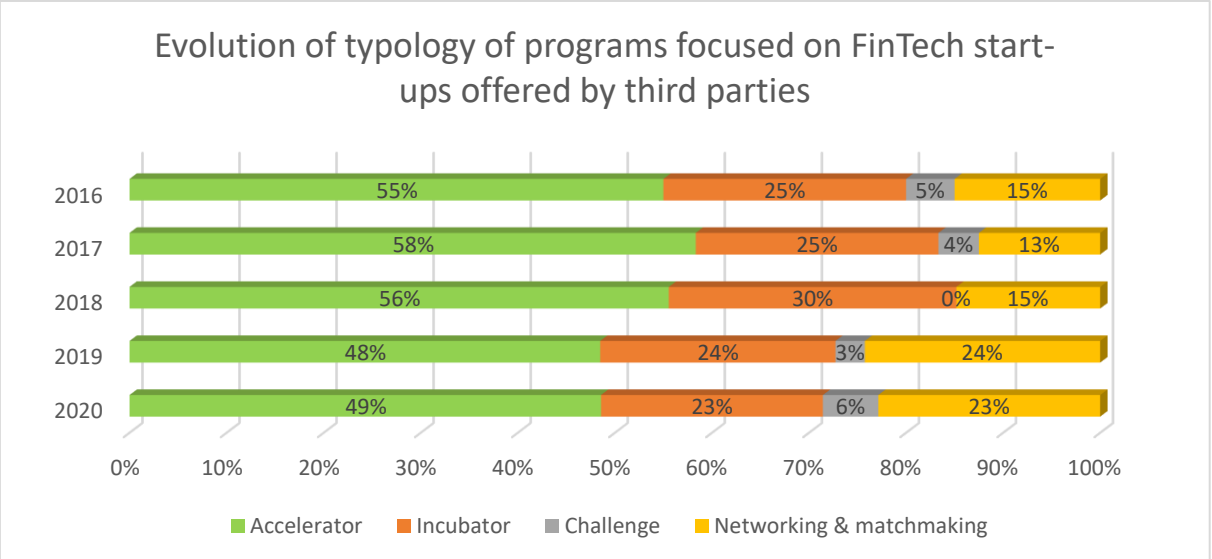

Figure 26 Evolution of typology of programs focused on FinTech start-ups offered by third parties

For programs provided by banks for FinTech start-ups, over time the relative number of formative resources and networking and matchmaking initiatives remained quite stable, while for both challenges and corporate accelerators they peaked in 2018 and after they left room for more corporate incubators and test labs. What emerge clearly from this graph is also that the relative number of test lab programs is growing faster than the other typologies of programs, showing the fact that banks are more willing to directly integrate the solutions already available on the market in their offerings though the arrangement of pilot projects.

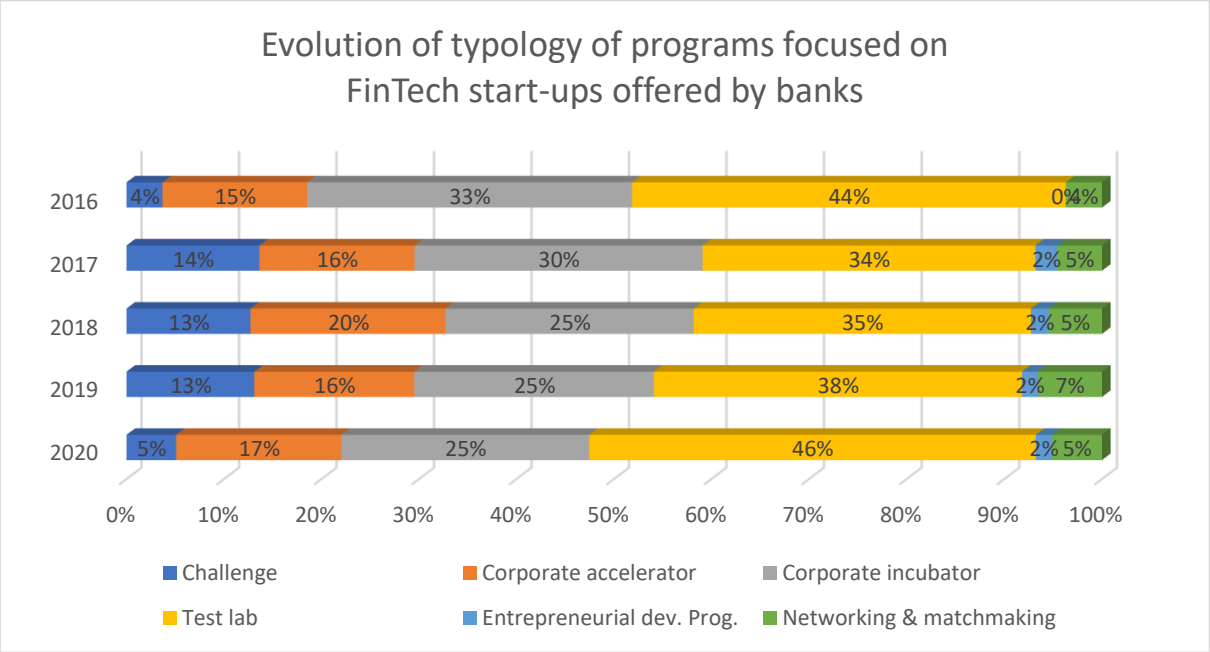

Figure 27 Evolution of typology of programs focused on FinTech start-ups offered by banks

Last but not least, for programs organized by banks targeting start-ups in domains different from FinTech, the situation did not changed by much: over time the relative number of accelerators remained stable, the growth in numbers of incubators and programs for entrepreneurship development saw a slight decrease while the relative number of networking and matchmaking programs grew faster respect to other typologies of initiatives.

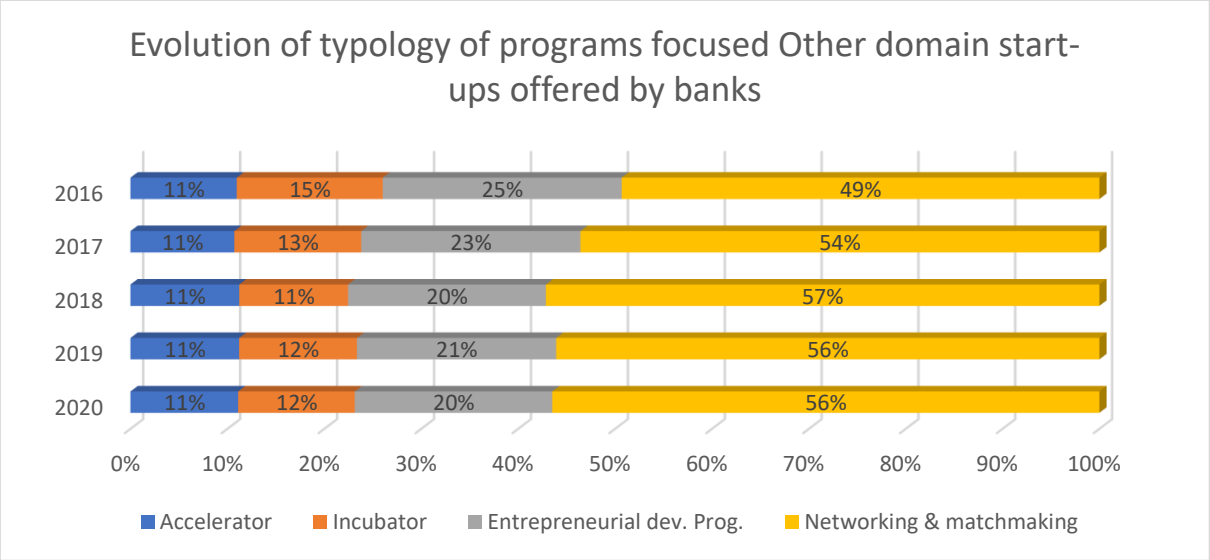

Figure 28 Evolution of typology of programs focused Other domain start-ups offered by banks

Strategic focus of the programs

After having identified the different typologies of programs for start-ups in which banks have been involved in the past five years, the next logical step to characterize the behaviour of these institutions regarding possible innovation strategies was to identify the possible strategic outcomes that could be pursued participating into the variety of programs identified. Considering the typologies of start-ups involved in these programs, two main categories of strategical focus have been identified: initiatives focusing on the involvement of FinTech start-ups and initiatives focusing on start-ups of the most disparate sectors. The former could be defined as programs made to scout technologies and solutions useful for the bank itself, while the latter as programs made to cultivate technologies and solutions useful for the overall innovation ecosystem development.

With a deeper analysis of each program description, a further classification of possible strategies has been developed defining different possible aims based on the intensity of the involvement of the corporations into these programs. This first analysis resulted in the identification of three levels of commitment, meaning start-up support, cultivation, and integration, here ordered in increasing level of the engagement of the corporation. On top of that, also considering the life-stage and/or the specific kind of solution provided by the start-ups, eight different strategical aims have been identified, of which five only related to solutions useful to improve the bank itself, as better explained by the list hereafter.

Scouting for technologies and solutions useful for the bank (*Bank Improvement strategies*):

- Start-up Support
    - Venture creation support
    - Venture development support
    - Venture scaling support
- Start-up Cultivation
    - Cultivating back-end technological solutions (Cultivating Back-end)
    - Cultivating B2C customer-oriented front-end product and services (Cultivating B2C)
    - Cultivating B2B enterprise-oriented products and services (Cultivating B2B)
- Start-up Integration
    - Integration of back-end solution in banking infrastructure (Integration Back-end)
    - Integration of new product and services into the bank offering (Integration Front-end)

Supporting technologies and solutions useful for economic system development (Ecosystem Development):

- Start-up Support
    - Venture creation support
    - Venture development support
    - Venture scaling support

Depending on the industry focus, the program provider, and characteristics of the program utilized as instrument to reach specific strategic goals, similar programs have been classified with different strategical aims during the research process. Consequently, on top of the eight strategical aims, a total of 33 different combination of bank role, program type, industry focus and strategic goal have been identified, as reported in Table 5 and Table 6.

Table 5 Recap of different strategies pursued throughout identified programs (1)

Bank role	Program type	Industry focus	Strategic goal
Provider	Challenge	Bank Improv	Cultivating B2B
Provider	Corporate accelerator	Bank Improv	Cultivating B2B
Provider	Corporate incubator	Bank Improv	Cultivating B2B
Recipient	Accelerator	Bank Improv	Cultivating B2B
Recipient	Challenge	Bank Improv	Cultivating B2B
Provider	Challenge	Bank Improv	Cultivating B2C
Provider	Corporate accelerator	Bank Improv	Cultivating B2C
Provider	Corporate incubator	Bank Improv	Cultivating B2C
Recipient	Accelerator	Bank Improv	Cultivating B2C
Recipient	Challenge	Bank Improv	Cultivating B2C
Recipient	Incubator	Bank Improv	Cultivating B2C
Provider	Challenge	Bank Improv	Cultivating Back-end
Provider	Corporate accelerator	Bank Improv	Cultivating Back-end
Provider	Corporate incubator	Bank Improv	Cultivating Back-end
Recipient	Accelerator	Bank Improv	Cultivating Back-end
Recipient	Incubator	Bank Improv	Cultivating Back-end
Provider	Test laboratory	Bank Improv	Integration Back-end
Provider	Test laboratory	Bank Improv	Integration Front-end
Provider	Entrepreneurial dev. program	Bank Improv	Venture creation support
Provider	Corporate incubator	Bank Improv	Venture development support
Provider	Networking and matchmaking	Bank Improv	Venture development support
Recipient	Incubator	Bank Improv	Venture development support
Recipient	Networking and matchmaking	Bank Improv	Venture development support
Provider	Networking and matchmaking	Bank Improv	Venture scaling support
Recipient	Accelerator	Bank Improv	Venture scaling support
Recipient	Networking and matchmaking	Bank Improv	Venture scaling support

Table 6 Recap of different strategies pursued throughout identified programs (2)

Provider	Entrepreneurial dev. program	Ecosyst Dev	Venture creation support
Provider	Incubator	Ecosyst Dev	Venture creation support
Provider	Networking and matchmaking	Ecosyst Dev	Venture creation support
Provider	Accelerator	Ecosyst Dev	Venture development support
Provider	Networking and matchmaking	Ecosyst Dev	Venture development support
Provider	Accelerator	Ecosyst Dev	Venture scaling support
Provider	Networking and matchmaking	Ecosyst Dev	Venture scaling support

As different researchers have highlighted with their work, different engagement instruments (if and when properly designed and integrated within corporate processes) could lead organizations to develop a different set of innovation-related capabilities and know-how useful to transform their businesses (Steiber and Alänge, 2019; Weiblen and Chesbrough, 2015; Nesta report, 2015). These innovation capabilities, better defined by Teece as dynamic capabilities, are the capabilities of the management class to reconfigure assets and resources to enhance and sustain the competitiveness of the corporation on the market, and include sensing, seizing, and re-configuring competencies (Teece, 2006). Sensing capabilities are identified as the ability of an organization to recognize emerging opportunities and threats. Seizing refers instead to the ability to structure effective decision-making processes able to mobilize resources that could enable business transformation. Finally, re-configuring capability refers to the ability of the organization to execute and implement required changes in order to integrate the new knowledge generated into an updated organisational setting, better aligned with market requests (Teece, 2006).

Taking into account the innovation management framework just outlined, after providing a general description of strategical aims developed while analysing program characteristics, the following part of the thesis will be focused on highlighting, for each possible program which has been identified as pursuing a specific strategical aim, which are its main benefits and limitations in terms of both the typology of knowledge that could be generated and in terms of dynamic capabilities development possibilities. It must be noted that presented results are not only related to available literature, but some reasonable assumptions developed while researching information for the thesis will also be included to present a wider overview of the topic.

Scouting for technologies and solutions useful for the bank

FinTech start-up support

Programs created to support FinTech start-ups could be defined as initiatives targeting innovative projects potentially useful for the financial industry, created to provide support in the creation, in the establishment and in the expansion phases of the involved start-ups. These initiatives usually do not envisage the structural involvement of the bank supplying the program into the definition of the FinTech start-up business model, but are providing a series of tailored supportive services able to satisfy the needs of the different targets of these initiatives, all without any investment in the start-up at any stage[36]. The generic goal of these activities targeting FinTech start-ups is the expansion of the influence of the bank over the FinTech ecosystem, since with these programs the financial institutions are acting more as networking information broker. Rather than co-developing strategies together with participating start-ups, bank in these initiatives are helping new ventures to execute their strategies without great involvement in their decision-making process.

Venture creation support

FinTech venture creation support programs are targeting teams working on start-ups not yet established and are structured to provide entrepreneurial formation to support these new projects in the creation of a new legal entity. This typology of programs could be used to get new insights on technological evolution and trends, but due to the stages at which entrepreneurial projects are involved, probably these initiatives are more focused on establishing a point of contact between banks and the early-entrepreneurial community, providing advantages in the early detection of potentially valuable ideas to be further developed with the support of the bank itself (Table 6).

Table 7 Innovation capabilities that could be developed with venture creation support programs for FinTech initiatives

Entrepreneurial development program - Provider	
Benefits	Limitations
Support development of entrepreneurial capabilities of subjects willing to establish FinTech start-ups could give access to talented people and interesting ideas. The educational tool could be useful also as a learning tool for banking employees that through these courses could develop entrepreneurial capabilities, learning the subject matter and increase their engagement and motivation regarding entrepreneurship matters. Gaining early access to new ideas could increase opportunity recognition and	Working with unstructured teams and projects could lead to waste effort and resources. This fact could be limited by the provision of digital-only services. Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by start-ups: information flows and knowledge integration must be carefully managed to keep track of information gathered from the innovative ventures.

[36] Meaning that direct investment of the bank or the program provider into the start-up are not included in the declared scope of the programs analysed.

opportunity creation capabilities of the overall FinTech ecosystem (and of employees) (Draycott and Rae, 2011) Offer to student tools and opportunities to apply ideas and artifacts to create direct value for the bank itself (Breslin and Jones, 2014) These platforms could be used as repositories of information to be used for delivering further services, as matchmaking initiatives with internal stakeholders and/or venture creation support. Could improve the image of the bank as a dynamic organization.	

Venture development support

Targeting start-ups already incorporated, this typology of support is provided to FinTech innovative ventures to help them developing and growing their businesses. The support provided does not entail specific help in shaping the business models of these start-ups (as it happens with "cultivation") but is rather focused on the matching of internal needs of innovations of banks with solutions already available on the market provided by these innovative companies. In this typology of initiatives, the bank is acting as a networking player (or vector of innovation) both for finding solutions for internal needs and for matching these promising start-ups with potential investors, internal or external to the bank (Table 8).

Table 8 Innovation capabilities that could be developed with venture development support programs for FinTech initiatives

Corporate Incubator – Provider	
The corporation can choose which start-ups to engage with. Providing the experience and usually coworking spaces located near to employees, the bank can be at direct contact with the innovative start-up personnel. Being the provider of the incubation enable the exploration of different technologies in parallel while controlling the flow of information, increasing the awareness of employees involved in the process on future technological trends and potential of new technologies (Nesta report, 2015).	External partners with track-record could be perceived as more relevant than corporate employees working in the innovation field in providing business development support (Nesta report, 2015): corporate incubators are relatively young programs with mentoring from the industry provided by a narrower range of internal mentors, fact that could lead start-ups to rely on external programs for a wider exposure to industry players. Need to offer a compelling value proposition, clarifying how the bank could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015)

Involving more employees, not only for R&D department, in the business support processes could enable a faster learning while getting access to emerging technologies and innovative business models (Branstad and Saetre, 2014; Weiblen and Chesbrough, 2015) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities (foresight capabilities) (Eshun, 2009). Business support provided to start-ups could foster internal learning by engaging employees as mentors and advisors of start-ups, rejuvenating therefore the corporate culture while developing employee's entrepreneurial mindset (Nesta report, 2015). Working with start-ups could improve the perception of the bank's image, improve its attractiveness respect to potential partners and talent (Nesta report, 2015). Providing knowledge regarding new technologies, competencies and business models, start-ups could help reduce costs and riskiness of future investments on solutions offered by external companies (Nesta report, 2015)	Resources committed for scouting, engagement of start-ups and mentoring could be significant (Nesta report, 2015) The exclusive use of internal resources for scouting purposes could limit the development of sensing capabilities (Steiber and Alänge, 2019). Controlling the flow of information imply that there must be processes in place to capitalize on knowledge disclosed by incubated start-ups: information flows and knowledge integration must be carefully managed to keep track of knowledge generated. Lack of clear duration of initiative could lead corporate employees to dedicate less attention to the incubation process, slowing down the overall corporate innovation process.
Incubator – recipient	
The external organization, being specialized in incubation services, could provide better selection process due to screening capabilities developed along the years. Resource commitment could be reduced using external providers (Onetti, 2021) Programs could be implemented faster, with relevant knowledge on design parameters already tested and validated by experience of the provider (Nesta report, 2015). Start-ups participating in the programs could receive mentoring from different companies on the market, resulting in the possibility for the corporation to obtain better feedback on market evolution and trends.	Selection of start-ups to be involved in the program is decided by the service provider. The relationship with the start-up is intermediated and start-ups are hosted in facilities that are not directly linked with banks activities: these two facts could limit knowledge absorption from corporate employees due to lower level of engagement of the workforce (both numerically and in terms of time dedicated) Being provided by a third party specialized in this typology of services, usually the incubator is open also to other competing banks, meaning that knowledge generated is be shared among different partners.

Networking and matchmaking – Provider	
Better possibilities to link external start-ups with internal stakeholders and decision-makers, controlling therefore the overall flow of information (Burt, 1992). The bank could decide the typology of start-ups to target for the event, better aligning it with internal needs. Sensing capabilities of internal needs could be developed: the personnel involved in the intermediation process, talking with relevant internal stakeholders could better understand which are the urgent needs. Scouting of external technological solutions could increase the organization sensing capabilities regarding available solutions on the market (Watkins and Horley, 1986; Bessant and Rush, 1995) Being directly involved in the generation and exchange of information, adsorptive capacity of the organization could be increased (Watkins and Horley, 1986)	Relying exclusively on internal resources could limit the exposure to external organizations: this fact could limit organization ability to develop sensing capabilities regarding latent and future needs and related possibility to know potential threats and opportunities (Steiber and Alänge, 2019) Due to limited engagement with external organizations, positional knowledge is built at a slower pace respect to third parties. Limited exposure to external start-ups could restrict the ability to reconfigure existing knowledge and recombination capabilities. Risk of not being able to properly bridge cultural and cognitive differences among start-ups and corporate employees involved.
Networking and matchmaking - Recipient	
The party organizing the event could be better positioned to leverage on positional knowledge: the intermediary, being exposed to different incumbents' personnel and to a wider pool of external start-ups could be better equipped to understand future and latent needs of the industry (Howells, 2006). Being exposed to a wider number of different actors of the value chain, third party intermediaries could better reduce the information gap between demand and supply of innovation due to better capabilities of reconfiguring and recombining information collected (McEvily and Zaheer, 1999). These enhanced capabilities could facilitate the matching of organizations and the partner's decision-making processes (Mantel and Rosegger, 1986), creating a useful filter able to reduce research costs for corporations which are participating to these events.	Few people from the corporation could participate to each event, resulting in some barriers in the flow of information and a possible slow-down of the adsorption and diffusion of the knowledge generated. The target of start-ups participating to the event is decided by an external organization and could result in suboptimal choice of participants respect to corporate needs. The corporation has a lower control over the flow information between different stakehoders. Fewer possibilities to develop sensing capabilities regarding latent and future needs due to the intermediated match.

Venture scaling support

Venture scaling support services for FinTech companies are targeting scale-ups, meaning start-ups with a validated business model, a proved track record and already on a path toward profitability (if not yet reached) to help them in establishing their presence in new countries or territories, and therefore in accessing new markets. Banks with their vast network of branches usually present across different countries could therefore provide their knowledge about these markets to scale-ups participating in these programs, linking them with relative local stakeholders (Table 9).

Table 9 Innovation capabilities that could be developed with venture scaling support programs for FinTech initiatives

Accelerator – Recipient	
The external organization, being specialized in acceleration services, could provide better selection process due to screening capabilities developed along the years and thanks to the availability of multiple programs in different locations across the world. By offering seed money in exchange of a relatively low percentage of equity and by being independent from the industry players, the external accelerator is generally able to attract huge numbers of applications (best accelerators receive hundreds of applications each batch). Relying on external providers therefore could be considered for corporation as a de-risking strategy, since the acceptance of an application (and relative investment from the VC fund) could be considered as a signal of the quality of the accelerated start-up. Resource commitment could be reduced using external providers (Onetti, 2021) Programs could be implemented faster, with relevant knowledge on design parameters already tested and validated by experience of the provider (Nesta report, 2015). Start-ups participating in the programs could receive mentoring from different companies on the market, resulting in the possibility for the corporation to obtain better feedback on market evolution and trends.	Selection of start-ups to be involved in the program is decided by the service provider. The relationship with the start-up is intermediated and start-ups are hosted in facilities that are not directly linked with banks activities: these two facts could limit knowledge absorption from the corporation due to lower level of engagement of employees (both numerically and in terms of time dedicated) Being provided by a third party specialized in this typology of services, the accelerator is open also to other competing banks, meaning that knowledge generated and opportunities are shared among different partners, resulting in possible higher competition for further collaborations with promising ventures.

Networking and matchmaking – Provider	
Better possibilities to link external start-ups with internal stakeholders and decision-makers, controlling therefore the overall flow of information (Burt, 1992). The bank could decide the typology of start-ups to target for the event, better aligning it with internal needs. Scouting of external technological solutions could increase the organization sensing capabilities regarding available solutions on the market (Watkins and Horley, 1986; Bessant and Rush, 1995) Being directly involved in the generation and exchange of information, adsorptive capacity of the organization could be increased (Watkins and Horley, 1986) Helping start-ups to establish themselves in new markets could improve the brand of the corporation, creating an image of dynamism and collaboration, on top of generating useful information regarding the market characteristics due to extensive dialogue with these scale-ups (Nesta report, 2015). Helping FinTech start-ups to enter in the financial market in which the corporation is operating could enable a better knowledge of market evolution and could open-up possibilities of collaboration.	Due to limited engagement with external organizations, positional knowledge is built at a slower pace respect to third parties. Limited exposure to external start-ups could restrict the knowledge reconfiguring and recombination capabilities. Providing help to external organizations to establish themselves into foreign markets could limit the possibilities of the corporation to establish itself on that specific market.
Networking and matchmaking - Recipient	
The party organizing the event could be better positioned to leverage on positional knowledge: the intermediary, being exposed to different incumbents' personnel and to a wider pool of external start-ups could be better equipped to understand future and latent needs of the industry (Howells, 2006), and consequently transfer this knowledge to the corporation while providing better links with relevant players.	Few people from the corporation could participate to each event, resulting in some barriers in the flow of information and a possible slow-down of the adsorption and diffusion of the knowledge generated. The target of start-ups participating to the event is decided by an external organization and could result in suboptimal choice of participants respect to corporate objectives.

Being exposed to a wider number of different actors of the value chain, third party intermediaries could better reduce the information gap between demand and supply of innovation due to better capabilities of reconfiguring and recombining information collected (McEvily and Zaheer, 1999). These enhanced capabilities could facilitate the matching of organizations and the partner's decision-making processes (Mantel and Rosegger, 1986) creating a useful filter able to reduce search costs for corporations which are participating to these events. Helping FinTech start-ups to enter in the financial market in which the corporation is operating could enable a better knowledge of market evolution and could open-up possibilities of future collaboration.	Providing help to external organizations to establish themselves into foreign markets could limit the possibilities of the corporation to establish itself on that specific market.

Cultivation of new technological solutions

Programs aiming at cultivating new technological solutions could be defined as initiatives targeting FinTech start-ups in which the bank is directly and explicitly involved in providing mentoring, industry specific support and experience to innovative ventures participating to these programs. Selected bank personnel are directly involved in the design and in the definition of the business models of the participating start-ups, even if with various degree of involvement depending on the typology of the program. Most of the time these programs do not provide ex-ante direct investment of the bank into the start-up, but this option should not be excluded in later stages of the program itself. Start-ups supported for cultivation purposes are usually still in search of product-market fit, therefore the bank (irrespectively of providing direct or intermediated support) could aim at helping these new ventures in the definition of their offering, guiding them from the creation of a proper value proposition to the identification of suitable customers (sometimes being the banks themselves). A wide number of emerging technologies are opening up opportunities for banks to revolutionize the infrastructure, the processes, and products and services on which these institutions are currently operating, therefore the opportunity to get in contact with FinTech start-ups at early stages an helping them in the definition of their strategies could first increase the absorptive capacity of the organization and in second place the overall chances to get in contact with useful solutions.

Cultivating back-end technological solutions

For the purpose of this thesis, back-end solutions are identified as the innovative FinTech propositions that could be used by financial players to improve processes, data management, banking infrastructure, or generally speaking all the technological solutions not directly embedded in products offered to the customers but rather useful for a proper or improved

functioning of the bank itself. Some examples might include improving credit management procedures based on the processing and analysis of enormous amounts of data with artificial intelligence, the improved security of transaction obtainable with blockchain, or the use of cloud computing to streamline computational burden or customer operations or cybersecurity and authentication solutions.

Cultivating B2C customer-oriented front-end product and services

Business-to-customers solutions, in this thesis, are identified as product and services directly offered and/or sold to people, defined as the end users. FinTech companies are leveraging emerging digital technologies to create products based on huge amounts of standardized data and better customer experience to create interesting value propositions for customers. Moreover, the fact that these innovative ventures are digital-based and (up to now) low regulated provides them a nimbleness that could stress the offering provided by established players. Examples of B2C product and are wealth management solutions, payment applications, daily family financial management, innovative financing solutions, new lending schemes and stock-trading related applications.

Cultivating B2B enterprise-oriented front-end product and services

Business-to-business product and service, as the name suggests, are solutions provided by the bank to entities with legal personality, that most of the time are other businesses with which the bank has already some kind of relationship. This kind of products, as introduced in the first pages of the thesis, differ from B2C ones since are created to target more complex problems and are usually adopted based on an extensive evaluation of efficiency gains and decrease of operational costs that could provide to the adopter. Ernst & Young report of customer adoption of FinTech solutions (Ernst & Young, 2019) highlighted that customer adopt these services based on the range of functionalities that match their business needs and relative easiness of setup, that usually requires the integration of a wide variety of software and databases in order to provide a coherent picture of the overall financial situation of the company. Solutions offered are again based on emerging digital technologies, which are enabling the creation of new value propositions able to attract a wider pool of business day after day. Example of possible solutions offered are products create to improve invoice management, tools to better predict cashflows based on industry wide and extended regional market data, better instruments to hedge financial market risks, or more generally speaking solutions able to reduce the burden of financial management of other businesses (Table 10).

Table 10 Innovation capabilities that could be developed with cultivation programs for FinTech initiatives

Corporate Incubator – Provider	
The corporation can choose which start-ups to engage with. Providing the experience and usually coworking spaces located near to employees, the bank can be at direct contact with the start-up personnel. Being the provider of the incubation enable the exploration of different technologies in parallel while controlling the flow of information, increasing the awareness of employees involved in the process on future market trends and regarding the potential of new technologies (Nesta report, 2015). Involving more employees, not only for R&D department, in the business support processes could enable a faster learning while getting access to emerging technologies and innovative business models (Branstad and Saetre, 2014; Weiblen and Chesbrough, 2015) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities (foresight capabilities) (Eshun, 2009). Business support provided to start-ups could foster internal learning by engaging employees as mentors and advisors of start-ups, rejuvenating therefore the corporate culture while developing employee's entrepreneurial mindset (Nesta report, 2015). Working with start-ups could improve the perception of the bank's image, improve its attractiveness respect to potential partners and talent (Nesta report, 2015). Providing knowledge regarding new technologies, competencies and business models, start-ups could help reduce costs and riskiness of future investments on innovation of the corporation (Nesta report, 2015)	External partners with track-record could be perceived as more relevant than corporate employees working in the innovation field in providing business development support (Nesta report, 2015): corporate incubators are relatively young programs with mentoring from the industry provided by a narrower range of internal mentors, fact that could lead start-ups to rely on external programs. Need to offer a compelling value proposition, clarifying how the bank could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015) Resources committed for scouting, engagement of start-ups and mentoring could be significant (Nesta report, 2015) The exclusive use of internal resources for scouting purposes could limit the development of sensing capabilities (Steiber and Alänge, 2019). Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by incubated start-ups: information flows and knowledge integration must be carefully managed to keep track of knowledge generated. Lack of clear duration of initiative could lead corporate employees to dedicate less attention to the incubation process, slowing down the overall corporate innovation process.

Incubator – recipient	
The external organization, being specialized in incubation services, could provide better selection process due to screening capabilities developed along the years. Resource commitment could be reduced using external providers (Onetti, 2021) Programs could be implemented faster, with relevant knowledge on design parameters already tested and validated by experience of the provider (Nesta report, 2015). Start-ups participating in the programs could receive mentoring from different companies on the market, resulting in the possibility for corporation to obtain better feedback on market evolution and trends.	Selection of start-ups to be involved in the program is decided by the service provider. The relationship with the start-up is intermediated and start-ups are hosted in facilities that are not directly linked with banks activities: these two facts could limit knowledge absorption from corporation due to lower level of engagement of the employees (both numerically and in terms of time dedicated) Being provided by a third party specialized in this typology of services, usually the incubator is open also to other competing banks, meaning that knowledge generated is shared among different partners.
Corporate Accelerator – Provider	
The corporation can choose which start-ups to engage with. Providing the experience and usually coworking spaces located near to employees, the bank can be at direct contact with the innovative start-up personnel. Intensive few-months mentoring could ensure that employees involved in the acceleration process focus on extracting the most out of the experience. Structural separation from the corporation could increase seizing capabilities of the whole organization due to higher capabilities of mobilizing resources at the speed required to collaborate with start-ups (Steiber and Alänge, 2019). Being the provider of the accelerator enable the exploration of different technologies in parallel while controlling the flow of information, increasing the awareness of employees involved in the process on future trends and potential of new technologies (Nesta report, 2015).	Significant resources are committed to sustain the program, especially in terms of time of personnel involved in the mentoring process. The program could be potentially less attractive than independent accelerators due to the possible restricted pool of mentors coming exclusively from inside the corporation and the relative novelty of the program itself. The bank needs to offer a compelling value proposition, clarifying how the corporation could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015) The exclusive use of internal resources for scouting purposes could limit the development of sensing capabilities (Steiber and Alänge, 2019). Business support must be designed around start-up needs rather short-term corporate innovation needs (Nesta report, 2015)

Providing knowledge regarding new technologies, competencies and business models, start-ups could help reduce costs and riskiness of future investments on innovation of the corporation (Nesta report, 2015) Working with start-ups could improve the perception of the bank's image, improve its attractiveness respect to potential partners and talent (Nesta report, 2015). Involving more employees, not only for R&D department, in the business support processes could enable a faster learning while getting access to emerging technologies and innovative business models (Branstad and Saetre, 2014; Weiblen and Chesbrough, 2015) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities (foresight capabilities) (Eshun, 2009). Business support provided to start-ups could foster internal learning by engaging employees as mentors and advisors of start-ups, rejuvenating therefore the corporate culture while developing employee's entrepreneurial mindset (Nesta report, 2015).	
Accelerator - Recipient	
The external organization, being specialized in acceleration services, could provide better selection process due to screening capabilities developed along the years and thanks to the availability of multiple programs in different locations across the world. Offering seed money in exchange of a relatively low percentage of equity and being independent from the industry players, the external accelerator is generally able to attract huge numbers of applications (best accelerators receive hundreds of applications each batch).	Selection of start-ups to be involved in the program is decided by the service provider. The relationship with the start-up is intermediated and start-ups are hosted in facilities that are not directly linked with banks activities: these two facts could limit knowledge absorption of the corporation due to lower level of engagement of the employees (both numerically and in terms of time dedicated)

Relying on external providers therefore could be considered for corporation as a de-risking strategy, since the acceptance of an application (and relative investment from the VC fund) could be considered as a signal of the quality of the accelerated start-up. Resource commitment could be reduced using external providers (Onetti, 2021) Programs could be implemented faster, with relevant knowledge on design parameters already tested and validated by experience of the provider (Nesta report, 2015). Start-ups participating in the programs could receive mentoring from different companies on the market, resulting in the possibility for corporation to obtain better feedback on market evolution and trends.	Being provided by a third party specialized in this typology of services, the accelerator is open also to other competing banks, meaning that knowledge generated and related opportunities are shared among different partners, resulting in possible higher competition for extending the bank relationship with interesting start-ups.
Challenge - Provider	
Targeting pre-identified business issues: the bank could decide which issues to address. Good instrument to attract external talent with digital innovation related capabilities (like marketers, product designers, business developers, etc) from which employees could learn (Briscoe and Mulligan, 2014). Enabling external innovators to access bank data through API and Open Data initiatives could speed-up the development of new products, while providing the owner the opportunity to create an ecosystem of actors able to develop digital services (Kitsios and Kamariotou, 2018a) Being focused on solving a specific problem these, interesting ideas developed during the challenges could receive further support and funding right after the event (Briscoe and Mulligan, 2014), eventually speeding-up the creation of innovative companies or the integration of the team and of the idea into the corporation pipeline (Kitsios and Kamariotou, 2018a; Kitsios and Kamariotou, 2018b)	Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by incubated start-ups: information disclosed and related flows must be carefully managed to keep track of knowledge generated. Working with unstructured teams and projects could lead to waste effort and resources. There must be willingness and availability from employees to dedicate some sequential working days to mentor participating teams and then to support them in product development processes. Arising interesting start-ups must be then nurtured and helped in growing, implying that the corporation must foresee a commitment of resources (both monetary and in terms of mentoring time) even after the initiative.

Could improve the image of the corporation as a dynamic organization. Good instrument to develop entrepreneurial and sensing capabilities of employees, which could participate both as teams or as mentors. Discovering new ways in which corporate data could be used to provide innovative products and services to the customer base could enable a better understanding of the market challenges, enabling potential improvements of corporate product and services and of complementary applications or infrastructure (Janssen et al, 2012)	
Challenge - Recipient	
Could improve the image of the corporation as a dynamic organization. In some cases, mentoring could be directly provided by bank employees, which could directly scout for talent and interesting ideas. Good instrument to attract external talent with digital innovation related capabilities (like marketers, product designers, business developers, etc) from which employees could learn (Briscoe and Mulligan, 2014). Enabling external innovators to access bank data through API and Open Data initiatives could speed-up the development of new products (Kitsios and Kamariotou, 2018a). Interesting ideas developed during the challenges could receive further support and funding right after the event (Briscoe and Mulligan, 2014), eventually speeding-up the creation of innovative companies or the integration of the team and of the idea into the corporation pipeline (Kitsios and Kamariotou, 2018a; Kitsios and Kamariotou, 2018b)	Being usually open to more banks, the choice of the challenges to be addressed is shared with other players and/or with the sponsoring organization, possibly leading to a compromise. Working with unstructured teams and projects could lead to waste effort and resources. Talend is showcased to different banks involved in the program, as also ideas generated by the teams, limiting the potential of exploiting results generated. There must be willingness and availability from employees to dedicate some sequential working days to mentor participating teams and then to support them in product development processes. Interesting start-ups must be then nurtured and helped in growing, implying that the corporation must foresee a commitment of resources (both monetary and in terms of mentoring time) even after the initiative. Knowledge generated is dispersed among all stakeholders involved in the event and not centralized only on specific corporate employees as happen when these companies are directly providing the programs.

Discovering new ways in which corporate data could be used to provide innovative products and services to the customer base could enable a better understanding of possible solutions, enabling potential improvements of corporate product and services (Janssen et al, 2012) Teams participating to these events could receive mentoring from different industry players, possibly resulting in better guidance and consequently higher quality of the projects. Time and resources commitment are limited, and organization of the event is left to specialized parties, maybe more capable of attracting the right kind of participants based on corporate requirements.	By involving less employees for each bank, the development of organizational sensing capabilities could be limited.

Integration of new technological solutions

Programs aiming at integrating new technological propositions could be defined as initiatives targeting later stage FinTech start-ups already on the market to collaborate with the bank to integrate the proposed innovative solution inside the banking ecosystem of product and services (if B2B or B2C solution) or in its own infrastructure (if back-end solution). The initiatives pursuing this strategic aim are created to solve specific banking needs identified by internal business units and departments, which then will participate in the scouting phase to identify possible solutions and that lately will directly engage with these innovative ventures to enable the testing phase with bank assets and resources. Start-ups selected to participate in these programs are usually still not self-sustaining enterprises; financial institutions are then financing participating companies with small amount of money (without requiring equity) to integrate these solutions with the bank infrastructure and/or private data to run small-scale experiments, both in real-life and in simulated environments. For this typology of program, due to the life-stage of the start-ups involved, no explicit involvement in the definition of the business model and strategy of the innovative companies is usually foreseen or required; however, a substantial stronger commitment of both resources and personnel of interested business units is required to be able to align interests and make possible an effective integration, possibly solving the need for which the program has been created.

Integration of back-end technological solutions

As already explained in the previous section, back-end solutions are propositions that could be used by financial players to improve processes, data management, banking infrastructure, or all the technological solutions useful for a proper functioning of the bank itself. The same examples of applications to be cultivated could be used to highlight some potential banking interest in solving specific needs, that obviously vary bank by bank depending on their actual level on knowledge.

Integration of front-end technological solutions

Instead of treating separately solutions for businesses and for clients, due to the different nature of the reasons for which the programs with these strategical aims are set up (that is for solving actual banking needs, rather than having an overview of new possibilities as it happens with cultivation), the two categories are grouped together when integration of the proposed solution is the main aim of the initiative. The same examples described for B2B and B2C cultivation could be used to describe possible typologies of innovative front-end solutions researched to be integrated into the banking ecosystem (Table 11).

Table 11 Innovation capabilities that could be developed with integration programs for FinTech initiatives

Test laboratory - Provider	
Being the provider of the initiative, the bank could decide for which challenges to scout and with which partner to engage. Leverage on corporate assets (like infrastructure, sales channels, and customer data) that result complementary to start-ups ones (knowledge of new technologies and new markets) plus the offering of grant to test their solutions result in strong value proposition for start-ups. Collaboration and co-development could increase the knowledge of corporate employees involved in the process and involving personnel from all levels of the organization could help in building adsorptive capacity throughout the whole organization. Building a relationship with the start-ups involved in test laboratories could advantage them in subsequent funding rounds and commercial agreements and partnerships. Tool capable of building seizing capabilities (the ability to structure effective decision-making processes able to mobilize resources that could enable business transformation) and re-configuring capabilities (ability of the organization to execute and implement required changes in order to integrate the new knowledge generated into an updated organisational setting, better aligned with market requests) (Teece, 2006).	Clear needs from business units must be identified and collected to scout for suitable solutions. Close attention must be paid by the corporation in identifying the typology of strategy that they want to implement (exploration vs exploitation) to tailor operational aspects of the program and subsequent collaboration (Freytag, 2019a) During implementation phases, concurrent cooperation of different business units is vital to effectively deploy the innovative solution. Close attention must be put on involving the right stakeholders from the beginning and to cultural resistance to change since tests are directly applied in collaboration with corporate employees (World Economic Forum, 2018) Substantial resource commitment both in terms of money and corporate employees time is necessary to build the relationship, to integrate information acquired and to sustain the development and the subsequent implementation into the infrastructure of the proposed solution. These costs must be foreseen at the beginning of the collaboration to avoid unpleasant situations in which once the technology has been validated but cannot be implemented due to lack of funds (Nesta report, 2015)

Innovation processes could speed-up since product development capabilities of start-ups should not be constrained by corporate processes. Working directly with the start-up could enable the corporation to acquire competencies in understanding the hurdles of start-ups, knowing the issues that players into the ecosystem are facing, with consequent opportunity to develop adequate tools to improve flexibility of the corporation innovation processes.	Slow corporate processes could hinder the usefulness of the program. Relationship with start-ups must be carefully managed and processes related to the establishment of possible commercial relationships must be tailored to start-up speed requirements. More lightweight procedural and contractual instruments must be developed to establish fruitful cooperation with start-ups (Weiblen and Chesbrough, 2015). The corporation must own an adequate initial pool of knowledge, and related adsorptive capacity, to be able to fully benefit from this typology of initiatives (World Economic Forum, 2018)

Supporting technologies and solutions useful for the economic system development

As already explained in the previous chapter, not all programs for start-ups in which banks are involved are targeting FinTech applications: almost 50% of the overall number of different programs provided are not directly focused on FinTech start-ups but on entrepreneurial initiatives working in the most disparate sectors. This statistic seems to highlight the fact that banks are not only pursuing financial-related product and process innovation to better serve current customers, but they are also trying to create innovative value-added services involving start-ups operating in other domains to build new products and services involving a different customer base. These new categories of clients could be the start-ups themselves, toward which the bank is offering facilitated access to current banking products and services and various tailored support depending on the life-stage of the innovative company, and corporations in close relationship with the financial institution, requiring the bank to perform scouting activities on their behalf. Programs supporting start-ups operating in sectors different from the financial one could be defined as initiatives targeting innovative projects with high-growth potential created to provide support in the creation, in the establishment and in the expansion phases of these innovative ventures, with the final aim of improving the overall entrepreneurial and industrial ecosystem in which the bank is established. The generic goal of these activities is the expansion of the influence of the bank over the industrial ecosystem, since with these programs the financial institutions, acting as networking agents, could help in establishing and growing new industries inside the countries in which they operate. Differently from start-up support services provided to FinTech companies, and especially for early stages entrepreneurial projects, these initiative sometimes envisage a stricter collaboration between bank and start-up in the definition of the new-venture strategy and business model: knowing what corporations are searching for thanks to the strict relationship that the bank could have with its industrial clients, these financial institutions could provide better guidance to start-ups participating in this kind of initiatives. All these programs do not entail any kind of financial investment from the bank into participating start-ups, but sometimes cash prizes of modest entity are awarded. With this typology of initiatives,

targeting entrepreneurial projects from the most disparate industrial sectors, banks are also able to develop privileged relationships with high-growth potential projects, fact that could be beneficial in terms of cross-selling of product and services targeting these new ventures.

Venture creation support

Venture creation support programs are targeting teams working on start-ups not yet established and are structured to provide entrepreneurial formation to support these new projects in the creation of a new legal entity. Due to the different typologies of programs pursuing this strategic aim, different level of involvement of the bank in the definition of these ventures business models has been found. These initiatives are focused on establishing a point of contact between banks and the entrepreneurial community, providing advantages in the early detection of potentially valuable ideas to be further developed with the support of the bank and relative industrial partners with the aim of innovating the industrial ecosystem in which they are established (Table 12).

Table 12 Innovation capabilities that could be developed with venture creation support programs for Ecosystem development initiatives

Entrepreneurial development programs – Provider	
Support development of entrepreneurial capabilities of subjects willing to establish start-ups could give access to talented innovative people and interesting ideas who can be put in contact with relevant industry clients. The educational tool could be useful also as a learning tool for banking employees that through these courses could develop entrepreneurial capabilities, learning the subject matter and increase their engagement and motivation regarding entrepreneurship matters. Gaining early access to new ideas could increase opportunity recognition and creation capabilities (Draycott and Rae, 2011) for ecosystem development purposes. These platforms could be used as repositories of information to be used for delivering further services, as matchmaking initiatives with industry players and/or venture creation support.	Working with unstructured teams and projects could lead to waste effort and resources, but somehow this fact could be limited by the provision of only digital services. Not all digital platforms are collecting data regarding the ideas generated, making even more difficult to measure the efficacy of the program. When controlling the flow of information, there must be processes in place to capitalize on knowledge generated by start-ups: information flows and knowledge integration must be carefully managed to keep track of relevant knowledge that could be useful for industrial partners.

Networking and matchmaking - Provider	
The bank, being the intermediary which deals with innovative ideas, could be better positioned to understand future trends of the industry, improving its sensing capabilities of market evolutions. Acting as middlemen could advantage banks on developing positional knowledge (knowing where solutions are to be found) that could be utilized to provide scouting and matchmaking services to corporations once start-ups are able to validate their ideas. Being exposed to a wider number of different actors of the value chain and controlling the information flow, the bank could combine and reconfigure more easily information coming from different sources and therefore reduce the information gap between demand and supply of innovation (McEvily and Zaheer, 1999). These enhanced capabilities could facilitate the matching of organizations and partners' decision-making processes (Mantel and Rosegger, 1986), creating a useful filter able to reduce research costs for corporations. Knowing multiple contacts from different corporations and investors, banks could act as links among innovative ventures and relevant stakeholders (McEvily and Zaheer, 1999).	In order to allow to a higher number of employees to act as intermediaries, positional and relational knowledge regarding multiple industries must be somehow mapped to avoid that information remain tacit and embedded exclusively in human capital. Dealing with a multitude of corporations operating in different fields, and therefore not being focused on any particular industry, could limit the ability of the intermediary to leverage on positional knowledge due to potentially dispersed focus.
Incubator - Provider	
Tap into the corporate network for matchmaking, providing to incubated start-up's introductions and networking opportunities with relevant industry actors and investors part of the banks' clientele (Autio and Klofsten, 1998) Working directly with start-ups could rejuvenate corporate culture, creating an entrepreneurial mindset inside the corporations and increasing awareness of future technological evolution of markets of interest of banks' clientele (Nesta report, 2015).	External partners with track-record could be perceived as more relevant than corporate employees working in the innovation field in providing business development support (Nesta report, 2015): ecosystem development incubators provided by banks are relatively young programs with mentoring from the industry provided by a narrower range of mentors, fact that could lead start-ups to rely on external programs for more tailored support.

Working with start-ups could improve the perception of the bank's image as a dynamic enterprise, improving its attractiveness respect to new customers, enterprises, talent (Nesta report, 2015), and the start-up themselves. The bank could provide a wide network of contacts, both in industry ad in investors, which could be able to support the start-up in their growth plan, while controlling the information flow among interested parties. Start-ups participating in the programs could potentially receive mentoring from different companies in the network of the bank, resulting in the possibility of corporation benefitting from the program to obtain better feedback on market evolution and trends. Providing the experience and usually coworking spaces, the bank can be at direct contact with the innovative start-up personnel and better understand their requirements while disseminating this information throughout the bank infrastructure for matching purposes. Involving different employees in the business support processes could enable a faster understanding of industries evolution (Branstad and Saetre, 2014) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities to eventually be proposed to corporate partners and investors (Eshun, 2009). Business support provided to start-ups could foster internal learning by engaging employees as mentors and advisors of start-ups, rejuvenating therefore the corporate culture while developing employee's entrepreneurial mindset (Nesta report, 2015).	Need to offer a compelling value proposition, clarifying how the bank could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015) Resources committed for scouting, engagement of start-ups and mentoring could be significant (Nesta report, 2015) Not being linked with the bank core business, evaluating the efficacy of these programs (in terms of return on investment) could be complicated: this fact could lead to under commitment of resources involved in the incubation process due to lack of interest in the program from the bank executive team. Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by incubated start-ups: information flows and knowledge integration must be carefully managed.

Venture development support

Targeting start-ups already incorporated, this typology of support is provided to innovative ventures operating in domains different from the financial one to help them growing their businesses. The level of involvement of the bank in the refinement of the strategies of the start-ups is again depending on the typology of program provided, but usually these financial institutions play the role of the information and knowledge intermediary between innovative start-ups and corporate clientele interested in innovating their businesses, or potential investors looking for new opportunities of investment, and are therefore acting as vectors of innovation (Table 13).

Table 13 Innovation capabilities that could be developed with venture development support programs for Ecosystem development initiatives

Networking and matchmaking – Provider	
The bank, being the intermediary, could be better positioned to understand future and latent needs of the industry (Howells, 2006) improving its sensing capabilities of market trends. Acting as middlemen could advantage banks on developing positional knowledge (knowing where solutions are to be found) that could be utilized to provide scouting and matchmaking services to corporations. Being exposed to a wider number of different actors of the value chain and controlling the information flow, the bank could combine and reconfigure more easily information coming from different actors and therefore reduce the information gap between demand and supply of innovation (McEvily and Zaheer, 1999). These enhanced capabilities could facilitate the matching of organizations and the partner's decision-making processes (Mantel and Rosegger, 1986), creating a useful filter able to reduce research costs for corporations which are participating to these events. Knowing corporate financials and plans, banks could cross-sell corporate services (like m&a analysis, due diligence, etc) to corporate partners willing to benefit from networking opportunities created by the bank.	In order to allow to a higher number of employees to act as intermediaries, positional and relational knowledge regarding multiple industries must be somehow mapped to avoid that information remain tacit and embedded exclusively in human capital. Dealing with a multitude of corporations operating in different fields, and therefore not being focused on a particular industry, could limit the ability of the intermediary to leverage on positional knowledge due to potentially dispersed focus.

Knowing multiple contacts from different corporations and investors, banks could act as links among innovative ventures and relevant stakeholders (McEvily and Zaheer, 1999).	
Accelerator – Provider	
The corporation can choose which start-ups to engage with depending on corporate requests and local ecosystem characteristics. Tapping into the corporate network the bank could provide to accelerated start-us introductions and networking opportunities with relevant industry actors and investors (Autio and Klofsten, 1998) Involving different employees in the business support processes could enable a faster understanding of industries evolution (Branstad and Saetre, 2014) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities to eventually be proposed to corporations and investors (Eshun, 2009). Being the provider of the accelerator enable the exploration of different technologies in parallel while controlling the flow of information, increasing the awareness of employees involved in the process on future trends and potential of new technologies regarding targeted industries (Nesta report, 2015). Providing knowledge regarding new technologies and business models, start-ups could help the bank to obtain useful information able to facilitate due diligence of future investments intermediated by the bank. Working with start-ups could improve the perception of the bank's image as a dynamic enterprise, improving its attractiveness respect to new customers, enterprises, talent (Nesta report, 2015), and the start-up themselves.	Significant resources are committed to sustain the program, especially in terms of time of personnel involved in the mentoring process. The program could be potentially less attractive than independent accelerators due to the relative novelty of the program itself. Industry mentors must be selected carefully in order to provide a significant acceleration process, since by this selection depends also the attractiveness of the program: high quality mentors require high quality start-ups selection and vice versa. The bank needs to offer a compelling value proposition, clarifying how the corporation could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015) Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by incubated start-ups: information flows and knowledge integration must be carefully managed to keep track of knowledge. Not being linked with the bank core business, evaluating the efficacy of these programs (in terms of return on investment) could be complicated: this fact could lead to under commitment of resources involved in the incubation process due to lack of interest in the program from the bank executive team.

Venture scaling support

Venture scaling support programs are targeting scale-ups operating in different sectors to help them in establishing their presence in new countries or territories, and therefore in accessing new markets. Banks, with their vast network of branches usually across different countries, could therefore provide their knowledge about these markets to scale-up operations of interested ventures, linking them with local stakeholders, corporations, and investors that could eventually accelerate their growth (Table 14).

Table 14 Innovation capabilities that could be developed with venture scaling support programs for Ecosystem development initiatives

Networking and matchmaking – Provider	
The bank, being the intermediary, could be better positioned to understand future and latent needs of the industry (Howells, 2006) improving its sensing capabilities of related market evolutions. Acting as middlemen could advantage banks in developing positional knowledge (knowing where solutions are to be found) that could be utilized to provide other services to corporations. Being exposed to a wider number of different actors of the value chain and controlling the information flow, the bank could combine and reconfigure more easily information coming from stakeholders and therefore reduce the information gap between demand and supply of innovation (McEvily and Zaheer, 1999). These enhanced capabilities could facilitate the matching of organizations and the partner's decision-making processes (Mantel and Rosegger, 1986), creating a useful filter able to reduce research costs for corporations which are participating to these events. Knowing corporate financials and plans, banks could cross-sell corporate services to corporate partners willing to benefit from networking opportunities created by the bank. Knowing multiple contacts from different corporations and investors, banks could act as links among innovative ventures and relevant stakeholders (McEvily and Zaheer, 1999).	In order to allow to a higher number of employees to act as intermediaries, positional and relational knowledge regarding multiple industries must be somehow mapped to avoid that information remain tacit and embedded exclusively in human capital. Dealing with a multitude of corporations operating in different fields, and therefore not being focused on any particular industry, could limit the ability of the intermediary to leverage on positional knowledge due to potentially dispersed focus.

Accelerator – Provider	
The corporation can choose which start-ups to engage with depending on corporate requests and local ecosystem characteristics. Tapping into the corporate network the bank could provide to accelerated start-ups introductions and networking opportunities with relevant industry actors and investors (Autio and Klofsten, 1998) Involving different employees in the business support processes could enable a faster understanding of industries evolution (Branstad and Saetre, 2014) that is translated into improved employees' capabilities to generate alternatives, to reframe solutions, and sensitivity to new and emerging opportunities to eventually be proposed to corporations and investors (Eshun, 2009). Being the provider of the accelerator enable the exploration of different technologies in parallel while controlling the flow of information, increasing the awareness of employees involved in the process on future technological trends and potential of new technologies regarding targeted industries (Nesta report, 2015). Providing knowledge regarding new technologies and business models, start-ups could help the bank to obtain useful information able to facilitate due diligence of future investments intermediated by the bank. Working with start-ups could improve the perception of the bank's image as a dynamic enterprise, improving its attractiveness respect to new customers, enterprises, talent (Nesta report, 2015), and the start-up themselves. Intensive few-months mentoring could focus employees' efforts on the business support initiative.	Significant resources are committed to sustain the program, especially in terms of time of personnel involved in the mentoring process. The program could be potentially less attractive than independent accelerators due to the relative novelty of the program itself and consequent possible lack of picking competencies due to the scarce number of programs run. Industry mentors must be selected carefully in order to provide a sound acceleration process, since by this selection depends also the attractiveness of the program: high quality mentors require high quality start-ups selection and vice versa. The bank needs to offer a compelling value proposition, clarifying how the corporation could add value to the entrepreneurial project that cannot be found elsewhere in the innovation ecosystem (Weiblen and Chesbrough, 2015) Controlling the flow of information imply that there must be processes in place to capitalize on knowledge generated by incubated start-ups: information flows and knowledge integration must be carefully managed. Not being linked with the bank core business, evaluating the efficacy of these programs (in terms of return on investment) could be complicated: this fact could lead to under commitment of resources involved in the acceleration process due to lack of interest in the program from the bank's executive team.

Strategic focus over time

To understand if during the timeframe considered for the research the strategic focus of the programs has changed, data regarding the different years were analysed. A great number of programs available are focused on more than one strategic outcome, therefore for subsequent analysis the numbers will not match with the overall number of programs described with previous analysis[37]. As expected, since the number of programs grew year by year, the interest around different strategic outcomes increased for almost all the objectives identified: visible exceptions have been found in programs following the strategical aim of cultivating solutions for B2B applications and programs supporting the creation of new FinTech solutions, while for ecosystem development it seems that the interest in supporting start-ups in their scaling phase has not grown significantly over time. Figure 29 and Figure 30 report graphically information just described.

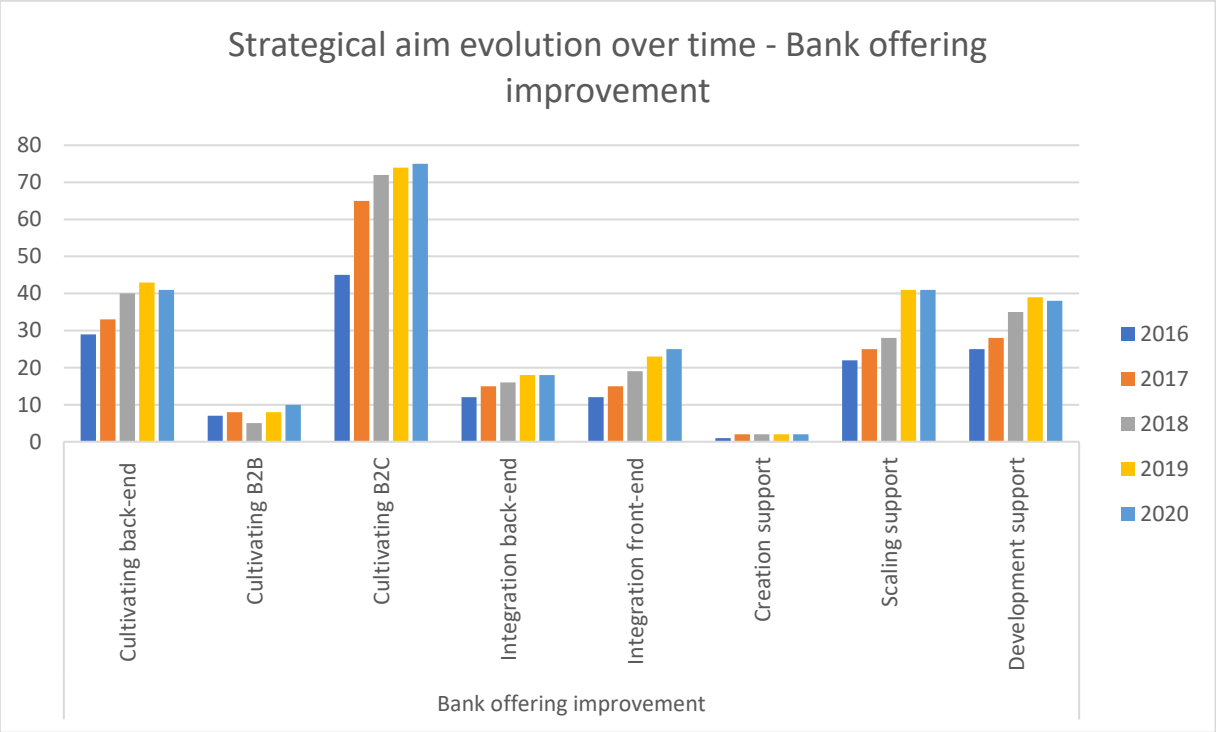

Figure 29 Strategical aim evolution over time – bank offering improvement

[37] For example, an accelerator could be accepting demands both from start-ups operating on front-end solutions and start-ups with products able to optimize the back end of the bank.

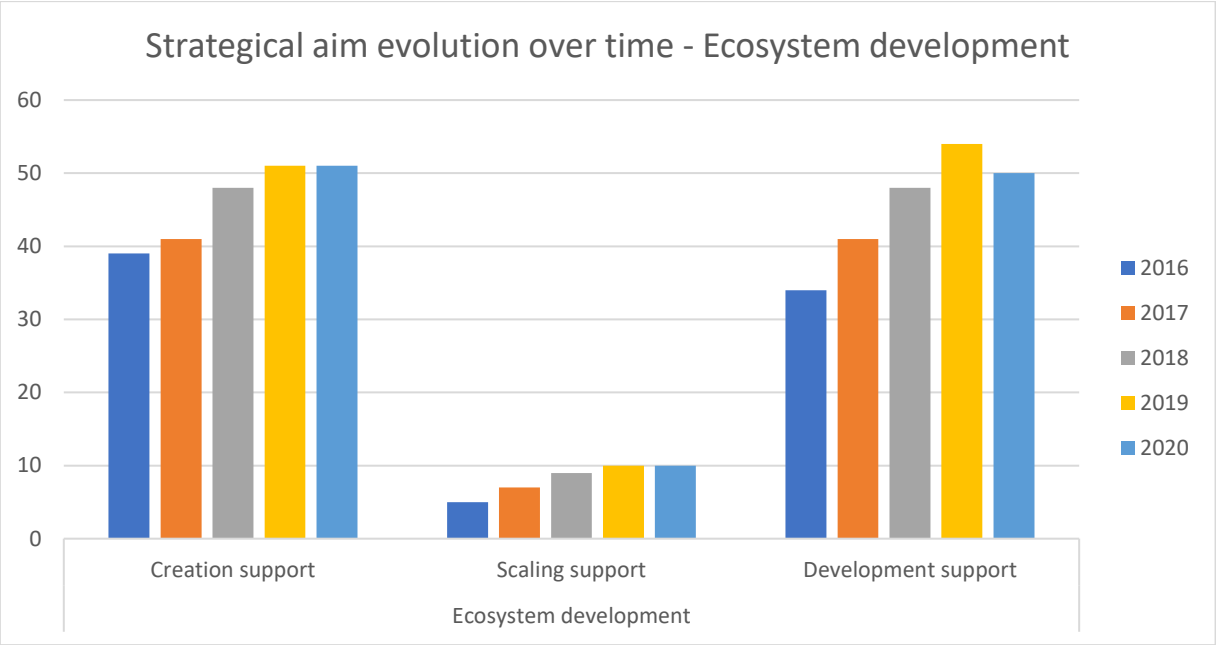

Figure 30 Strategical aim evolution over time – Ecosystem development

As discussed in the previous chapter regarding the different typologies of programs, absolute frequencies are not able to highlight potentially stronger trends, consequently to better understand if there have been shifts in strategic focus the visualization of relative frequencies compared for each year has been developed.

For programs created to improve the bank, during time some typologies of strategic focus grew faster than others: as the graph highlights (Figure 31), the initiatives focused on the integration of front-end applications and the programs created to enable a faster entrance in new markets of FinTech companies grew more than proportionally. Initiatives aiming at cultivating B2C solutions grew faster during the first years considered for this research, but now it seems that banks are more concerned with other typologies of strategical focuses.

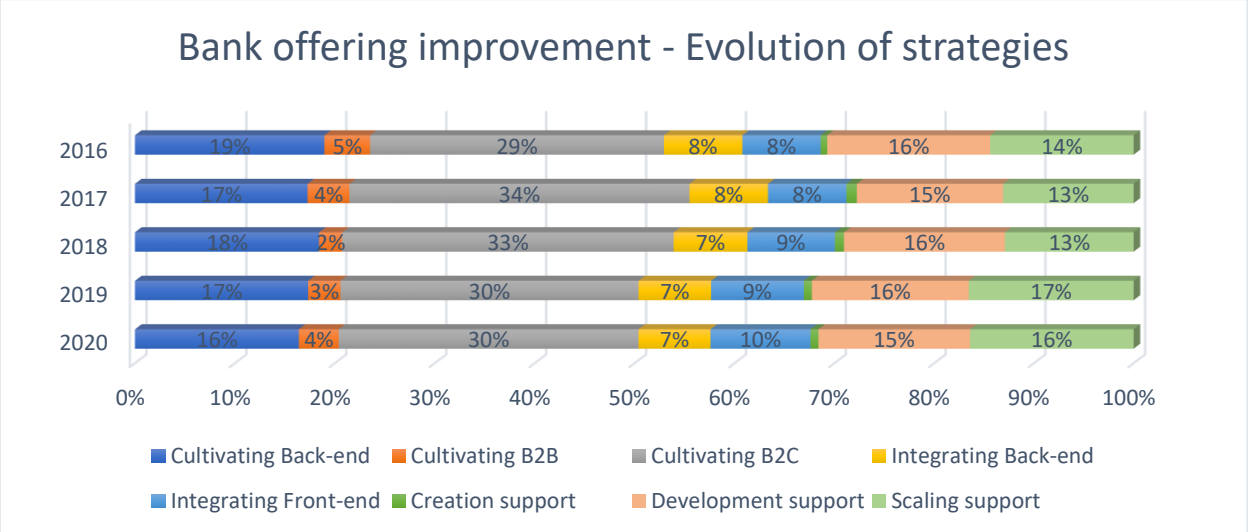

Figure 31 Bank offering improvement – evolution of strategies

Regarding programs with the aim of developing the overall entrepreneurial ecosystem, a little shift could be seen toward supporting start-ups already up-and-running (Figure 32): during the timeframe of the research, the relative number of programs focused on supporting the creation of new start-ups grew at a slower pace respect to the initiative supporting venture development or venture scaling, resulting in a slight decrease in relative weight of 4% points over five years.

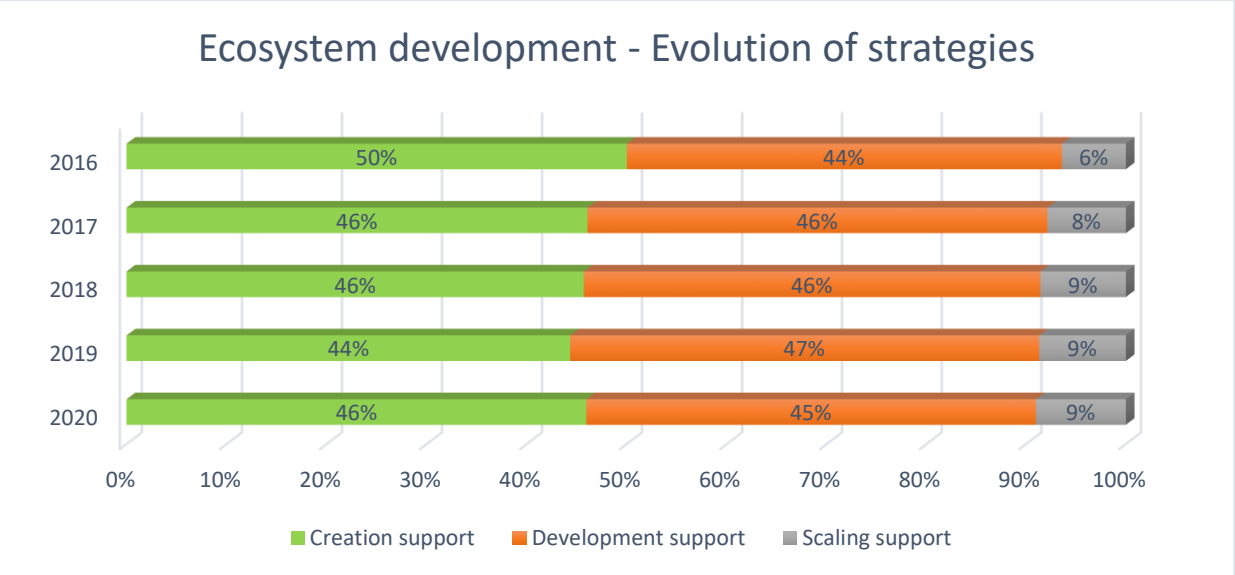

Figure 32 Ecosystem development – Evolution of strategies

Geographical scope

Another important strategical characteristic to be considered to complete the analysis is the geographical breadth of applications accepted for each program: some programs are open or accessible just to local participants, while others are targeting a wider spectrum of participants from confining countries or even from the entire world. The scope of different programs and related ability to influence the development of relevant knowledge and dynamic capabilities, as easily foreseeable from the detailed description provided in the previous chapter of the thesis, could be easily influenced by its degree of openness and subsequent target of beneficiaries. Understanding the relationships between geographical openness and different typologies of programs, and its evolution over time, is therefore an important step in the detection of possible differences among banks regarding innovation strategies (Figure 33).

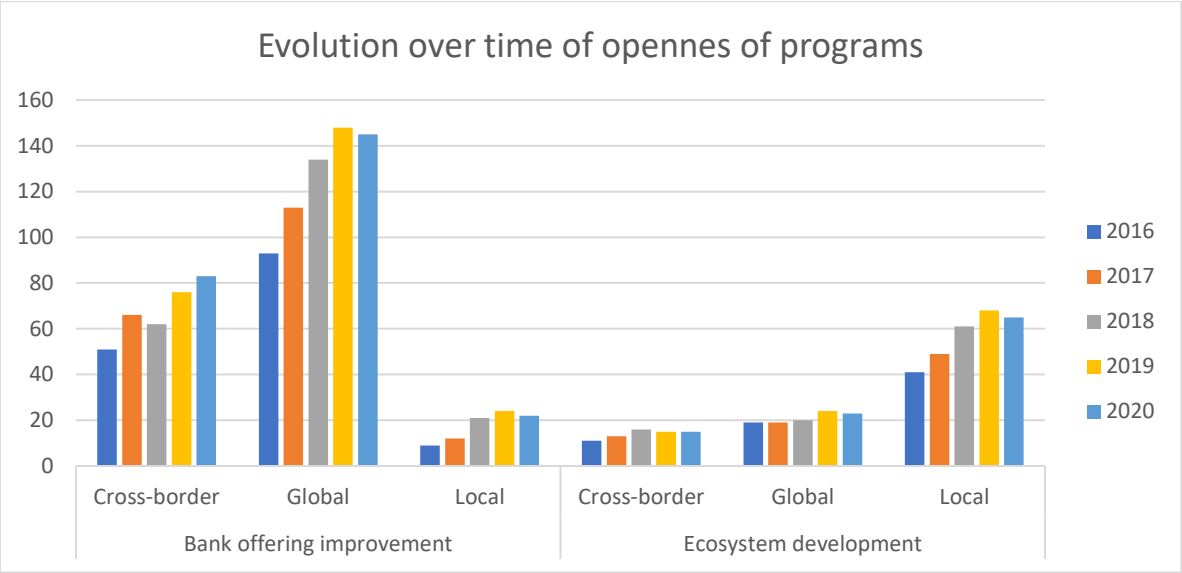

Figure 33 Evolution over time of opennes of programs

As expected, Ecosystem Development initiatives, in line with its characterization, are mainly focused on helping local start-ups. Programs of this category provided in English have been classified as open to a global audience, while the ones provided just in the local country language have been categorized as local. On the other hand, most of the programs created to improve the bank offering are instead open to collect ideas and opportunities not only from countries closer to the one in which the program is proposed, but in the majority of the cases they are open to participants coming from all over the world.

Observations about the breadth of the programs become more interesting when the typology of initiative offered is considered in the analysis. Programs aiming at cultivating new solutions to improve bank offering are heavily skewed toward global sourcing of idea, especially if scouting for back-end related technologies and for business to customer front-end product and services innovations. For these categories there is also a trend in providing programs open only to local new venture, usually represented by smaller initiatives like hackathons and challenges (Figure 34).

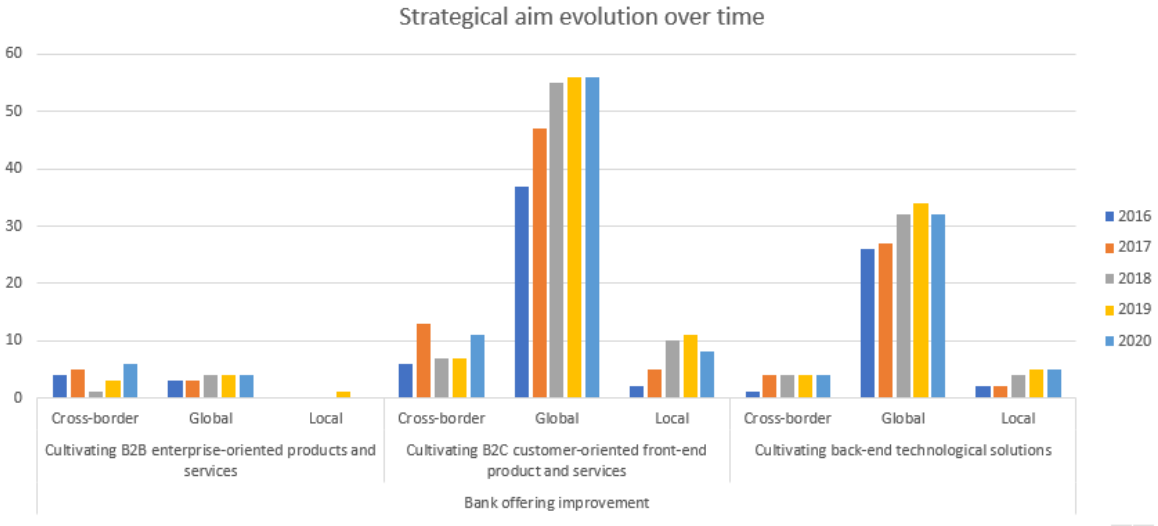

Figure 34 Strategical aim evolution over time (1)

Programs aiming at integrating innovative solutions into the banking infrastructure, except one case, are mainly scouting for solutions at least at a cross-border level. For initiatives aiming at integrating new product and services a recent trend toward the globalization of scouting processes could be also observed (Figure 35).

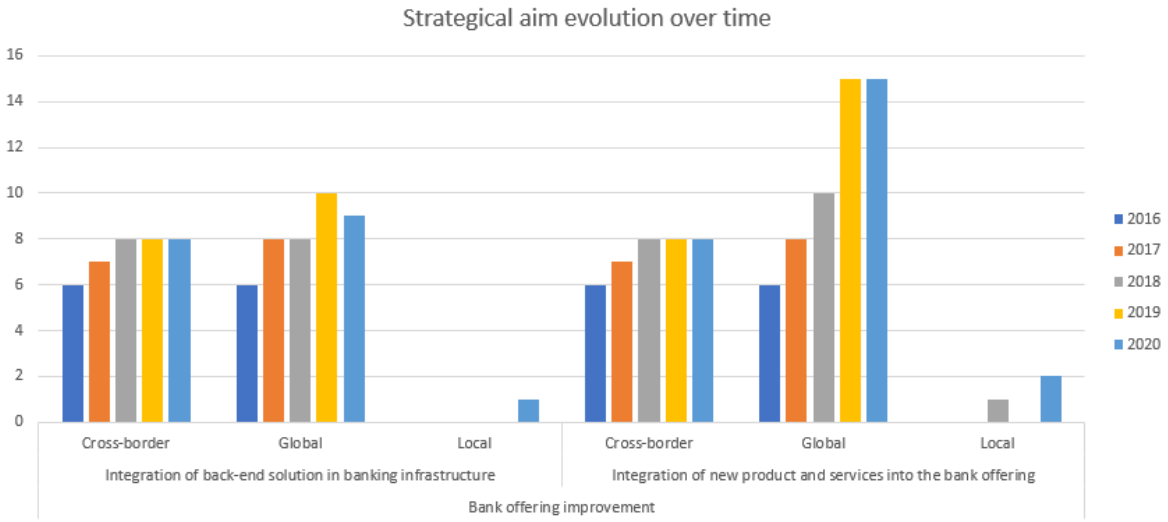

Figure 35 Strategical aim evolution over time (2)

Venture creation support programs for FinTech start-ups, despite being few, are all open to participants from different countries. Venture development initiatives remained stable over time and are mainly open to cross-border initiatives, even if in the timeframe of the analysis this kind of scouting year after year become wider in geographical scope. Venture scaling support programs, as explained before, are instead focused on helping start-ups in accessing new markets: it is therefore normal that this kind of initiatives are mostly open at cross-border or global start-ups. Cross border ones saw a great spike since 2019 due to few programs organized by big players of the financial sector that was able to draw significant interest from a large pool of banks from Nordic countries (Figure 36).

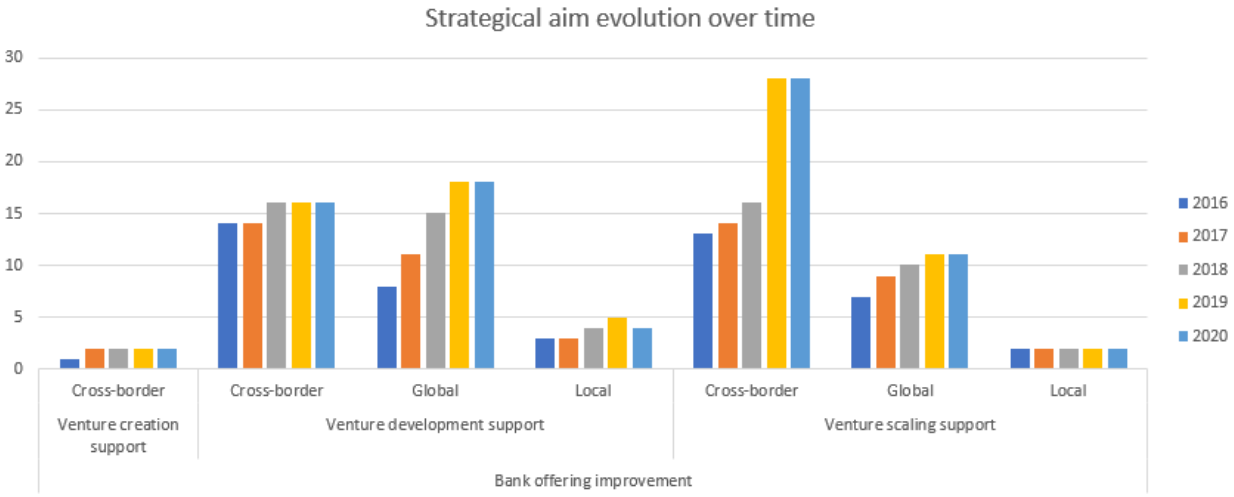

Figure 36 Strategical aim evolution over time (3)

Regarding programs created for ecosystem development purpose, as anticipated before, most of them are focused on local start-ups. Across the years, for venture creation support initiatives, the number of initiatives accessible to participants from different countries remained quite stable, while programs created to support local innovative venture grew constantly year after year. The same can be seen for venture development initiatives, even if a slightly higher number of programs open to the global audience have been found. Venture scaling support programs for non-FinTech ventures did not grew during the timeframe of the analysis and, up to the days of the analysis, present different degree of openness with no prevailing modality (Figure 37).

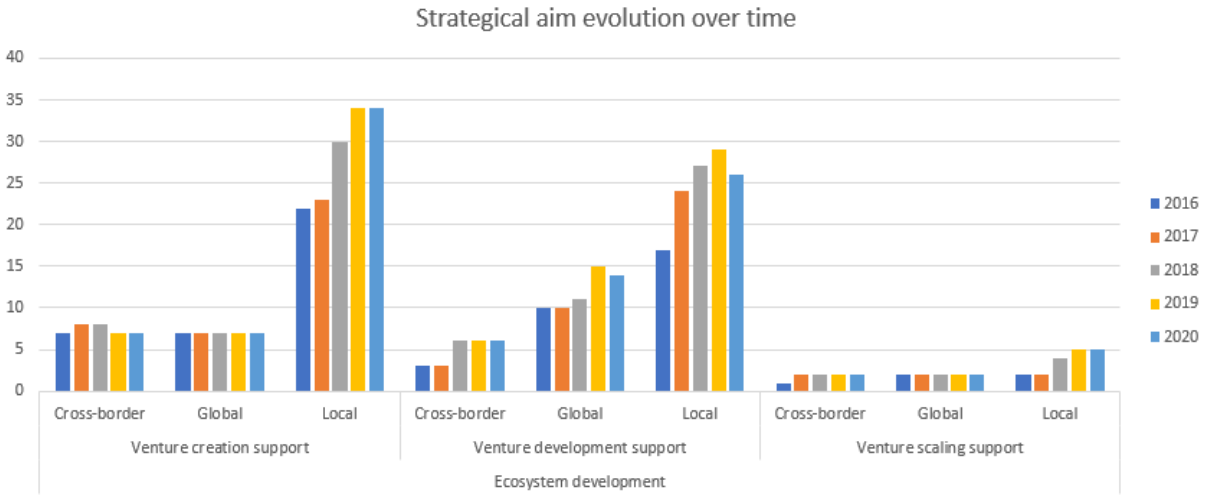

Figure 37 Strategical aim evolution over time (4)

Even if the number of programs grew constantly over time, it emerged from the analysis that there has been no major shift over a prevailing geographical focus for specific strategical objectives neither from programs created to improve the bank itself nor for the initiatives aiming ad developing the overall economic system in which interested banks are operating. Few exceptions are the increased interest in providing to non-FinTech ventures from all over the world the opportunity to receive market scaling support, and in helping FinTech start-ups coming from everywhere in the growth of their initiatives toward sustainable companies.

Data regarding geographical scope at aggregate level however do not take into account the possible differences of breadth of different typologies of programs that the bank is offering or from which it is benefitting.

Regarding FinTech programs directly provided by banks, it could be easily seen in Figure 38 that a considerable part of programs offered are open at least at cross-border level (grey and blue areas): exceptions to this fact are only networking and matchmaking events, for which roughly 50% of programs are dedicated to local FinTech start-ups. Another interesting aspect is that programs requiring more commitment, like corporate incubators, corporate accelerators and test laboratories, are most of the time open at global level, trying therefore not to limit the deal flow of interesting ideas to a particular geographical area. Less-requiring programs, meaning networking events and challenges, are instead more focused on local and cross-border participants rather than global audiences. Entrepreneurial development programs, being online programs have been considered cross-border initiatives due to the openness to start-ups from few selected countries.

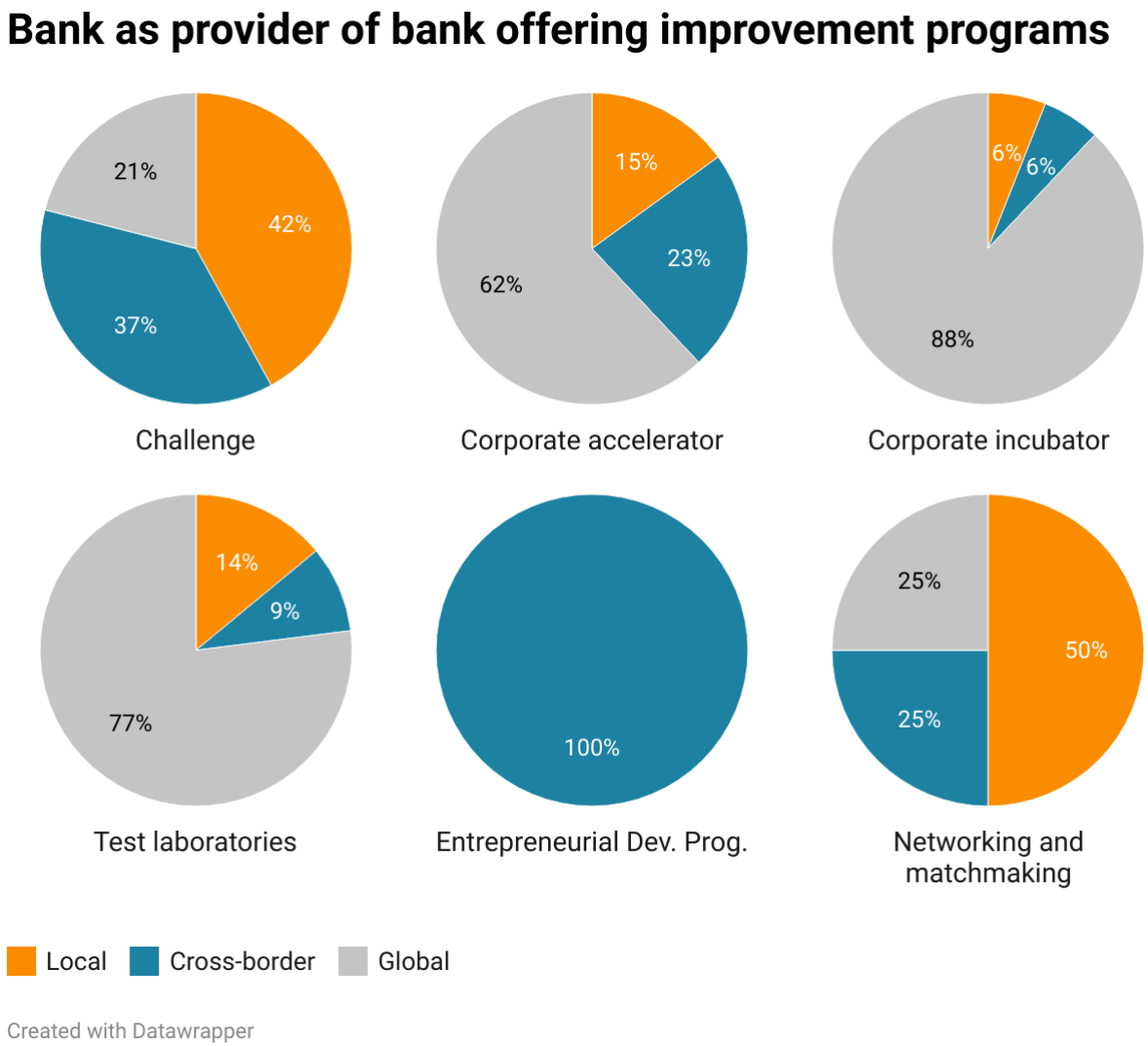

Figure 38 Bank as provider of bank offering improvement programs

Programs offered by third parties are barely limited in geographical scope to a single country (Figure 39). Since these programs are organized by third parties specialized in offering these services, usually these organizations are pointing at attracting the best start-ups to link them with interested corporation regardless of geographical provenience. One interesting fact that emerged from the analysis is that both incubators and accelerators (the former more consistently than the latter) are offering programs open just to local start-ups, reducing the scope of scouting for corporations to the county in which this program is operated: this fact could be counterbalanced by the fact that these programs are established in famous FinTech hubs, therefore start-up are naturally present in that specific locations. Interestingly, all the challenges provided by third parties are open at cross-border level: involving banks coming from and operating in different countries could have pushed these organizations to keep the applications open to a wider audience.

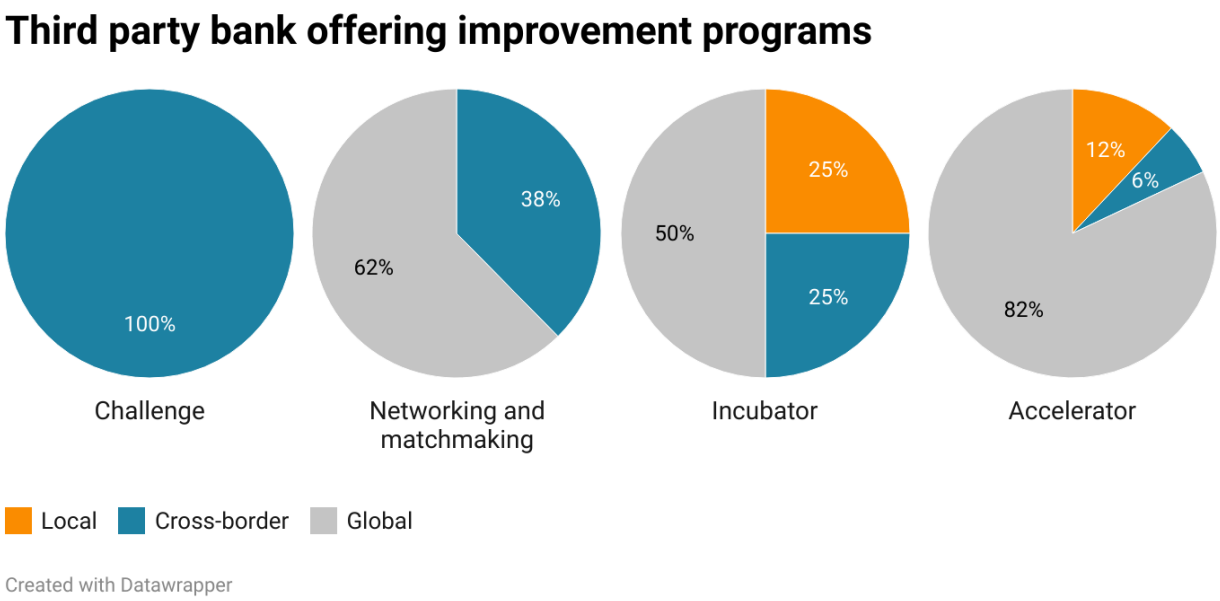

Figure 39 Third party bank offering improvement programs

Programs offered by the bank for ecosystem development purposes are unexpectedly mainly dedicated to help and sustain local start-ups (Figure 40). The openness of available program is almost the same for each typology of program offered, apart from accelerators that are considerably more open to accept applications from start-ups coming from all around the world.

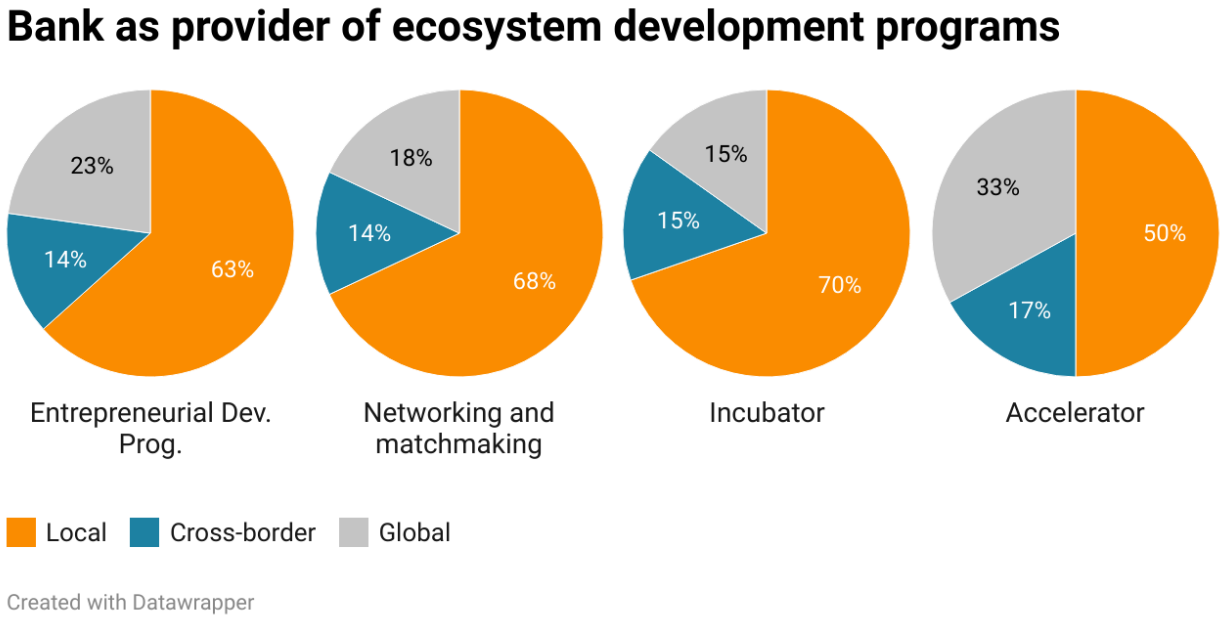

Figure 40 Bank as provider of ecosystem development programs

This section of thesis was structured to provide to the reader an overview of possible strategies followed by the banks in terms of innovation directions, including elements on which kind of capabilities and competencies could be developed while engaging in different typologies of programs for different aims, but a big point is still missing: as introduced in the descriptive statistics chapter, most of the banks are engaging in multiple programs concurrently, therefore their overall possible innovation strategy could be disentangled only when the whole set of initiatives in which each of them is involved is analysed.

Considering the totality of the programs and related characteristics of each single entity identified with the research process, the next step of the analysis was then to describe possible strategies followed by these institutions. Due to the high number of banks included and the great variety of programs found, it has been decided to run a clustering analysis to reduce the number of "strategical directions" and to spot possible patterns of similar innovation strategies of different financial intermediaries across Europe. Next chapter of the thesis will be therefore dedicated to describing the approaches utilized to build a suitable model of clustering and resulting outcomes.

Clustering

Cluster analysis is the study of methods and algorithms used to group and classify objects in different categories for finding subgroups of similar observations within a specific data set. Differing from decision making processes, where experts first define labels analysing some observations and then assign observations to pre-defined groups, in clustering analysis categories are not identified at-priori, leaving to the selected algorithm the discretion of forming suitable groups based on perceived similarities among observations (Jain and Dubes, 1988). Due to this fact, cluster analysis is identified as an “unsupervised learning” method.

Cluster analysis is therefore a fundamental tool used to understand and learn about the phenomena under observation, since these algorithms allows the researcher to explore the dataset with the objective of finding suitable structure and patterns in the data under analysis (Jain and Dubes, 1988). The objective of these methods is therefore to create collections of objects with similar characteristics (clusters) by comparing similarities between all pair of observations such that objects within the same cluster are as similar as possible, whereas objects from different clusters are as dissimilar as possible, and subsequently to determine the membership of each observation to suitable groups (Jain and Dubes, 1988). Cluster algorithms are particularly useful to perform comparison of observations described by a great variety of characteristics and are capable of analyse multidimensional data where visual perception of humans is not able to identify patterns (Jain and Dubes, 1988).

The comparison of pairs of observations, however, is problem dependent: since different algorithms are better suited for some typology of data, defining how to structure data, which proximity measure to use to compare observations, and which algorithms to apply to partitioning the dataset are challenges that researcher need to face to build suitable models for the data to be analysed (Jain and Dubes, 1988). Once these arguments are cleared and the algorithms applied, resulting partitions need to be analysed and validated to understand if the assignment proposed could reveal some hidden commonalities among different points on the dataset (Jain and Dubes, 1988). Every algorithm, following a predetermined set of rules for evaluating the similarity of data points, could group observations in different clusters. Clustering is therefore a subjective task, and more than one correct clustering algorithm could be applied to a specific data set. Consequently, the appropriate clustering algorithm for a particular data set often needs to be chosen experimentally unless there is a mathematical reason to prefer one clustering algorithm to another.

After providing a general description of the classification of different typologies of data, of main similarity measure parameters and of resulting applicable algorithms for creating clusters, the following part of the thesis will be focused on providing to the reader a sound explanation of the analysis made to identify suitable models to be used to perform the clustering analysis, and related description of clusters obtained with implemented models.

Theory

Clustering problems are a subset of classification problems. Lance and Williams (Lance and Williams, 1967) suggested a representation of classification problems as in Figure 41 below.

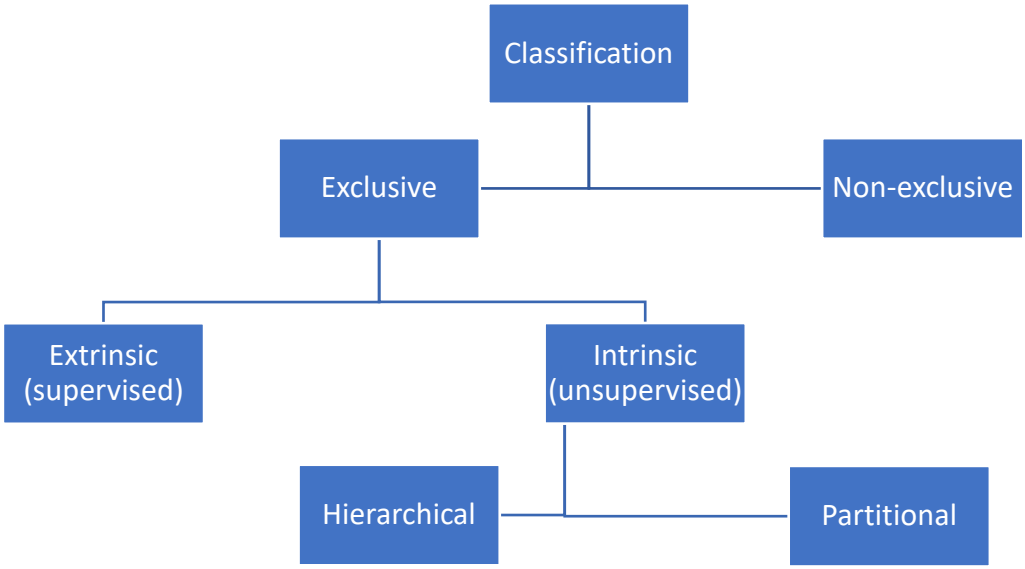

Figure 41 Graphical representation of Classification problems (adapted from Lance and Williams, 1967)

In exclusive classification (or hard classification), each object is assigned to only one cluster; the union of all clusters recreate exactly the initial dataset. In non-exclusive classification instead each object could be assigned to several classes, therefore this typology of clustering is also labelled as "overlapping" clustering or soft clustering.

Extrinsic classification algorithms utilize an already known at-priori partition of the objects to initialise the clustering process, while with Intrinsic (or unsupervised) classification the partitioning is performed utilizing only the proximity matrix generated while calculating similarity of couples of objects.

Depending on the typology of structure that needs to be assigned to the data, classification algorithms could be differentiated in hierarchical and partitional classification. With partitional classification observations are divided into a single partition of the dataset, while with hierarchical algorithms the resulting classification is composed by a nested sequence of different partitions, as to create a dendrogram (like the one represented above for classification problems).

With the term clustering algorithms researchers refer to exclusive, intrinsic and partitional classification algorithms. Hereafter a short description of how these clustering algorithms work is provided to the reader.

Clustering algorithms are utilized to group observations in different partitions based on a similarity index which discriminates in which partition the observations are going to be classified. Each object of the dataset to be analysed (of dimension m) could be represented by a combination of different attributes (n different characteristics). The overall dataset could

consequently be seen as a m x n "pattern matrix" where each row represents a particular observation composed by attributes that could be different, as exemplified in Table 15.

Table 15 Example of pattern matrix

Pattern matrix	Attribute 1 (n1)	Attribute 2 (n2)	Attribute 3 (n3)	…
Observation 1 (m1)	Data	Data	Data	…
Observation 2 (m2)	Data	Data	Data	…
Observation 3 (m3)	Data	Data	Data	…
…	…	…	…	…

To classify observation in different categories an index of proximity, measured with similarity (or dissimilarity) between observations, must be established between each pair of observations. A proximity matrix then stores the pairwise comparison between observations and resulting indices of proximity in a matrix in which each row and columns represent a single observation, and the intersection gives the value of the proximity, as represented in Table 16. The more the m_i observation will be similar to the m_j observation, the larger the similarity index and the smaller the dissimilarity index will be.

Table 16 Example of proximity matrix

Proximity matrix	Observation 1 (m1)	Observation 2 (m2)	Observation 3 (m3)	…
Observation 1 (m1)	-	Similarity (or dissimilarity)	Similarity (or dissimilarity)	…
Observation 2 (m2)	Similarity (or dissimilarity)	-	Similarity (or dissimilarity)	…
Observation 3 (m3)	Similarity (or dissimilarity)	Similarity (or dissimilarity)	-	…
…	…	…	…	…

Recognizing the type of data available in the dataset is therefore the first step in identifying suitable algorithms to be applied to perform a classification. Anderberg (1973) provided a categorization of data types and data scales appropriate to perform this typology of analysis. Data type refers to degree of quantization of data representing a specific attribute: binary data have only two manifestations (like ye/no, 0/1), discrete data have a finite number of possible manifestations values (like east, west, south and north), while continuous data could assume any value within a fixed range (like measurements). Data scales instead indicates the relative significance of attribute values respect to each other and could be divided in

qualitative and quantitative scales. Qualitative scales, also identified as categorical scales, include nominal and ordinal scales. Nominal scales are not real scales since variables do not have a natural order or ranking; consequently numbers (when used) have no practical quantitative meaning (example: yes-no transcoded in 0-1 or 0-100 does not make any difference in terms of interpretation once labels are assigned). Ordinal scales are scales in which values have meaning "only in relation to one another", and distances between them do not matter or do not have meaning. Rankings (like level of income = low, medium, high, extremely high) are typical ordinal scales. Quantitative scales (or numerical scales) include interval and ratio scales. In interval scales, the separation between different measurements have meaning, but there is no a "zero reference": a measurement unit exists, and the interpretation of the numbers assigned to the observation depend on that unit. Finally, in ratio scales differences between measurements have an absolute meaning, implying that an "absolute zero" exists along with a unit of measurement.

Once the typology of data and related scales with which each different attribute could be represented are identified, a suitable proximity index could be chosen. Clustering methods use quantitative indexes of proximity to assign a label to each observation.

Proximity indexes between observation x and observation y, identified as *d(x,y)*, must satisfy a clear set of properties:

1. For a dissimilarity index, *d(x,x)=0* for each x, meaning that the dissimilarity of each observation to itself must be null (since they are perfectly equal)
2. For a similarity index, *d(x,x) >= max d(x,y)* all x, meaning that the similarity of each observation to itself must be always higher or equal to each similarity value of the element x compared with other observations
3. *d(x,y) = d(y,x)* for each pair of observations, meaning that the proximity index is symmetrical
4. and *d(x,y) >= 0* for each pair of observations

If all the attributes of the observations are continuous and measured on a ratio scale, Minkowski dissimilarity measures could be applied.

$$Minkowski\ distance = \left(\sum_{i=1}^{n} |x_i - y_i|^p\right)^{1/p}$$

Where x_i is the current observation, y_i the reference one, and n the overall number of different characteristics to compare.

From the general formula, varying the parameter p, specific distances could be derived. The Euclidean distance and the Manhattan distance are among the dissimilarity indexes most utilized in clustering analysis.

$$Euclidean\ distance = \left(\sum_{i=1}^{n} |x_i - y_i|^2\right)^{1/2}$$

$$Manhattan\ distance = \left(\sum_{i=1}^{n} |x_i - y_i|^1\right)^{1/1}$$

When all the attributes of the observations are continuous and measured on a ratio scale, a normalization of data could also be applied to overcome some limitations of the distance measurement used. For example, Euclidean distance assigns a higher weight to features with large ranges rather than those with smaller ones, risking to generate a distortion in distances among different observations. This process could be carried out normalizing with a *statistical standardization approach* (meaning scaling back all features to have a zero mean and a unitary standard deviation) or simply by subtracting the mean of the attribute value to each observation. If however the spread of values among different observation is due to the presence of differentiated clusters, normalization operations risk to deteriorate the quality of resulting clusters, therefore its application is not suggested.

In real life setting, however, datasets are frequently composed by a mix of quantitative and categorical attributes. Most of the time categorical information are left out from the pattern matrix to be used as parameters to interpret resulting clusters obtained. This fact implies that in these cases, qualitative attributes are not used to calculate proximity indexes. In literature, however, some proximity measures able to measure similarity or dissimilarity of a couple of observations which have a mix of qualitative and quantitative data exists, like the Gower index.

Gower's distance could be used to measure how different two records are, irrespectively of their composition of attributes, meaning that this proximity index is able to compare also categorical attributes along quantitative ones, and condensate the result of the dissimilarity in a single index (Gower, 1971). Observations may contain combinations of ratio scale, ordinal scale and nominal scale data types, and the distance calculated is always a number between 0 (identical observations) and 1 (maximal dissimilarity among observations).

$$Gower\ distance = 1 - \left(\frac{1}{n} \times \sum_{j=1}^{n} s_j(x_1, x_2) \right)$$

General Gower distance between two objects x_1 and x_2 is calculated based on partial dissimilarity index s_j, that differs depending on the characteristics of the data compared.

For quantitative data, a normalized Manhattan measure is calculated for each attribute j to be compared. The normalization is performed dividing the obtained distance respect to the range of values R_j of the attribute under scrutiny.

$$s_j(x_1, x_2) = 1 - \frac{|x_{1j} - x_{2j}|}{R_j}$$

For qualitative variables instead s_j is calculated utilizing the Sørensen -Dice (Sørensen*,* 1948; Dice, 1945*)* coefficient, which first divide each qualitative attribute in binary columns (containing two digits), and then performs comparisons dime by dime for each pair of attributes referred to the observations under scrutiny.

The dissimilarity index s_j is then calculated as

$$s_j(x_1, x_2) = 1 - \frac{NNEQ}{NTT + NNZ} = \frac{2 \times NTT}{2 \times NTT + NTF + NFT}$$

where variables could be defined as:

NTT = number of dimes in which both values are true

NTF = number of dimes in which the first value is true and the second is false

NFT = number of dimes in which the first value is false and the second is true

NFF = number of dimes in which both values are false

NNEQ = NTF + NFT = number of non-equal dimensions

NNZ = NTF + NFT + NTT = number of non-zero dimensions

Irrespective from the method used to create proximity indexes, the values obtained by the comparison of each observation could then be stored in a proximity matrix for subsequent application of a clustering algorithm able to discriminate the different clusters hidden into the dataset. Among available methods, partitional clustering algorithms aims to discover possible groupings in a dataset by iteratively optimizing an objective function to improve the quality of clusters generated: utilizing a specific distance function selected in accordance with the typology of data available these algorithms try to minimize the relative objective function. By assigning randomly observations to clusters and recalculating assignments to different clusters iteratively, these algorithms are capable of improving the overall quality of each cluster identified by the algorithm iteration after iteration (Reddy and Vinzamuri, 2013). Among others, for the scope of the thesis, K-means and K-medoids partitional clustering algorithms are going to be presented.

K-means clustering (MacQueen, 1967) is based on the idea of using the cluster centers (or means) as representatives' elements of each partition. Due to its simplicity, this algorithm is widely used in clustering dataset containing only numerical data.

$$K - means\ cost\ function = MIN \sum_{l=1}^{k} \sum_{i=1}^{n} \sum_{j=1}^{m} u_{il} \times d(x_{ij}, z_{lj})$$

Where k is the number of clusters, n the number of observations, m the number of quantitative attributes and u_{il} the relative weight of that attribute. For each attribute (m) of each observation (n), a comparison with the average value z of the selected cluster (l) respect to the same attribute (j) is performed and resulting cost function is the minimized iteratively until a convergence criterion is met.

Algorithm description:

1. Select a set of k initial points out of the available dataset and take them as centroids.
2. Associate each remaining observation of the dataset to the respective closest centroids by using the distance measurement selected (like one of Minkowski distances)
3. When all the observations are assigned, recalculate the centroid positions.
4. Iteratively repeat step 2 and 3 until a convergence criterion is met by exchanging centroids with non-centroids datapoints with the objective of minimizing the cost function. The convergence criterion is usually to stops the swapping when the cost function stops to decrease.
5. The final selection of centroids is found and the assignment to relative clusters is performed.

Since k-means uses means of attributes values to identify the center of the clusters (named centroids), the main limitation of this algorithm is that it cannot be applied directly to dataset containing also categorical data: to overcome this limitation k-medoids algorithms could be used.

In *k-medoids clustering* each cluster is represented by one of the data points of the cluster itself, named cluster medoids, referring to the fact that the selected object utilized to represent each cluster is the observation for which the average dissimilarity between itself and all the other members of the assigned cluster is minimal. Briefly, the medoids are corresponding to the most centrally located point of each cluster. The most used k-medoids algorithm is the one developed by Kaufman and Rousseeuw in 1990, denominated *Partitioning Around Medoids* (or PAM) (Kaufman and Rousseeuw, 1990). The k-medoids algorithm is similar to k-means but allowing the usage of any dissimilarity measure it could include also categorical variable directly into the partitioning algorithm, thus Gowen's distance could be used to compare dissimilarities of complex typology of observations. The PAM algorithm, as k-means, is based on the research for k representative medoids among the observations available in the dataset, and on top of them build clusters able to minimize the cost function of dissimilarities. The general formula of k-medoids is consequently the same as k-means, with the difference that the dissimilarity measure could compare also categorical data on top of quantitative ones.

$$PAM\ cost\ function = MIN \sum_{l=1}^{k} \sum_{i=1}^{n} \sum_{j=1}^{m} u_{il} \times d(x_{ij}, z_{lj})$$

Where k is the number of clusters, n the number of observations, m the number of quantitative attributes and u_{il} the relative weight of that attribute. For each attribute (m) of each observation (n), a comparison with the medoids of the cluster l (represented by z) respect to the same attribute j is performed and resulting cost function is the minimized iteratively until a convergence criterion is met.

Algorithm description:

1. Select a set of k out of the available dataset and take them as medoids.
2. Associate each remaining observation of the dataset to the closest medoids by using the distance measurement selected (like Minkowski distances in case of numerical attributes, or Gower for a mix of categorical and numerical characteristics).
3. Each selected medoid and each non-medoid data point is then exchanged (swapped) and the objective function is computed again and again, until a convergence criterion is met. The criterion is usually to stops the swapping when the cost function stops to decrease.
4. The final selection of medoids is found and the assignment to relative clusters is carried out.

On top of the possibility to compare categorical attributes, k-medoids algorithms could also provide a robust alternative to k-means clustering when there is great variability of the phenomena observed in attributes: k-medoids results are less sensitive to possible outliers, that instead in k-means algorithms are able to modify the mean of the cluster and possibly worsening the overall partitioning.

Partitional clustering algorithms however face two main limitations: the initial selection of centroids/medoids is usually a random selection of point available in the dataset, and the number of clusters to be created must be somehow estimated and given in input as a parameter before running the algorithm (Reddy and Vinzamuri, 2013).

As Steinley demonstrated, starting from a random selection of k centroids or medoids and utilizing a convergence criterion that stops as soon as a minimum is identified could lead to stopping the algorithm in local minimum rather than the global one (Steinley, 2003). As shown in the explanatory figure below (Figure 429, the initial selection of k centroids/medoids could place the starting point of the iterative process in different point (like 1, 2 or 3): depending on the starting point, different minimum of the cost function could be reached, resulting in possible different grouping of observations. In literature are available other convergence criterion based on heuristics, but due to large amount of computing capacity that computers now have, while implementing them it is possible to let the algorithm test-out hundreds of thousands of initial combinations of different starting points and compare results of associated cost function to give as output the assignment able to generate the overall lowest cost function among the ones explored.

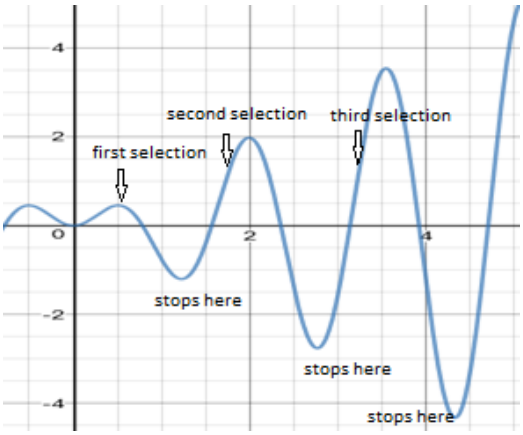

Figure 42 Example of different local minimun obtained analysing the space from different starting points

Second, the under-estimation or the over-estimation of the number of clusters (k) risks of negatively influencing the quality of the overall clustering procedure (Reddy and Vinzamuri, 2013). Identifying a suitable number of clusters in a dataset is therefore a fundamental task to perform before running each algorithm. Two methods suitable for estimating this parameter are going to be presented hereafter: the elbow method (applicable only to k-means) and the silhouette method (applicable to both algorithms). The *elbow method* (Thorndike, 1953) is a heuristic algorithm utilized to identify a suitable number of clusters based on an evaluation of the explained variation as a function of an increasing number of clusters. By measuring the compactness of each partition generated through an estimation of the intra-cluster variation, it then sums-up the total (to obtain the total within-cluster sum of squares WSS) and compare this obtained value with other partitions obtained while increasing the number of clusters to be analysed. The more clusters are added to the analysis, the lower the total WSS should be since with a higher number of clusters available observations could spread in clusters closer to other similar objects. However, from a certain point on, adding more clusters does not reduce significantly the WSS: this point associated to a specific number of clusters, identified as the elbow of the curve, could be considered as the relevant number of clusters to be inspected. It is not always possible to determine with precision which could be the suitable number of clusters from the graph due to the ambiguity to which it is subject, but different tests could be made with different number of clusters closer to the potential elbow point. In Figure 43 an example of graph representing the reduction of total Within Sum of Squares depending on the number of clusters is represented.

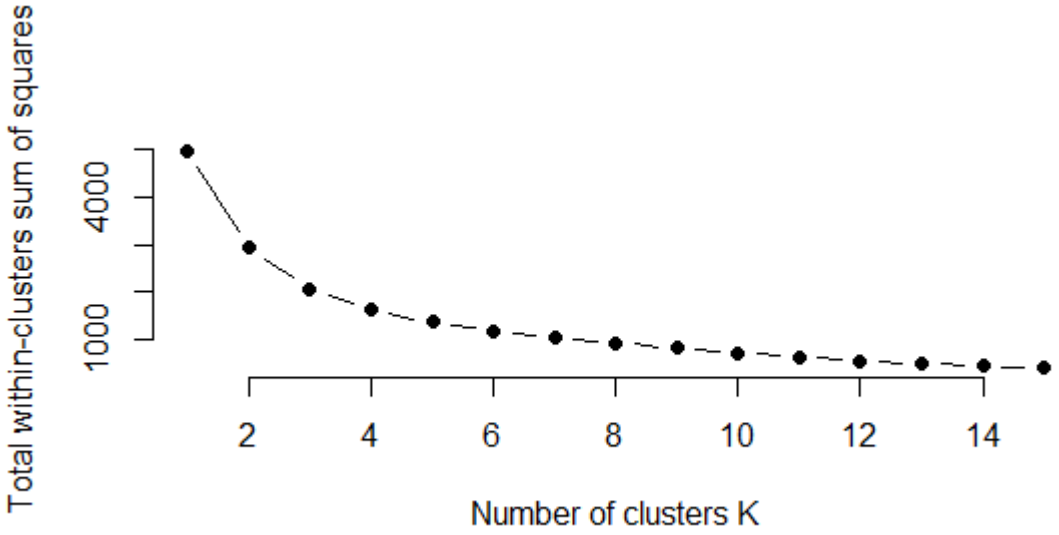

Figure 43 Example of graph utilized to identify a plausible number of clusters through elbow method

Algorithm to identify k with the elbow method:

1. With the pre-identified clustering algorithm, compute the hypothetical result of the partitioning varying the number of clusters, for example from k equal 2 to k equal 20.
2. For each k calculate the WSS (total within-cluster sum of squares) obtained with that number of different clusters.
3. Plot the curve of WSS against k to identify the elbow.

Silhouette coefficient, first theorized by Rousseeuw (Rousseeuw, 1987), is another index utilized to estimate the number of potential clusters embedded inside a dataset. The silhouette, considering both intra-cluster and inter-cluster distances, gives for each partition of k clusters a measure of how appropriately observations of the dataset have been clustered.

For each observation x, the average of the distances to all observations inside the same cluster is first calculated and set to a(x). C_x represents the dimension of selected cluster, minus one observation to remove the comparison between x and itself.

$$Intracluster\ distances = a(x) = \frac{1}{|C_x| - 1} \times \sum_{j, x \neq j} d(x, j)$$

Subsequently, for each cluster that does not contain the observation x, the average distance of x to all observations in pertaining to other clusters is calculated, and the smallest of these distances is taken and set to b(x). C_k represents the overall number of observations pertaining to clusters different from the one in which x has been assigned. The higher the value of b(x), the better the assignment of observation x to the relative cluster.

$$Intercluster\ distances = b(x) = MIN\left(\frac{1}{|C_k|} \times \sum_{j \in C_k} d(x, j)\right)$$

These two values a(x) and b(x) are then used to estimate the silhouette coefficient of the observation x, denominated s(x).

$$\mathrm{s(x)} = \begin{cases} 1 - \dfrac{a(x)}{b(x)} & if\ a(x) < b(x) \\ \dfrac{b(x)}{a(x)} - 1 & if\ a(x) > b(x) \\ 0 & if\ a(x) = b(x) \end{cases}$$

The mean of silhouette values calculated considering all the data of the dataset is consequently a measure of how appropriately the data have been clustered: the higher the value of this average, the higher will be the fit of the proposed clustering. The k associated to the maximum (or second best) average silhouette of the data sample could then be used as an estimation of the number of clusters to be examined with the predefined algorithm. A graphical representation of a Silhouette analysis is represented in Figure 44.

$$AVG\ Silhouette = \frac{\sum_{x=1}^{n} s(x)}{n}$$

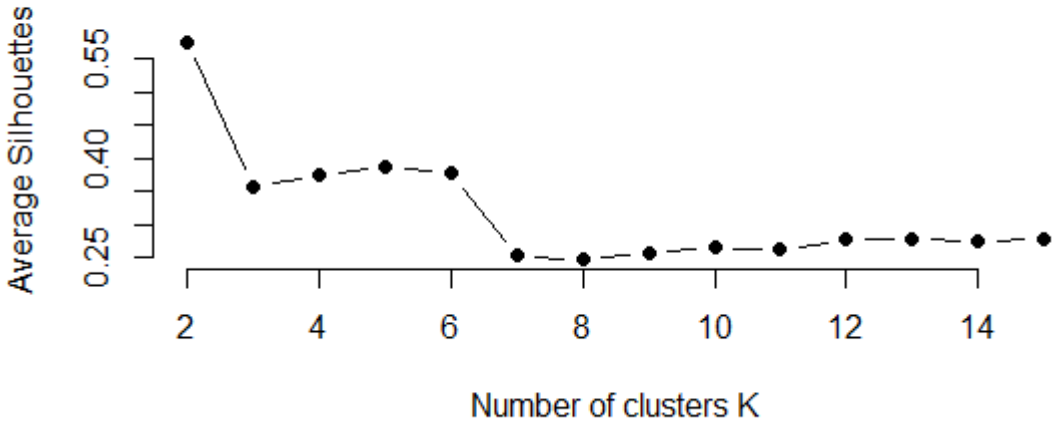

Figure 44 Example of graph utilized to identify a plausible number of clusters through silhouette method

Algorithm to identify k with the silhouette method:

1. With the pre-identified clustering algorithm, compute the hypothetical result of the partitioning varying the number of clusters, for example from k equal 2 to k equal 20.
2. For each k calculate the average silhouette obtained with that number of different clusters.
3. Plot the curve of average silhouette against k to identify the maximum average silhouette (or second best in case the maximum is k=1 or k=2).

Found a suitable solution to overcome partitional clustering algorithm main problematics, a model could be created to explore the available dataset. Usually, since results are never perfectly fitting, it is suggested to build and test different models which could be able to give additional or complementary information to researchers. The quality of these models utilized to explore the dataset should also be analysed, therefore some measurement of clustering validations could be used. Among these techniques, both Elbow and Silhouette could already be considered suitable validation techniques, pertaining to the class of relative and internal cluster validation techniques (Theodoridis and Koutroubas, 2008).

Application

Once identified the theoretical foundation necessary to build a suitable clustering model, the next sections will be developed following the approach delineated by Jain and Dubes in 1989 (Jain and Dubes, 1989) and represented in the Figure 45 below.

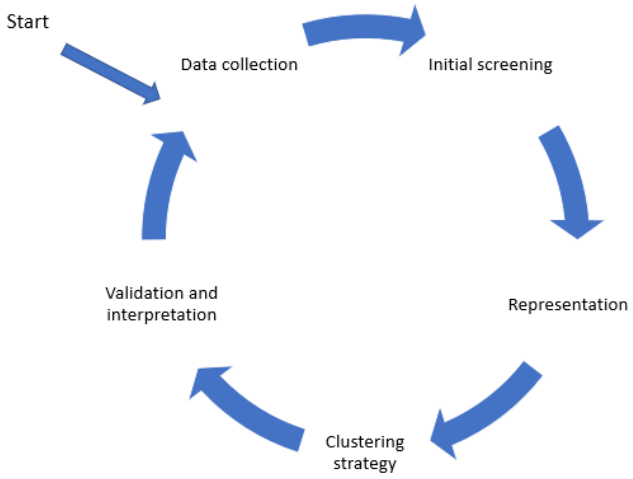

Figure 45 Data clustering process, adapted from Jain and Dubes (1989)

Data were initially collected at initiative level, meaning that for each initiative found a set of information regarding its main characteristics was collected. For each of these initiatives, banks involved in their organization or in their execution were also noted down, and since with some initiative it is possible to pursue different strategical aims (here denoted as "activity"), multiple rows were registered when these programs were present[38] (as shown with program "S"). Hereafter in Table 17 a sample of how data were collected could be seen.

Table 17 Example of data collected

Prog_name	**track_code**	**bank_code**	**role**	**type**	**goal**	**activity**	**Participation**
P	P060	B14	Provider	Networking and matchmaking	Ecosystem development	Development support	Cross-border
Q	P061	B14	Recipient	Incubator	Bank improvement	Development support	Cross-border
S	P063	B14	Provider	Test labs	Bank improvement	Integration of back-end technologies	Cross-border
S	P064	B14	Provider	Test labs	Bank improvement	Integration of front-end solutions	Cross-border

[38] For example, the same corporate accelerator accepting applications from start-ups working either on back-end technologies or on b2c solutions was registered two times.

With this initial structure, a first screening was performed to check that collected attributes were meaningful, therefore a thorough check of values that each attribute obtained was performed to eliminate potential factors common to all programs. The first screening confirmed the relevance of data collected, since excessive commonalities were identified.

To compare strategies of different banks, however, data at bank level needed to be generated. The initial structure of the data (the one in the table above) was composed of only qualitative attributes, and usually more rows were associated to the same bank. Due to this fact, qualitative information was converted into quantitative one throughout a counter for each different value of the attributes, as in the example reported hereafter in Figure 46. Consistently with the fact that most of the programs were continuing over time and due to the possible strategic focus given by banks to these programs, it seemed appropriate to perform a unique analysis considering all the programs in which banks were involved during past years as a measure of a possible strategical direction. Data regarding time were then synthesised as if all the programs were active during the overall timeframe. For each different attribute, a separate counter was created to take into account the frequency with which each attribute was identified within programs in which each bank was involved, resulting in a total of 23 different quantitative variables (program type, program characteristics and strategical aims). Summation of "strategical aims" is exactly equal to the rows collected with the research process, while "program type" and "program characteristics" instead could sum to a lower number, due to the fact that some program could pursue different strategical aims at the same time. Data structured as reported below (in a sequential way) were used as pattern matrix to perform subsequent clustering.

General info:

bank_name	bank_ identifier	country_ name	business_ model	total_ assets (B€)	Europe_HQ_ region	Operations
Jyske Bank	B14	DK	Local universal	87	North	Denmark

Program type:

Networking & matchmaking	Formative resources	Incubator	Accelerator	Challenge	Corporate Incubator	Corporate Accelerator	Test Labs
3	0	2	1	1	0	0	1

Program characteristics:

Provider	Recipient	Ecosystem development	Bank improvement	Local	Cross-border	Global
3	5	1	7	0	7	1

Strategical aims:

Cultivating back-end technologies	Cultivating b2b solutions	Cultivating b2c solutions	Integration of back-end technologies	Integration of front-end solutions	Creation support	Develop -ment support	Scaling support
0	0	1	1	1	0	3	3

Figure 46 Example of data collected for each bank

After performing this type of conversion for each bank included in the research, a second screening has been performed to eliminate from the dataset to be supplied to the algorithm the rows representing the banks which were not involved in any program. These banks however were not completely removed from the analysis but were automatically assigned to an additional cluster of disinterested financial institutions.

Due to data structure and type, a total of four different models have been identified and tested out:

- K-means, Euclidean distance, number of clusters identified with silhouette method.
- K-means, Euclidean distance, number of clusters identified with elbow method.
- K-medoids, Euclidean distance, number of clusters identified with silhouette method.
- K-medoids, Gower distance, number of clusters identified with silhouette method[39].

Qualitative data regarding the characteristics of each bank (meaning business model, total assets, headquarter and countries of operations) have been left out from all the different computational operations due to fact that the main objective of the clustering was to recognize possible similar strategies among the different banks, irrespectively from their qualitative information. These descriptive data were then utilized to produce further information through a thorough analysis of possible commonalities among banks following similar strategies in terms of engagement with start-ups. To sum-up, only quantitative data regarding the counters of the different characteristics of the ensemble of programs for which each start-up was engaged were used (in table above: counters about program types, program characteristics and strategical aims).

In the context of the analysis, having more programs with a certain characteristic implied that the bank under analysis had a stronger commitment to that specific typology of characteristics identified. The fact that the spread of values obtained among different observations could be considered as a measure of the differentiation among clusters, plus the fact that all the different attributes are measured on the same scale (a frequency counter), led to exclude to perform operations of normalization of data to revise the quality of clustering analysis.

The algorithms selected have been implemented in R language, as could be consulted in "Appendix B – Code commented", therefore in this part of the thesis only the explanation of the different steps is reported. Similar steps have been followed to implement each different test: after recalling the general functions useful to perform the clustering analysis, data have been selected from a pre-formatted file containing the pattern matrix, then the estimation of the number of clusters have been performed and resulting k has been utilized as estimation of number of different clusters to feed the selected clustering algorithm. After obtaining the first results, a thorough analysis of the characteristics of the programs available for each bank grouped in the same cluster has been performed to identify further commonalities not able to emerge from the analytical algorithm, and to confirm the quality of clusters generated.

[39] Working with medoids (rather than means), the k-medoids algorithm allows only the utilization of dissimilarity indexes which could take into account different typologies of data, therefore there is no opportunity to calculate any "sum of squares" and to consequentially to use the elbow method to estimate the number of parameters.

The objective of the clustering analysis performed was to analyse the overall combination of programs characteristics of each bank to identify if financial institutions are engaged in a similar pattern of initiatives. The possible strategies resulting from the mix of programs available for each financial institution grouped in the same cluster, along with the analysis of the bank-level characteristics, are going to be presented in the next chapter dedicated to results analysis.

Cluster analysis – implementation

K-means algorithm

The first step needed to be clarified is how to (partially) overcome the possibility of stopping the k-means algorithm when a local minimum is reached: to do so, it is important to test as many combinations of different initial point from which to start to generate clusters as possible. The dataset is composed by 51 observations (each one corresponding to a bank with at least a program), and the initialization requires to select k elements from it. Due to characteristics of the problem, to calculate the overall number of possible initial combinations of starting points the formula of the combination without repetition is applied.

$$Possible\ combinations = \left(\frac{n!}{k! \times (n-k)!}\right)$$

In our case, for example with k=8, a total of 636 million of possible initial combinations of k=8 points should be inspected, with the number of possible combinations increasing as k increase. However, due to limited capabilities of the equipment used to perform the testing, only a limited space of possible solutions has been inspected, setting the number of initial combinations of different points at 5000 (five thousand). To explore the overall space of possibilities would have required a prohibitive amount of time and resources.

K-means with silhouette method for the identification of number of clusters (5 clusters)

By calculating the average silhouette value varying the number of potential clusters, the graph below emerged (Figure 47).

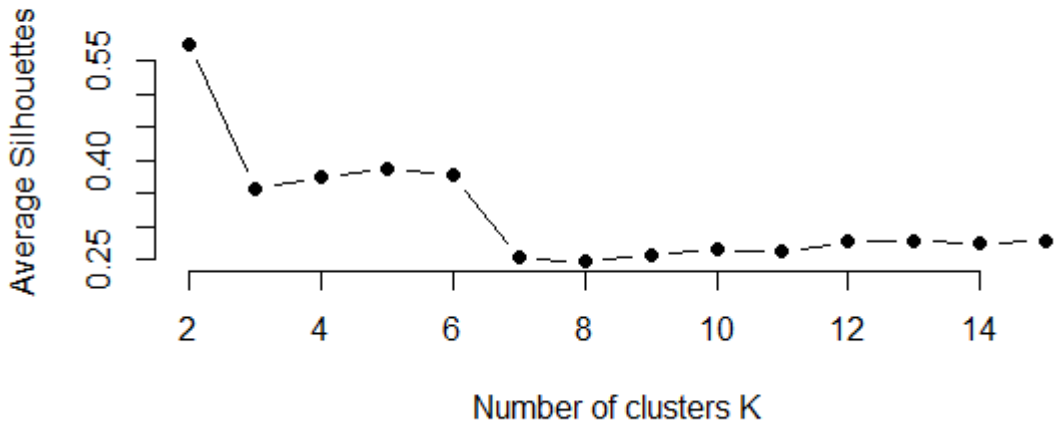

Figure 47 Identification of number of clusters through silhouette method

The average silhouette is maximized for a number of clusters equal to two, but with this low resolution is indeed almost useless to perform the clustering analysis. The second best local optima is obtained at k=5, number of clusters that offer a discrete discerning power to perform the analysis.

Cluster 1: **Diversifier**

Banks into the cluster: BNP Pasibas, Skandinaviska Enskilda Banken

Banks with a great number of programs for both strategical objectives. Local ecosystem developers, Scouting for banking improvement at cross-country and global level. Relying for two thirds of banking improvement programs organized by external organizations, with programs focused on cultivating back end and B2C technological solution and providing scaling support through the participation to multiple incubators, accelerators, and networking and matchmaking initiatives. When provider of the program, integration of front and back-end applications (no B2B) through test labs and cultivation through corporate incubators, corporate accelerators, and some challenges. When providing programs for ecosystem development, focus on creation and development support through formative resources and networking and matchmaking initiatives.

Cluster 2: **Worldwide scouter**

Banks into the cluster: Raiffeisen bank International, Jiske Bank, Nykredit, Op-Pohjola Group, Credit Agricole, Societè Generale, Deutsche Bank, OTP Bank, Banco Santander, Banco Bilbao Vizcaya Argentaria, Barclays Bank, Hongkong and Shanghai Banking Corporation, Lloyds Bank, NatWest

These banks are focused on banking improvement programs, relying on both internally and external initiatives. For programs provided by thirds parties, they almost always include at least two different initiatives, of which one accelerator at least for venture development and scaling support or cultivation of back-end and b2c. Tendentially engaging in one program for each typology (lower extent respect to FinTech enthusiasts which engage in multiple programs), but still providing at least two programs among challenges, test labs, corporate accelerators, or corporate incubators autonomously. For this cluster scouting for ideas is open at least at cross-border level. Tendentially below the average respect to providing ecosystem development programs, mostly with just one or two programs, focused on local actions through networking initiatives and entrepreneurial development programs for creation and development of local start-up. Tendentially below the average respect to providing ecosystem development programs (with someone not offering any program at all), mostly focused on local actions through networking initiatives and entrepreneurial development programs for creation and development support of local start-up. Some are also offering networking initiatives and accelerators open to cross-border or global participants for venture development and scaling.

Cluster 3: **Ecosystem grower**

Banks into the cluster: Erste Group Bank, Intesa Sanpaolo, Rabobank, Unicredit Bank

Banks in this cluster are more focused on directly providing ecosystem development programs rather than banking improvement ones, leaving their organization mainly to external specialized parties. These banking improvement programs run by third parties are mainly global accelerators and challenges, focused mostly on cultivating b2c and back-end, with some initiative cultivating also b2b solutions, open usually at least at cross-border level. Ecosystem development programs instead are mainly focused on creation support and development support, not only at local level but also at cross-border or even global one, mainly delivered through networking and matchmaking initiatives, with some entrepreneurial development programs and incubators for creation support.

Cluster 4: **FinTech enthusiast**

Banks into the cluster: Danske Bank, Nordea, ING Bank

Strong focus on banking improvement at cross-border or global level, with some ecosystem development programs developed at cross-country or global level. For banking improvement programs, two thirds of programs are provided by third parties are focused on cultivating back-end and B2C solutions and scaling support through accelerators, offering development support though incubation and scaling support through networking initiatives. Programs directly provided by banks include corporate incubator, corporate accelerator, and challenge for cultivation of b2c solutions, and test labs for integration of back and front-end solutions.

Cluster 5: **FinTech Agnostic**

Banks into the cluster: Belfius Bank, KBC Group, Bank of Cyprus Public Company, Credit Mutuel, Group BPCE, Bayerusche Landesbank, Commerbank, DZ Bank Group, Landesbank Baden Wruttenberg, Norddeutsche Landesbank Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, National Bank of Greece, Puraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banca Sella, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, ABN Amro Bank, PKO, Banco Sabadell, Bankia, Caixa Bank, Swedbank

Cluster of banks with below the average focus on banking improvement programs, and varying focus on ecosystem development initiatives. Regarding to bank improvement programs, there is a tendency in relying or on internally organized initiative, or completely on externalized ones. Institutions relying on internal initiative are providing corporate incubators and challenges especially for cultivation of b2c solutions and development support matching with internal business units, and on test labs for integration of both back and front-end solutions. Organizations benefiting from programs organized by third parties instead are involved in FinTech incubator and accelerators. Regarding ecosystem development, these banks are providing networking, incubator and accelerators for creation and development support, with some entrepreneurial development program for venture creation and some scaling support programs.

The subsequent figure (Figure 48) has been created positioning the banks on the two axes (namely Ecosystem Development and Bank improvement), based on the numbers of programs in which they participated during the timeframe of the research. The positioning was performed after a normalization of data for each of the two categories respect to the average number of programs in which the banks participated: resulting interpretation is therefore that banks positioned in the positive quadrant of x axes have progressively more programs for Ecosystem Development that the average of banks, and the same reasoning applies to the y axis with Bank Improvement initiatives[40]. Resulting clusters have then been highlighted to highlight potentially common approaches to innovation strategies.

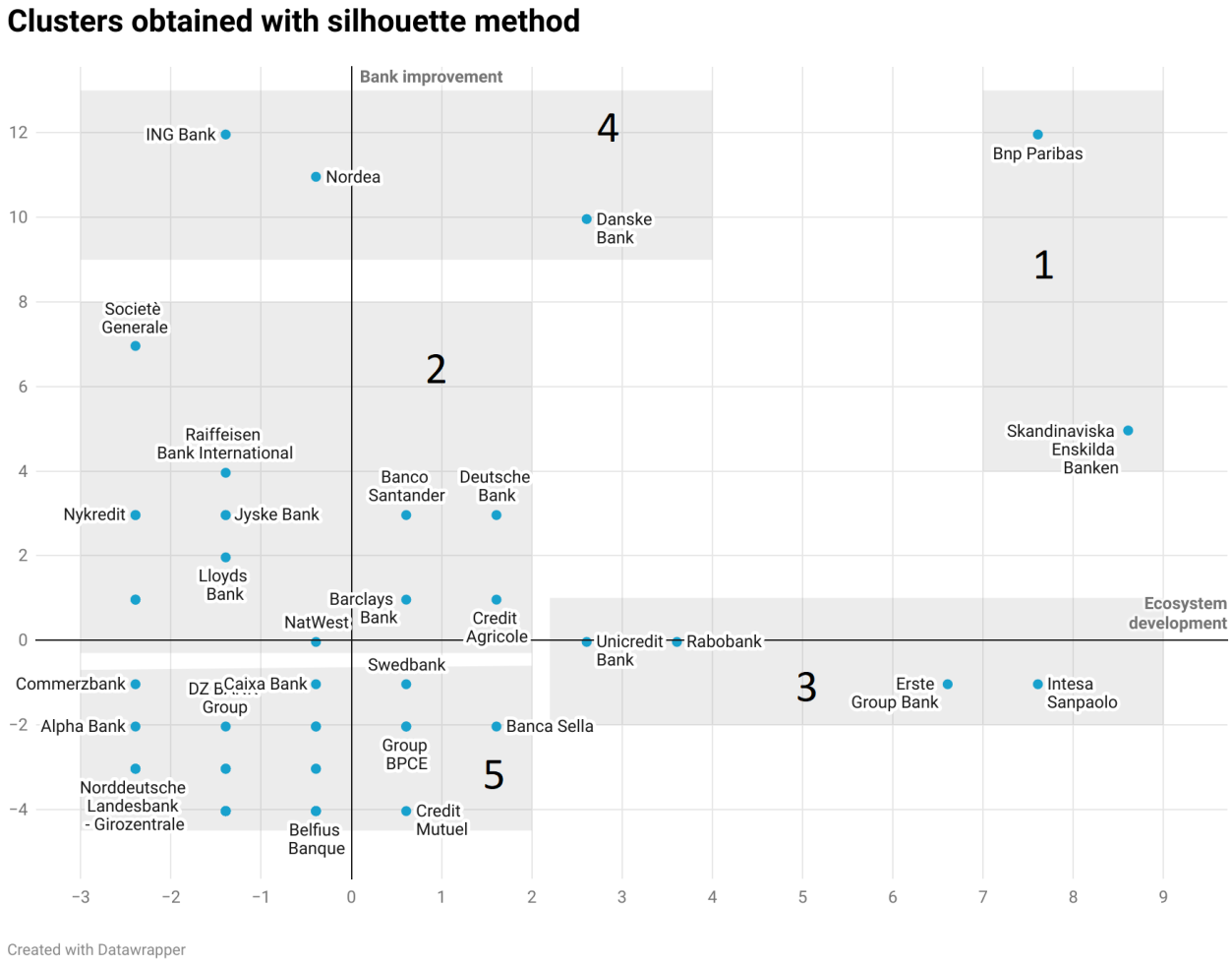

Figure 48 Representation of clusters obtained with K-Means algorithm and silhouette method

[40] Banks in quadrant I (+,+) are offering an higher number of programs for both Ecosystem development and Bank Improvement respect to the average of the sample, while banks positioned in quadrant III (-,-) are offering a number of programs lower that the average for both categories. Banks positioned in quadrant II (-,+) are tendentially more focused on Bank improvement programs, while banks in quadrant IV (+,-) are instead involved in an above the average number of Ecosystem Development programs and fewer Bank Improvement ones.

K-means with elbow method for the identification of number of clusters (k=8)

By calculating the total within-clusters sum of squares varying the number of potential clusters, the graph below emerged (Figure 49).

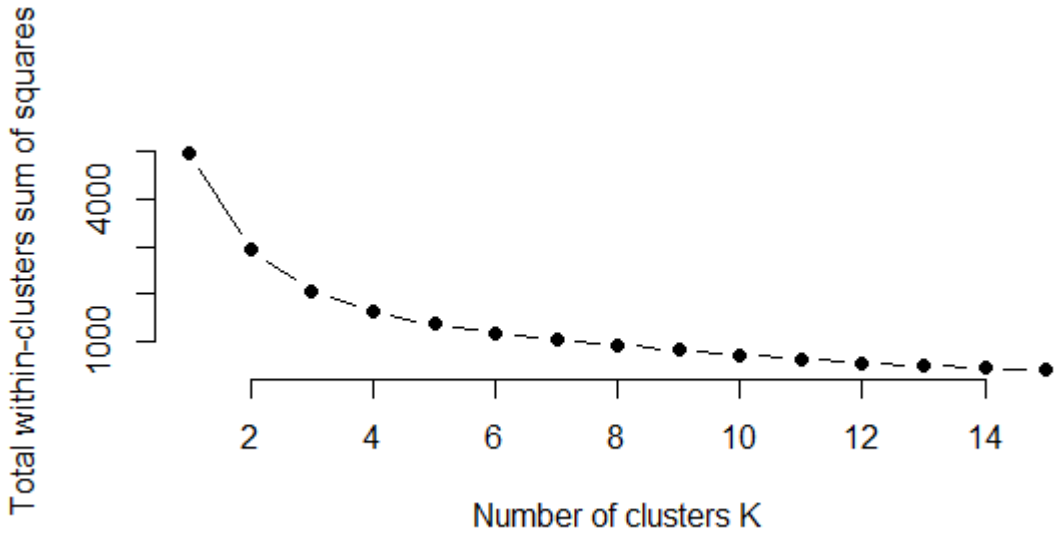

Figure 49 Identification of number of clusters through elbow method

As can be seen in Table 18 below, the reduction of total WSS obtained with eight clusters is already significant (-81% respect to using one single cluster), and subsequent adding of more clusters results in small additional reductions of WSS. A reasoning regarding the number of banks included in the analysis has also been made while selecting the number of clusters, since with only 51 elements to be classified, adding to many clusters could have highlighted small differences withing groups, lowering the quality of subsequent analyses.

Table 18 WSS reduction by increasing the number of clusters

# of Clusters	Total WSS	Reduction of WSS
1	4987	0%
2	2937	41%
3	2079	58%
4	1632	67%
5	1368	73%
6	1194	76%
7	1062	79%
8	938	81%
9	822	84%
10	725	85%
11	630	87%
12	557	89%
13	500	90%

Cluster 1: **Total diversifier**

Banks into the cluster: BNP Paribas

Banks with a great number of programs for both strategical objectives. Local ecosystem developers, Scouting for banking improvement at cross-country and global level. Relying for two thirds of banking improvement programs organized by external organizations, with programs focused on cultivating back end and B2C technological solution and providing scaling support through the participation to multiple incubators, accelerators, and networking and matchmaking initiatives. When provider of the program, integration of front and back-end applications (no B2B) through test labs and cultivation through corporate incubators, corporate accelerators, and some challenges. When providing programs for ecosystem development, focus on creation and development support through formative resources and networking and matchmaking initiatives.

Cluster 2: **Skewed diversifier**

Banks into the cluster: Skandinaviska Enskilda Banken

Banks with a great number of programs for both strategical objectives. Local ecosystem developers, Scouting for banking improvement at cross-country and global level. Relying for two thirds of banking improvement programs organized by external organizations, with programs focused providing scaling support through the participation to multiple incubator and accelerators. When provider of the program, integration of front and back-end applications (no B2B) through test labs and cultivation through corporate challenge. For ecosystem development, these banks focus on creation and development support through formative resources and networking and matchmaking initiatives open at local start-ups.

Cluster 3: **Ecosystem grower**

Banks into the cluster: Erste Group Bank, Intesa Sanpaolo, Rabobank, Unicredit Bank

Banks in this cluster are more focused on providing directly ecosystem development programs rather than banking improvement ones, leaving their organization mainly to third parties specialized. Banking improvement programs are mainly global accelerators and challenges, focused mostly on cultivating B2C and back-end, with some initiative cultivating also B2B solutions, open usually at least at cross-border level. Ecosystem development programs instead are mainly focused on creation support and development support, not only at local level but also at cross-border or even global one, mainly delivered through networking and matchmaking initiatives, with some entrepreneurial development programs and incubator for creation support.

Cluster 4: **FinTech enthusiast**

Banks into the cluster: Danske Bank, Nordea, ING Bank

Strong focus on banking improvement at cross-border or global level, with some ecosystem development programs developed at cross-country or global level. For banking improvement programs, two thirds of programs are provided by third parties are focused on cultivating back-end and B2C solutions and scaling support through accelerators, offering development support though incubation and scaling support through networking initiatives. Programs

directly provided by banks include corporate incubator, corporate accelerator, and challenge for cultivation of B2C solutions, and test labs for integration of back and front-end solutions. Regarding ecosystem development, these banks are offering entrepreneurial development activities with cross-border relevance, and networking events for venture development support.

Cluster 5: **Worldwide scouter with no ecosystem support**

Banks into the cluster: Raiffeisen Bank International, Jyske Bank, Nykredit, Op-Pohjola Group, OTP Bank, Banco Santander

These banks are focused on banking improvement programs, relying on both internally and external initiatives. For programs provided by thirds parties, they almost always include at least two different initiatives, of which one accelerator at least for venture development and scaling support or cultivation of back-end and B2C. Tendentially engaging in one program for each typology (lower extent respect to FinTech enthusiasts which engage in multiple programs), but still providing at least two programs among challenges, test labs, corporate accelerators or incubators autonomously. For this cluster scouting for ideas is open at least cross-border. Tendentially below the average respect to providing ecosystem development programs, mostly with just one or two programs, focused on local actions through networking initiatives and entrepreneurial development programs for creation and development of local start-up.

Cluster 6: **Worldwide scouter with local business development**

Banks into the cluster: Credit Agricole, Societè Generale, Deutsche Bank, Banco Bilbao Vizcaya Argentaria, Barclays Bank, Hongkong and Shanghai Banking Corporation, Lloyds Bank, NatWest

These banks are focused on banking improvement programs, relying on both internally and external initiatives. For programs provided by thirds parties, they almost always include at least two different initiatives, of which one accelerator at least for venture development and scaling support or cultivation of back-end and B2C. Tendentially engaging in one program for each typology (lower extent respect to FinTech enthusiasts which engage in multiple programs), but still providing at least two programs among challenges, test labs, corporate accelerators or incubators autonomously. For this cluster scouting for ideas is open at least cross-border. Tendentially below the average respect to providing ecosystem development programs. Tendentially below the average respect to providing ecosystem development programs (someone offering no program for ecosystem development at all), and mostly focused on offering incubation and accelerators events open to either local or global participants for venture development and scaling purposes.

Cluster 7: **Autonomous Fintech developer**

Banks into the cluster: Bank of Cyprus Public company, Credit Mutuel, Group BPCE, National bank of Greece, Banca Sella, ABN Amro Bank, Banco Sabadell, Bankia, Caixa Bank, Swedbank

Banks pertaining to this cluster are both involved in ecosystem development programs and in banking improvement ones, tendentially directly operated by themselves (therefore not relying on external programs). Regarding programs for ecosystem development, the majority

of banks in this cluster are offering networking initiatives for venture creation and support, restricted at local start-ups, with some bank offering also incubators or accelerators with same strategical aims and geographical scope. Regarding banking improvement programs, these banks tend to rely on internally developed programs, especially corporate incubators and challenges created to cultivate B2C front end solutions, or test laboratories to integrate both back and front-end applications.

Cluster 8: **Tester**

Banks into the cluster: Belfius Banque, KBC Group, Bayerische Landesbank, Commerbank, DZ Bank Group, Landesbank Baden-Wurttemberg, Norddeutsche Landesbank – Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, Piraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, PKO

This cluster groups together banks with a number of programs below the average respect to both ecosystem development and bank improvement. However, despite being clear regarding the small amount of program that each of these banks are offering, the cluster is grouping banks that somehow could still be differentiated between them respect to possible strategical objective. In fact, inside this cluster there are banks offering programs only for ecosystem development (mainly networking or incubator/accelerators) focused on local or maximum cross-border start-ups, and banks providing just test laboratories open to participants from all over the world. In between, there are some banks offering lightweight programs for ecosystem development (like entrepreneurial development programs or networking initiatives for venture creation and development at local level), while benefitting from external incubators and accelerators for cultivating b2c products (usually open at least at cross-border level). Due to the few programs in which these banks are involved, identifying this ensemble of initiatives as “strategies” for development of new capabilities could be a strong assumption, therefore they will be treated as a single cluster, even if inside it different sub-clusters could be identified analysing thoroughly the data.

In Figure 50 a rough graphical representation of clusters obtained with the method just described is represented.

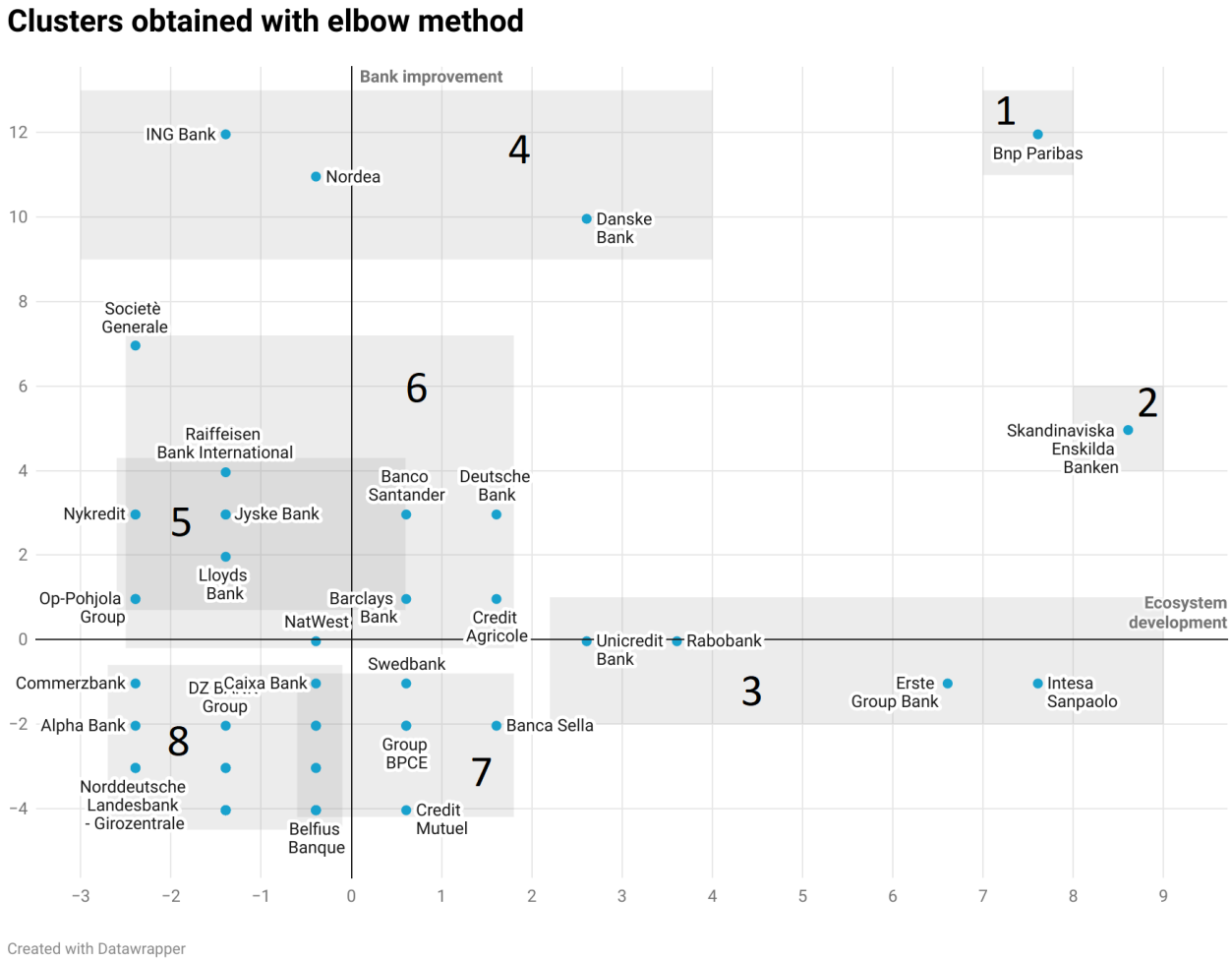

Figure 50 Representation of clusters obtained with K-Means algorithm and elbow method

As can be easily seen from previous analysis and resulting two graphical representations, clusters obtained with elbow method could be considered refinements of clusters previously identified utilizing the silhouette method. This fact is confirmed by the assignment of banks to respective clusters: while clusters labelled Ecosystem Grower and FinTech Enthusiast are the same, cluster Diversifier obtained with silhouette method is less specific than clusters Total Diversifier and Skewed Diversifier which better highlight different behaviours regarding FinTech program availability. Clusters Worldwide scouter with no ecosystem support and Worldwide scouter with local business development are specification of cluster Worldwide scouter obtained with silhouette method, as also Autonomous FinTech Developer and Tester respect to FinTech Agnostic. From this point on, clusters obtained with k=8 will be used as reference output of k-means algorithm application.

K-medoids algorithm

By calculating the average silhouette value varying the number of potential clusters utilizing Gower's distance, the graph below emerged (Figure 51).

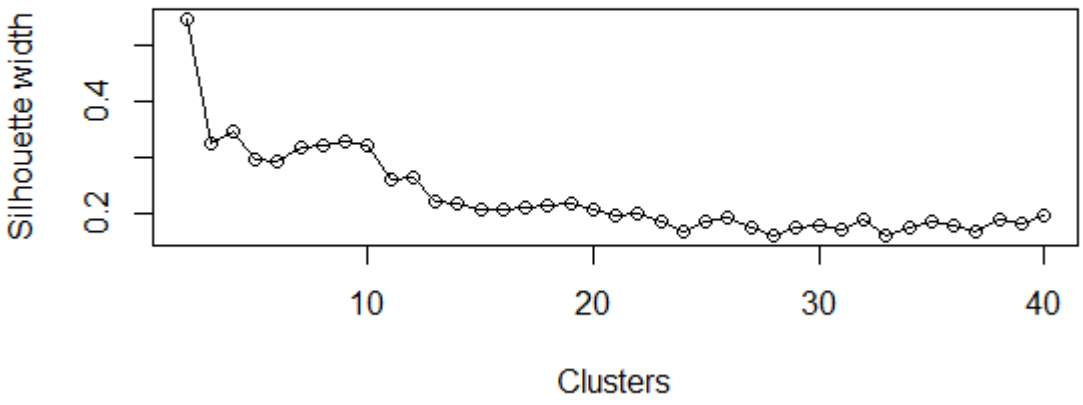

Figure 51 Identification of number of clusters through silhouette method and Gower distance

The average silhouette is maximized for a number of clusters equal to two, but with this low resolution is indeed almost useless to perform the clustering analysis. Other local optima are obtained at k=4 and k=9 with average silhouette values very similar. This number of clusters offer a discrete discerning power to perform the analysis, therefore two tests have been implemented. The following analysis will be developed recalling the definition and descriptions provided above for k-means clusters, without specifying anymore the specific set of characteristics identified analysing resulting clusters.

K-medoids algorithm with Gower's distance and silhouette method (K=4)

Cluster 1: ING Bank, Nordea, Danske Bank, BNP Paribas, Skandinaviska Enskilda Bank

Cluster composed exactly by banks pertaining to categories of FinTech Enthusiast, Total Diversifier and Skewed Diversifier.

Cluster 2: Erste Group Bank, Credit Agricole, Group BPCE, Deutsche Bank, Banca Sella, Banca Intesa Sanpaolo, Unicredit Bank, Rabobank, Banco Santander, Barclays Bank

Cluster composed by all the banks pertaining the the cluster Ecosystem Grower (Erste Group Bank, Banca Intesa Sanpaolo, Unicredit Bank e Rabobank), plus some financial institution labelled as Autonomous FinTech Developer (Group BPCE and Banca Sella), Worldwide scouter with no ecosystem support (Banco Santander) and Worldwide scouter with local ecosystem development (Credit Agricole, Deutsche Bank and Barclays Bank).

Cluster 3: Raiffeisen Bank International, Jyske Bank, Nykredit, Op-Pohjola Group, Societè Generale, OTP Bank, Banco Bilbao Vizcaya Argentaria, Swedbank, HSBC, Lloyds Bank, Natwest

Cluster composed by remaining banks pertaining to category of Worldwide scouter with no ecosystem support (Raiffeise, Jyske, Nykredit, OP-Pohjola, OTP) and Worldwide scouter with local ecosystem development (Societè Generale, BBVA, Swedbank, HSBC, Lloyds and Natwest).

Cluster 4: Belfius Banque, KBC Group, Bank of Cyprus Public Company, Credit Mutuel, Bayerische Landesbank, Commerbank, DZ Bank Group, Landesbank Baden-Wurttemberg, Norddeutsche Landesbank – Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, National Bank of Greese,Piraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, ABN Amro, PKO, Banco Sabadell, Bankia, Caixa Bank

Cluster composed by all the banks pertaining the the cluster identified as Tester and some bank pertaining to Autonomous FinTech Developer cluster.

In Figure 52 a rough graphical representation of clusters obtained with the method just described is represented.

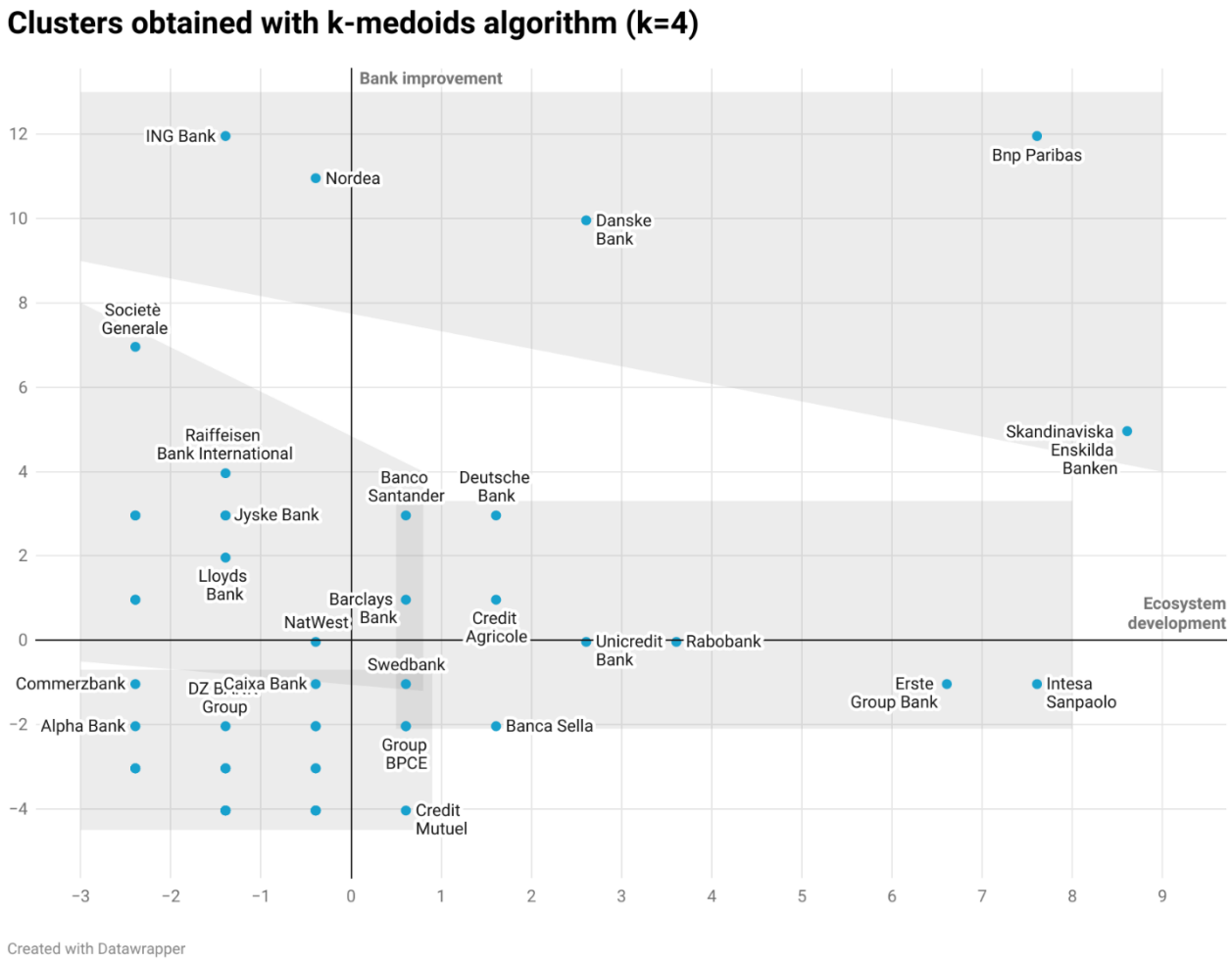

Figure 52 Representation of clusters obtained with K-Medoids algorithm, silhouette method and Gower distance (1)

K-medoids algorithm with Gower's distance and silhouette method (K=9)

Cluster 1: BNP Paribas

Corresponding to cluster labelled as Total Diversifier.

Cluster 2: Skandinaviska Enskilda Bank

Corresponding to cluster labelled as Skewed Diversifier.

Cluster 3: ING Bank, Nordea, Danske Bank

Corresponding to cluster labelled as FinTech Enthusiast.

Cluster 4: Erste Group Bank, Banca Intesa Sanpaolo, Unicredit Bank, Rabobank, Banco Santander

Corresponding to cluster labelled as Ecosystem Grower, apart from the additional presence of Banco Santander which, differently from other banks in this cluster, is providing directly also a corporate accelerator and challenges for FinTech start-ups.

Cluster 5: Raiffeisen Bank International, Op-Pohjola Group, OTP Bank, HSBC, Lloyds Bank, NatWest

Cluster in which part of banks classified as Worldwide scouter with no ecosystem support and Worldwide scouter with local ecosystem development are grouped together. These banks have similar behaviour respect to FinTech start-ups, but different approaches regarding Ecosystem development initiatives, where some banks do not provide services at all (or just some networking event) while others are providing incubators or accelerators.

Cluster 6: Belfius Banque, KBC Group, Bank of Cyprus Public Company, Credit Mutuel, Bayerische Landesbank, Commerbank, DZ Bank Group, Landesbank Baden-Wurttemberg, Norddeutsche Landesbank – Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, National Bank of Greece, Piraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, , PKO

Cluster composed by all the banks pertaining the cluster identified as Tester and some bank pertaining to Autonomous FinTech Developer cluster.

Cluster 7: Jyske Bank, Nykredit Bank

Cluster obtained as a subgroup of cluster labelled as Worldwide Scouter with no ecosystem support.

Cluster 8: Credit Agricole, Societè Generale, Deutsche Bank, Banco Bilbao Vizcaya Argentaria, Barclays Bank

Subgroup of bank pertaining to the cluster labelled as Worldwide scouters with local business development.

Cluster 9: Group BPCE, Banca Sella, ABN Amro Bank, Banco Sabadell, Bankia, Caixa Bank, Swedbank

Corresponding to a subgroup of banks present in cluster identified as Autonomous Fintech Developer.

In Figure 53 a rough graphical representation of clusters obtained with the method just described is represented.

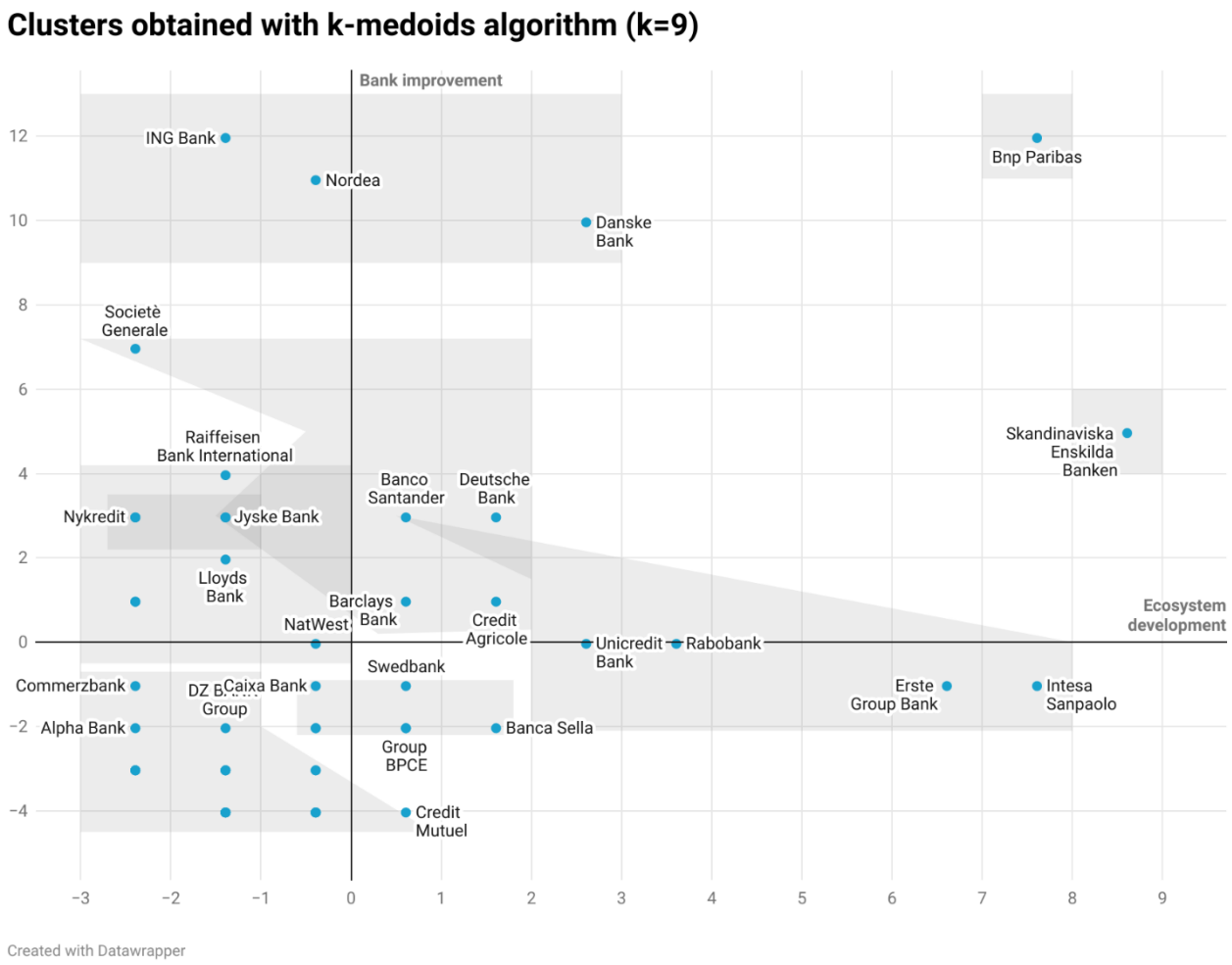

Figure 53 Representation of clusters obtained with K-Medoids algorithm, silhouette method and Gowers distance (2)

K-medoids algorithm with Euclidean distance and silhouette method (K=4)

The average silhouette value, as applied with k-means testing reported before, could also be calculated utilizing the Euclidean distance as measure of dissimilarity. A further test utilizing Euclidean distances to calculate the dissimilarity matrix has been performed and resulting average silhouette value depending on k is represented below in Figure 54.

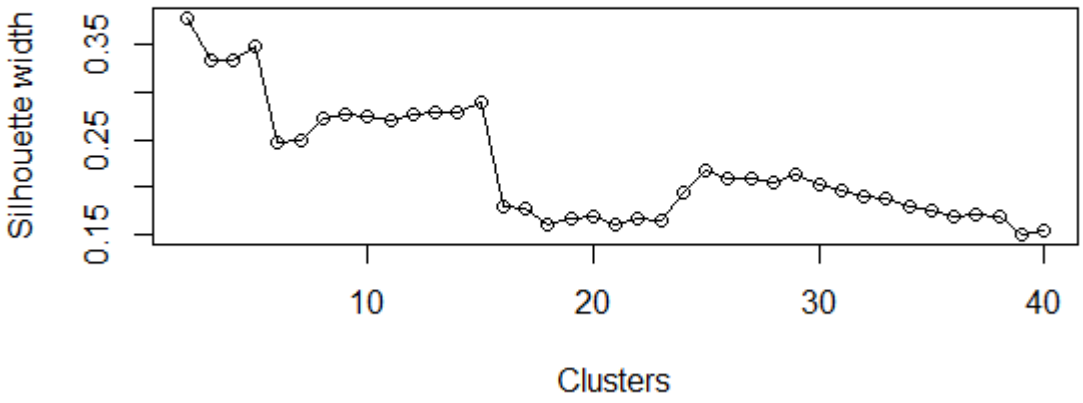

Figure 54 Identification of number of clusters through silhouette method

From the graph it emerged that five is the second-best optima, therefore it has been selected as number of clusters to perform a further clustering analysis with k-medoids algorithm.

Cluster 1: BNP Paribas, ING Bank, Nordea, Danske Bank

Cluster composed by banks pertaining to clusters FinTech Enthusiast and Total Diversifier.

Cluster 2: Skandinaviska Enskilda Bank, Erste Group Bank, Intesa Sanpaolo

Cluster composed by banks pertaining to cluster Skewed diversifier and some of the banks classified as Ecosystem Grower.

Cluster 3: Raiffeisen Bank International, Jyske Bank, Nykredit, Op-Pohjola Group, OTP Bank, HSBC, Lloyds Bank, NatWest

Cluster composed entirely by banks pertaining to cluster Worldwide scouter with no ecosystem support, plus some other bank initially labelled as Worldwide scouter with local ecosystem development.

Cluster 4: Belfius Banque, KBC Group, Bank of Cyprus Public Company, Credit Mutuel, Bayerische Landesbank, Commerbank, DZ Bank Group, Landesbank Baden-Wurttemberg, Norddeutsche Landesbank – Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, National Bank of Greese, Piraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banca Sella, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, ABN Amro Bank, PKO, Banco Sabadell, Bankia, Caixa Bank

Cluster obtained by the union of banks pertaining to cluster of Tester and cluster of autonomous FinTech developer.

Cluster 5: Credit Agricole, Societè Generale, Deutsche Bank, Unicredit Bank, Rabobank, Banco Santander, Banco Bilbao Vizcaya Argentaria, Swedbank, Barclays Bank

Cluster composed by the majority of bank pertaining to group identified as Worldwide scouter with local business development, plus some bank previously identified as Ecosystem grower.

In Figure 55 a rough graphical representation of clusters obtained with the method just described is represented.

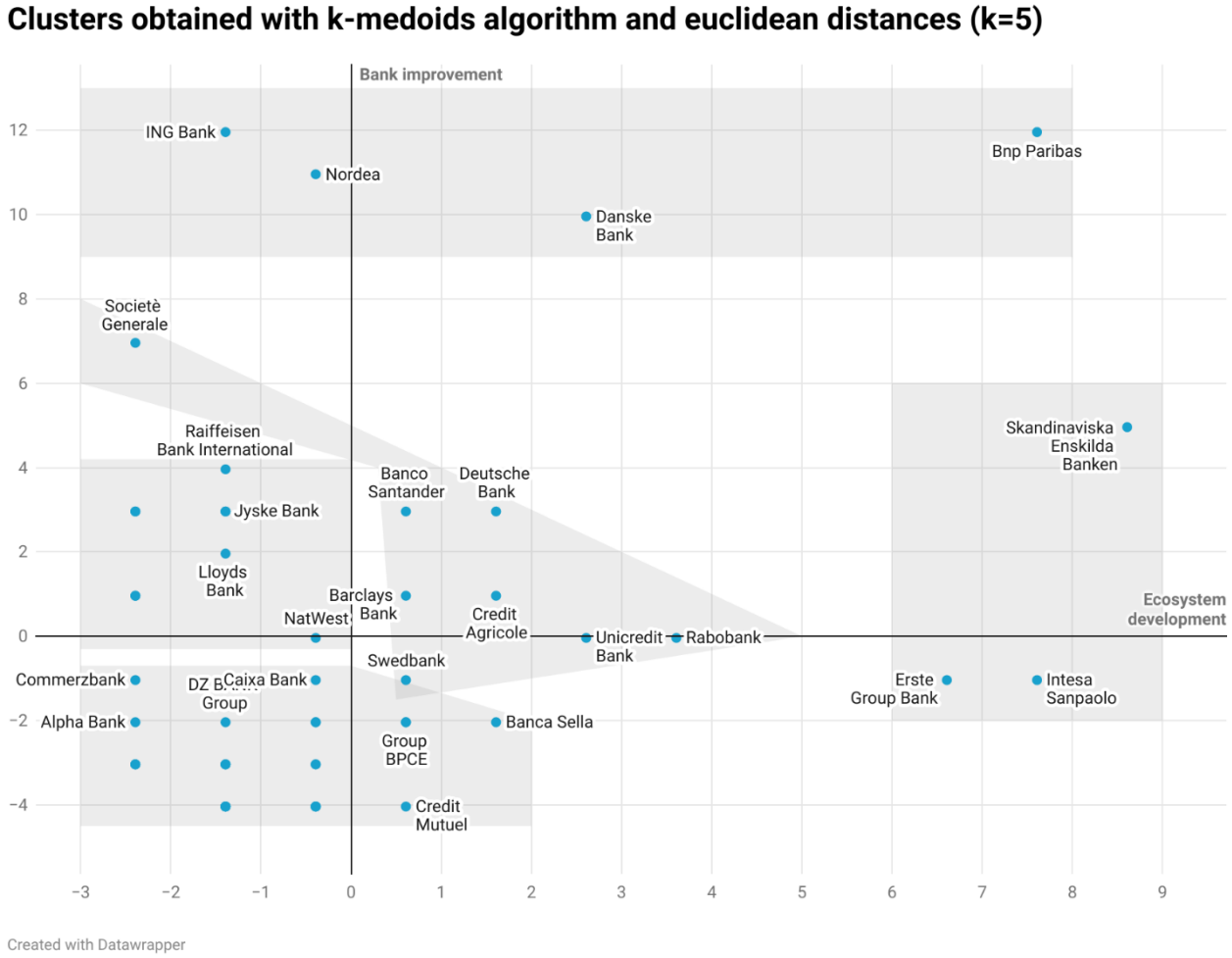

Figure 55 Representation of clusters obtained with K-Medoids algorithm, silhouette method and Euclidean distance

Final assignments

K-medoids algorithms, which creates groups around specific datapoints available between observations collected, for the scope of the thesis were capable to generate clusters less specific that the ones obtained with k-means algorithms. Groupings obtained utilizing K-means clustering, created with algorithms capable of grouping observations around mean values of each attribute (irrespectively from the fact that these datapoints existed or not), have consequently been utilized as reference outputs from the clustering analysis.

Analysing carefully the data collected with the research process and taking into account results obtained with k-means clustering with elbow method as reference clustering outcome, some small changes of the final assignment of banks to different clusters were necessary. Societè Generale, Hongkong and Shanghai Banking Corporation and Lloyds bank, first assigned to cluster Worldwide scouter with local business development, were not offering at all programs for ecosystem development. This fact led to a reassignment of these three banks to Worldwide scouter with no ecosystem support cluster, sharing with other banks pertaining to that specific cluster the fact that there was very low involvement in ecosystem development initiatives. A similar reassignment has been made for Bank of Cyprus Public Company, Credit Mutuel, National Bank of Greece and ABN Amro Bank, institutions initially assigned to the cluster Autonomous FinTech developer, but which in reality do not offer at all banking improvement programs or rely on externally provided ones, and tendentially are engaged in a very limited set of programs considering also ecosystem development initiatives.

Before continuing with the further analysis, we must remember that some banks were excluded in the analysis performed in chapter 3 and 4 due to the lack of involvement in any program for start-ups in the past five years. This group of banks could be considered as an additional cluster, labelled from here on as *Disengaged*, and consequently some descriptive statistics regarding their common features will be presented as for all the other groups.

Final clusters and main characteristics are highlighted in subsequent Table number 19.

Table 19 Final cluster composition and common characteristics regarding engagement in start-up programs

Total Diversifier (TD)	
BNP Paribas	
Relying for two thirds of banking improvement programs organized by external organizations, engaged in multiple programs of the same typology with programs focused on cultivating back end and B2C technological solution and providing scaling support. When provider of the program, integration of front end B2C and back-end applications through test labs and cultivation through corporate incubators, corporate accelerators, and some challenges. Scouting for banking improvement at cross-country and global level.	Providing a great number of Ecosystem development programs mostly opened only at local start-ups, focused on creation and development support through formative resources and networking and matchmaking initiatives.
Skewed Diversifier (SD)	
Skandinaviska Enskilda Banken	
Relying for two thirds of banking improvement programs organized by external organizations, engaged in multiple programs of the same typology with programs focused providing scaling support through the participation to multiple networking events, incubators, and accelerators. Scouting for banking improvement at cross-country and global level. When provider of the program, integration of front end B2C and back-end applications through test labs and cultivation through corporate challenge.	Providing a great number of Ecosystem development programs mostly opened only at local start-ups, focused on creation and development support through formative resources and networking and matchmaking initiatives.
Ecosystem Grower (EG)	
Erste Group Bank, Intesa Sanpaolo, Rabobank, Unicredit Bank	
Banks with a number of programs for banking improvement tendentially close to the average respect to the sample. Banking improvement programs are mainly provided by third parties and consist in global accelerators and challenges, focused mostly on cultivating B2C and back-end, with some initiative cultivating also B2B solutions, open usually at least at cross-border level.	Offering a number of Ecosystem development programs well above the average of the sample. These programs are mainly focused on creation support and development support, not only at local level but also at cross-border or even global one, mainly delivered through networking and matchmaking initiatives, with some entrepreneurial development programs and incubators for creation support.

FinTech Enthusiast (FE)	
Danske Bank, Nordea, ING Bank	
Strong focus on banking improvement programs, being engaged in a number of programs well above the average, and usually in multiple programs of the same typology. More than two-thirds of banking improvement programs are provided by third parties and are focused on cultivating back-end and B2C solutions, on providing scaling support through accelerators, or on offering development support though incubation and scaling support through networking initiatives. Programs directly provided by banks include corporate incubator, corporate accelerator, and challenge for cultivation of b2c solutions, and test labs for integration of back and front-end solutions. These programs are scouting at cross-border or global level.	Regarding ecosystem development, these banks are offering entrepreneurial development activities with cross-border relevance, and networking events for venture development support open at cross-border or global start-ups. However, the overall engagement in ecosystem development programs varies between banks of the clusters.
Worldwide scouter with no ecosystem support (WSN)	
Raiffeisen Bank International, Jyske Bank, Nykredit, Op-Pohjola Group, OTP Bank, Banco Santander, Societè Generale, Hongkong and Shanghai Banking Corporation, Lloyds bank	
Engaged in a number of programs for banking improvement above the average respect to the sample. For programs provided by thirds parties, they almost always include at least two different initiatives, of which one accelerator at least for venture development and scaling support or cultivation of back-end and b2c. Tendentially engaging in one program for each typology (lower extent respect to FinTech enthusiasts which engage in multiple programs), but still providing at least two programs among challenges, test labs, corporate accelerators or incubators autonomously. For this cluster scouting for ideas is open at least cross-border.	Tendentially below the average respect to providing ecosystem development programs, mostly with just one or two programs, focused on local actions through networking initiatives and entrepreneurial development programs for creation and development of local start-up.

Worldwide scouter with local business development (WSED)	
Credit Agricole, Deutsche Bank, Banco Bilbao Vizcaya Argentaria, Barclays Bank, NatWest	
Engaged in a number of programs for banking improvement above the average respect to the sample. For programs provided by thirds parties, they almost always include at least two different initiatives, of which one accelerator at least for venture development and scaling support or cultivation of back-end and b2c. Tendentially engaging in one program for each typology (lower extent respect to FinTech enthusiasts which engage in multiple programs), but still providing at least two programs among challenges, test labs, corporate accelerators or incubators autonomously. For this cluster scouting for ideas is open at least at cross-border level.	Tendentially below the average respect to providing ecosystem development programs, and mostly focused on offering incubation and accelerators events open to either local or global participants for venture development and scaling purposes.
Autonomous FinTech Developer (AFD)	
Group BPCE, Banca Sella, Banco Sabadell, Bankia, Caixa Bank, Swedbank	
Engaged in a number of programs for banking improvement below the average respect to the sample. They tend to rely exclusively on internally developed programs, especially corporate incubators and challenges created to cultivate b2c front end solutions, or test laboratories to integrate both back and front-end applications.	These banks are offering networking initiatives for venture creation and support, restricted at local start-ups, with some bank also offering incubators or accelerators with same strategical aims and geographical scope.
Tester (TST)	
Bank of Cyprus Public company, Credit Mutuel, National bank of Greece, Belfius Banque, KBC Group, Bayerische Landesbank, Commerbank, DZ Bank Group, Landesbank Baden-Wurttemberg, Norddeutsche Landesbank – Girozentrale, OLB Wustenrot, Alpha Bank, Eurobank, Piraeus Bank, MKB Bank Nyrt., Allied Irish Banks, Bank of Ireland, Banco BPM, Monte dei Paschi di Siena, Banque International a Luxembourg, PKO, ABN Amro Bank	
Tendentially below the average respect to both ecosystem development and bank improvement. Due to the few programs in which these banks are involved, identifying this ensemble of initiatives as “strategies” for development of new capabilities could be a strong assumption. Inside this cluster there are banks offering programs only for ecosystem development (mainly networking or incubator/accelerators) focused on local or maximum cross-border start-ups, and banks providing just test laboratories open to participants from all over the world.	

In between, there are some banks offering lightweight programs for ecosystem development (like entrepreneurial development programs or networking initiatives for venture creation and development at local level), while benefitting from external incubators and accelerators for cultivating b2c products (usually open at least at cross-border level).
Disengaged (DIS)
Central Cooperative bank, First Investment banks, Investbank AD, Municipal bank, Agram Banka, HPB, Astrobank, Ringkjobing Landbobank, Sydbank, AS LHV Pank, Aktia Bank Abp, Optima Bank, Budapest loan and development bank, Granit bank, Bper Banca, Credito Lombardo Veneto, Citadele Bank, Millenium Banco Comercial Português, Caiza General de Depositos, Novo Banco, Banca Romanesca, Nova Ljubljanska banka, Handelsbanken
Not involved in any program.

Definitive clusters could be represented as in Figure 56.

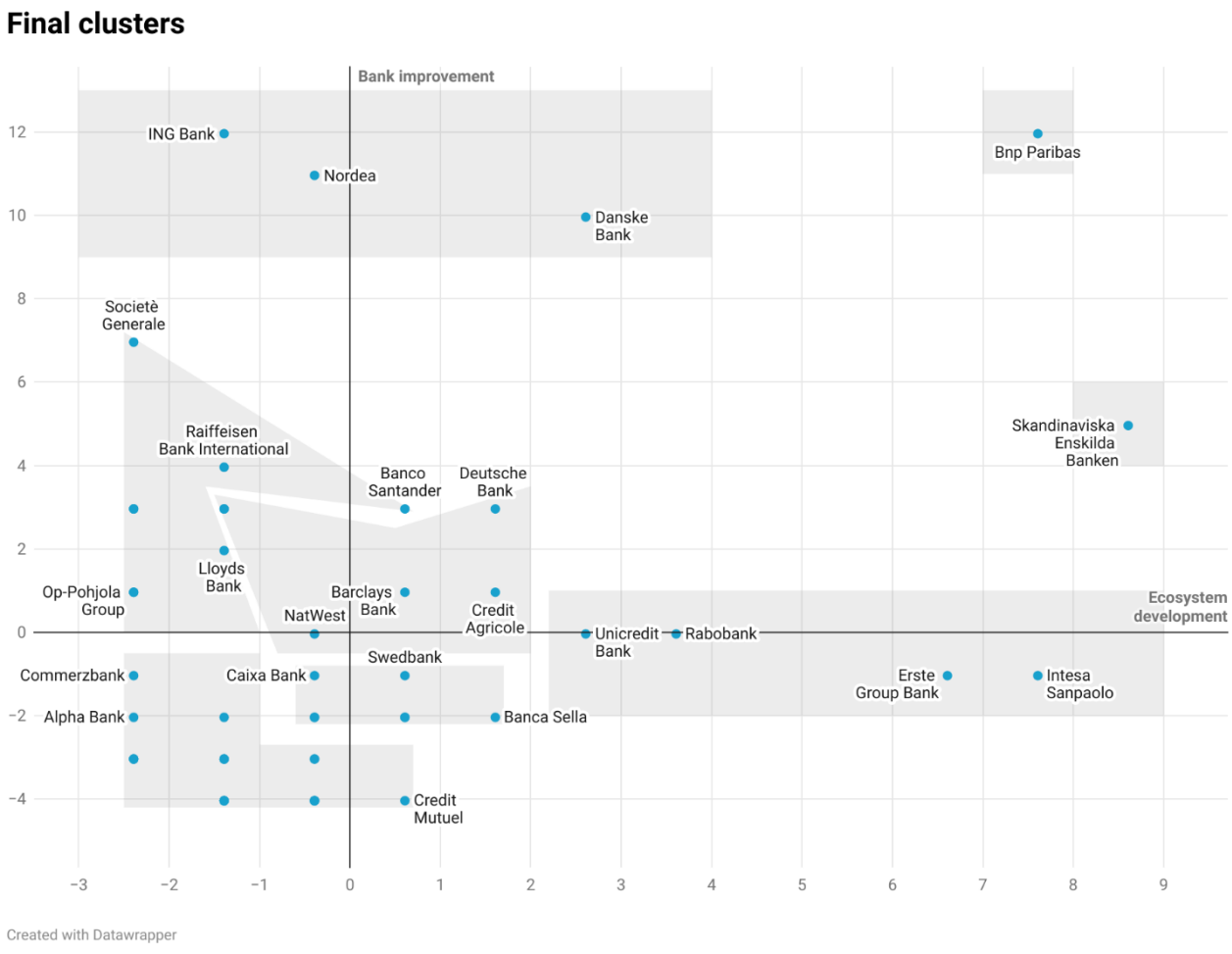

Figure 56 Graphical representation of final clusters

Results

After having identified which innovation capabilities could be built participating in each different typology of programs oriented toward achieving specific strategical goals and after the identification of groups of banks engaged in similar patterns of initiatives the last logical step to conclude the analysis was therefore to link these two elements to give a representation of which could be the overall innovation strategies adopted the different clusters of European banks while engaging with start-ups. On top the afore mentioned analysis, the last part of the thesis will also present a further analysis of qualitative attributes collected at bank level to discover if financial institutions engaged in similar activities are associated to specific European regions, typology of business model or dimension of the bank itself. Considering the final classification adopted in the last table of previous chapter, hereafter a short description of possible innovation strategies and main characteristics of banks engaged in similar groups of programs are briefly presented.

Total Diversifier

Second biggest bank in Europe (in terms of total assets), with headquarter in central Europe (France), operating with a cross border business model in Central and South European countries.

Regarding FinTech programs, by leveraging extensively both on programs organized by third parties and on internally developed initiatives, banks following "total diversifier" strategy are the institutions better positioned for an organic development of dynamic capabilities regarding FinTech domain. By being engaged concurrently in multiple typologies of initiatives created to cultivate innovative solutions for back and front end provided by third parties and directly by the bank itself (like corporate incubator and corporate accelerators), the financial institution is able to experiment and test different directions with start-ups directly engaged through internal programs, while benefitting from external expertise and guidance in recognizing and support the development of innovative ventures. In the context of programs provided by third parties, by being engaged with start-ups which receive mentoring from different industry players, the bank could leverage on collective information generated during these events to refine its internal scouting processes to be better prepared to recognize opportunities and gradually develop its own adsorptive capacity, which in turns increases the institution sensing capabilities. These activities of cultivation of technological solutions are complemented with test laboratories created to integrate solutions into the banking ecosystem: these initiatives could leverage the knowledge about markets and start-up needs built while creating the relationship with the innovative ventures engaged in corporate incubators and accelerators, enabling the financial institution to better develop both its seizing capabilities and its re-configuring capabilities. By leveraging on a combination of external services and direct provision of programs, the bank representing this cluster seems that it is trying to leverage extensively on the external expertise while concurrently building internal instruments able to strengthen the company innovation muscle to be better prepared to recognize and eventually integrate opportunities as soon as they arise, without the need of an intermediation of third parties.

Regarding ecosystem development programs, by providing mainly formative resources and local networking and matchmaking events, these institutions could gain early access to new ideas able to strengthen the sensing capabilities of what is new on the market and what are the challenges that incumbents (especially if client of the bank) are going to face in the upcoming years. The combination of networking and matchmaking events and educational tools, which are instruments able to provide guidance to external entrepreneurs and occasionally to put them in direct contact with bank employees, are the foundation to develop positional knowledge able to reduce the information gap between supply and demand of innovation of different industrial partners clients of the bank, enabling the bank to build capabilities to become therefore an intermediary of information. The educational tools, on top of being useful instruments to develop the local innovation ecosystem, could be also useful for banking employees that through these courses could develop entrepreneurial capabilities to be used to improve their understanding regarding innovation processes irrespective from the field of application.

Skewed Diversifier

Cluster formed by a single bank with total assets at the top of the third quartile respect to the overall sample, with headquarter in northern Europe (Sweden) and operating with a cross border business model across North Europe.

Respect to Total Diversifiers, banks pertaining to this category are equally engaged in programs for ecosystem development, but less engaged in programs involving FinTech start-ups. Regarding FinTech programs, banks in this cluster are leveraging on both programs organized by third parties and on internally developed initiatives, even if at a smaller extent respect to Total diversifiers. While engaged in programs provided by third parties, like networking events, incubators and accelerators, the bank is mainly focused on providing development support and scaling support to start-ups, helping them in establishing themselves on their respective markets or to enter in new geographical territories. By operating in this way, the financial institution could leverage on external expertise in organizing these programs to limit resource commitment and to benefit from a wider pool of start-ups (usually from all over the world) supported by an industry wide pool of mentors able to provide comprehensive guidance. On top of participating into incubators and accelerator, the institution is directly providing test laboratories to eventually integrate innovations encountered in other programs. The mix of programs in which this bank is engaged could enable the institution to develop sensing capabilities at lower costs by leveraging on a wide pool of start-ups and external expertise in recognizing potential innovations, and the knowledge of the market generated could then be used for subsequent integration of FinTech services into the banking ecosystem throughout the usage of test laboratories, elements that could enable the financial institution to strengthen its seizing and reconfiguring capabilities.

Likewise Total Diversifier, the bank pertaining to this cluster is heavily influenced in Ecosystem Development initiatives, providing services similar to the ones offered by the bank in the previous category to start-ups in their early stages operating in the most disparate industries. By providing formative resources and networking and matchmaking events open mainly to local start-ups, these institutions could gain early access to new ideas able to strengthen the sensing capabilities of what is new on the market and what are the challenges that incumbents

are going to face in the upcoming years. The combination of networking and matchmaking events and educational tools, which are instruments able to provide guidance to external entrepreneurs and occasionally to put them in direct contact with bank employees, are the foundation to develop positional knowledge able to reduce the information gap between supply and demand of innovation of different industrial partners clients of the bank, enabling the bank to act as an intermediary player. The educational tools, on top of being useful instruments to develop the local innovation ecosystem, could be also useful for banking employees that through these courses could develop entrepreneurial capabilities to be used to improve their understanding regarding innovation processes irrespective from the field of application.

Ecosystem Grower

Cluster of banks with total assets pertaining tendentially to the fourth quartile (higher total assets compared to other banks in the sample), that are headquartered in central or south Europe and follow cross-border business models with operations in Central, East and South Europe. One Bank (Rabobank) is following a local universal business model focused on Netherland, but it is among the biggest banks (in terms of total assets) following this specific kind of business model.

As the label given to the cluster suggests, ecosystem growers are banks which are heavily engaged in Ecosystem Development initiatives. By mainly providing networking and matchmaking initiatives for local venture creation and venture development, these banks could gain early access to new ideas able to strengthen the sensing capabilities of what is new on the market and what are the challenges that incumbents are going to face in the upcoming years. In this cluster most of the banks are also offering an incubator or an accelerator; by creating more structured programs able to engage participant start-ups and related pool of interested stakeholders for a longer period these banks could better develop sensing capabilities regarding the incumbent technological challenges and innovation needs, and consequentially build at a faster pace the positional knowledge and related matchmaking capabilities needed to possible transitioning to an information intermediary role able to reduce the information gap between supply and demand of innovation of different industrial partners clients of the bank.

Regarding Banking improvement programs, the institutions grouped in this cluster tend to rely exclusively on programs organized by third parties, especially challenges and accelerators. These programs, created to cultivate technologies and solutions both for front and back end are usually open at least at cross-border level, enabling the involved banks to benefit from the expertise of external entities for the organization and the scouting of suitable solutions, thus reducing resource commitments while scouting for potentially interesting innovations, sometimes directly linked with innovation challenges identified by the bank (as in the case of challenges). Being involved in different challenges provides to the participating banks also some advantages in identify talented groups and resources passionate about upcoming technologies which could eventually joint the bank itself if their initiative fades-out and makes employees of key business units to work side-by-side with innovators, enabling a faster development of sensing capabilities. Moreover, by directly providing incubation and acceleration services to non-FinTech start-ups, these banks could be better positioned to

understand challenges and needs of companies in the early days of their life, making less important to own proprietary corporate programs for FinTech initiatives to develop related competencies in managing this typology of programs. Considering only the involvement of these institutions in programs for start-ups, the development of seizing and reconfiguring capabilities seems not to be of particular interest for the banks grouped in the described cluster[41].

FinTech Enthusiast

Cluster of banks with total assets pertaining to the fourth quartile, all following cross border universal business models across Central and North Europe. These banks are headquartered in North Europe or Central Europe.

As the names suggests, banks labelled as FinTech enthusiasts are mainly engaged in programs for start-ups targeting FinTech initiatives. Similarly to Total Diversifiers, FinTech enthusiasts are engaged extensively in programs provided by third parties (usually in multiple initiative of the same typology) but are also providing their own corporate initiatives, enabling the institution to leverage on a large network of experts which could help in a faster and organic development of dynamic capabilities regarding the FinTech domain. By being engaged concurrently in multiple typologies of initiatives created to cultivate innovative solutions for back and front end provided by third parties and directly by the bank itself, the financial institution is able to experiment and test different directions with start-ups directly engaged through internal programs (like corporate incubator and accelerator and challenges), while benefitting from external expertise and guidance in recognizing and support the development of innovative ventures while engaged in third party programs. In this context, by being engaged with start-ups which receive mentoring from different industry players, the bank could leverage on collective information generated during these events to refine its internal scouting processes to be better prepared to recognize opportunities and gradually develop its own adsorptive capacity, which in turns increases the institution sensing capabilities. These activities of cultivation of technological solutions (both internal and external) are complemented with test laboratories created to integrate solutions into the banking ecosystem: these initiatives could leverage the knowledge about markets and start-up needs built while creating the relationship with the innovative ventures engaged in corporate incubators and accelerators, enabling the financial institution to better develop both its seizing capabilities and re-configuring capabilities. By leveraging on a combination of external services and direct provision of programs, the bank representing this cluster seems that it is trying to leverage extensively on the external expertise while concurrently building internal instruments able to strengthen the company innovation muscle to be better prepared to recognize and eventually integrate opportunities as soon as they arise, without the need of an intermediation of third parties.

Regarding ecosystem development initiative tendentially these banks are offering a very limited number of services to start-ups operating in other industries different form FinTech, providing some formative resources and few networking and matchmaking events focused on supporting the creation and the development of local innovative ventures. Due to the limited

[41] This fact does not exclude that these capabilities are under development utilizing other typologies of instruments not considered for the purpose of the thesis.

involvement of these companies into initiatives helpful to improve the local ecosystem of start-ups, it seems reasonable to state that no particular strategical relevance has been given by the banks to develop capabilities of intermediation between this typology of start-ups and banks' industrial clientele.

Worldwide scouter with no ecosystem support

Banks following this strategy are mostly headquartered in north or central Europe and following either cross border or local universal business. Banks from North Europe tend to operate with a local universal business model in their respective headquarter countries, while the remaining institutions belonging to the same cluster are operating in countries belonging to the south and east regions of Europe on top of their headquarter region. Regarding the dimension in terms of total assets, again here a split emerges: banks following local universal business models tend to be relatively small (falling mostly in the second quartile of the distribution), while banks operating in across multiple countries tend to be in the fourth quartile, therefore being among the biggest banks considered for the research, with some exception also in second and third quartile.

Similarly to FinTech enthusiasts, banks in this cluster along the years have been engaged in a very limited number of initiatives for ecosystem development, providing some formative resources and few networking and matchmaking events focused on supporting the creation and the development of local innovative ventures. As before, it seems reasonable to state that no strategical relevance has been given by these banks to develop capabilities of intermediation between this typology of start-ups and banks' industrial clientele.

Regarding FinTech initiatives, banks in this cluster are engaged with FinTech start-ups both through programs provided by third parties and through programs directly organized by the financial institution. All the banks are engaged in at least two initiatives provided by external organizations, of which almost always one is an accelerator for cultivating back-end and B2C front-end solutions or to provide scaling support, and in two initiatives organized directly by the bank, as corporate incubators, corporate accelerators, challenges, or test laboratories. Working with external partners could help the institution to develop sensing capabilities which could then be transferred to internally organized programs, while the direct provision of corporate initiatives could strengthen the development of seizing competencies. Re-configuring capabilities could be built especially when these banks are providing test laboratories programs, therefore not all the banks pertaining to this specific cluster are directly developing it. However, by leveraging on a combination of external services and direct provision of programs (even if at lower extern respect to other clusters in which corresponding banks were engaged in multiple programs), the banks representing this cluster are trying to leverage on the external expertise while concurrently building internal instruments able to strengthen the company innovation muscle to be better prepared to recognize and eventually pick-up and nurture opportunities as soon as they arise, without the need of the intermediation of third parties for opportunity recognition.

Worldwide scouter with local business development

Cluster of banks with total assets pertaining to the fourth quartile, all located in Central or South Europe and following cross border universal business models across Central, South and East Europe.

Banks pertaining to this cluster present similar characteristics to banks classified as Worldwide scouters with no ecosystem support in terms of engagement with Fintech start-ups, but present two main differentiating elements: geographical scope of the activities of the banks is focused on central south and east Europe (While before was mostly central and north Europe), and these banks are providing several programs for ecosystem development (while before they were completely missing).

Recalling what written for the previous cluster about FinTech initiatives, banks in this cluster are engaged with FinTech start-ups both through programs provided by third parties and through programs directly organized by the financial institution. All the banks are engaged in at least two initiatives provided by external organizations, of which almost always one is an accelerator for cultivating back-end and B2C front-end solutions or to provide scaling support, and in two initiatives organized directly by the bank, as corporate incubators, corporate accelerators, challenges, or test laboratories. Working with external partners could help the institution to develop sensing capabilities which could then be transferred to internally organized programs, while the direct provision of corporate initiatives could strengthen the development of seizing competencies. Re-configuring capabilities could be built especially when these banks are providing test laboratories programs, therefore not all the banks pertaining to this specific cluster are directly developing it. However, by leveraging on a combination of external services and direct provision of programs (even if at lower extern respect to other clusters in which corresponding banks were engaged in multiple programs), the banks representing this cluster are trying to leverage on the external expertise while concurrently building internal instruments able to strengthen the company innovation muscle to be better prepared to recognize and eventually pick-up and nurture opportunities as soon as they arise, without the need of the intermediation of third parties for opportunity recognition.

Regarding Ecosystem Development programs, even if these banks are tendentially engaged in a number of programs below the average respect to the overall sample, they tend to provide incubators or accelerators to either local or global start-ups. This involvement into more structured programs could help the bank in building the capabilities required to organize and run successfully other internally developed initiatives for FinTech start-ups (like corporate accelerators or test laboratories usually provided by banks of this cluster), strengthening consequently sensing and seizing capabilities regarding both FinTech and non-FinTech initiatives. Dealing with start-ups operating in the most disparate industries for a longer period of time as result of the typology of program designed could also help the bank into developing positional knowledge, useful element to potentially develop an information brokering position between start-ups and industrial partners already client of the bank.

Autonomous FinTech Developer

Banks following the Autonomous FinTech Developer strategies are banks tendentially headquartered and operative in central or south Europe, some following cross border business models while others local universal business models. One bank operating in northern Europe and headquartered in Sweden is also present in the same cluster. Regarding total assets, however, this is the cluster with the highest variance regarding bank dimension: inside the cluster there are banks with assets as low as 15 B€, as also banks with assets over 1300 B€, with other observations evenly dispersed among these extremes.

As the name suggest, these banks tend to rely exclusively on programs organized directly by the financial institution for banking improvement purposes. Even if these institutions are providing a number of programs for FinTech start-ups below the average respect to the sample, these programs tend to be quite structured. Most of these banks in fact are involved or in programs targeting early-stage ventures like corporate incubators and challenges and in initiatives targeting the direct integration of innovative services through test laboratories. Relying exclusively on programs directly organized by the bank entail some advantages for the financial institution, like the possibility to choose which start-up to engage with but hide several drawbacks in terms of development of innovation capabilities. As explained in previous sections of the thesis, external providers are usually specialized organizations which have the opportunity to get in touch with countless ideas from all over the world and engage multiple stakeholders of the reference industry, factors able to offer a stronger value proposition to innovative venture which translate in more applications and subsequent in developing a stronger sensing capability respect to independent players. Regarding this fact, relying only on internally developed initiative could limit the development of sensing capabilities of proposing banks. Being providers also of test-laboratories however could help these banks in developing solid decision-making processes (defined also as seizing capabilities) and re-configuring capabilities needed to integrate these innovations into the banking ecosystem.

For what concerns ecosystem development initiatives, these banks are mainly providing networking and matchmaking initiatives for local venture creation and venture development, through which they could gain early access to new ideas able to strengthen the sensing capabilities of what is new on the market and what are the challenges that incumbents are going to face in the upcoming years. In this cluster most of the banks are also offering an incubator or an accelerator; by creating more structured programs able to engage participant start-ups and related pool of interested stakeholders for a longer period these banks could better develop sensing capabilities regarding the incumbent technological challenges and innovation needs, and consequentially build at a faster pace the positional knowledge and related matchmaking capabilities needed to possible transitioning to an information intermediary role able to reduce the information gap between supply and demand of innovation of different industrial partners clients of the bank.

Tester

The banks grouped in this cluster tend to be headquartered in central or south Europe (with some also from east Europe) and are following with a similar frequency cross border or local universal business models with related operations in same regions. Assets of these banks are distributed mostly in the second and third quartile, with few exceptions of bank located in the first or in the fourth quartile. These financial institutions tendentially provide a number of programs for both ecosystem development and banking improvement below the respective average of the sample, therefore identifying this ensemble of initiatives as strategies for development of innovation capabilities could be a strong assumption. Among the three different sub-clusters identified in the previous chapter however different set of capabilities could be on development.

For banks offering programs only for ecosystem development through networking, incubators, or accelerators, sensing capabilities of what is new on the market and what are the challenges that incumbents are going to face in the upcoming years could be under development. For the banks providing more structured programs, as already described before, the involvement of a larger pool of interested stakeholders could help these institutions to better develop sensing capabilities regarding the incumbent technological challenges and innovation needs.

Second category is the one of banks providing just test laboratories open to participants from all over the world for banking improvement purposes, for which re-configuring capabilities could be under development, while sensing and seizing competencies are not directly build throughout the typologies of programs considered for the research.

In between, there are some banks offering lightweight programs for ecosystem development like entrepreneurial development programs or networking initiatives for venture creation and development at local level, while benefitting from external incubators and accelerators for cultivating b2c products, usually open at least at cross-border level. These banks are engaging in similar programs as Ecosystem growers, but at a substantially lower extent respect to these financial institutions, therefore similar capabilities could be built but at a limited pace.

Disengaged

Among the banks with no programs, most of them follows local universal business models, and are tendentially small financial institutions (apart one, all of them have assets pertaining to the first quartile). These banks have headquarters (and operate) either in south, east or north Europe countries. Obviously, by not being involved in any program for start-ups in the last five years, these banks for sure are not trying to build innovation capabilities throughout the involvement in start-up programs.

In Appendix C a short summary of main characteristics of each cluster is presented.

Considering the graph created to represent the final allocation of clusters (Figure 56, reported again here below for clarity purposes as Figure 57), created based on the normalized number of total programs for both ecosystem development and banking improvement, an interesting fact emerge: leaving aside Tester cluster and few other punctual exceptions, banks with similar number of programs (for both categories) tend to be engaged in the same typology of initiatives, irrespectively of other institution characteristics. This fact was detected simply

analysing the form of clusters that resulted from the analysis, that as show below seems quite defined and delimited in specific regions of the graph. It must be remembered that the result of the clustering analysis was created considering all twenty-three variables identified, but graphical representation here reported was created utilizing only two of these dimensions.

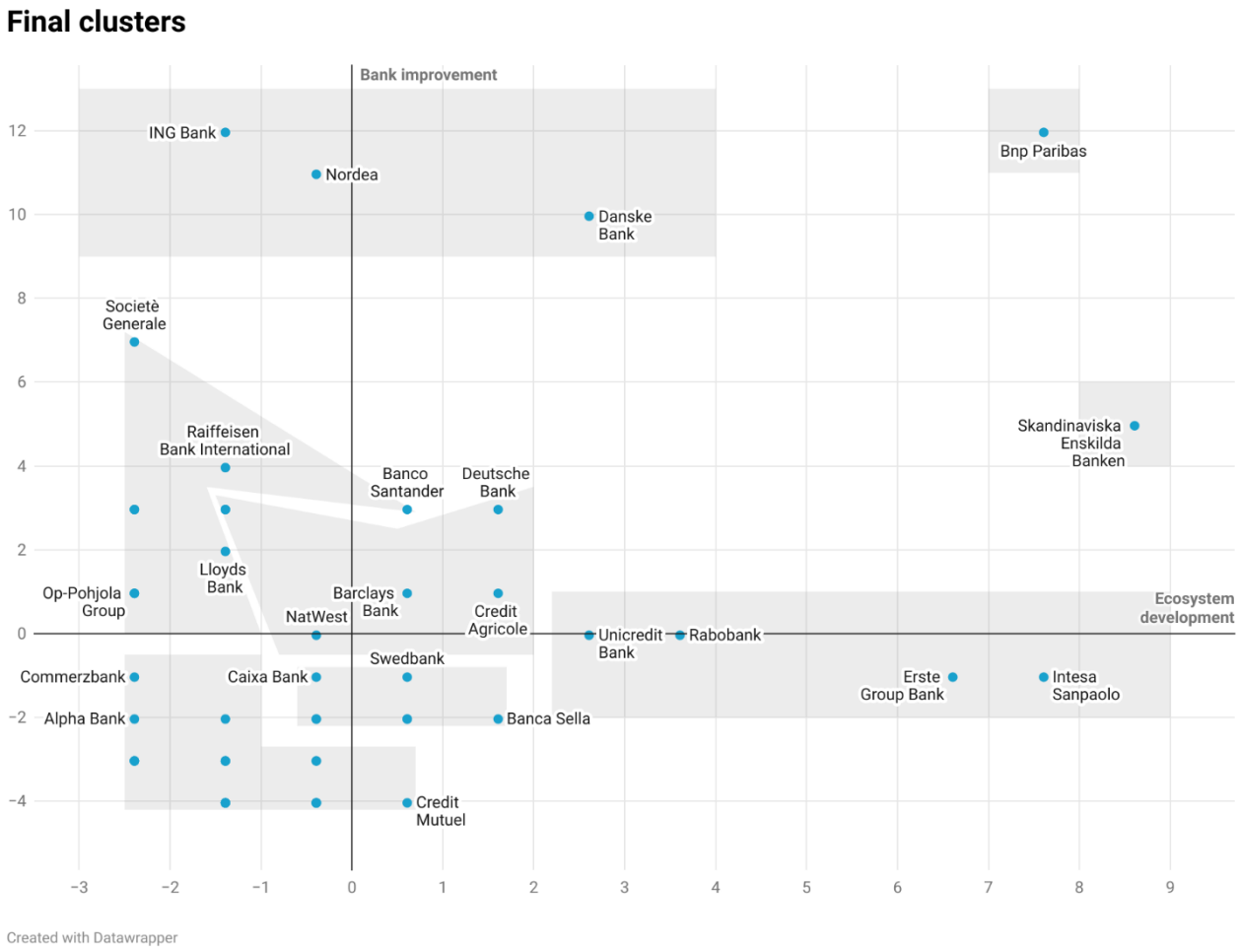

Figure 57 Graphical representation of final clusters

Considering also categorical information about the different banks, some other interesting insights emerged. Bigger banks pertaining to the fourth quartile of the distribution of total assets, almost all operating with a cross-border business model, tend to be engaged in a higher number of programs respect to smaller institutions, and maybe due to this fact different strategies have been detected.

For example, banks operating in North Europe are engaged almost exclusively in banking improvement initiatives able to strengthen dynamic capabilities regarding FinTech opportunity recognition and exploitation while the strategy of almost all the other banks in this quartile which are operating concurrently in Central, East and South Europe (leaving aside BNP Paribas classified as total diversifier) varies greatly. Regarding FinTech programs, it seems that these banks are adopting different strategies depending on geographical areas in which they operate. Institution operating in central-north Europe are relying extensively on externally provided programs, being engaged in multiple initiatives of the same typology concurrently, to complement internal initiatives of integration of back end and B2C front end

technologies (TD and FE). Other banks (WSN and WSED), mainly operating in central-south and east Europe, tend to be engaged in less FinTech initiatives (four or five programs), of which half organized by third parties and half directly by the bank itself again for cultivating (through incubators and accelerators) and subsequently integrate (through test laboratories) back-end and B2C front end solutions. Even if all of them at some degrees are relying on external program providers for part of their initiatives, some are integrating these programs providing also their own corporate initiatives (WSN, WSED) while others not, as Ecosystem Growers. Banks in this cluster, operating as WSN and WSED in central and south Europe with cross-border business models, respect to FinTech programs are engaged exclusively in initiatives organized by third parties for the same strategical purposes just described.

The same happens for ecosystem development programs offered by banks in this category, where there are banks that provide a comprehensive set of programs to nurture the local ecosystem of start-ups (EG), and others on the other extreme that do not provide any program of this type (WSN), with some institutions in the middle (WSED). For the same category of banks of the fourth quartile even ecosystem development strategies varied greatly, presenting even less commonalities than the ones identified above. Banks pertaining to Total and Skewed diversifiers are heavily engaged in ecosystem development programs, but only with lightweight programs like entrepreneurial educational initiatives and local networking and matchmaking events, while EG and WSED (even if at lower extent respect to EG) are providing more structured programs like incubators and accelerators open even at start-ups established in foreign countries. Banks pertaining to clusters FI and WSN instead seems not interested at all in developing related innovation capabilities obtainable by engaging providing and engaging in ecosystem development programs.

The bank classified as Skewed diversifier, also part of fourth quartile, seems to be engaged in a unique set of initiatives especially when considering FinTech programs; this bank, operating with a cross border business model across Northern Europe countries, is engaged with in multiple programs which scope is to help FinTech companies scale and enter into new markets with the help of the bank as an intermediary. The strategy of targeting more structured start-ups, coupled with the provision of a test laboratory, seems to point out that this bank is focusing on integrating available and already validated solutions into their ecosystem of products and services.

Banks labelled as Testers share also similar characteristics: despite being involved in different typologies of programs (as identified previously in clustering definition) and following different business models, all these banks have assets distributed along the 2nd and the 3rd quartile and operate across Central, East or South Europe.

This high variety of strategical aims however was not found in banks with total assets pertaining to lowers quartiles of the distribution. Disengaged banks are very small banks, almost all pertaining to the first quartile of the distribution, operating exclusively in their home countries located in North, South or East Europe with local universal business models. Testers, which are banks with no clear strategy neither for ecosystem development nor for bank improvement, instead are financial institutions either following cross border or local universal business models in Central, South and East Europe, all distributed among the second and third quartile of the distribution.

Part of banks located in the second quartile, and especially the Nordic ones following local universal business models, in contrast to other banks of the same quartile, are engaged in a greater number of programs exclusively for improving the bank ecosystem, therefore have been classified as Worldwide scouters with no ecosystem development initiatives by the clustering algorithm.

The cluster of Autonomous FinTech developers, considering both qualitative data of banks and typology of strategies followed, could be considered the most heterogeneous among clusters identified within this research. Banks in this clustering tend to rely exclusively on programs organized autonomously for developing transformative capabilities regarding FinTech industry offering incubators and test laboratories for cultivation and consequent integration of back and B2C front-end solutions, while providing incubators and accelerators to local non-FinTech start-ups for ecosystem development purposes. Regarding instead qualitative information, banks inside this clusters have total assets evenly distributed along all the distribution (from first to fourth quartile) and follow either local universal or cross border business models while operating mostly on countries of Central and South Europe.

Conclusion

During past years European banks have increased their interest into collaborating with start-ups, not only with new ventures operating in the FinTech industry but also with innovative entrepreneurial initiatives operating in the most disparate sectors. This increased interest could be due to the fact that in the last decade a set of different trends, both impacting the industry and the consumer habits, paved the ground for the emergence of a new technological paradigm regarding the financial industry. Operating into this evolving context, incumbents seem that are feeling the need of setting up processes and initiatives able to develop competencies inside their organization first to understand trends and future direction of technological innovations, and then to be able to adapt and adjust the company business model to face emerging threats and to take advantage of upcoming opportunities (Kupp et all, 2017).

To build these innovation capabilities, throughout the years banks have utilized both programs leveraging exclusively on the internal resources, like corporate intrapreneurship initiatives, separate digital and innovation units, and Corporate Venture Capital arms, but also programs which enabled the interaction of banks' employees with multiple external players, like the programs for start-ups object of this study.

What emerged from the analysis is that more and more banks across past half decade have increased their involvement into programs for start-ups. Among the 74 financial institutions considered in the research, 51 banks were effectively engaged in programs for start-ups. Among them, the majority (37/51) are institutions following cross-border business models. Along the years an increase in participation to these programs has been detected, since at the beginning of the research timeframe (in 2016) only 44 banks were engaged with start-ups, while nowadays all 51 identified are somehow supporting innovative ventures. Another interesting fact is that these financial institutions throughout time tended to be increasingly engaged in start-up programs: the number of different programs identified grew year over year, from 120 in 2016 to over 200 in 2020. Moreover, most of these programs were not only spot initiatives but stable programs repeated year after year, as highlighted by the fact that the great majority of initiatives started in a specific year were still active several years later. This prolonged engagement of the corporation into the same program over time somehow confirmed the fact that these initiatives are not only *marketing programs*, but maybe some strategical intention underlying the engagement with these ventures is in banks' evolutionary plans.

Among the banks engaged into programs for start-ups big disparities emerged however in overall engagement: a sound 31% (16/51) of institutions which provided programs were engaged in only one or two initiatives. Moreover, banks following local universal business models were tendentially engaged in less programs respect to financial institutions operating across different countries with cross-border business models. Taking into consideration also data regarding total assets, not surprisingly bigger banks, almost all following cross-border business models, were tendentially engaged in more initiatives.

Considering the overall number of different programs identified throughout the research process, surprisingly only 51% of initiatives available (116 out of 228 in absolute terms) were targeting FinTech start-ups, while the remaining 49% of programs (corresponding to 112 initiatives) were focused on innovative ventures operating in the most disparate industrial sectors, signalling that some innovation in the traditional role of ecosystem developers of financial institutions is somehow considered of strategical relevance at least for some banks. Among programs directly provided by banks, corresponding to a total of 193 initiatives, only 40% of them (amounting to 81programs) were targeting FinTech start-ups, signalling that third parties were also involved in developing banking improvement programs. Participation to these initiatives signals the fact that most of the financial institutions are heavily relying on external program providers for FinTech start-ups, since the 35 programs offered by third parties (focused exclusively on FinTech start-ups) were participated on average by more than 3 financial institutions concurrently. The number of different programs however did not reflect actual participation of banks into different initiatives: while programs provided by third parties were usually participated by multiple financial institutions concurrently, very few programs directly provided by banks were created collaborating with other financial institutions, signalling a low propensity to collaborate with competitors for creation of shared initiatives in either category of programs (FinTech and non-FinTech).

A mutually fruitful collaboration with these external innovative ventures (regardless of their reference industry) is largely dependent on the ability of the financial institution to understand needs, expectations, culture, and incentive of start-ups and to consequently engage in adequate typologies of initiatives able to provide interesting value propositions for all stakeholders involved. In this regard, and respect to the fact that corporate processes and public structure of the financial institution usually pose several constraints in terms of commitment of resources in high-risk projects, these corporations, as just described, are relying on programs organized by third parties able to provide complementary resources that the bank could not supply, resulting in programs with value proposition that the financial institutions could not offer.

Start-ups depending on their stage of life require different complementary assets and are able to offer the bank different set of capabilities and knowledge regarding the targeted market. Consequently, on the market are available several initiatives with different models of engagement targeting start-ups at different stages of their evolution, some directly provided by the bank while other developed by third parties but for which the banks were the main beneficiaries. Knowing the right model of engagement of start-ups, with related key elements and characteristics which are considered fundamental for a proper functioning of the initiative and key success factor for generating effective outcomes for all stakeholders involved was the objective of chapter two, where the main typologies of programs found with the research process were presented to the reader. Banks were actively engaged in providing networking and matchmaking initiatives and Entrepreneurial development resources to both FinTech and non-FinTech start-ups, Incubation and acceleration services to innovative venture operating in the most disparate sectors, and challenges, corporate incubators, corporate accelerators, and test laboratories exclusively for FinTech start-ups. While benefitting of programs organized by third parties, banks were engaged in networking and matchmaking initiatives, challenges, incubators, and accelerators.

Since the number of banks interested in engaging with start-ups grew over time, supply of related initiatives grew accordingly: most of the typologies of programs identified saw an increase in absolute number of initiatives available throughout the years, irrespectively from program provider. This growth in availability of initiatives however was not directly proportional for all typologies of programs. Among programs organized by third parties for FinTech start-up a stronger increase in networking and matchmaking programs was noticed in the timeframe of the analysis, while other programs grew in number but without any marked spike. Regarding FinTech initiatives directly provided by banks it seems that a quite stable number of initiatives has been reached between 2018 and 2019 for almost all categories of programs, even if some reduction of involvement seems undergoing in 2020; the only typology of program that currently is being provided by more and more financial institution are test laboratory programs, somehow signalling the fact that banks are increasingly interested in providing initiatives which enable the institutions to directly integrate solutions available on the market into the banking ecosystem of products and services. Finally, a stronger increase in the direct provision by the bank of networking and matchmaking initiatives for non-FinTech start-ups has been noticed comparing relative growth over time of different typologies of programs for this specific category of initiatives.

Due to the uncertain nature of start-ups the majority of these initiatives, created to leverage on competencies and knowledge of innovative ventures usually in their early stages of venture life, are not created to obtain tangible results in terms of business development opportunities in the short term but more probably are focused on developing internal innovation capabilities to be used for medium-long term business transformation plans (Freitag, 2019b). Considering this statement and the fact that multiple typologies of programs were found with the research process, both provided by third parties and directly by the bank, a thorough analysis of possible strategical aims that motivated the bank to engage in each specific typology of program and has been developed in chapter four. For each strategical objective identified, different programs were associated based on characteristics of start-ups involved in it or based on typology of outcome identified analysing informative material found online regarding the program. Since distinct programs were utilized by different banks of the sample to reach similar strategical objectives, a hypothesis regarding the fact that a different set of capabilities and knowledge regarding interested start-ups could be developed while engaging with them through different typologies of initiatives has been studied further, adding to the same chapter a thorough analysis of the main advantages and disadvantages of each typology of initiative in terms of potential development of knowledge and innovation capabilities.

Three main levels of engagement and service provision were identified with the research process: start-ups support programs, cultivation programs and integration programs, here reported in order of increased involvement of the financial institution into supporting the innovative companies. Start-up support programs were focused on providing lightweight consulting by the bank to innovative start-ups, and most generally in providing support services different from co-development of strategies and business models that was found instead within cultivation strategies. Lastly, integration strategies, as the name suggest, were found in programs willing to enable a smoother integration of external innovations into the bank.

Among these categories, the first typology of strategies (support strategies) was utilized not only to support FinTech start-ups but also in programs provided to non-FinTech start-ups for ecosystem development goals, while the last two (cultivation and integration strategies) were exclusively found within initiatives involving FinTech start-ups.

Considering start-up support programs, regardless of industry focus three different sub levels of strategical aims were identified depending on the level of maturity of start-ups involved. Programs for venture creation support were utilized to help teams with innovative ideas to structure their ideas into a start-up project. For start-ups already incorporated venture development support was offered by helping these ventures in finding potential partners to further develop the technology and to test out proposed solutions. Venture scaling support initiatives instead were offered to more mature start-ups to help them in expanding their influence on specific markets not yet penetrated. For programs which last aim was to cultivate technological solutions, a further differentiation has been made depending on typology of technology or solution cultivated: some programs were focused on cultivating solutions able to improve and enhance bank's back-end technological infrastructure, while others were more focused on engaging with start-ups able to provide solutions either of B2C or B2B typology, depending on the final user benefitting from the innovation. A similar deeper classification of strategical aims has been adopted also for program utilized for integrating solutions inside the banking ecosystem, with a distinction between programs focused on the integration of back-end solutions and programs focused on the integration of front-end solutions.

While collecting data it emerged that several of the banks considered for the research have been engaged in multiple programs across the timeframe of the analysis. Being engaged in different programs, each one with its own strategical aim and main elements of strength and weaknesses respect to the development of innovation capabilities, could signal that these financial institutions are not only trying to reap results from single stand-alone initiatives but could be considering the whole subset of programs in which are engaged as a comprehensive strategy, carefully picking different initiatives to satisfy corporate innovation needs (Weiblen and Chesbrough, 2015; Nesta report, 2015). Since different sets of capabilities could be built while engaging in different programs, it is possible that a carefully selected mix of complementary and mutually reinforcing initiatives could help these banks to build the knowledge base and innovation capabilities required to implement the planned strategical business transformation (Steiber and Alänge, 2015).

Considering the fact outlined above, the next logical step was to analyse which were the bundles of programs offered by each European financial institutions and if similarities of model of engagement emerged across different banks. To perform this comparison and find structure in the dataset, a clustering analysis at bank level has been developed applying k-means and k-medoids algorithms with several distance measurement to the available information. After several tests developed with suitable algorithms and parameters, 9 different clusters (8+1 of banks with no programs) were identified.

Overall, a great heterogeneity of comprehensive strategical approaches adopted by different financial institutions emerged, resulting in possible development of well differentiated set of innovation capabilities and knowledge across different financial institution, even though some commonalities were identified while considering separately bank improvement and ecosystem development strategies.

Ecosystem growers and Autonomous FinTech developers seem to adopt completely different approaches: while ecosystem growers are focusing on directly developing start-ups not operating in FinTech domain, autonomous FinTech developers are instead offering just networking events to enrich local start-ups' ecosystem. On FinTech side, ecosystem growers are relying on external accelerators for cultivating potential back-end and front-end applications, while Autonomous FinTech developers are offering by themselves corporate incubators and accelerators for the same purposes. Another cluster is instead comprising banks which are operating one or two programs, making questionable the fact that they are following a specific strategy to acquire innovation capabilities. These banks, identified in the thesis as Testers are running by themselves the start-up programs, both for FinTech integration and for ecosystem development. Other two clusters are represented by financial institutions that have similar scopes regarding FinTech innovation, but different involvement in ecosystem development activities. Both Worldwide scouters with local ecosystem support and Worldwide scouters with no ecosystem support are relying on internally and externally provided initiatives for FinTech, providing at least two programs and participating again in at least other two, among which one accelerator, usually open at global level. However, regarding ecosystem development programs, the formers are providing incubation and acceleration initiatives for local start-ups, while the latter are providing no program at all or just some entrepreneurial development program or networking event. Other banks, instead, are way more engaged with start-ups: these have been identified as FinTech enthusiast, Total diversifier, and Skewed diversifier. FinTech enthusiast are banks with a number of programs for FinTech start-ups well above the average respect to the sample, which engaged in multiple programs of the same typology open at least at cross-border level and are usually relying for more than two-thirds of the programs on external partners, to integrate corporate incubators/accelerators and test laboratories offered by themselves. These banks moreover are offering few ecosystem development initiatives, of which mostly networking events for venture development support. Banks pertaining to the Diversifiers clusters have been labelled in this way due to the high number of programs offered to both improve the bank itself and the overall start-up ecosystem: Total Diversifiers are engaged in roughly a similar number of programs for both categories of start-ups, while Skewed Diversifiers are instead more focused on ecosystem development, offering at the same time a significant higher number of FinTech programs respect to other banks. Both are relying on multiple FinTech programs organized by external organizations, with programs focused on cultivating technological solution through the participation initiatives, while providing by their own FinTech programs in the form of test laboratories, corporate incubators/accelerators, and challenges. When providing programs for ecosystem development, they focus on providing creation and development support through formative resources and networking and matchmaking initiatives.

Taking into account also qualitative data regarding banks, some other interesting result emerged from the analysis. Bigger banks (pertaining to the fourth quartile of the distribution of total assets), almost all headquartered across Nord, Central and South Europe and operating with a cross-border business model in same regions, tend to be engaged in a higher number of programs respect to smaller institutions, and maybe due to this fact very different approaches emerged with the analysis. Inside this quartile and regarding FinTech initiatives, most of the banks are relying on a mix of programs offered by third parties for cultivating technological solutions and by the bank itself to subsequently integrate results (TD, FE, WSN, WSED). This strategy, even if exercised at different extents among different clusters (with TD,SE and FE engaged in multiple similar projects concurrently while WSN and WSED only in a single initiative per each typology of program available for FinTech start-ups) could enable these institutions to develop a comprehensive set of dynamic capabilities and knowledge regarding FinTech market thanks to the fact that different typologies of programs are able to provide complementary information and build different capabilities. Sweked Diversifiers, even if adopting a similar mix of programs as other banks in its quartile regarding FinTech initiatives (two thirds provided by external parties), however follow a completely different strategical aim regarding external programs which points to support innovative ventures in entering not-yet penetrated markets instead than cultivating technological solutions which have still to be proven on the market.

The same banks, when taking into considerations also ecosystem development programs, again follows very differentiated programs: while TD and SD are providing a great amount of networking initiatives for improving the local start-up ecosystem and consequently develop local market and positional knowledge that could help these institutions to became knowledge intermediaries, other banks (especially the ones pertaining to FE and WSN clusters) are not engaged at all with non-FinTech start-ups. A third typology of strategy is followed by WSED and EG, clusters both containing banks always in the fourth quartile of the distribution, which instead are not only providing networking and matchmaking initiatives for non-FinTech start-ups but are also delivering more structured programs (like incubators and accelerators) for start-ups even established in countries different from the headquarter country of these banks.

For banks of this quartile it could be stated that, even if pertaining to different clusters, all financial institutions are somehow trying to develop innovation capabilities and knowledge to be ready to recognize, to nurture and in some cases to integrate possible opportunities arising from FinTech market, with the majority of banks (pertaining to TD, SD, FE, WSN and WSED clusters) providing a mix of corporate initiatives and externally organized programs to leverage on complementary characteristics of these initiatives. Regarding Ecosystem development involvement, however, only some institution seems to be willing to enhance their capabilities of intermediation (TD, SD, EG and WSED). Total diversifier and Skewed diversifier, strong of their experience with both corporate and externally provided incubators and accelerators for FinTech start-ups, do not need to provide very structured programs to non-FinTech start-ups to identify and understand possible innovation challenges that these categories of start-up face along their journey, therefore they are providing only networking and matchmaking initiatives for ecosystem development purposes. On the other side EG and WSED, which are way less engaged in FinTech program respect to clusters just cited and tend to rely more on FinTech programs provided by external actors than on ones developed internally, by providing more structured initiatives like incubators and accelerators for

ecosystem development purposes they could better develop scouting and problem identification capabilities, both particularly useful to successfully engage with FinTech start-ups while participating in third parties' programs.

This high variety of strategical aims was not found in banks with total assets pertaining to lowers quartiles of the distribution. Disengaged banks are very small banks, almost all pertaining to the first quartile of the distribution, operating exclusively in their home countries located in North, South or East Europe with local universal business models. Testers, which are banks with no clear strategy neither for ecosystem development nor for bank improvement, instead are financial institutions either following cross border or local universal business models in Central, South and East Europe, all distributed among the second and third quartile of the distribution. Part of banks located in the second quartile, and especially the Nordic ones following local universal business models, in contrast to other banks of the same quartile are engaged in a greater number of programs exclusively for improving the bank ecosystem, therefore have been classified as Worldwide scouters with no ecosystem development initiatives by the clustering algorithm.

Autonomous FinTech developers' group is an abnormal cluster since it presents a high heterogeneity in terms of qualitative characteristics of banks grouped together and follows a very different strategy, as described in previous paragraphs. These banks in fact tend to rely exclusively on programs organized autonomously for developing transformative capabilities regarding FinTech industry offering incubators and test laboratories for cultivation and consequent integration of back and B2C front-end solutions, while providing incubators and accelerators to local non-FinTech start-ups to develop competencies in managing these typologies of programs and to start building positional knowledge in home-country markets. Banks inside this clusters have total assets evenly distributed along all the distribution (from first to fourth quartile) and follow either local universal or cross border business models while operating mostly on countries of Central and South Europe.

While considering the overall strategical direction taken by different clusters, with this research it has been found that across Europe there exists different groups of financial institutions which behave very differently, fact that is enabling institutions to develop somehow differentiated sets of innovation capabilities needed to evolve and transform corporate products and services both in the financial industry but also toward enterprises operating into geographical markets covered by them. Inside these groups, banks following similar strategies tend to have some common characteristic, especially in terms of total assets and typology of business model followed, while geographical information seems to be relevant just for some specific cluster, highlighting the fact that apart few regional focuses (like FinTech Enthusiasts in Northern countries) across Europe exists a great heterogeneity regarding strategical objectives pursued by financial institutions while engaging with innovative start-ups.

Limits of the research and possible further developments

A set of final remarks must be made to present the main limitations of the thesis, coupled with possible strategies to overcome them and to advance research on the topic of development of innovation capabilities throughout the involvement of start-ups into initiatives sponsored by financial institutions, or more generally by corporations operating in a specific industry.

What happens inside the bank?

For the scope of the thesis, only programs for start-ups (as defined in the introductory chapter) have been considered to build the model of dynamic capabilities and knowledge development: Corporate Venture Capital initiatives, intrapreneurship programs, and other intra-bank initiatives were left out to focus exclusively on models which required deeper involvement of external companies. Since no program is mutually exclusive, the concurrent use of these different typologies of initiatives could lead financial institutions to accelerate the development of transformative knowledge and competencies, but evidence of the mutually enhancing effects have not yet been studied.

Another element which has not been analysed is how all the information flows and knowledge generated while engaging with start-ups throughout the various programs is managed and integrated into the banking ecosystem. Are these banks engaging with start-ups exclusively throughout independent innovation subsidiaries of the corporation or depending on the typology of programs different business units were engaged separately? Are these programs carried out within the boundaries of the activities of Corporate Venture Capital division (when available)? Since organization structure and related communication flows impact the diffusion of knowledge and development of capabilities inside companies, a deeper analysis of how these initiatives are digested by the corporation could yield to the creation of guidelines on how to get the best out sponsored programs.

In relationship with results obtained with clustering, and especially referring to outliers of respective groups, it would also be interesting to study if shareholder composition (meaning dispersion of ownership, typology of shareholders involved, etcetera) might push banks toward specific direction that are different from banks with similar characteristics (either in term or of total assets, or of involvement in specific bundle of programs).

What happens later?

The work presented in this thesis aimed at understanding which transformative capabilities were developed by financial institutions while engaging in different mix of initiatives, therefore the analysis was stopped at level of program description; no data about characteristics of start-ups admitted to selected programs were collected. Throughout the analysis of such characteristics more information could have been collected regarding the effective strategical aim pursued by the financial institution, especially when the program provider was the bank itself. By analysing technological field of operation, start-up life stage, funding received, and other start-up related parameters could have generated a richer dataset and better information capable to enhance the comprehension of real strategical aims pursued by financial institutions while engaging with innovative ventures.

Stopping the research process at the analysis of programs characteristics obviously the outcomes and effectiveness of these programs were not evaluated. Have there been investments, acquisitions, or partnerships with start-ups participating to the different initiatives? Has some start-up been matched with relevant stakeholder, either internal or external to the bank? Providing answers to these questions would be of great value to build knowledge regarding the actual behaviour of financial institution respect to the development of transformative capabilities throughout start-up programs and related integration of innovations into the banking ecosystem.

Finally, the limited timeframe available for research purposes caused by the recent engagement of financial institutions into these typologies of programs could have limited the understanding of real innovation strategies pursued. As commented before, banks with similar number of programs seems to be engaged in similar patterns of initiatives; maybe along the time, increasing the number of programs, banks could tend to behave similarly. To validate or disconfirm the identified characteristic, the availability of data along a longer timeframe could have allowed the study of the evolution of models of engagement throughout European banks, providing a more comprehensive overview of possible strategies pursued.

What happens outside?

Another element which has been left outside of the analysis space is the innovation context in which these banks operate. By not taking into account country specific innovation policies, which could influence the decision of related financial institution to engage in different typologies of programs, a simplification to the complex ecosystem in which innovation happens has been represented and analysed. Together with policies, also macroeconomic indexes of the "innovativeness" of countries has not been considered: do more innovative states pursue similar strategies in terms of start-up involvement, and with similar indexes do these strategies differ depending on geography?

To conclude, for the scope of the thesis only banks following universal business models have been considered, but what are doing banks operating with different models? Deeply analysing if and how the categories of financial institutions left out from current analysis engage with start-ups could have generated complementary results able to enrich the overall comprehension of the evolution of the innovation landscape of financial industry.

As just highlighted, several questions regarding the effective integration of programs, their exploitation and related context into which the European financial institutions are operating are still uncovered. Answers to these open points could be provided by further analysing elements suggested utilizing the data collected and work created within this thesis as a starting point to better understand the reasons why financial institutions are engaging with start-ups while preparing themselves to face turbulent periods in the upcoming years.

Moreover, trends presented at the beginning of the thesis are not only impacting the financial sector but are considered potentially revolutionary for a great variety of industrial sectors. The methodology utilized to analyse possible strategical implications resulting from the involvement of incumbents into bundle of start-up programs introduced with the thesis here presented, with due modifications respect to strategical focuses of programs, could be easily

utilized to perform similar analysis of different industries. Since the same typologies of knowledge and innovation capabilities could be developed by being involved in specific typologies of programs, independently from the industry on which these programs are focused, similar high level strategical aims could be pursued across different industries in terms of development of transformative capabilities throughout the help of new innovative players of respective industrial sectors.

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Appendix A – Program description

Austria

Erste Group

#glaubadich Challenge[42] (can be translated in #beliveinyourself challenge)

Organized since 2018[43], this yearly competition created in collaboration with Trending Topics[44] (an Austrian media platform specialized in innovation topics), Puls4[45] (TV channel) and WKO Gründerservice[46] (the governmental consulting service for start-ups of the Austrian Federal Economic Chamber), the program aim is to support Austrian companies providing visibility, cash prizes and opportunities to network with investors to the winners. The start-up competition is accepting applications from market-ready start-ups with maximum five years of life with multiple industry focus depending on the years, ranging from Mobility to fitness and lifestyle, from food and wellbeing to tourism, from energy and sustainability to MedTech and BioTech, from AI and Robotics to Social Impact projects and from climate and environmental protection solutions to Fintech projects. A jury of business angels, venture capitalists and start-up support organizations preselect projects that will pitch in the local rounds, each one dedicated to few verticals. The winner of each local round will win 1.000 € (one thousand) cash prize and the access to the final grand event. During the country final all the local round winners will compete, by presenting their pitch, to win a cash prize amounting to 10.000 € (ten thousands), media coverage provided by the partner for other 10.000 € of value, and various other services like Start-up executive masterclasses (2018) or strategic consultancy (2019) with market value of multiple tens of thousands of dollars. To conclude, the winner will also be designated as the Austrian "Start-up of the Year". The program has been quite successful, attracting more than 350 application in the two editions in which the competition has been organized[47].

#glaubandich Startup Accademy[48]

The start-up academy is a 2-day coaching session for start-ups and new Austrian businesses operating in the retail realm who are willing to introduce new products into the market, provided by a group of mentors from Rewe Group[49] (a multinational company operating in retail and tourism industries) and Clever Clover [50]venture capital firm. During these speed-up sessions, start-ups proposing new retail products in the categories of food, beverage, drugstore, over-the-counter, fashion or design with a prototype of product already set-up can discuss and learn from mentors about topics like pricing, branding, distribution channels,

[42] https://www.sparkasse.at/sgruppe/kampagne-unternehmen/glaubandich-challenge?wacmpgn=mx.ToBR_Glaubandich-challenge.na.na.na.na
[43] 2020 edition postponed due to pandemic conditions
[44] https://www.trendingtopics.at/
[45] https://www.puls4.com/2-minuten-2-millionen/staffel-7
[46] https://www.wko.at/service/Start-up_Service_(Gruenderservice).html
[47] Data collected from different sources, like video and press release from partners of the initiative
[48] https://www.sparkasse.at/erstebank/gruender/services-fuer-gruenderinnen-/glaubandich-startupacademy
[49] https://www.rewe-group.com/en/startseite
[50] https://cleverclover.vc/

logistics and go-to-market strategies to find out how can be successfully listed into retail chains, meanwhile building their network of acquaintances.

This free opportunity is awarded to maximum forty teams (coming from Austria only) and could provide good advices to successfully participate to the #glaubandich Challenge or to other initiatives promoted by the partners other than valuable advices useful to grow their businesses and potential deals. The selection is made by Erste bank experts and mentors who are going to evaluate the pitch deck and business plan submitted during the application process.

Businessplan-initative[51]

Started back in 2010 in collaboration with WKO Gründerservice[52], the governmental consulting service for start-ups of the Austrian Federal Economic Chamber, this program provides entrepreneurs with specific knowledge regarding how to write a business plan, both with online resources and with in-person dedicated consultancy provided by analysts of supporting organizations. On top of these services, each year a business plan competition is held, where plans submitted in the different categories allowed (mainly new product & services, industrial solutions, social impact enterprises and "student ideas") are evaluated by the network of consultants and the best ones win different prizes amounting to a total value of around 150.000 € (one hundred fifty thousands). These prize vary from cash prizes awarded by i2b partnership of 10.000 € (ten thousands) for the overall winner across all categories and 3000 € (three thousands) for the winners of each category, to in-kind perquisites like free consultancy services from top consulting firms, free operational services (like free accounting software for new product & service category) or free media coverage, both online and on printed supports.

Erste für Gründer[53] (can be translated as Erste for funders)

This portal owned and operated Erste Group, dedicated completely to founder of businesses in Austria, on top of offering traditional banking services like current accounts, card and special loan is also a collector of all the initiatives for start-ups that the group is carrying out. Other than showing all the initiatives already described in the previous paragraphs[54], the website is providing future entrepreneurs with documents and information regarding how to write a business plan and how to finance and fund their initiatives and various tools useful for this scope on top of checklists and suggestions about common mistakes to avoid. All these services are also offered in the Gründercenter in Wien, where start-ups could book consultancy slots to discuss about these topics with Erste group dedicated team.

[51] https://www.i2b.at/wettbewerb/wettbewerbskategorien/
[52] https://www.wko.at/service/Start-up_Service_(Gruenderservice).html
[53] https://www.sparkasse.at/erstebank/gruender
[54] Meaning #glaubadich Challenge, #glaubadich Startup accademy and Businessplan-initative

Start Rampe[55]

Located into the *Wolkersdorf Business Park*[56] in the north-eastern part of Austria few kilometres away from Wien, Erste Group is offering to start-ups and SME's 24/7 office space availability and related services at low fares covering operating costs on a monthly basis contract, while the bank pays the rent for them. Being hosted into these spaces provide several benefits to the companies since the *ecocenter Wolkersdorf* is currently hosting more than 100 companies from different industries, dimension and stage of life, providing a pool ok knowledge, resource and services that potentially could mutually benefit and reinforce business inside the ecosystem.

EG IT INT Hackathon[57]

Organized three times between 2018 and 2019 in Bratislava branch of the Erste Group Bank (*Slovenska Sporitelna*) for Erste Group IT International division, the hackathon had no particular focus: participants, being team of students or start-ups, could choose the topic or take inspiration from suggestions from the bank, with the possibility of winning modest cash prizes (in case of student teams) or the possibility to pitch the idea in front of the board of the bank in case the solution provided from the start-up would prove to be useful to the bank itself. Solutions were evaluated by a jury based on criteria like graphic experience, innovativeness, and usability. The bank provided the workplaces and the technology (like sensors, robots and drones) and some lectures on topics regarding digital world (like about user experience, how to maintain code) in all the editions.

Open banking hackathon[58]

Organized by Finqware[59], a middleware provider linking businesses with financial service providers API, the competition was held in 2019 and in September 2020. In the first edition, no external banking partners were involved, but in 2020 the event has been sponsored by multiple east-European institutions like Erste Bank (the Romanian branch), Raiffeisein Bank, Alpha Bank and OTP other than other technological partners like Google Cloud and Asseco (one of the biggest software houses of the European market) and Ernst and Young consulting firm. As the name of the program suggests, the hackathon aim is to challenge participants to build valuable applications on top of Open Banking data provided by partners and aggregated by Finqware platform. Accepting applications coming from teams and from start-ups from Poland, Romania, Bulgaria, Hungary, Croatia, Slovenia, Slovakia, Czech Republic and Greece the hackathon has been focused on the implementation of real use cases in three main fields: open banking for individuals, for business and for Internet ff Things (IoT). The teams, provided with data and tools to craft and test their own solution, were guided and received feedbacks from market experts provided by partners, with which they also had the opportunity to network and to discuss about partnerships. The participants also had the opportunity to be exposed to investors and cash, services prizes and POC contracts are awarded.

[55] https://www.sparkasse.at/erstebank/gruender/services-fuer-gruenderinnen-/coworking-space
[56] https://www.ecoplus.at/wirtschaftsparks/ecoplus-wirtschaftspark-wolkersdorf/
[57] https://www.erstegroupit.com/en/egitint-hackathon/spring-2019
[58] https://www.openbankinghackathon.com/
[59] https://www.finqware.com/

Bankathon[60]

The events proposed and coordinated since 2015 by Finleap[61] have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. Banks from Erste Group were involved in the edition of 2016, 2017 and 2019, while there is still no information available regarding the 2020 sponsors[62]. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

BCR-InnovX accelerator[63]

The accelerator, born at the beginning of 2019, is dedicated to Romanian technology start-ups developing solutions in the fields of FinTech, cybersecurity, AI, machine learning, robotics, cloud applications and automation. The initiative by the Romanian division of Erste Group (*Banca Comerciala Romana*) in partnership with *UiPath*[64], *Startup Grind*[65]*, Mind space*[66], *Google for Startups*[67] and the *European Center for Services Investments and Financing (ECSIF)* [68]aim at accelerating a total of 25 start-ups in different stages of life in each call for three months. Three different paths are offered depending on the stage of the start-up:

1. Grinders path for companies with turnover below 100000€ (one hundred thousand), including therefore also ideas;
2. Start-ups path for organizations with a turnover between 0,5 and 1 million €;
3. Scale-ups for SMEs with higher turnover.

The program will provide to selected companies a tailored business acceleration experience though e-courses about entrepreneurship and financial education and the possibility to interact with mentors with international experience and European Commission experts in risk

[60] https://www.bankathon.net/
[61] https://www.finleap.com/#
[62] Even if as of November 2020 on the website some information regarding 2020 edition are available
[63]https://www.bcr.ro/ro/business/acceleratorul-de-business-innovx
[64] https://www.uipath.com/ multinational company developing software for automation and robotics
[65] https://www.startupgrind.com/ entrepreneur community
[66] https://www.mindspace.me/ coworking space provider
[67] https://startup.google.com/
[68] https://www.ecsif.eu/

financing from ECSIF for consulting and networking, all to help these organizations to scale. Companies in the program will also be able to give presentations at *Startup Grind* conferences in Silicon Valley, London, Barcelona or Tel Aviv. The bank is covering all the scholarship and logistic costs for each of the start-up selected the project without requiring equity.

Business School[69]

The online portal for Romanian start-ups and businesses is a repository of useful information about financing, cashflow optimization, decision making tools, Romanian financial aids for enterprises and entrepreneurial tips on how to conduct market analysis, drawing the business model canvas, building and motivation of teams and entrepreneur common characteristics and mistakes to avoid. These courses are open and free to anyone that wants to follow them, and part of them are also utilized as support tools during the BCR-InnovaX Accelerator program.

Raiffeisen Bank

Elevator Lab programs[70]

Raiffeisen Bank International (RBI) Group, by means of its local and international subsidiaries in central and eastern Europe[71], since 2017 is organizing three different *equity-free*[72] typologies of programs addressing start-ups providing FinTech solutions. These programs are mainly differentiated by the start-up stage targeted, but the common aim of these initiatives is to find new solutions to improve the bank operations efficiency and the creation of new products and services. The program targeting early and seed-stage start-ups, named Elevator FinTech Bootcamp, is offering them the possibility to develop Minimum Viable Products (MVPs) with the help of local banking experts through a three-month educational program. The programs also offer to the winners additional training on digital entrepreneurship provided by Talent Garden Wien[73]. The second program, targeting post seed-stage start-ups, is called Elevator FinTech Challenge. During this program selected start-ups have the possibility to demonstrate the benefit of their own FinTech solution to the bank and support in product development and market entrance while developing a joint solution with local experts. The program duration is around 3 months and winners are going to pitch their solution in front of the local country branches Boards of Directors, with the possibility to activate further pilot projects. The last program, named Elevator FinTech Partnership Program, aims at involving growth stage start-ups already on the market into the development of pilot projects (completely funded by the bank) during a four-month program.

[69] https://www.bcr.ro/ro/business/scoala-de-business
[70] https://elevator-lab.com/
[71] There is not a clear definition about what is considered "central and eastern Europe". The best proxy could be considered including Austria, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia other than non-EU members like Belarus and Ukraine.
[72] Equity free means that the organization does not require the start-up to sell part of their equity to them in exchange of the admission to the path. Most of these programs are somehow involving venture capitalist firms, therefore equity investments proposal are possible by the end of the program.
[73] https://talentgarden.org/it/

Participants work on real life banking environment with customer data and using the bank infrastructure and other than getting the possibility to pitch in the international RBI demo day they could win the possibility of signing partnership contracts with Raiffeisen Group. The programs are tightly linked with the activities of the venture capital arm of RBI, Elevator Ventures, which eventually could invest in promising ideas developed during the projects.

Open banking hackathon

Organized by Finqware, a middleware provider linking businesses with financial service providers application programming interfaces (API), the competition was held in 2019 and in September 2020. In the first edition, no external banking partners were involved, but in 2020 the event has been sponsored by multiple east-European institutions like Erste Bank (the Romanian branch), Raiffeisein Bank, Alpha Bank and OTP other than other technological partners like Google Cloud and Asseco (one of the biggest software houses of the European market) and Ernst and Young consulting firm. As the name of the program suggests, the hackathon aim is to challenge participants to build value creation applications on top of Open Banking data provided by partners and aggregated by Finqware platform. Accepting applications coming from teams and from start-ups from Poland, Romania, Bulgaria, Hungary, Croatia, Slovenia, Slovakia, Czech Republic and Greece the hackathon has been focused on the implementation of real use cases in three main fields: open banking for individuals, for business and for Internet Of Things (IoT). The teams, provided with data and tools to craft and test their own solution, were guided and received feedbacks from market experts provided by partners, with which they also had the opportunity to network and to discuss about partnerships. The participants also had the opportunity to be exposed to investors and cash, services prizes and POC contracts are awarded.

Bankathon

The events proposed and coordinated since 2015 by Finleap have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. Banks from Raifeissein Group were involved in the edition of 2017 and 2019, while there is still no information available regarding the 2020 sponsors. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

Fintechweek Hackathon[74]

In November 2019, during the week dedicated to FinTech organized in Vienna, RBI and Unicredit Bank Austria organized a hackathon hosted in Talent Garden spaces open to teams and start-ups from Austria with the goal of creating prototypes of products able to solve some of the challenges proposed by the banks regarding financial behaviour of customers. Some of the topics proposed were solutions to improve financial literacy of customers, to tailor investment decisions to customer preferences, to encourage private pension scheme creation and to find new ways to connect with the customers and to promote sustainability with financial actions. Some prizes were awarded, but the quantification of them is not expressed on the website source of data.

Open API Hackathon[75]

In September 2020 the first edition of the Open API Hackathon, organized by the Slovakian division of RBI, HubHub[76] and different media and innovation partners, was held in Bratislava. The initiative proposed to teams to solve two different challenges: one asking participants to figure out "the future of payments" and the second one regarding the sustainability of transactions between customers and the bank, all using API provided by Raiffeisen bank. Each challenge gave right to the winners to obtain 5000 € in cash prize and three months of free space inside the HubHub office spaces across Europe, plus the possibility to further develop the idea cooperating with Raiffeisen bank.

Plug & Play FinTech Europe[77]

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. Raiffeisen Bank has just announced at the beginning of 2020[78] that they are going to join the initiative as corporate partner. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties.

[74] https://fintechweek.at/fintech-hackathon/
[75] https://openapihackathon.hubhub.com/
[76] https://www.hubhub.com/en/ HubHub is a coworking space provider with different offices across Europe
[77] https://www.plugandplaytechcenter.com/fintech/
[78] https://medium.com/@PlugandPlay/raiffeisen-bank-international-to-collaborate-on-innovation-in-fintech-with-plug-and-play-fe280acf9875

The Factory[79]

Opened in 2018, the programs aim at supporting entrepreneurship in Romania providing special loans up to 50000 € to start-ups (even not yet founded) through the European COSME program[80], guaranteed by the European Investment Fund (EIF)[81]. New businesses must submit the business plan of their activity to get a change to get financed and to do so the bank provide them useful tools, documentation and on-line resources designed to guide and inspire and to help them succeed as entrepreneurs with suggestions on how to run a business. The program is addressed to Romanian companies providing innovative product and services up to five years old with annual revenues lower than 1 million. Competing on the quality of the idea and of the business plan, selected companies will have to open an account with Raiffeisen Bank to receive the financing, which will need to be reimbursed at favourable rates.

Belgium

Belfius Bank

Business creation support[82]

One of the strategic pillars of Belfius Bank is to help the establishment of new companies in Belgium, thereby they created a portal where they provide entrepreneurs with useful information, checklists and tools to better develop their idea. This information vary from advices on how to build an effective business plan to advices on the legal form to choose other than advices on how to raise capital and the range of instruments available, not only from the external market but also by the bank with financing loan schemes. Moreover, it is also possible to book an appointment with business banking personnel to discuss about the topic mentioned above.

The Birdhouse Accelerator[83]

With a participation of 20% of the capital of the accelerator[84], Belfius Bank is the second biggest shareholder of the accelerator since 2018. Providing working capital and start-up-oriented services, like bullet loans, the bank supports the acceleration programs offered by the Birdhouse. These acceleration programs are sector agnostic and will provide selected start-ups (15 per batch) four months of intensive training, coaching and free office space in one of the dedicated office spaces of Birdhouse or Belfius Bank across Belgium. Thanks to the networks provided by the two organizations, participants could also benefit of getting easy access to a multitude of actors spanning from commercial partners to potential investors. The bank has also set up a VC fund of 10 million € to invest in promising start-ups identified through the program.

[79] https://www.raiffeisenfactory.ro/
[80] https://ec.europa.eu/growth/smes/cosme_en
[81] https://www.eif.org/
[82] https://www.belfius.be/professional/nl/begeleiding/starters/uw-opstart-voorbereiden/index.aspx
[83] https://gobirdhouse.com/
[84] https://startups.be/blog/post/birdhouse-gets-funded-belfius

KBC Group

Start it @ KBC[85]

Launched at the beginning of 2014 in partnership with Accenture[86], Start it @ KBC is an incubator and accelerator partner of the GAN Network [87]created with the aim of supporting and boosting entrepreneurship and innovation in the states in which KBC Group operates with its branches. The initiative is accepting applications from start-ups of all stages, providing the teams a place where to set up their operations in nine different locations across Europe (6 in Belgium, 2 in Hungary and 1 in Czech Republic) and consulting services not requiring equity or any form of payment from new businesses. Each year since the launch, the program hosted more than 120 start-ups per batch and companies mentored have raised more than 200 million € in funding. The program last for 1 entire year and provides start-ups with tailored mentoring, workshops on common topics that entrepreneur must handle well and different opportunities to pitch their idea in front of relevant stakeholders, being investors or corporations of the network of the organizing companies, on top of millions of fringe benefits provided by the GAN Network partners.

Bulgaria

Central Cooperative Bank CCB

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

First Investment bank FIBank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Investbank AD

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Municipal Bank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Croatia

Agram Banka

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

[85] https://startit.be/
[86] https://www.accenture.com/be-en
[87] https://www.gan.co/ Global network of accelerators, born to facilitate start-ups in accessing human and financial capital

HPB Hrvatska Postanska banka

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Cyprus

Astrobank public company ltd

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Bank of Cyprus Public company BoC

IDEA Innovation Center[88]

Founded back in 2015 by the bank itself as part of the Corporate Social Responsibility initiatives as a non-profit entity, the innovation center through the IDEA program is providing incubation and acceleration services to Cypriot start-ups to improve and grow the economic scene of the region. The 9 month program offers start-ups from all stages strategic consultancy on topics like funding, human resource management, business development and start-up building methodologies plus the access to a network of mentors and coaches and space to work in IDEA building, all of that upon a strict selection process which, if giving a positive result, implies a little seed investment from the organization itself of maximum 6 thousand € in exchange of a part of the equity of the start-up not specified in the relative website. The start-ups need to follow different workshops and training and they must provide tangible results for the bank to obtain a second tranche of seed investment of 6 thousand € during the program, otherwise they are discarded from the initiative. Some of the partners supporting the initiative are consulting firms (like Deloitte[89]), local and international innovation specialist organization, local venture capital firms and professional services like lawyers.

F3.0 BoC hackathon[90]

Organized by Crowdpolicy[91], an information system and open innovation services provider for financial and civilian organizations, and powered by Bank of Cyprus, the hackathon in 2019 reached its third edition after F2.0 in 2018 and F1.0 in 2017. No information was available for 2020 possible edition. Hosted in the IDEA innovation center, the program aimed at supporting entrepreneurship by bringing together teams and start-ups to create innovative FinTech solutions if few days, with the objective of turning proposed projects in possible POC or pilot projects for the bank. Participants at the end of the competition had to share the code developed, under the *creative commons licence regime*[92]*,* as per regulation of the hackathon. Some technological and consultant parties like Microsoft, IBM, KPMG and Cyta during the event provided guidance to participants regarding the development of their idea. On top of good opportunities to network, some cash prizes are awarded to the best ideas (up to 6000€)

[88] https://ideacy.net/
[89] https://www2.deloitte.com/global/en.html?icid=site_selector_global
[90] https://bochackathon.com/en/
[91] https://www.crowdpolicy.com/
[92] https://creativecommons.org/licenses/by/4.0/

selected by a pool of judges from partnering companies. Some of the criteria utilized to give the award were the compliance with the hackathon target specification, the complementarity with other application developed by contestants, the technological development level, the interdisciplinarity characteristics of the solution, the possibility of commercial exploitation and last but not least the social impact that the proposed project could generate.

Denmark

Danske Bank

Plug & Play FinTech Europe

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties. There is no clear indication or press release to identify when Danske bank has joined Plug & Play platform.

+ Impact accelerator[93]

Currently accelerating the fourth batch of start-ups working on circular economy topics, the program started back in 2018 with the collaboration of Danske bank and Katapult[94], a Swedish accelerator located in Oslo, even if today they are no more involved. Actual partners include WeWork Labs[95], RISE[96] and IGNITE Sweden[97]. The equity free program aims at accelerating start-ups from Denmark, Finland, Norway and Sweden that are currently proposing a scalable solution based on a circular business model offering selected participants four months of free accommodation, formative events, mentoring and workshops in which start-ups are guided into the development of the proposed solution. Start-ups are selected after a three days bootcamp in which they present their solution to a panel of companies from different industries. If the ideas match corporations' interests, pilot projects are proposed, and the start-up is officially enrolled in the program.

[93] https://accelerator.plusimpact.io/
[94] https://katapultaccelerator.com/members/katapult/company/kaone/#all
[95] https://www.wework.com/it-IT/labs/ Part of WeWork group, WeWork Labs are providing space to work for start-ups and formative events
[96] https://www.ri.se/en The Research Institute of SwEden
[97] https://ignitesweden.org/aboutandcontact A Swedish consortium of incubators, accelerators and science parks born to promote entrepreneurship and innovation

Mastercard Lighthouse Program[98]

Organized by Mastercard[99] and NFT venture capital firm[100] since the beginning of 2019, the program is aiming at building partnership between financial corporations and ready to scale start-ups from FinTech and cybersecurity field established in northern Europe and Baltic countries. The banks involved in the program are Danske Bank, Nordea, Op-Pohjola Group, Commerzbank, SEB and Swedbank. Each batch admits cumulatively around 15 (fifteen) scale-ups hosted for free in one of the cities in which the program is held and provides them, along five months, the opportunity to participate to different networking workshops. In these reunions the program brings banks, investors, advisors and start-ups together to explore the possibility of creating partnerships and close investment and financing rounds. All participants will remain in the Alumni network of the program, but the start-ups able to build the largest partnerships will also win some prizes: top three of them are invited to attend the annual Slush event[101] and the overall winner will also be enabled to participate to Mastercard's StartPath Pitch Day in New York, all for free.

The Hub by Danske Bank[102]

Developed by Rainmaking[103] and powered by Danske Bank, since 2016 The Hub is a virtual platform and start-up community website aiming to foster and accelerate the growth of start-ups based in Denmark, Finland, Norway and Sweden. From the second half of 2019 these services have been expanded also to Northern Ireland, thanks to the partnership with The Catalyst [104], one of the biggest coworking provider and start-up ecosystem of Ireland and United Kingdom. The website is offering multiple services to start-ups: from learning material and tools to develop their business (like checklists, templates for presenting pitches and business plans) to the possibility to post job recruitment announces for free and obtain screening services useful to shorten the hiring process for busy CEOs. Moreover the website is also open to investors, incubators and accelerators, who could register and get access to the network of start-ups involved for matchmaking purposes: thanks to the information provided by both parties, these organizations could scout for start-ups based on industry preferences, stage focus, business model, location and investment required.

Copenhagen Fintech[105]

Operative since 2018, the consortium was born with the goal of establishing Copenhagen as one of the leading FinTech hubs all around the world. Three different levels of collaboration are active: partners, which are responsible of the creation and the development of the ecosystem; sponsors, that are organizations that will benefit with the establishment of

[98] https://mclighthouse.com/
[99] https://www.mastercard.it/it-it.html
[100] https://www.nftventures.com/about
[101] https://www.slush.org/
[102] https://thehub.io/
[103] https://rainmaking.io/ Innovation platform who act as a VC, a consultant for companies and an Open Innovation catalyst between start-ups and corporations. They run also the Startupbootcamp accelerators.
[104] https://wearecatalyst.org/2019/09/19/launch-of-the-new-hub/
[105] https://copenhagenfintech.dk/

Copenhagen as a leading FinTech ecosystem; members, which have the right of actively participating to events.

Between the partners different industries are represented, like e-commerce, telecommunication, enterprise IT and software providers and consulting firms, on top of financial institutions like Danske Bank, BNP Paribas, ING Group, Jyske bank, Nordea, Nykredit and SEB. Different initiatives, all hosted in the dedicated LAB in Copenhagen, are available for start-ups of different stages to provide a comprehensive offering able to foster the growth of the ecosystem, all without requiring equity to the start-ups involved.

First, the Copenhagen FinTech LAB[106] is a coworking space designed to host start-ups and consortium-related events. Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services around legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program[107], in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative. On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

For start-ups that already found product market fit and are therefore in later stage of their lives, four programs are available:

1. Nordic fast track program[108]: targeting non-Danish start-ups, the program aims at facilitating their entering in the Nordic markets offering them a two months acceleration program and free hosting and services provided in the LAB spaces. This program will benefit start-ups by connecting them with the most relevant stakeholders in the market that they want to enter.
2. Global Impact partnership program[109]: the program goal is to link Nordic FinTechs with scaling opportunities in south-eastern Asian regions provided by global partners with local presence in these countries, all of that taking into account sustainable development goals targets like the improvement of financial literacy and inclusion and the tracking of the societal impact produced by these financial organization.
3. Partnership fast track program[110]: partners of the consortium propose some challenges to be solved related to FinTech domain and interested start-ups could apply to have a chance of starting a Proof-of-Concept (PoC) project with them. Selected start-ups will be put in contact with partners' business units proposing the challenge and will get 50.000 (fifty thousand) Danish koruna (around 6.700€). During the development of the PoC project these start-ups could also access the LAB workspaces spaces and services.

[106] https://copenhagenfintech.dk/startups/copenhagen-fintech-lab/
[107] https://copenhagenfintech.dk/startups/stage-specific-programs/incubation-program/
[108] https://copenhagenfintech.dk/startups/stage-specific-programs/nordic-fast-track-program/
[109] https://copenhagenfintech.dk/startups/stage-specific-programs/partnership-program/
[110] https://copenhagenfintech.dk/startups/stage-specific-programs/accelerator-program/

4. Global scaleup program[111]: in this program, start-ups of the network from Nordic countries are invited to apply if they have already found their product-market fit and they want to start to expand internationally. The program, which is developed along maximum four months, provides scale-ups three days of 1:1 tailored strategic consulting with international experts, individualized sessions with the Denmark's Ministry for foreign affairs[112], mentoring and coaching from corporations partners of the consortium and access to FinTech founders who have already experienced the internationalization of their start-ups and therefore can provide useful advices.

In 2017 Copenhagen FinTech, with the support of Danske Bank and Nordea, created also a hackathon[113] with the aim of exploring the potential of open banking. Lasting for 48 hours, the competition challenged participants to create innovative application using sponsoring banks' API, and during the event different learning workshops were organized. Participating teams at the end of the event had to pitch in front of a panel of judges to compete for the cash prizes available, amounting to a total of 50.000 Danish Koruna (6.700€).

Canute[114]

Started in the mid of 2017, Canute is an initiative targeting Nordic start-ups who are ready to scale internationally. Supported by partners like Danske Bank, Deloitte, Accelerace[115], Symbion[116], the Danish state investment fund Vaekstfonden[117] and Digital Hub Denmark[118], the three day program held in different cities around the world multiple times a year is providing to start-ups involved consulting services on how to grow the business in that specific location and access to the local network of stakeholders (like start-ups already established in that market, corporations, accelerators and innovation promotion entities) that could help start-ups scale internationally at a faster pace. Participation to these events is not free, costing to start-ups 7.500 Danish Koruna (around one thousand euros). On top of the events, Canute provides also an online platform where alumni could grow their network, exchange trading insights and build a community.

Startupbootcamp[119]

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand

[111] https://copenhagenfintech.dk/startups/stage-specific-programs/global-scaleup-program/
[112] https://um.dk/en/
[113] https://medium.com/@techsprint/open-banking-recap-b454b86bf011
[114] https://canute.io/
[115] https://www.accelerace.io/ One of the biggest accelerator of Norther Europe
[116] https://symbion.dk/en/ Provider of coworking spaces in Denmark
[117] https://vf.dk/en/
[118] https://digitalhubdenmark.dk/ A non-profit organisation who connects tech talent, start-ups, companies, investors and international delegations with opportunities in Denmark region.
[119] https://www.startupbootcamp.org/

euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Danske Bank is partnering with Startupbootcamp, but no clear evidence in which program is participating is available on their website. In any case, partners have some advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

Rockstart.[120]

Rockstart launched in 2011 in Amsterdam to accelerate the best start-ups in four domains of energy, health, agriculture and food and emerging technologies. On top of offering classical accelerator services like strategic consulting, access to capital market and personal and team development, Rockstart collaborate with corporations and public entities to organize challenges with the aim to provide to start-ups space to test their proof of concept or to launch pilot projects in collaboration. For acceleration programs Rockstart usually act also as a seed stage business angel, requiring to participants to sign a convertible loan, dispensed partially in cash and partially in services, while for programs built in cooperation with corporations and other entities usually is the external entity to provide the prizes of the contest. Since the starting of their activities Rockstarts have supported and invested in more than 200 companies. Danske bank is partner of the agricultural and food initiatives, but no timing on the entrance in the program is available online.

The Catalyst x Women in Business [121]

The program, organized by Danske bank, The Catalyst and Woman in Business organization[122] only during 2019, aimed at providing to four FinTech female entrepreneurs the opportunity of hosting their start-ups into The Catalyst spaces in central Belfast for 12 months to participate to an acceleration program.

Techstart Ventures NI open banking challenge[123]

Techstart Ventures NI[124], a seed capital investor in Northern Ireland and Scotland, and Danske bank in 2018 launched a program with the aim of finding and funding great FinTech projects based on open banking technologies coming from all over United Kingdom. The program invited entrepreneurs to pitch their idea in front of a panel composed by representatives of both institutions to compete for 60.000 £ (around 66.000 €) of funding, dispensed via grants, and additional prizes like free workspace in coworking environment, mentoring and access to the network of the bank. The program was organized just in 2018.

[120] https://www.rockstart.com/
[121] https://danskebank.co.uk/about-us/news-and-insights/wib-danske-tech-stars
[122] https://www.womeninbusinessni.com/Home.aspx
[123] http://www.mcepublicrelations.com/techstart-ni-danske-bank-join-forces-launch-open-banking-challenge/
[124] https://www.techstart.vc/

Open Up Challenge[125]

Born in 2017 as an initiative by Nesta[126] (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited[127] organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

Helsinki FinTech Farm[128]

Describing itself as a "digital finance innovation service provider", the FinTech Farm is located in Helsinki inside HUB13[129] spaces. Since 2016 the farm is providing services that could facilitate FinTech start-up growth and success not only in Finland but also globally, connecting them with various stakeholders like institutions and regulators, corporations and investors. The farm is offering to start-ups matchmaking & deal flow services, linking them with key people inside financial corporations to foster the drafting of POC, pilots and contracts and with Investors for financing opportunities and provides to start-ups useful information, contacts and visibility needed to enter into the Finnish market smoothly.

Jyske Bank

DTU Science Park – Futurebox Incubator[130]

Futurebox is an incubator established since 2018 in the DTU Science Park, part of the Technical University of Denmark. The incubator is focused on offering their services to start-ups producing hardware goods and spinouts from the Northern universities in order to build new high-tech ventures. The incubator provides access to workspace, tooling and machines for rapid prototyping and access to a network of corporations and other industry players present in the campus. Jyske Bank is a leading partner of the initiative, providing start-ups hosted in Futurebox spaces financial consulting and access to the network of bank's clients. This access helps start-ups to get introduced to more established corporation working in the same industry to get advices, collaboration proposals or investments from the business owners that are willing to give back to the community.

[125] https://openup.challenges.org/
[126] https://www.nesta.org.uk/
[127] https://www.openbanking.org.uk/
[128] https://www.helsinkifintech.fi/
[129] https://www.hub13.fi/
[130] https://dtusciencepark.com/news/jyske-bank-is-first-futurebox-partner/

Copenhagen Fintech

Operative since 2018, the consortium was born with the goal of establishing Copenhagen as one of the leading FinTech hubs all around the world. Three different levels of collaboration are active: partners, which are responsible of the creation and the development of the ecosystem; sponsors, that are organizations that will benefit with the establishment of Copenhagen as a leading FinTech ecosystem; members, which have the right of actively participating to events. Between the partners different industries are represented, like e-commerce, telecommunication, enterprise IT and software providers and consulting firms, on top of financial institutions like Danske Bank, BNP Paribas, ING Group, Jyske bank, Nordea, Nykredit and SEB. Different initiatives, all hosted in the dedicated LAB in Copenhagen, are available for start-ups of different stages to provide a comprehensive offering able to foster the growth of the ecosystem as a whole, all without requiring equity to the start-ups involved.

First of all, the Copenhagen FinTech LAB is a coworking space designed to host start-ups and consortium-related events. Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services in the area of legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program, in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative. On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

For start-ups that already found product market fit and are therefore in later stage of their lives, four programs are available:

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2. Global Impact partnership program: the program goal is to link Nordic FinTechs with scaling opportunities in south-eastern Asian regions provided by global partners with local presence in these countries, all of that taking into account sustainable development goals targets like the improvement of financial literacy and inclusion and the tracking of the societal impact produced by these financial organization.
3. Partnership fast track program: partners of the consortium propose some challenges to be solved related to FinTech domain and interested start-ups could apply to have a chance of starting a proof of concept project with them. Selected start-ups will be put in contact with partners' business units proposing the challenge and will get 50.000 (fifty thousand) Danish koruna (around 6.700€). During the development of the POC project these start-ups could also access the LAB workspaces spaces and services.
4. Global scaleup program: in this program, start-ups of the network from Nordic countries are invited to apply if they have already found their product-market fit and they want to start to expand internationally. The program, which is developed along

maximum four months, provides scale-ups three days of 1:1 tailored strategic consulting with international experts, individualized sessions with the Denmark's Ministry for foreign affairs, mentoring and coaching from corporations partners of the consortium and access to FinTech founders who have already experienced the internationalization of their start-ups and therefore can provide useful advices.

Nykredit Bank

Copenhagen Fintech

Operative since 2018, the consortium was born with the goal of establishing Copenhagen as one of the leading FinTech hubs all around the world. Three different levels of collaboration are active: partners, which are responsible of the creation and the development of the ecosystem; sponsors, that are organizations that will benefit with the establishment of Copenhagen as a leading FinTech ecosystem; members, which have the right of actively participating to events. Between the partners different industries are represented, like e-commerce, telecommunication, enterprise IT and software providers and consulting firms, on top of financial institutions like Danske Bank, BNP Paribas, ING Group, Jyske bank, Nordea, Nykredit and SEB. Different initiatives, all hosted in the dedicated LAB in Copenhagen, are available for start-ups of different stages to provide a comprehensive offering able to foster the growth of the ecosystem, all without requiring equity to the start-ups involved.

First of all, the Copenhagen FinTech LAB is a coworking space designed to host start-ups and consortium-related events. Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services in the area of legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program, in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative. On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

For start-ups that already found product market fit and are therefore in later stage of their lives, four programs are available:

1. Nordic fast track program: targeting non-Danish start-ups, the program aims at facilitating their entering in the Nordic markets offering them a two months acceleration program and free hosting and services provided in the LAB spaces. This program will benefit start-ups by connecting them with the most relevant stakeholders in the market that they want to enter.
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In 2018 Copenhagen FinTech, with the support of Nykredit Bank, created also a hackathon with the aim of exploring the potential of open banking. Lasting for 48 hours, the competition challenged participants to create innovative application using sponsoring banks' API, and during the event different learning workshops were organized. Participating teams at the end of the event had to pitch in front of a panel of judges to compete for the cash prizes available.

Ringkjobing Landbobank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Sydbank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Estonia

AS LHV Pank

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Finland

Aktia Bank Abp

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Nordea

FinTech Innovation Lab London[131]

Launched in 2012 by Accenture[132], the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

Start-up & Growth Services[133]

Nordea has established different branches across norther countries dedicated to fast growing businesses, named Startup & Growth units, that are providing a range of services to aforementioned organizations. These services range from tailored loans to activities more linked to consulting and matchmaking with Venture Capitalist firms and other bank's network stakeholders, like corporations and business angels. Notably, Nordea is also partnering with an equity crowdfunding company (Invesdor[134]) to help start-ups in need of cash to raise funds without the need to subscribe a loan. This service also entails an online resources where start-uppers can access a complete guide on how to start a business, how to draft start-up needed documents and useful material regarding market reports, country profiles and checklist to comply with local requirements in different industries.

Nordea start-up Accelerator[135]

Held for two times in two different batches back in 2016, the initiative saw Nestholma[136] (a corporate innovation platform) helping Nordea in the organization of the acceleration program. The goal of the program was to find valuable start-ups providing products and services able to solve specific bank problems, like improving customer services with new technologies, new solution for pension schemes and life insurance and the enablement of faster transactions. At the conclusion of the 3 months period of acceleration, participating start-ups had the possibility of pitch in front of a jury composed by bank key employees, and the best projects had the possibility to establish working collaborations with the bank itself[137].

[131] https://www.fintechinnovationlab.com/london/
[132] https://www.accenture.com/
[133] https://www.nordea.fi/en/business/your-company/startup-and-growth-solutions.html
[134] https://www.invesdor.com/en-gb/
[135] https://nestholma.com/collaboration-programs/nordea-startup-accelerator/
[136] https://nestholma.com/
[137] https://www.nordea.com/en/press-and-news/news-and-press-releases/the-digital-hub/2017/2017-04-07-why-would-a-bank-partner-up-with-a-factory.html

The Factory[138]

Located in Oslo, Norway, since 2015 The Factory is providing to start-ups working in the field of FinTech, Insurance, Property, Regulatory, Artificial Intelligence and Blockchain different acceleration programs based on their needs by taking part of their equity for their services. Apart from the formative program, selected ideas for 5-12% of the equity can therefore get seed funding from the organization, access the selected program and get space to work in the Factory offices plus benefits and perquisites offered by the GAN network. Three different programs are offered:

- Grundr Academy[139]: a free online academy for aspiring entrepreneurs, intrapreneurs and early stage start-ups in which participants can learn the basics of entrepreneurship, from how to design a proper business model canvas and a complete business plant to how to pitch, from to how to test and sell the idea to how to draft legal contracts. The academy offers also the possibility to reach out experts in the network to get additional advices and a peer support network for sharing experiences. No equity is required for this program.
- Startup Academy[140]: targeting the early stage start-ups, this 10-week incubation program offers selected team guidance in developing the concept, the business model, on how to do customer discovery activities and how to design a go to market strategy. Moreover, start-ups enrolled could get access to mentors and industry experts coming from the network of partners of The Factory and to investors. The organizer will provide seed capital but will require the start-up to sell part of their equity for the participation.
- Scaleup Academy[141]: The program wants to offer to companies that have a ready MVP, some customers and have found the problem-solution fit the access to the network of partners and investors to get them scale faster. This acceleration program therefore will provide selected start-ups consultancy regarding the strength of the business model, strategic guidance and connections with mentors, board members and investors able to help them to validate their business model and concentrate on growth.

Nordea is collaborating with the factory since 2017 as a main partner of the programs proposed.

Findec[142]

Literally meaning FinTech Decentralized, the Swedish non-for-profit association situated in Stockholm was born in 2019 to provide to start-ups from FinTech, InsureTech and Regulatory Technology a hub able to facilitate them in entering and growing into the Swedish market. Sponsored by Nordea itself and PwC[143], the hub connects different players to help them collaborating and exchange knowledge and know-how in order to build a stronger innovation

[138] https://www.thefactory.no/
[139] https://www.thefactory.no/grundr-academy
[140] https://www.thefactory.no/early-stage
[141] https://www.thefactory.no/growth-program
[142] https://findec.co/
[143] https://www.pwc.com/

ecosystem, make start-ups grow and attract talent. Start-ups accessing the services get mentoring, introductions to relevant stakeholders, the possibility to draft POC contracts and the pilots plus support in all collateral activities needed to establish and run a business, like legal and accounting consultancy and access to software developers.

Mastercard Lighthouse Program

Organized by Mastercard and NFT venture capital firm since the beginning of 2019, the program is aiming at building partnership between financial corporations and ready to scale start-ups from FinTech and cybersecurity field established in northern Europe and Baltic countries. The banks involved in the program are Danske Bank, Nordea, Op-Pohjola Group, Commerzbank, SEB and Swedbank. Each batch admits cumulatively around 15 (fifteen) scale-ups hosted for free in one of the cities in which the program is held and provides them, along five months, the opportunity to participate to different networking workshops. In these reunions the program brings banks, investors, advisors and start-ups together to explore the possibility of creating partnerships and close investment and financing rounds. All participants will remain in the Alumni network of the program, but the start-ups able to build the largest partnerships will also win some prizes: top three of them are invited to attend the annual Slush event and the overall winner will also be enabled to participate to Mastercard's StartPath Pitch Day in New York, all for free.

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Helsinki FinTech Farm

Describing itself as a "digital finance innovation service provider", the FinTech Farm is located in Helsinki inside HUB13 spaces. Since 2016 the farm is providing services that could facilitate FinTech start-up growth and success not only in Finland but also globally, connecting them with various stakeholders like institutions and regulators, corporations and investors. The farm is offering to start-ups matchmaking & deal flow services, linking them with key people inside financial corporations to foster the drafting of POC, pilots and contracts and with Investors for financing opportunities and provides to start-ups useful information, contacts and visibility needed to enter into the Finnish market smoothly.

Op-Pohjola

OP Lab[144]

Op Pohjola bank is offering to start-ups already established on the market the opportunity to collaborate with them to improve their customers' life. Accepting proposals from start-ups operating in the fields of FinTech, Mobility, Housing, Insurance, Commerce, New Work and Health and Wellness, the banks wants to find new bold ideas that can help the company move toward their strategic goal faster, that is to transform the bank from a traditional finance service provider to a more customer centric service provider with financial services at the core of the operations[145]. The program is therefore looking for start-ups with which directly start building new business opportunities together, collaborating for the launch of pilots and later on commercial agreements, offering them up to 50.000 € (fifty thousand) in grants in the co-creation phase and access to the full customer base of the banking group, amounting to over 4,5 million. During the four-months program selected Start-ups work at strict contact with bank employees to design, test and launch the proposed common solution and get access to advisors' meetings and networking opportunities with the executives of the bank.

Startup Wise Guys FinTech Accelerator[146]

Born in 2018, the accelerator is currently accelerating the fourth batch of selected start-ups working on FinTech, PropTech, RegTech, InsurTech, Analytics and Cybersecurity solutions. Hosted by Swedbank in Vilnius, Lithuania, the accelerator is targeting start-ups in early stages, providing selected ones a seed investment between 50 and 100 thousand euros in exchange for the participation to the program and a percentage of equity around 8-10%. The program is involving also other banks from the Nordic countries, like Op Pohjola bank and SEB. During the four months of the program, due to the stage of the start-ups involved, an intensive formative program is delivered, covering topics like how to do customer discovery, marketing and sales to how to deal with corporations and how to raise funds. On top of these services, legal consulting is also offered, and corporations could also provide some great opportunity to set up POC projects.

Ultrahack Hack the Index[147]

The hackathon, held in 2018 in Finland and Organized by Ultrahack company (an organization specialized in open innovation hackathon events) for OP Pohjola bank, aimed at finding interesting ideas to make saving and investing easier and more accessible to all bank's customers and not only to professionals, all developed on the API offered by the financial institution. Since the initiative was sponsored by the OP Lab division of the bank, start-ups participating to the hackathon on top of winning modest cash prizes could get the opportunity to develop pilot projects with the bank.

FinTech Innovation Lab London

[144] https://op-lab.fi/collaborate/
[145] https://op-lab.fi/partnership/
[146] https://startupwiseguys.com/fintech/
[147] https://ultrahack.org/ultrahack2018sprint2/hack-the-index-manage-your-portfolio-like-a-pro

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

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France

BNP Paribas

Plug & Play x BNP Paribas[148]

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider (or briefly an innovation platform), operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. Differing from the other programs usually organized by Plug & Play, this initiative has been organized since 2017 exclusively for BNP Paribas in

[148] https://www.plugandplaytechcenter.com/bnp-paribas-plugandplay/

Station F incubation spaces in Paris. The goals of the program is still to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties (start-ups and corporate partner), but start-ups have the opportunity to show their products and solutions just to a single partner.

Plug & Play Smart Cities[149]

As stated in the previous program description, Plug & Play organizes acceleration programs not only for FinTech but also in other verticals, like in this case on Smart Cities. Following the EU definition, a Smart City is a city in which digital and telecommunication technological solutions are used to improve the management and efficiency of urban environments[150]. From the second half of 2019 Plug & Play is providing a platform to public entities and corporate partners coming from different industries that could be impacted by this trend to find valuable start-ups that could help them shaping the products and services of the cities of the future in sectors like Mobility, IoT, Real estate and construction and Energy and sustainability. The goals of the program are still to connect promising early and growth stage start-ups to relevant stakeholders to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to all the parties.

Plug & Play FinTech Europe

BNP Paribas, on top of its own dedicated acceleration program in partnership with Plug & Play held in Paris, participate and sponsors since 2018 the European FinTech program organized in Frankfurt[151]. The aims and objectives of the program are the ones just described in the section above, but here start-ups could access a wider network of corporate partners with which install business relationships and make investment deals.

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[149] https://www.plugandplaytechcenter.com/smart-cities/

[150] https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en

[151] https://www.prnewswire.com/news-releases/plug-and-play-and-techquartier-announce-the-first-five-corporate-partners-to-join-the-fintech-europe-innovation-platform-in-frankfurt-300634143.html

Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services in the area of legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program, in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative. On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

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Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of

the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. BNP Paribas is partnering with Startupbootcamp in different initiatives, like FinTech & Cybersecurity in Amsterdam and the AfriTech Program held in Cape Town, South Africa. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

Lux Future Lab[152]

The incubator, run by BNP Paribas and located in the center of Luxembourg City, was launched in 2012 and it will be discontinued at the end of 2020[153]. The incubator was accepting applications from early stage start-ups in different domains, but it was primarily concentrated on FinTechs. To the 50 start-ups hosted during the life of the program BNP offered office space to work, meeting rooms, access to the BNP corporations' and investors' network, legal, marketing and accounting consulting at controlled prices and formative lectures and training about entrepreneurship topics.

The LHoFT[154]

The Luxembourg House of Financial Technologies is private-public initiative born in 2017 by Luxembourg For Finance (LFF, the governmental agency for the development of Luxembourg as a financial center)[155] and the Ministry of Finance[156] in partnership wit credit institutions like BNP Paribas and Societè Generale, consulting firms like PwC and KPMG, and various innovation promotion partners. The aim of The LHoFT is to create a hub able to drive innovation for Luxembourg's financial service sector by connecting the internal FinTech community with international partners: open to FinTech start-ups from all over the world, by attracting talent and ideas this initiative hopes to accelerate the pace of innovation in the financial sector in Luxembourg. The main activity of the hub is therefore to provide help to already established start-ups to enter the Luxembourg (and therefore the European) market in the smoothest way possible, providing these companies training and education, access to the key ecosystem stakeholders, and consulting services. The LHoFT provides also to matchmaking service for funding and grants with their own network of investors and governmental agencies.

[152] https://www.luxfuturelab.lu/
[153] https://www.siliconluxembourg.lu/end-of-the-story-for-the-lux-future-lab-startup-incubator/
[154] https://www.lhoft.com/en/home
[155] https://www.luxembourgforfinance.com/en/homepage/
[156] https://mfin.gouvernement.lu/en.html

#Lancez Vous[157]

Literally meaning "launch yourself", #Lancez Vous is an online platform created to facilitate the launch and the establishment of new entrepreneurial organizations of all sectors across France. The platform offers to future entrepreneurs and start-ups access to partners' services offered at an advantageous price, offered in order to help these organizations to grow faster without the need of spending all their resources on them. These services ranges from lawyers consultancy to marketing service promotions, from accounting software to management services, from the help in creating effective business plans to favoured access to market researches, and last but not least help on financing matters, provided directly by the bank's experts. The platform offers also self-service formative online resources that covering all the topics described above.

WAI by BNP[158]

The WAI initiative, launched back in 2017 and collecting different services supplied also before this date, is the larger-scale support program in France for innovative entrepreneurs, being start-uppers or SME employees. On top of offering favourable traditional banking products to start-ups and the VC fund opened to invest in the most promising ones, WAI offers a comprehensive offer to help entrepreneurs succeed in their initiative, like:

WAI Banking[159]: offering advice of the business idea, on financing means and putting the start-ups in contact with relevant incubators, accelerators, innovation hubs and investors. This service is offered all across France, with more than 100 dedicated resources scattered across the country with local knowledge of the innovation ecosystem.

WAI Boost[160]: this initiative is helping SME and Corporations to establish partnerships with start-ups to co-develop new products and services, under the Open Innovation approach. BNP therefore, based on company's needs, select the start-ups that could help them solve these problems and organizes challenges to experiment with the goal of signing POC or pilot project contracts.

WAI Connexions[161]:WAI organizes events across all France in which selected start-ups and corporations working in the same sector are invited to meet and discuss about innovation related topics. The main goal of these initiatives is to develop common understanding of problems of the industry and, especially for start-ups, to enter in contact with relevant stakeholders that could help them grow.

WAI Lead[162]: 24 months of acceleration provided to promising start-ups from all industries. The initiative provides to start-ups affordable coworking space in the two WAI dedicated centers, one in Paris and the other one in Massy-Saclay, access to meeting rooms and conferences organized by BNP, on top of dedicated coaching and mentoring from WAI experts and valuable networking opportunities with BNP corporate clients;

[157] https://lancezvous.bnpparibas/
[158] https://wai.bnpparibas/qui-sommes-nous/
[159] https://wai.bnpparibas/offres/wai-banking
[160] https://wai.bnpparibas/offres/wai-boost?step=2
[161] https://wai.bnpparibas/offres/wai-connect?step=1
[162] https://wai.bnpparibas/offres/wai-lead

WAI International[163]: targeting scale-ups, as the name suggest this service is aiming to help these companies to enter foreign markets. Thanks to the various service offered to the corporations in the traditional banking sector, BNP could help entrepreneurs navigate into the issues that could arise while internationalizing their businesses, providing consultancy and support to make the transition as smooth as possible.

Innovation Hub[164]

Similar to the services offered by WAI in France, the Innovation Hub by BNP Paribas Fortis is concentrated on the Belgian market. The services offered are mainly networking services, like connecting start-ups with relevant stakeholders (being both other corporations or incubators, accelerators and innovation promotion entities) and supporting the scale-ups in setting the ground for international expansion.

International Hackathon[165]

Held in 2015, 2016 and in 2017, the program should not be described as a hackathon, but rather as an accelerator or an open innovation initiative, organized in different stages. First, the teams participate to a real hackathon of 48 hours held simultaneously in different places around the world (from North America to Europe to Asia) in which they have to propose and pitch a suitable solution to some challenges proposed by BNP. Selected local teams therefore had the opportunity to access to an international digital bootcamp, in which teams of employees of the interested division of the group helped start-ups in fine tuning their ideas in order to pitch, at the end of the acceleration period, in front of a global audience gathered in Paris in order to obtain POC and pilot project contracts with the division with which they had worked.

Miss in Action[166]

The incubator, developed by Digital Magics[167] for BNP Italy, was created to foster female entrepreneurship in Italy and in 2020 has reached the second edition of the program. Early stage female start-uppers working on FinTech, Smart mobility, Smart cities, Wellbeing, Welfare, Insure Tech and PropTech could apply to the program by pitching their ideas to a jury, and it they get selected they could access a three month incubation program delivered by Digital Magics that will help them in creating a first MVP. At the conclusion of the program the teams have to pitch again their refined solutions, and the three best ideas get the opportunity to sign contracts with BNP for Proof of Concept testing on the group infrastructure.

[163] https://wai.bnpparibas/offres/wai-international?step=1
[164] https://innovation-hub.be/en
[165] https://www.bnpparibas.it/it/2016/06/23/bnp-paribas-international-hackathon-2016-tre-startup-italiane-accedono-alla-seconda-fase/
[166] https://www.missinaction.it/it/challenge/miss-in-action-2-edizione
[167] http://www.digitalmagics.com/ One of the Italian biggest incubators

Store del Futuro – Experience More[168]

Organized by Axepta[169] (the payment service solution provider of BNP Paribas) and PoliHub170 (the innovation district and start-up incubator / accelerator of Polytechnic of Milan), the challenge wanted to find solutions able to improve the customer purchase and payment experience in retail environment. In the first part of the competition, 10 start-ups were selected to participate to one to one meetings and formative events: thanks to these interactions the representatives of BNP Axepta had the opportunity to select, at the end of the process, the best three ideas that could help them solve some of their challenges. Winning projects had the opportunity to access four months of acceleration dispensed by PoliHub and a grant of 25.000 € (twenty-five thousand) each from Axepta to co-develop a POC to be validated on the market.

LUISS EnLabs Startup Factory[171]

The innovation platform L-Venture Group, collaborating with BNL Paribas, WindTre[172], Accenture and Sara Assicurazioni[173], each semester since few years is offering to start-ups an acceleration program able to put them in contact with corporations. The 5 months program is targeting start-ups in the field of FinTech, Cyber security, Healthcare, Smart Manufacturing, Urban Technology, Enterprise software, Retail and personal care working with enabling technologies like AI, Virtual Reality and Big Data. In exchange of the services of the program, priced 60.000€, L-Venture requires the start-ups to sell 6% of the equity and 50.000€ + 50.000€ as convertible notes in cash if the start-ups provide results during the acceleration period. L-Venture is in constant dialogue with partnering corporations' in order to scout promising start-ups that could match and solve some of their issues, and therefore is scouting and selecting projects that have great possibilities of becoming partners or suppliers of their partners.

Web Marketing Festival[174]

Organized since 2013 by Search On Media Group S.r.l.[175], the three day festival is held once a year in Italy and is focused on digital innovation, entrepreneurship, entertainment, networking and tourism. The program is offering to participants the possibility to attend events and workshops organized by key figures of the respective sector. Since the second edition during the event a pitching competition for start-ups is organized: the registered companies will have to showcase their business idea to a whole hall full of public and will get judged by a panel of partners of the initiative. During the years different players from the Italian and international banking sectors have been partners of the Web Marketing Festival: BNP was among them in the 2018 edition.

[168] https://www.polihub.it/iniziative/storedelfuturo-experiencemore/
[169] https://www.axepta.it/
[170] https://www.polihub.it/
[171] https://www.accelerationluissenlabs.com/
[172] https://www.windtregroup.it/IT/Home.aspx
[173] https://www.sara.it/il-gruppo
[174] https://www.webmarketingfestival.it/startup-competition/
[175] https://www.searchon.it/#

Maze X[176]

Born in 2019 to support the initiative of The Maze[177], a venture capital organization part of the Fundacao Calouste Gulbenkian[178], the accelerator is supported by the legal firm PLMJ[179] and BNP Paribas as part of their Corporate Social Responsibility programs. Eligible start-ups must work on ideas that could help solving social and environmental challenges while providing also sustainable financial results, and in each batch a maximum of 10 early-stage companies with some proof of market traction could be selected for the program. The four-months acceleration program is customized for each participant and will help them in overcoming their growth challenges by providing customized consultancy in order to be able at the end of the program to attract investment and establish relationship with corporate clients, since two of the projects will be selected by corporate partners to run pilots. During the program the organizations could get access to free legal consulting and to perquisites offered by the GAN Network, of which the Maze is a partner. After the end of the program, start-ups could raise funds directly from the sponsoring venture capital firm of from a network of investors and corporations that they could meet while participating to the final international roadshow that complete the offering.

Crédit Agricole

Le Village[180]

Le Village by Crédit Agricole is the name given to each of the more than thirty innovation hubs owned by the bank and spread over Europe. The initiative was born in 2014 with the first offices in Paris and since then it has expanded all over France and internationally in Luxembourg and Italy. The mission of the Village is to create links between start-ups and enterprises in order to accelerate the innovation pace and to increase the attractiveness of each territory, creating regional employment though new ventures. These villages therefore are structured and work as autonomous specialized incubators / accelerators of new ventures, offering them a full range of service starting from workspaces to incubation and acceleration programs, from formative events to networking opportunities with local partners and last but not least the opportunity to participate to contests and to be matched with partners involved in Open Innovation projects organized by the staff of the Village. Partners in each regional Village consist of big corporations, SMEs, schools, universities and governmental organizations. The initiative is sector agnostic, but to reflect the variety of the local industrial ecosystem in which these villages are established different hubs are specialized on different topics, providing therefore a better match for both parties involved with higher possibilities of successful development and collaboration between them. Of course, all these services, competencies and capabilities developed while running these services are also used to foster innovation of the banking group, using La Fabrique as a support tool to link internal decision makers with relevant start-ups.

[176] https://maze-impact.com/maze-x/
[177] https://maze-impact.com/
[178] https://gulbenkian.pt/
[179] https://www.plmj.com/en/
[180] https://levillagebyca.com/en

La Fabrique[181]

La Fabrique, born at the beginning of 2018[182], is the start-up studio part of Credit Agricole group. The aim of this start-up studio is to facilitate innovation within the group accelerating start-ups able to enhance, improve and complete solutions developed by the group itself. These ideas could come both from intrapreneurs (employees with attitude toward entrepreneurship) or entrepreneurs (in this case meaning external start-uppers). This branch of the group will help the bank's department during the scouting phase, and with its own budget can invest directly in the proposed solutions and provide them strategic mentoring to align the start-up's and the bank's interests. The mentors working inside la Fabrique will also provide their experience and network to the start-ups, linking them with decision makers in the different division of the group in order to carry out tests in real-life environment. The start-up will be also allowed to access all the resources provided by the various Villages by CA spread across France and Italy.

Je Suis Entrepreneur[183]

Literally meaning "I am an entrepreneur", this online platform launched in the second half of 2019 from the start-up studio La Fabrique (owned by Crédit Agricole) aims at providing for free useful online tools and resources for future entrepreneurs. After registering to the website entrepreneurs can access to different tools revolving around the study and the creation of a strong business plan like:

- A location finder that enable them to compare establishment costs in different areas.
- A market analysis tool able to tell the entrepreneur important data regarding the potential competition in the chosen location, with average turnover of the activity and the demographics statistics of people living in that area.
- A tool to build reasonable financial projections considering estimates provided by previous steps of the process, also capable of evaluating if there are big discrepancies respect to similar activities in similar locations.
- A complete list of financial aid and subsidies for which the entrepreneur is eligible based on the activity that they want to set up and the chosen location.
- Guidance in the selection of the legal form of incorporation and the possibility to fill online required forms.

With all these tools at disposal, entrepreneurs will be able to study better their idea while drafting their business plan, therefore increasing by the start the awareness of the risks that they could face while trying to launch their initiative.

[181] https://lafabriquebyca.com/
[182] https://pressroom.credit-agricole.com/news/credit-agricole-group-is-launching-a-startup-studio-la-fabrique-by-ca-to-facilitate-the-creation-and-growth-of-startups-8329-94727.html
[183] https://jesuisentrepreneur.fr/

The FALC Incubator[184]

Developed by Euratechnologies with the support of Crédit Agricole and Group BPCE, the incubator is now arrived to host its fourth batch of start-ups. Launched in 2015, the incubator program aimed at helping early stage start-ups in the fields on FinTech, InsureTech, LegalTech and Cybersecurity to develop their ideas and to go on the market in less than one year. The program, lasting form 12 months provided in an initial phase (3 months) guidance to selected start-ups to develop their MVP and to test them, while in the second phase (9 months) they were supported by partners in the launch of their solution on the market. The program is completely free for start-ups, that during the development of their prototypes could also benefit of free working space and amenities provided by the campus in which they are going to be located for the program.

Crédit Mutuel

H7[185]

Born at the beginning of 2019, H7 is an innovation hub located in Lyon founded by Crédit Mutuel with the support of Huawei[186] and Suez[187] with the aim of facilitating the development of the entrepreneurial ecosystem and of the start-ups located around Lyon. This facilitation is provided to start-ups offering them coworking space and the organization of formative and networking events, both occasions in which they can get to know other entrepreneurs working in their filed, corporations and investors interested in helping the start-ups grow.

Le French Tech Rennes - Saint Malò[188]

Le French Tech is the private public initiative supported by the France government that aims at building capabilities in the community to put France among the big start-up nations. The innovation hubs located in Rennes and Saint Malò, supported by Crédit Mutuel and by Group BPCE, are two of the regional hubs scattered across France that though the services offered to the entrepreneurs and to the community is going to create the ecosystem needed to thrive in the future. These hubs are offering coworking spaces for both new and already established companies, tailored incubation and acceleration programs and organize events in order to enrich the network of the hosted ventures and to form them on entrepreneurial topics.

Les Idees Nueves[189]

Organized by the regional division of Crédit Mutuel de Bretagne in 2016, 2017, 2018 and 2019, the initiative aimed at finding the most promising ideas to support them in the development of their projects. Structured as a start-up challenge, the ten finalist start-ups had to present their work in front of a jury composed by members of the banking group in order to win the opportunity to receive strategic consulting and mentoring from the banking experts to bring to life their projects.

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[184] https://en.euratechnologies.com/startups-programs/startups-incubator/fintech-incubator/
[185] https://h-7.eu/
[186] https://www.huawei.com/en/
[187] https://www.notion.so/Suez-33f1f74ce8384d8b952eaf17669e9a9f water and trash management company
[188] https://lepoool.tech/language/en/home-en/
[189] https://lesideesneuves.cmb.fr/trophee

Group BPCE

Prix Next Innov[190]

Organized since 2018 by Banque Populaire (part of Group BPCE) and Maddyness[191] (the French start-ups' magazine), the start-up competition is targeting business to business start-ups working in the field of LegalTech, Administrative and accounting facilitation, Human resource management, marketing and enhanced organizational productivity. Start-ups to participate must have at least an MVP on the market, but also later stages innovative companies can participate. The three winners will get a cash prize for a total of 20.000€ and media coverage by the partners.

Art et Métiers Acceleration[192]

Located in the iconic Station F[193], the biggest innovation hub all over France, since 2017 is collaborating with the banks of the Group BPCE in order to provide to hosted start-ups the best possible acceleration experience. The initiative is organized by Art et Métiers[194], the association of the Alumni of the homonym school, with the aim of accelerating the growth of start-ups in the field of hardware and industry 4.0. The start-ups selected to participate to the program therefore will receive mentoring from expert, strategic consulting and matchmaking services with industrial partners thanks to the network of Alumni in order to let them create and test their prototypes with the objective of obtaining a product ready to be launched on the market by the end of the acceleration period. The bank, during this period, is going to support the start-up with tailored mentoring regarding funding opportunities leveraging on its own network of contacts.

Hackathon Recouvrement[195]

Organized just in 2017 independently by BPCE division dedicated to digital innovation B9c3, the hackathon aimed ad finding solutions regarding the customer journey of clients that are finding difficulties using the banks interfaces between the community of employees, start-uppers, students and academics.

The FALC Incubator

Developed by Euratechnologies with the support of Crédit Agricole and Group BPCE, the incubator is now arrived to host its fourth batch of start-ups. Launched in 2015, the incubator program aimed at helping early stage start-ups in the fields on FinTech, InsureTech, LegalTech and Cybersecurity to develop their ideas and to go on the market in less than one year. The program, lasting form 12 months provided in an initial phase (3 months) guidance to selected start-ups to develop their MVP and to test them, while in the second phase (9 months) they were supported by partners in the launch of their solution on the market.

[190] https://www.prixnextinnov.com/
[191] https://www.maddyness.com/
[192] https://www.am-acceleration.fr/
[193] https://stationf.co/
[194] https://artsetmetiers.fr/fr/formation/associations-danciens-eleves
[195] https://www.89c3.com/news/le-hackathon-recouvrement-est-lance/

The program is completely free for start-ups, that during the development of their prototypes could also benefit of free working space and amenities provided by the campus in which they are going to be located for the program.

Le French Tech Rennes - Saint Malò

Le French Tech is the private public initiative supported by the France government that aims at building capabilities in the community to put France among the big start-up nations. The innovation hubs located in Rennes and Saint Malò, supported by Crédit Mutuel and my Group BPCE, are two of the regional hubs scattered across France that though the services offered to the entrepreneurs and to the community is going to create the ecosystem needed to thrive in the future. These hubs are offering coworking spaces for both new and already established companies, tailored incubation and acceleration programs and organize events in order to enrich the network of the hosted ventures and to form them on entrepreneurial topics. Each regional hub has its own area of expertise, and the ones of Rennes – Saint Malò are Cybersecurity, Privacy, Education, Entertainment and Food.

Societè Generale

#LePlateau[196]

Part of the open innovation offering of the banking group created in 2017, #LePlateau is the Societè Generale innovation campus located near Paris that hosts start-ups for acceleration purposes. Inside the spaces of the campus external and intrapreneurial start-ups work side by side, providing a good ground for knowledge sharing and building. External start-ups could be hosted for free up to six months, but to enter they need to be selected by the Venture Capital arm of the group or by collaborating with the bank though a POC project. Similar campuses, called the #Greenhouse and #LePlateau LUX, has been opened in 2018 in the bank's offices in London and Luxembourg respectively.

Global Markets Incubator[197]

Launched in 2018 in Paris and for the 2020 batch expanded also in Asia, the Global Markets Incubator is an acceleration program dedicated to start-ups working on Financial Markets innovations, irrespectively from the stage. Created in collaboration with Paris&CO[198], the governmental innovation and economic development agency of the Paris metropolitan area, the incubator is offering to start-ups the possibility to access the bank's data to create POC projects to be tested in real environments and strategic consulting and support delivered by financial market experts. The screening of the application is performed directly by Societè Generale finalcial market division so that they could admit only the start-ups that could provide and add value to the services of the banks. The program lasts for six months and it's totally free for the start-ups.

[196] https://openinnovation.societegenerale.com/ourprograms
[197] https://globalmarketsincubator.societegenerale.com/
[198] https://www.parisandco.com/

The Catalyst[199]

The Catalyst is an incubation program organized since 2016 by the Indian division of the group. Open to start-ups in the early stages from all around the world, the program offered three months of incubation to participants in order to solve with them some of the business challenges identified across the bank. The start-ups had therefore the possibility to create their MVP with the help of banking experts and to test them in real environments though the banking infrastructure.

China Startup Challenge[200]

Organized in the second half of 2017 in China but open to ideas coming from all around the world, this challenge had the aim of finding the best start-ups able to help the bank in increasing customer knowledge though simplified data analysis, leverage digitalization to speed-up operations and increase conversion rates for corporate customers. The competition was organized in two phases: in the first one the teams had to refine the solutions with the help of banking experts, while after a selection process the ten best projects could access an incubation program lasting for 6 months. In this second phase, similarly to the other initiatives organized by Societè Generale, the start-ups the possibility to create their MVP with the help of banking experts and to test them in real environments though the banking infrastructure.

Innovation Labs[201]

Organized by TechLounge[202] and supported by public institutions and corporations like the Polytechnic of Bucharest, Carrefour, Atos, Orange and OMV Petrom, the Innovation Labs are vertical programs focused on different industries created to develop innovative solutions able to solve partner's challenges. The structure of the program is similar for each vertical: first of all the teams, being composed by students or university spin-off or already established start-ups, after a first call with experts, participate to a three-day hackathon to refine the ideas to be pitched in front of the jury composed by partner representative; winning start-ups are than allowed to participate into a three months incubator aimed at developing the prototype of the idea. During this period the start-ups must also participate to formative events and will have the possibility to engage with relevant stakeholders of the vertical selected. Societè Generale though its Romanian subsidiary is sponsoring the FinTech vertical Innovation Lab since 2018.

[199] https://sggsc.blog/2020/08/17/societe-generales-catalyst-sets-a-benchmark-in-startup-acceleration/
[200] https://www.agorize.com/es/challenges/societe-generale-china?lang=en
[201] https://www.innovationlabs.ro/
[202] https://tech-lounge.ro/

Defrag the Dinosaur[203]

Powered by BeMyApp Agency[204] and Societè Generale, Defrag the Dinosaur was a 48-hours hackathon organized in 2019 in Berlin to help the bank in better processing data though automation and with smarter solution of design. The call provided to participants, both to early-stage start-ups and independent teams, mentoring and support during the challenge and awarded the best teams with cash prizes and the possibility to follow on with the project thanks to a stricter collaboration with the bank itself in the development and the deployment of the innovation.

Hackathon FinTech & Machine Learning[205]

Powered by Finastra (a financial software developer) and Societè Generale, this hackathon aimed at finding new ways to use machine learning to improve fund management solutions for the bank. Held in April 2019 in Paris, the hackathon was open both to start-ups and to single developer/analyst or designer. The prize of the competition was the opportunity to present the project at the FusionONE conference in London and the possibility to enter the incubator of Societè Generale (#LePlateau) in Paris.

Bankathon

The events proposed and coordinated since 2015 by Finleap have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. Banks from Societè Generale group were involved in 2019 edition, while there is still no information available regarding the 2020 sponsors. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

[203] https://defrag-the-dinosaur.bemyapp.com/
[204] http://www.bemyapp.com/
[205] https://www.hackathon.com/event/hackathon-fintech-machine-learning-by-societe-generale-and-finastra-58578330363

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

The LHoFT

The Luxembourg House of Financial Technologies is private-public initiative born in 2017 by Luxembourg For Finance (LFF, the governmental agency for the development of Luxembourg as a financial center) and the Ministry of Finance[206] in partnership wit credit institutions like BNP Paribas and Societè Generale, consulting firms like PwC and KPMG, and various innovation promotion partners. The aim of The LHoFT is to create a hub able to drive innovation for Luxembourg's financial service sector by connecting the internal FinTech community with international partners: open to FinTech start-ups from all over the world, by attracting talent and ideas this initiative hopes to accelerate the pace of innovation in the financial sector in Luxembourg. The main activity of the hub is therefore to provide help to already established start-ups to enter the Luxembourg (and therefore the European) market in the smoothest way possible, providing these companies training and education, access to the key ecosystem stakeholders, and consulting services. The LHoFT provides also to matchmaking service for funding and grants with their own network of investors and governmental agencies.

Germany

Bayerische Landesbank Group

Startup Harbour[207]

The Startup Harbour is a six months incubation program focused on IoT and digital start-ups organized by Bosch[208] and sponsored by the public entities Berlin Senate Department of Economics[209]and by ESF (European Social Fund)[210] started in the second half of 2018. Focused on seed stage start-ups the program aims to support talented teams into the creation of a first MVP to be tested on the market, the program offers tailored mentoring provided by Bosch experts from all over the company and access to laboratories and academic knowledge thanks

[206] https://mfin.gouvernement.lu/en.html
[207] https://www.startup-harbour.com/focus-areas/
[208] https://www.bosch.com/company/
[209] https://www.berlin.de/sen/wirtschaft/en/
[210] https://ec.europa.eu/esf/home.jsp

the collaboration with the University of Applied Sciences Berlin. On top of the ecosystem creation aim of the program, the Startup Harbours serves also as a matchmaker between most promising start-ups with Bosch business units, corporate partners and investors. Bayerische Landesbank is the corporate supporter of the vertical dedicated to the "farming of the future", scouting for solutions able to optimize agricultural processes, prediction engines and new tools for data analysis. The bank is participating to the initiative since it is one of the biggest suppliers of financial services to the agricultural sector of all Germany, therefore they could help linking the start-ups with relevant German farming association to test and validate their ideas.

Bankathon

The events proposed and coordinated since 2015 by Finleap have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. The bank pertaining to the group of Bayerische Landesbank, with its universal banking brand DKB[211], was involved in 2016 and 2017 editions, while there is still no information available regarding the 2020 sponsors. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

Commerzbank

Tech Quartier[212]

Founded in 2016 by more than fifty academic institutions and corporations, Tech Quartier is a FinTech innovation hub located in Frankfurt, the financial capital of Europe. The initiative aims at providing a to the financial industry stakeholders a place where start-ups and corporates can meet, learn from each other and collaborate on the development of business models and technologies supporting the financial industry. The hub offers to start-ups office space, formative workshops with industry players and regulators and the networking events with corporate key employees and investors.

[211] https://www.dkb.de/
[212] https://techquartier.com/#

To corporate partners, on the other side, Tech Quartier provides scouting services, organizes business speed dates and offers the possibility to organized dedicated accelerators and challenges on top of organizing corporate innovation workshops.

Between the Towers events[213]

Organized by the R&D unit of Commerzbank, Main Incubator[214], these events are held once a month in the bank's headquarter in Frankfurt and aims at building knowledge for the financial ecosystem regarding innovation and enabling technologies for FinTech. Speakers present the latest trends and innovative start-ups have the possibility to pitch their solutions in front of a panel of stakeholders of the financial industry, with opportunities to network.

Mastercard Lighthouse Program

Organized by Mastercard and NFT venture capital firm since the beginning of 2019, the program is aiming at building partnership between financial corporations and ready to scale start-ups from FinTech and cybersecurity field established in northern Europe and Baltic countries. The banks involved in the program are Danske Bank, Nordea, Op-Pohjola Group, Commerzbank, SEB and Swedbank. Each batch admits cumulatively around 15 (fifteen) scale-ups hosted for free in one of the cities in which the program is held and provides them, along five months, the opportunity to participate to different networking workshops. In these reunions the program brings banks, investors, advisors and start-ups together to explore the possibility of creating partnerships and close investment and financing rounds. All participants will remain in the Alumni network of the program, but the start-ups able to build the largest partnerships will also win some prizes: top three of them are invited to attend the annual Slush event and the overall winner will also be enabled to participate to Mastercard's StartPath Pitch Day in New York, all for free.

Deutsche Bank

Innovation Labs[215]

Deutsche Bank's Innovation Labs are a series of offices located in multiple locations all around the world born to support the banking group in the digital transformation. These offices, started in 2015 in Berlin and London and in the subsequent years expanded in Silicon Valley and Ney York, are focused on creating an effective environment where collaboration between start-ups and corporation is possible with an open innovation mindset. The Labs are collecting needs from business units and trough scouting actions they enter into contact with start-ups that could provide valuable solutions to identified pain points and link the two parties directly in order to develop a pilot project to seek validation. The start-ups therefore are directly contacted by the Innovation Labs, which on top of connections provide them also with resources to develop and refine the products that meet the bank's needs and support them in the integration of their solution into the banking infrastructure.

[213] https://main-incubator.com/en/community/#events
[214] https://main-incubator.com/en/home/
[215] https://labs.db.com/

Startup@Germany[216]

The initiative promoted by Deutsche Bank has been created to follow and help the start-ups along all their growth path. For each stage of the start-up the bank is offering help in market analysis and connections to industrial partners on top of the possibility to get involved in the open innovation activities carried out by the Innovation Lab if solving one of the bank's needs and traditional banking services, both for day to day cash management and for fundraising.

SPINLAB[217]

SPINLAB is the HHL Leipzig Graduate School of Management[218] accelerator for early-stage start-ups since 2015. The accelerator provides to start-ups working in the field of HealthTech, Energy, Smart cities and in other sectors related to the local industrial presence a program lasting six months in which they receive tailored mentoring to help them test and scale their solutions. One of the strengths of the program is that industrial partners and governmental organizations are deeply integrated within the accelerator and are constantly seeking for activating proof of concept projects with start-ups to innovate their services. Deutsche Bank is an active sponsor of the program, offering to the start-ups tailored consulting regarding capital issue and helps them to be introduced to relevant partners in their field of work.

M.Tech Accelerator[219]

M.Tech is the acceleration program launched in 2018[220] by the Technology Transfer Initiative (TTI) department of the University of Stuttgart[221] to increase and promote the growth of start-ups in the German region of Baden-Wuerttemberg, created in collaboration with the city of Stuttgart, BWcon[222], The Impact Hub Stuttgart[223], different corporations and sponsored by Stuttgart Region Economic Development entity[224] and the European Social Fund. The program is focused on start-ups developing solution in the field of mobility, manufacturing and engineering and will provide them direct access to leading corporate partners that will eventually support them in structuring pilot projects, free use of hardware and software of the university laboratories and corporate support for product development, workspace in the innovation hub in Stuttgart and tailored mentoring and coaching to better prepare the innovative companies to raise funds. On top of these opportunities, start-uppers will be invited to participate to different pitching and networking events organized with industrial partners four times each year.

[216] https://www.deutsche-bank.de/ub/branchenkompetenz/startups.html
[217] https://www.spinlab.co/
[218] https://www.hhl.de/
[219] https://www.mtechaccelerator.com/en/#partnerunternehmen
[220] https://www.festo.com/group/en/cms/13068.htm
[221] https://www.uni-stuttgart.de/en/
[222] https://www.bwcon.de/english
[223] https://stuttgart.impacthub.net/
[224] https://wrs.region-stuttgart.de/

Female FinTech Competition[225]

The competition organized for the first time in 2019 by Atos[226], Deutsche Bank and Google Cloud into the TechQuartier spaces aim at supporting women-led teams of FinTech start-ups into the creation of their businesses. The program is structured as an idea competition: participants, in a first phase, have to submit their idea to be analysed and evaluated by a panel of industry expert who are going to select the best once and in a second phase help them build a business plan of their business. At the end of the experience, participants will have to pitch in front of the jury to win a place into the FinTech accelerator organized by Atos.

Made for Good[227]

Made for Good is the Corporate Social Responsibility program of Deutsche Bank with which they try to address societal issues throughout the promotion of entrepreneurship around the world, working with small and early stage ventures. The bank supports these businesses with local programs focused on different topics for each country and helps them building skills and business knowledge to become sustainable businesses and to be ready for investments. The program is offered by banks volunteers that provide advices on business planning, strategy and fundraising other then helping the new entrepreneurs creating the right mindset to succeed with their initiative.

Bankathon

The events proposed and coordinated since 2015 by Finleap have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. Banks from Deutsche bank group were involved in 2016, 2017 and 2018 edition, while there is still no information available regarding the 2020 sponsors. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

[225] https://engage.atos.net/fintech2020
[226] https://atos.net/fintech/home
[227] https://www.db.com/cr/en/society/made-for-good.htm

Plug & Play FinTech Europe

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties. Deutsche bank has joined Plug & Play European FinTech program held in Frankfurt as a partner since 2018[228].

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Deutsche Bank is partnering with Startupbootcamp in the New York FinTech program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè

[228] https://www.prnewswire.com/news-releases/plug-and-play-and-techquartier-announce-the-first-five-corporate-partners-to-join-the-fintech-europe-innovation-platform-in-frankfurt-300634143.html

Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

Tech Quartier

Founded in 2016 by more than fifty academic institutions and corporations, Tech Quartier is a FinTech innovation hub located in Frankfurt, the financial capital of Europe. The initiative aims at providing a to the financial industry stakeholders a place where start-ups and corporates can meet, learn from each other and collaborate on the development of business models and technologies supporting the financial industry. The hub offers to start-ups office space, formative workshops with industry players and regulators and the networking events with corporate key employees and investors. To corporate partners, on the other side, Tech Quartier provides scouting services, organizes business speed dates and offers the possibility to organized dedicated accelerators and challenges on top of organizing corporate innovation workshops.

DZ Bank

Startups Nordwest[229]

Launched in 2017 by the innovation center of the University of Oldenburg[230], Startup Nordwest is a website where start-ups that wants to grow their businesses in the North-Western part of Germany could find useful formative resources, a network of other start-ups already established in that region and information regarding innovation partners that could help them achieve their goals and scale. One of these partners is DZ Bank, who is offering to these star-ups help in drafting their business plans and network introduction to relevant stakeholders.

Plug & Play FinTech Europe

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide

[229] https://startups-nordwest.de/
[230] https://uol.de/

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Landesbank Baden-Württemberg

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Norddeutsche Landesbank – Girozentrale (NORD LB)

Hafven Innovation Community[232]

Located in Hannover, Germany, Hafven is an innovation hub opened in 2014 offering workspaces for start-ups and corporations and laboratories for makers and rapid prototyping, counting as far of November 2020 more than 1300 members. On top of ease networking between the start-ups and the corporation through the organization of focused events, the Hafven team organizes with corporations also specific Acceleration programs, like the one with NORD LB that is running since 2019. The accelerator is focused on start-ups providing solutions in the field of Digital Platforms, Artificial Intelligence, Sustainable Finance, Property Technology, Customer Service, Renewable, Infrastructure, Agricultural Technology and

[231] https://www.prnewswire.com/news-releases/plug-and-play-and-techquartier-announce-the-first-five-corporate-partners-to-join-the-fintech-europe-innovation-platform-in-frankfurt-300634143.html
[232] https://www.hafven.de/page/ueber-uns

Regulatory Technology. Hafven is offering to participant start-ups tailored mentoring, formative events and resources to help them build a sustainable business model. The bank will provide to start-ups feedbacks and guidance in order to co-create a solution ready for the market.

OLB Wustenrot

Startups Nordwest

Launched in 2017 by the innovation center of the University of Oldenburg[233], Startup Nordwest is a website where start-ups that wants to grow their businesses in the North-Western part of Germany could find useful formative resources, a network of other start-ups already established in that region and information regarding innovation partners that could help them achieve their goals and scale. One of these partners is OLB, who is offering to these star-ups help in drafting their business plans and network introduction to relevant stakeholders.

Greece

Alpha Bank

FinQuest[234]

FinQuest is the Open Innovation program of Alpha Bank, organized since 2019 in collaboration with Found.Ation[235], Deloitte, Microsoft and IBM. The aim of the program is to find valuable start-ups able to provide innovative proposals to challenges decided by the bank and helping them to refine their solution in order to be integrated within the bank's ecosystem of products and services or within their infrastructure. 2020 edition was focused on finding solutions for a "new digital banking experience", therefore start-ups from everywhere in the world were invited to apply if they were able to provide solutions to improve customer onboarding and engagement, identity management, predictive analysis, personalization and new ways to interact with the bank though IoT. Selected start-ups could access to a five weeks acceleration program in which they could receive mentoring from partners and technical and business support from the bank's own employees in order to test and implement pilot projects, thanks to the API library provided to prototype the start-ups solutions.

Open banking hackathon

Organized by Finqware, a middleware provider linking businesses with financial service providers application programming interfaces (API), the competition was held in 2019 and in September 2020. In the first edition, no external banking partners were involved, but in 2020 the event has been sponsored by multiple east-European institutions like Erste Bank (the Romanian branch), Raiffeisein Bank, Alpha Bank and OTP other than other technological partners like Google Cloud and Asseco (one of the biggest software houses of the European market) and Ernst and Young consulting firm. As the name of the program suggests, the hackathon aim is to challenge participants to build value creation applications on top of Open

[233] https://uol.de/
[234] https://www.finquest.gr/
[235] https://thefoundation.gr/

Banking data provided by partners and aggregated by Finqware platform. Accepting applications coming from teams and from start-ups from Poland, Romania, Bulgaria, Hungary, Croatia, Slovenia, Slovakia, Czech Republic and Greece the hackathon has been focused on the implementation of real use cases in three main fields: open banking for individuals, for business and for Internet Of Things (IoT). The teams, provided with data and tools to craft and test their own solution, were guided and received feedbacks from market experts provided by partners, with which they also had the opportunity to network and to discuss about partnerships. The participants also had the opportunity to be exposed to investors and cash, services prizes and POC contracts are awarded.

Eurobank

The EGG[236]

The EGG is the program of Eurobank active since 2013 and created in collaboration with Corallia237 (one of the most prominent innovation hubs in Greece) to support entrepreneurship in Greece though the offering of incubation services. The program is open not only to Greek start-ups but also to European ones, providing the fact that they are interested in establishing an activity in the Hellenic region or that they would like to consider that market a strategic part of their activity. Different path are offered to start-ups in different phase of their evolution: for early stage projects the program provides mentoring and formative events to structure a proper business plan, while for more mature projects the program provides formative events and access to the networks of the bank and the innovation hub in order to connect these projects with interested parties. The program is open to ideas from all sectors.

National Bank of Greece

Reload Greece[238]

Reload Greece is an initiative based in the UK aiming at supporting the image of Greece as an entrepreneurial land, able to attract and retain talent and place to build valuable start-ups. The non-for-profit entity has organized with the National Bank of Greece in 2019 RGYEP, a series of events and initiatives aiming at supporting and promoting start-ups and entrepreneurship in Greece. Focus on early stage start-ups, the program provided to aspiring entrepreneurs formative events to develop their business idea and a demo day at the end of the experience with relevant stakeholders of the sponsoring entities that could help these start-ups to grow their network and potentially starting business relationships.

Be Finnovative[239]

Be Finnovative is the acceleration program organized by National Bank of Greece in collaboration with Crowdpolicy for FinTech start-ups. Launched in 2016 but hosting it's first batch in 2017, the program reached its third edition in 2019. Selected early stage start-ups that have at least an MVP or a prototype ready to be tested in the market in the area of

[236] https://www.theegg.gr/el
[237] https://www.corallia.org/en/
[238] https://www.reloadgreece.com/
[239] http://befinnovative.com/en/

FinTech get access to a five months acceleration program through which they get mentoring from bank's employees, technical support in the integration of the bank's API into their solutions, free working space and possibilities to be linked with interested parties from the organization's networks. Teams are also rewarded with 3.000€ (three thousand) if they conclude the program, but most importantly they are collaborating directly in the development or integration of their solutions within the banking ecosystem since POC projects could be started if the solution proposed matches the needs of the bank. At the end of the program a demo-day is also organized where the participating start-ups could get in contact with investors, with a higher possibility to receive funding due to the further validation provided by the bank.

Business Seeds[240]

The initiative, born in 2010 as a joint initiative between NGB bank and top universities from the Hellenic region, is an idea competition in which Hellenic teams could participate and win cash prizes up to 20.000€. Applications are open for early start-ups ides in the fields of e-business, environment and culture broadly interpreted, who needs to submit a business plan and a slide deck of the pitch to be evaluated to compete for the awards. Participants could also be introduced by the bank to other initiatives in relevant field, like the EIT InnoEnergy program, which is sponsored by NGB.

Optima Bank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Piraeus Bank

Excelixi[241]

Excelixi is the center for sustaibable entrepreneurship of Piraeus Bank, born in 2010 to support entrepreneurship in Greece though different services: they offer training and educational program for corporate employees and consulting services. Since the initiative is aiming at supporting entrepreneurship, some consulting services are designed only for start-ups, like the help offered in drafting business plans and to access national and international funds and grants able to finance the innovative idea.

Hungary

Budapest Bank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

GRANIT Bank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

[240] https://www.nbg.gr/en/nbgseeds
[241] http://www.excelixi.org/innovation

MKB Bank

MKB FinTech Lab[242]

The FinTech Lab is the innovation lab of MKB Bank located in Budapest, born in 2018 with the aim of creating a FinTech community in the CEE region and to innovate the bank itself with open innovation initiatives. Throughout the partnership program, early-stage start-ups could present their ideas to the bank and win the possibility to run POC projects to validate their solutions using the banking resources and client pool data. The bank will also help these start-ups in the ideation phase, involving different stakeholders from interested departments in order to create a suitable solution for long term cooperation. This call is open all the year and selected start-ups will have to relocate in Budapest for the duration of the program in order to collaborate closely with bank's stakeholders and Lab's personnel.

OTP Bank

Startup Accelerator by Nestholma[243]

The Startup Accelerator was a program organized in 2018 by OTP Bank in partnership with Nestholma, lasting for three months and with the objective of accelerating business ideas in different sectors (from services for financial education to instruments to optimize personal workflows, from new technologies able to drive change in the banking experience to better tools for acquiring and capitalizing banking data) to improve processes and products of the bank. Nestholma supported both the bank and the start-ups in improving their learning processes, in finding business opportunities and in defining the terms of the collaboration between them. The program was not free, since start-ups had to sell part of their equity (maximum 10%) to participate to the program, but they get in exchange cash investment and in-service investment on top of direct links with the interested bank.

OTP Startup Partner Program[244]

This bank's open innovation initiative was born in 2017 and it is currently accelerating the fourth batch of growth stage start-ups and scale-ups. Innovative companies from everywhere in the world aiming at testing their products within the bank ecosystem could apply to get a chance to collaborate with OTP via POC or Pilot projects depending on the readiness of the solution. The goal of the program for OTP is therefore to find valuable solutions provided by start-ups to their issues and establishing with them fruitful collaborations after having tested their proposals. Each start-up selected will be mentored by senior experts and executives of departments in which the testing is going to happen and at the end of the program a demo day is organized to showcase the results not only to the entire banking group but also to external investors and other interested corporations.

[242] https://fintechlab.hu/
[243] https://nestholma.com/collaboration-programs/otp-startup-accelerator/
[244] https://otpstartup.com/

Ultrahack EIT Digital Deephack

The hackathon, held in 2019 in Budapest and Organized by Ultrahack and EIT Digital[245] for OTP eBIZ bank division, aimed at finding useful ideas able to address the shortcomings of SME finance management processes. Due to the lack of integration of tools that SME clients of OTP bank reported to the employees, the bank encouraged start-ups to provide solutions able to improve the interaction between buyers and suppliers, to integrate better the financial processes in the enterprise resource planning systems of the company and generally other solutions that could help SME do their administration work in an easier way. Winning ideas get the opportunity to win modest cash prizes and most importantly the opportunity to develop pilot projects with the bank itself.

Open banking hackathon

Organized by Finqware, a middleware provider linking businesses with financial service providers application programming interfaces (API), the competition was held in 2019 and in September 2020. In the first edition, no external banking partners were involved, but in 2020 the event has been sponsored by multiple east-European institutions like Erste Bank (the Romanian branch), Raiffeisein Bank, Alpha Bank and OTP other than other technological partners like Google Cloud and Asseco (one of the biggest software houses of the European market) and Ernst and Young consulting firm. As the name of the program suggests, the hackathon aim is to challenge participants to build value creation applications on top of Open Banking data provided by partners and aggregated by Finqware platform. Accepting applications coming from teams and from start-ups from Poland, Romania, Bulgaria, Hungary, Croatia, Slovenia, Slovakia, Czech Republic and Greece the hackathon has been focused on the implementation of real use cases in three main fields: open banking for individuals, for business and for Internet Of Things (IoT). The teams, provided with data and tools to craft and test their own solution, were guided and received feedbacks from market experts provided by partners, with which they also had the opportunity to network and to discuss about partnerships. The participants also had the opportunity to be exposed to investors and cash, services prizes and POC contracts are awarded.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

[245] https://www.eitdigital.eu/ European digital innovation and entrepreneurial educational organization

Ireland

Allied Irish Bank

Start-ups Tips and Resources[246]

The Irish Bank, on its webpage, has an entire section dedicated to start-ups in which articles on different topics regarding entrepreneurship are collected and organized in order to provide visitors with useful information regarding the start-up world. On top of articles the portal provides also visitors with useful tools for financial calculation and guides to draft a suitable business plan.

Open Up Challenge

Born in 2017 as an initiative by Nesta (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

Bank Of Ireland

Think Business[247]

Think Business is the online repository of articles, tools, templates and useful information for entrepreneurs and start-ups of Bank of Ireland. The website is providing for free to everyone guidance for each different phase of a business, from starting-up to scaling-up, and original content and case studies coming from the Irish entrepreneurial community. The initiative is also providing information on how to run the business on a daily basis, therefore special section for human resources, marketing and sales are also provided.

Open Up Challenge

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[246] https://business.aib.ie/my-business-is/business-start-up-package/tips-and-resources
[247] https://www.thinkbusiness.ie/topics/starting/

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Italy

Banca Sella

SellaLab[248]

SellaLab is the innovation platform of Banca Sella born in 2013 to support the digital transformation and the transition to an open innovation environment of corporations and SMEs and to support the growth of an entrepreneurial ecosystem into the territories in which they operate. To accomplish its mission SellaLab organizes courses of open innovation for corporations, providing also introductions to complementary ecosystem partners (like venture capital and business angels). The bank is providing also a service of business scouting and matchmaking, articulated trough different possible projects, to both corporation and start-ups in order to connect them and increase therefore the possibilities of creating business opportunities. Interested sectors for matchmaking opportunities are FinTech, IoT, Artificial Intelligence, Robotics, Fashion, E-commerce, mechatronic, naval and aerospacial. On top of these services, in each local regional office SellaLab is offering to start-ups the possibility to rent workspace: doing so selected start-ups could work in a place in which everyday business partners are participating to SellaLab activities, increasing their networking chances.

Dpixel[249]

Born in 2009 and subsequently acquired by Banca Sella Holding Group, dpixel is a certified incubator and accelerator with the mission of helping start-ups and corporations to innovate. Dpixel selects high-potential teams to support them along all the steps required for a successful exploitation of their innovation, offering them incubation programs, acceleration programs, matchmaking with corporates for POC and pilots, advisory for mergers and acquisitions and support in fundraising. Even if dpixel is part of the banking group, they are interested in growing all the ecosystem and therefore are evaluating and accepting applications from a wide range of sectors, like AgriTech, BioTech, Energy, Mobility, Retail, Automotive, Space and Travel.

[248] https://sellalab.com/startup/
[249] https://dpixel.it/

FinTech District[250]

Opened in 2017 in Milan following an initiative sponsored by Banca Sella and Copernico[251] (a coworking space provider), the FinTech District is the only Italian FinTech innovation hub till these days. The hub, located in the financial district of the city, has the aim of creating and growing the network of stakeholders of the financial industry in order to promote open innovation and the adoption and integration of FinTech based solutions by larger players, promoting and sustaining start-ups along this journey. FinTech start-ups could therefore be hosted in the coworking spaces where they could access easily different actors of the value network in order to scale faster their solution.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Banca Sella is partnering with Startupbootcamp in the FinTech & Cybersecurity program held in Amsterdam. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

Web Marketing Festival

Organized since 2013 by Search On Media Group S.r.l.[252], the three day festival is held once a year in Italy and is focused on digital innovation, entrepreneurship, entertainment, networking and tourism. The program is offering to participants the possibility to attend events and workshops organized by key figures of the respective sector. Since the second edition during the event a pitching competition for start-ups is organized: the registered companies will have to showcase their business idea to a whole hall full of public and will get judged by a panel of partners of the initiative. During the years different players from the Italian and international banking sectors have been partners of the Web Marketing Festival: Banca Sella was among them in the editions since 2018 till today.

[250] https://www.fintechdistrict.com/
[251] https://www.coperni.co/it
[252] https://www.searchon.it/#

Banco BPM

Business Meets Innovation[253]

The initiative, created by AHK Italien[254] (the German-Italian business development organization) and sponsored by different German corporations like Bosch, Siemens and Bizerba, was launched in 2018 with the aim of matching the innovation demand of corporations with solutions provided by start-ups. The program is structured as a challenge: each corporation provided one or more challenges to be solved and run a selection process based on the applications received during a pitch challenge. After selecting the most promising start-up for each challenge a period for co-development of the solution was programmed and based on the results obtained during these three months an overall winner among all the participants is selected every year. Banco BPM was main partner of 2018 and 2019 editions.

BPER Banca

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Credito Lombardo Veneto

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Intesa Sanpaolo

Innovation Center[255]

Intesa Sanpaolo Innovation Center is the innovation division of the banking group, born in 2014 with the aim of innovating not only the bank, though the VC arm part of the company, but also the broader society with different initiatives for both corporates and start-ups. Between all the initiative available, here will be presented just the ones relevant for the research purpose:

- **Officine formative**[256]: Officine Formative is the web-portal in which early stage entrepreneurs could learn basics of entrepreneurship though online video courses, created with the objective of helping future business-owners to refine their ideas. Start-ups at the end of the course can pitch their ideas in front of the committee that will decide if they are sufficiently refined to participate to the physical acceleration course provided by Intesa Sanpaolo experts and partners.
- **Startup initiative**[257]: is a format of events organized by Intesa Sanpaolo Innovation Center born with the aim of matching promising start-ups with corporate partners. These initiatives have been organized different times since 2009, and each meeting was focused on a vertical industry (like BioTech, AgriTech, Circular Economy).

[253] https://www.businessmeetsinnovation.com/
[254] https://www.ahk-italien.it/it/
[255] https://www.intesasanpaoloinnovationcenter.com/it
[256] https://www.officineformative.it/
[257] http://www.startupinitiative.com/en/index.html

In these meetings start-ups had the possibility to pitch their ideas in front of a panel of potentially interested parties and to network with value network partners.

- **Business development and scaleup program:** this is a service offered by the bank to start-ups that wants to find potential business partners, and therefore could be considered a matchmaking initiative. Based on the technological solution offered, the Innovation Center helps the start-up find potential customers and business partners.
- **Elite Network[258]:** this service, linked to the previous described program, is providing to selected scale-ups access to the exclusive network of partners of the Elite Network, a community of corporations and investors affiliated to the London Stock exchange, created with the aim of facilitating the access to alternative sources of capital. Selected business could get introduced to valuable partners that could help them raise the fund they need.
- **Tech-Marketplace**[259]: is the digital platform of the group created to facilitate and match supply and demand of technological innovation. The website is open to both corporations and start-ups that could offer their solutions or ask for external help in solving their business troubles, providing them the information regarding the activities of each registered party and the contacts to start networking with them. Dedicated personnel from the bank will then help the parties that get in contact throughout the platform to structure a plan to collaborate effectively, also providing financial services and solutions for special projects.
- **While label Startup Initiative**: with the service Intesa Sanpalo Innovation Center is offering to corporation the possibility to co-develop specific call for start-ups focused on the proponents' needs. The innovation center helps the corporation in defining the problem, in creating the program, in selecting the start-ups and in running the accelerator, usually with the help with an external acceleration partner. Since 2018 different calls were organized with partners like multi-utilities (like IREN) and media businesses (like The Rolling Stones journal).

B-Heroes[260]

The program, launched in 2018 by Im foundation and Boost Heroes[261] in collaboration with Intesa Sanpaolo and Endeavour Italia[262], is an acceleration initiative for start-ups active in all fields. Applying start-ups get screened by Boost Heroes, a Venture Capital firm that invests in early stage initiatives, and if selected they receive a first seed investment to participate to the program. During the acceleration program, start-ups receive formative courses regarding entrepreneurial topic, tailored consulting provided by experts, investors and industry corporations, that could even engage most promising solutions in open innovation initiatives. At the end of the acceleration period, a final demo-day is organized, and one start-up is awarded as the overall winner of the competition, getting the opportunity to sign a deal for a 500.000€ investment from Boost Heroes.

[258] https://www.elite-network.com/it
[259] https://www.tech-marketplace.com/
[260] https://www.bheroes.it/
[261] https://boostheroes.com/
[262] https://endeavoritaly.org/

On top of the acceleration experience, start-ups participating to the program get also media exposure since the program is also a TV show created to share the stories of successful start-ups and the culture of entrepreneurship among people.

Grow It Up[263]

Born as an initiative of Cariplo Foundation[264] and Microsoft Italia in 2016, Grow It Up is a open innovation platform created to grow the investments in digital start-ups in Italy. The platform aims therefore to match promising start-ups with corporates in order to build open innovation projects and is trying to achieve this objective supporting them along all the process. Fist of all the staff collects the requirements provided by corporations, then it makes technological scouting to identify suitable start-ups in collaboration with Italian incubators and accelerators. Identified start-ups are then invited to attend a workshop event in which corporations present their challenges and based on the result and feedback collected a decision is made upon which start-up better fits corporate needs. After that decision, start-ups and corporations could start working together, supported both by consulting firms and industry associations and by Grow It Up mentors found in the spaces available to the parties inside Cariplo's Centro di Open Innovation in the city of Milan. Intesa San Paolo is participating to the initiative as a corporate partner, therefore is likely that they are scouting for digital solutions that could help them innovate their products and services.

Techstars Smart Mobility Accelerator[265]

The initiative was created in 2019 as a joint initiative between techstars, Intesa Sanpaolo Innovation Center, Compagnia di Sanpaolo foundation and CRT foundation. Techstars is an american innovation platform that organizes sector specific-accelerators all around the world in collaboration with proposing corporations and organizations that want to innovate. Corporations therefore let techstars perform technology and start-up scouting and during the program they can mentor participating businesses providing coaches from their pool of employees. Techstars is also a Venture Capital firm, requiring to participant start-ups to sell part of their equity (6% for 20 cash + 100k€ convertible loan) to access the program and receive mentorship, perquisites and access to a wider nedtowk of investors and corporations that could help their company scale faster. Open to growth stage start-ups from all over the world, this accelerator is focused on smart mobility technologies, smart infrastrucure and smart cities.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering. The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of

[263] https://www.growitup.it/
[264] https://www.fondazionecariplo.it/it/index.html
[265] https://www.techstars.com/accelerators/smart-mobility

free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Intesa Sanpeolo and its subsidiaries are partnering with Startupbootcamp in the London FinTech & InsureTech program, in Cairo FinTech program and in Singapore FinTech program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

Web Marketing Festival

Organized since 2013 by Search On Media Group S.r.l., the three day festival is held once a year in Italy and is focused on digital innovation, entrepreneurship, entertainment, networking and tourism. The program is offering to participants the possibility to attend events and workshops organized by key figures of the respective sector. Since the second edition during the event a pitching competition for start-ups is organized: the registered companies will have to showcase their business idea to a whole hall full of public and will get judged by a panel of partners of the initiative. During the years different players from the Italian and international banking sectors have been partners of the Web Marketing Festival: Intesa Sanpaolo was among them in the 2016 edition.

Monte dei Paschi di Siena

Officina MPS[266]

Born in 2018, Officina MPS is the innovation branch of Monte dei Paschi di Siena created and run in collaboration with Accenture. Structured as a branch of the bank, this organization has been established to help local entrepreneurs to develop their ideas and their business and to establish fruitful partnership for both parties in a context of open innovation.

[266] https://www.officina.mps.it/

Regarding the initiatives for start-ups, since 2018 the bank is organizing different vertical idea contests, named "idee per crescere", awarding the best businesses ideas after a business plan and pitch evaluation. Cash prizes are awarded to winning start-ups along with opportunities to collaborate with MPS in order to access new markets, customers and opportunities of funding.

Unicredit Group

Appathon[267]

Organized for three times from 2014 to 2016, Appathon was a FinTech hackathon run by Unicredit bank to scout for promising ideas and start-ups. Proposing different challenges regarding banking issues, the competition was targeting particularly ready-to-test solutions, in order to test them within the bank's ecosystem and potentially integrating them in their portfolio of products. The first two editions were organized in Italy, targeting Italian developers and start-ups, while the third and last one was held online to let foreign talent to participate. At the end of the competition, the ten best projects identified by the jury won 50.000€ worth of processional collaboration provided by the bank's experts.

Start Lab[268]

Organized since 2009, Start Lab is an acceleration program of 12 months provided by Unicredit directed to Italian early stage start-ups working in the fields of Digital, Life Science, Clean Tech and Innovative Made in Italy, category comprising AgriFood, Fashion, Robotics, Mechanics, Tourism and Nano technologies. Each year 40 start-ups get selected (10 per category) after an evaluation performed not only from banks experts but also from external consultants like successful entrepreneurs and professionals from the network. During these months these teams receive mentoring from experts, get introduced to incubators and accelerators that could help them, participate to formative and networking events and are guided in the creation of a sound business in order to attract funding from investors. At the end of a competition a demo day is organized and, after a pitching session, one start-up from each category receives a grant of 10.000€ as prize for the best start-up of the year in their field.

Start-Cup Piemonte e Valle d'Aosta[269]

Reaching its sixteenth edition in 2020, Start-Cup Piemonte e Valle d'Aosta is an idea competition born to incentivize entrepreneurship and business creation in the afore mentioned regions. The competition is organized by the main university's incubators (I3P, 2i3t, enne3) and is supported by different institutional partners and Unicredit Bank. Start-ups registered or willing to establish themselves in these regions working on projects regarding ICT, Life Science, CleanTech, Energy, Industrial applications and Turism can participate to the competition providing their business plan, that is going to be evaluated by a pool of experts in order to identify the 30 best projects.

[267] https://www.economyup.it/startup/appathon-torna-il-contest-di-unicredit-per-app-finanziarie-ed-e-solo-online/
[268] https://www.unicreditstartlab.eu/it.html
[269] https://startcup.i3p.it/

Once identified, these projects have to participate to a demo day in which each of them will pitch in front of the committee and of public. The jury will therefore select some of these start-ups to assign awards, that could be cash grants up to 10.000€ or in value prizes for specific services tailored to start-up needs.

Bankathon

The events proposed and coordinated since 2015 by Finleap have been organized seven times in different places across Austria, Germany and Czech Republic involving each time a different and always bigger pool of different partners from the financial industry, like software vendors and system providers, and not just banks. Banks from Unicredit bank group were involved in 2016 and 2017 editions, while there is still no information available regarding the 2020 sponsors. Each edition has attracted more than 10 sponsors and more than 75 groups of developers, becoming therefore one of the biggest independent FinTech hackathon in Europe. Finleap, being a FinTech company builder and a software house collaborating with financial institutions, other than searching new idea to develop internally with the hackathon wants to provide to banks the opportunity to get in contact with new ideas and to collaborate with software houses to develop new applications. Group working on new ideas could be formed by newcomers willing to launch their project, established start-ups and even developers and employees from financial service activities, creating a unique environment of exchange of idea between different actors belonging to the value network. The platform has proven to be the starting point for the creation of several FinTech start-ups, the setup of bank-team projects and the cooperation between players of the sector to introduce new ideas on the market. Some cash prizes are awarded, but the real value added to the event is the possibility for different actors of the value chain to network and find new ideas to develop and improve the bank of the future.

Fintechweek Hackathon

In November 2019, during the week dedicated to FinTech organized in Vienna, RBI and Unicredit Bank Austria organized a hackathon hosted in Talent Garden spaces open to teams and start-ups from Austria with the goal of creating prototypes of products able to solve some of the challenges proposed by the banks regarding financial behaviour of customers. Some of the topics proposed were solutions to improve financial literacy of customers, to tailor investment decisions to customer preferences, to encourage private pension scheme creation and to find new ways to connect with the customers and to promote sustainability with financial actions. Some prizes were awarded, but the quantification of them is not expressed on the website source of data.

Plug & Play FinTech Europe

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to

FinTech, accelerating more than 200 start-ups working on payments, lending, wealth management, security, analytics and infrastructure optimization and investing in more than 50 of them. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties. Unicredit bank has joined Plug & Play European FinTech program held in Frankfurt as a partner since 2019[270].

Plug & Play Food[271]

As stated in the previous program description, Plug & Play organizes acceleration programs not only for FinTech but also in other verticals, like in this case on Food innovation. Unicredit joined the program as corporate partner in 2019 along Lavazza coffee producers and Esselunga supermarket retail among others, to find innovative solutions regarding personalized nutrition, food freshness and safety, asset tracking, waste reduction and distribution. The goals of the program are still to connect promising early and growth stage start-ups to relevant stakeholders to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to all the parties.

Web Marketing Festival

Organized since 2013 by Search On Media Group S.r.l.[272], the three day festival is held once a year in Italy and is focused on digital innovation, entrepreneurship, entertainment, networking and tourism. The program is offering to participants the possibility to attend events and workshops organized by key figures of the respective sector. Since the second edition during the event a pitching competition for start-ups is organized: the registered companies will have to showcase their business idea to a whole hall full of public and will get judged by a panel of partners of the initiative. During the years different players from the Italian and international banking sectors have been partners of the Web Marketing Festival: Unicredit was among them since the first edition in 2016.

Business Meets Innovation

The initiative, created by AHK Italien[273] (the German-Italian business development organization) and sponsored by different German corporations like Bosch, Siemens and Bizerba, was launched in 2018 with the aim of matching the innovation demand of corporations with solutions provided by start-ups. The program is structured as a challenge: each corporation provided one or more challenges to be solved and run a selection process based on the applications received during a pitch challenge. After selecting the most promising start-up for each challenge a period for co-development of the solution was programmed and based on the results obtained during these three months an overall winner among all the participants is selected every year. Banco BPM was main partner of 2018 and 2019 editions.

[270] https://www.unicreditgroup.eu/en/press-media/press-releases/2019/unicredit-e-plug-and-play-insieme-per-scoprire-soluzioni-innovat.html
[271] https://www.plugandplaytechcenter.com/food/
[272] https://www.searchon.it/#
[273] https://www.ahk-italien.it/it/

Latvia

Citadele Bank

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Luxembourg

Banque International a Luxembourg

Pitch Your Startup[274]

Reaching its sixth edition in 2020, Pitch Your Startup is an idea competition born to incentivize entrepreneurship and business creation in Luxembourg. The competition is organized by Farvest[275], organizer specialized in business events, is supported by governmental agencies and innovation ecosystem promoters, like Plug & Play, is sponsored by BIL Bank and has the objective of attracting entrepreneurial talent in the country. Start-ups less than 5 years old from everywhere around the world working on projects regarding FinTech, RegTech, InsureTech, AI, Supply chain, Cybersecurity, Healthcare and Smart Mobility can apply to the competition. The contest is organized in two phases: after the closing date 12 participants from each category are selected to pitch in front of the jury, that will identify one single most promising start-up between them that could access the Grand Finale. In this concluding event, selected start-ups from each field will compete again in a pitching session to receive a grant of 50.000€.

Start-up Support[276]

In compliance with the banks strategic aim of supporting entrepreneurship and innovation, the bank is offering different free consulting services for start-ups in order to help them grow and establish themselves on their relevant market. To accomplish this scope, the bank through the "BIL Start" initiative is offering its expertise in evaluating business plans, help in choosing the legal form of incorporation, guidance in accessing regional, governmental, and European grants or subsidies. Moreover, the bank is also partner of all the main incubators of Luxembourg, therefore could facilitate the entrance of supported projects in these spaces, granting for the quality of these start-ups.

Netherland

ABN Amro

Holland FinTech[277]

Holland FinTech is an independent FinTech ecosystem developer born in 2014 to establish the Netherlands as one of the leading countries in the banking revolution. To accomplish this goal, they create reports about the state of the industry and the technological trends, and they organize formative events, workshops and networking events in order to favour the encounter

[274] https://www.pitchyourstartup.eu/
[275] https://www.farvest.com/
[276] https://www.bil.com/innovation/index.html
[277] https://hollandfintech.com/

and the exchange of ideas between different players of the value network. Banks like ABN Amro, ING and Rabobank are supporting this initiative among other value network organizations, providing a good contact point for start-ups that wants to present their product and services and need guidance to scale their ideas.

Yes! Delft[278]

Yes! Delft is a non-profit incubator born in 2005 to support tech and digital start-ups in the fields of BioTech, CleanTech, MedTech, EdTech, Aviation, Robotics and complex technology in establishing themselves on the market. Different programs are offered, providing to start-ups a 360 degrees support from its inception to fundraising with investors thanks to the acceleration and coworking space provided and to the extensive network of partners that has been created around the initiative. ABM Amro is one of these partners, providing the start-ups with strategic consultancy regarding funding and introduction to potential investors from their business network.

Sustainability Pitch Days[279]

Organized for four consecutive years from 2014 till 2018 included, with this event ABN AMRO aimed at match start-ups focused on sustainability, irrespective from the industry, with potential investors, especially clients of the private banking division. During these events, start-ups had to pitch in front of the public composed by investors, and banking experts introduced the parties in order to increase the dealflow.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. ABN Amro is partnering with Startupbootcamp, but no clear evidence in which program is participating is available on their website. In any case, partners have some advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

[278] https://www.yesdelft.com/

[279] https://www.abnamro.com/en/about-abnamro/in-society/sustainability/newsletter/2019/january/matching-investors-with-sustainable-start-ups.html

ING Group

ING FinTech Labs[280]

Targeting growth stage start-ups, the program run by ING since 2019 is aiming at finding valuable partners to run open innovation proof of concept and pilot projects in cooperation with ING Business units, validating whether a commercial collaboration or partnership could begin after the testing months. On top of validation, ING offers also formative events, opportunities to access key decisionmakers inside the company and the network of investors provided by ING Ventures.

Think Forward Initiative[281]

Created by Amazon Web Services (AWS), Dell Technologies, Deloitte, IBM and ING Bank in 2016, the Think Forward Initiative is consortium born to make research on how people make financial decision and develop solutions to help them protect their savings and improve their financial literacy. To reach this scope the consortium is collaborating with different public institutions and research centers, like the Center for Economic and Policy Research (CEPR), to develop studies on people behaviour and decision making, but also with start-ups to translate the results of these findings in actual products that could improve financial stability of households. The consortium has created two different paths for start-ups:

- Incubation Track: in this path, early stage start-ups are invited to discuss about the latest findings of the consortium and are challenge to co-develop with the partners new solutions that could help people solve their financial struggles. From available documentation is not perfectly clear which is the criteria to select teams that could participate to this program, but since the objective of the program is to create new start-ups it has been included in the research.
- Acceleration Track: run from Deloitte's personnel, the acceleration track wants to help already established start-ups with an MVP already in the market in scaling faster. To reach their aim this track consists of workshops, mentors meetups and formative lessons delivered by experts regarding the topics of strategic positioning, execution, scaling challenges and operations. In line with the studies carried out by the consortium, start-ups are also trained on behavioural economics findings, like the effectiveness of nudging and of gamification.

Plug & Play FinTech Europe

Established in 2006 in Sunnyvale California, Plug & Play is an accelerator, a venture capital and a corporate innovation consultancy provider operating all around the world. They organize industry specific programs where start-ups, selected to match a pool of sponsoring industry player's needs, are accelerated for 12 (twelve) weeks. These programs do not require to start-ups to sell part of their equity to participate but Plug & Play strategic aim is to invest in some them after the completion of the course. Since 2015 Plug & Play is providing a platform to corporate partners to find valuable start-ups though the vertical program dedicated to FinTech, accelerating more than 200 start-ups working on payments, lending, wealth

[280] https://www.ing.be/en/retail/labs-brussels
[281] https://www.thinkforwardinitiative.com/

management, security, analytics and infrastructure optimization and investing in more than 50 of them. The goal of the program, run usually twice a year in different locations around the globe, is to connect promising early and growth stage start-ups to the biggest financial institution to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to both parties. There is no clear reference of when ING bank has joined Plug & Play European FinTech program held in Frankfurt.

Plug & Play Smart Cities

As stated in the previous program description, Plug & Play organizes acceleration programs not only for FinTech but also in other verticals, like in this case on Smart Cities. Following the EU definition, a Smart City is a city in which digital and telecommunication technological solutions are used to improve the management and efficiency of urban environments. From the second half of 2019 Plug & Play is providing a platform to public entities and corporate partners coming from different industries that could be impacted by this trend to find valuable start-ups that could help them shaping the products and services of the cities of the future in sectors like Mobility, IoT, Real estate and construction and Energy and sustainability. The goals of the program are still to connect promising early and growth stage start-ups to relevant stakeholders to facilitate the launch of pilot projects, the financing of POCs and to provide valuable business development and investment opportunities to all the parties.

Copenhagen Fintech

Operative since 2018, the consortium was born with the goal of establishing Copenhagen as one of the leading FinTech hubs all around the world. Three different levels of collaboration are active: partners, which are responsible of the creation and the development of the ecosystem; sponsors, that are organizations that will benefit with the establishment of Copenhagen as a leading FinTech ecosystem; members, which have the right of actively participating to events. Between the partners different industries are represented, like e-commerce, telecommunication, enterprise IT and software providers and consulting firms, on top of financial institutions like Danske Bank, BNP Paribas, ING Group, Jyske bank, Nordea, Nykredit and SEB. Different initiatives, all hosted in the dedicated LAB in Copenhagen, are available for start-ups of different stages to provide a comprehensive offering able to foster the growth of the ecosystem as a whole, all without requiring equity to the start-ups involved.

First of all, the Copenhagen FinTech LAB is a coworking space designed to host start-ups and consortium-related events. Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services in the area of legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program, in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative. On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

For start-ups that already found product market fit and are therefore in later stage of their lives, four programs are available:

1. Nordic fast track program: targeting non-Danish start-ups, the program aims at facilitating their entering in the Nordic markets offering them a two months acceleration program and free hosting and services provided in the LAB spaces. This program will benefit start-ups by connecting them with the most relevant stakeholders in the market that they want to enter.
2. Global Impact partnership program: the program goal is to link Nordic FinTechs with scaling opportunities in south-eastern Asian regions provided by global partners with local presence in these countries, all of that taking into account sustainable development goals targets like the improvement of financial literacy and inclusion and the tracking of the societal impact produced by these financial organization.
3. Partnership fast track program: partners of the consortium propose some challenges to be solved related to FinTech domain and interested start-ups could apply to have a chance of starting a proof of concept project with them. Selected start-ups will be put in contact with partners' business units proposing the challenge and will get 50.000 (fifty thousand) Danish koruna (around 6.700€). During the development of the POC project these start-ups could also access the LAB workspaces spaces and services.
4. Global scaleup program: in this program, start-ups of the network from Nordic countries are invited to apply if they have already found their product-market fit and they want to start to expand internationally. The program, which is developed along maximum four months, provides scale-ups three days of 1:1 tailored strategic consulting with international experts, individualized sessions with the Denmark's Ministry for foreign affairs, mentoring and coaching from corporations partners of the consortium and access to FinTech founders who have already experienced the internationalization of their start-ups and therefore can provide useful advices.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors.

ING Group is partnering with Startupbootcamp, but no clear evidence in which program is participating is available on their website. In any case, partners have some advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

Tech Quartier

Founded in 2016 by more than fifty academic institutions and corporations, Tech Quartier is a FinTech innovation hub located in Frankfurt, the financial capital of Europe. The initiative aims at providing a to the financial industry stakeholders a place where start-ups and corporates can meet, learn from each other and collaborate on the development of business models and technologies supporting the financial industry. The hub offers to start-ups office space, formative workshops with industry players and regulators and the networking events with corporate key employees and investors. To corporate partners, on the other side, Tech Quartier provides scouting services, organizes business speed dates and offers the possibility to organized dedicated accelerators and challenges on top of organizing corporate innovation workshops.

Grow It Up

Born as an initiative of Cariplo Foundation[282] and Microsoft Italia in 2016, Grow It Up is a open innovation platform created to grow the investments in digital start-ups in Italy. The platform aims therefore to match promising start-ups with corporates in order to build open innovation projects and is trying to achieve this objective supporting them along all the process. Fist of all the staff collects the requirements provided by corporations, then it makes technological scouting to identify suitable start-ups in collaboration with Italian incubators and accelerators. Identified start-ups are then invited to attend a workshop event in which corporations present their challenges and based on the result and feedback collected a decision is made upon which start-up better fits corporate needs. After that decision, start-ups and corporations could start working together, supported both by consulting firms and industry associations and by Grow

[282] https://www.fondazionecariplo.it/it/index.html

It Up mentors found in the spaces available to the parties inside Cariplo's Centro di Open Innovation in the city of Milan.

ING is participating to the initiative as a corporate partner, therefore is likely that they are scouting for digital solutions that could help them innovate their products and services.

Holland FinTech

Holland FinTech is an independent FinTech ecosystem developer born in 2014 to establish the Netherlands as one of the leading countries in the banking revolution. To accomplish this goal, they create reports about the state of the industry and the technological trends, and they organize formative events, workshops and networking events in order to favour the encounter and the exchange of ideas between different players of the value network. Banks like ABN Amro, ING and Rabobank are supporting this initiative among other value network organizations, providing a good contact point for start-ups that wants to present their product and services and need guidance to scale their ideas.

Rabobank

Impact City[283]

Established in 2015 in the Hague (Netherland), the Impact City is a private innovation Hub created with the aim of helping innovative entrepreneurs to start and grow their businesses. To accomplish these goals, the hub is offering different services to start-ups: support in establishing the company in Netherland, coworking spaces in one of the 53 hubs located across the region, support in creating their business plan and in fundraising, access to tools for rapid prototyping and to a whole network of corporate partners and investors though dedicated events. Rabobank started to collaborate with Impact City in 2019[284], providing value added services to start-uppers in the form of support in financial decision and matchmaking with investors and interested corporate partners to help these businesses scale.

Starthub Wageningen[285]

The Starthub is the start-up incubator for students and graduates of Wageningen University & Research[286], created with the goal of developing entrepreneurial capabilities of the territory. The hub is offering classical incubation services like strategic consultancy, support in the creation of the company, working spaces, access to services at controlled prices and support in fundraising to start-ups working in the domain of food, agriculture and environment created by students of the university. Rabobank collaborates with Starthub providing value added services to start-uppers in the form of support in financial decision and matchmaking with investors and interested corporate partners to help these businesses to validate their ideas and to scale.

[283] https://www.impactcity.nl/
[284] https://impactcity.nl/rabobank-en-impactcity-announce-collaboration-when-two-organizations-have-a-mission-that-is-so-similar-then-you-start-a-dialogue-with-each-other-about-how-you-can-strengthen-each-other/
[285] https://www.starthubwageningen.nl/expert-rabobank
[286] https://www.wur.nl/en/wageningen-university.htm

FoodBytes[287]

FoodBytes is a series of matchmaking programs launched by Rabobank in 2015 in order to match supply and demand of innovation in the domain of FoodTech and AgriTech. Two different types of events are organized by the bank: the first is an idea competition in which start-ups could present their solutions to a panel of suitable corporation representatives, while in the second service offered Rabobank helps to connect selected corporates with start-ups in order to launch pilot. During these events start-ups get the opportunity to enter in contact with interested stakeholders, not only being corporate decisionmakers but only investors operating in these fields.

Rabobank – MIT Food and Agribusiness Innovation Prize[288]

Organized since 2015 as part of the FoodBytes Initiative, this idea competition in collaboration with the MIT[289] aims at supporting student-based start-ups in the domain of Food and Agricultural Technology to develop their ideas. The competition is open to entrepreneurial teams created by students from all over the North America region (Canada, Mexico and USA) and teams, once selected, participate to different bootcamps to perfect their idea, their pitch and their business plan with a dedicated mentor. At the end of the competition a final demo-day celebration is organized to award the best ideas with the grants offered by the organizations (20.000$ for the first classified and 10.000$ for the second, corresponding more or less 16.500€ and 8.250€).

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Rabobank is partnering with Startupbootcamp in the London FinTech and in Amsterdam Commerce program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

[287] https://www.foodbytesworld.com/
[288] https://www.rabobankwholesalebankingna.com/winners-of-2020-rabobank-mit-food-agribusiness-innovation-prize-announced/
[289] https://mitsloan.mit.edu/

Rockstart.

Rockstart launched in 2011 in Amsterdam to accelerate the best start-ups in four domains of energy, health, agriculture and food and emerging technologies. On top of offering classical accelerator services like strategic consulting, access to capital market and personal and team development, Rockstart collaborate with corporations and public entities to organize challenges with the aim to provide to start-ups space to test their proof of concept or to launch pilot projects in collaboration. For acceleration programs Rockstart usually act also as a seed stage business angel, requiring to participants to sign a convertible loan, dispensed partially in cash and partially in services, while for programs built in cooperation with corporations and other entities usually is the external entity to provide the prizes of the contest. Since the starting of their activities Rockstarts have supported and invested in more than 200 companies. Rabobank is partner of the accelerator, but no information about timing of the entrance or the program supported is available online.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

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Yes! Delft

Yes! Delft is a non-profit incubator born in 2005 to support tech and digital start-ups in the fields of BioTech, CleanTech, MedTech, EdTech, Aviation, Robotics and complex technology in establishing themselves on the market. Different programs are offered, providing to start-ups a 360 degrees support from its inception to fundraising with investors thanks to the acceleration and coworking space provided and to the extensive network of partners that has been created around the initiative.

Rabobank is one of these partners, providing the start-ups with strategic consultancy regarding funding and introduction to potential investors from their business network.

Poland

PKO Bank

Let's FinTech[290]

Let's FinTech is the Corporate Venture Capital arm of PKO Bank, that non only invests in promising ideas that could help the bank in their business but offers also to start-ups the possibility to develop proof of concept and pilot projects to test and validate their solutions in a real environment. The bank is therefore adopting an open innovation approach to find valuable products that could help them improve their processes and services, scouting for solutions in the fields of Digital Banking, Customer Engagement, Data & Analytics, Blockchain and Security & Protection. With this program start-ups could get direct access to decision makers inside the company, co-develop their solution with a partner interested to commercialize or buy it and get financed while validating the project.

Portugal

Banco Comercial Portugues (Millenium BCP)

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Caixa General de Depositos

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Novo Banco

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Romania

Banca Romanesca

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Slovenia

Nova Ljubljanska banka

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

[290] https://fintech.pkobp.pl/fintech-en/

Spain

Banco Sabadell

BStartup[291]

BStartup is the open innovation initiative of Banco Sabadell directed to growth-stage start-ups operating in the domain of interest of the bank. With this program the bank is scouting for solutions regarding FinTech applications, Big data / Machine Learning / AI / Blockchain applications, IoT and solutions linked with the Corporate Social Responsibility objectives of the company. There is no indication of how the collaboration is going to happen, but it must be acknowledged that this initiative is linked with the two Venture Capital Funds managed by the bank.

Intrumhack[292]

Organized in 2018 and in 2019, the Intrumhack was an hackathon organized by Intrum[293] (a credit manager service company), Mulesoft[294] (a integration plaftorm) and Banco Sabadell with to find new ideas that can help costumers achieving their financial goals and better manage their savings. The competition lasting 48h was open both to independent participants and to start-ups, that competed to win a cash prize and the opportunity to obtain a collaboration contract with the organizers to further develop the idea.

Venture On The Road[295]

Active since 2017, Venture On The Road is an itinerant start-up competition for ICT projects in Spain organized by Seed Rocket (an accelerator) in collaboration with Banco Sabadell BStartup division. Few weeks before the convocations local start-ups had to provide to the jury their pitches and their business plans in order to be evaluated: if selected they get the opportunity to pitch in front of a panel of corporations and investors to compete for a cash prize. All the winners of the local rounds at the end of the program get invited to a country-level final in which they pitch again, trying to win a bigger prize and the opportunity to receive investments from the accelerator and help from the bank.

LetsDoIt Challenge[296]

Organized in 2018 by Banco Sabadell and Ulule, a reward crowdfunding platform, LetsDoIt challenge was a start-up competition targeting companies that want to launch a product thanks to the use of reward crowdfunding as a mean to collect capital for first productions. More than 60 projects applied for the program, but prizes were granted just to top three. These prizes consist in one year mentoring, PR and social media campaign, free workspace for a month in a coworking environment in Barcelona or Madrid and the overall winner get also a modest cash prize of 3.000€.

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[291] https://bstartup.bancsabadell.com/en/collaborative-innovation/
[292] https://www.intrum.com/press/news-stories/seamless-and-simple-stands-out-as-winner-in-intrumhack/
[293] https://www.intrum.com/
[294] https://www.mulesoft.com/
[295] https://www.seedrocket.com/eventos/venture-on-the-road/
[296] https://bstartup.bancsabadell.com/en/choose-cthulhu-wins-the-letsdoit-challenge-from-ulule-and-bstartup/

Banco Santander

Santander X[297]

Santander X is the on-line platform for entrepreneurs created by Banco Santander to collect all the bank-sponsored initiatives organized to support entrepreneurship across all the countries in which the bank operates, both in Europe and in South America. Being a repository for initiatives for entrepreneurs, all the useful information regarding various calls, formative and networking events can be easily retrieved by users. One of strategic aim of the bank is to support entrepreneurship across all stages of growth: the offering therefore comprises programs targeting projects from the stage of the ideation to already established and profitable companies with different formats. Among these programs we can find:

- Entrepreneur X[298]: the start-up competition organized by Santander in South America, where start-ups born inside universities present their ideas to win a grant of the magnitude of the ten-thousands of dollars.
- The Call[299]: an open innovation project launched by the bank itself in 2019 to match supply and demand of innovation for client SMEs. Through this open call, four start-ups have been selected to run open innovation proof of concept projects with Spanish SMEs, with the bank covering the role of facilitator of the negotiation.

Open Bank Project Hackathon[300]

Held in 2018 in London, this hackathon organized by the Open Bank Project and Santander UK had the objective of finding new ideas in the FinTech field using the Open Banking API applications to build them. The competition was open to start-ups, employees of the bank and single participants, that grouped together had to develop in few days an MVP for a new product.

Actua UPM[301]

Actua is the start-up competition organized by the Universitad Politècnica de Madrid[302] to promote entrepreneurship among its own pool of students, researchers, professors and alumni. The competition in 2020 has reached its seventeenth edition and with the help of partners like Banco Santander and Bankia, is able to award selected promising businesses with money grants for a total value of 45.000€.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred

[297] https://www.santanderx.com/
[298] https://www.santander.com/en/press-room/press-releases/santander-rio-universities-announces-the-winners-of-the-2018-edition-of-entrepreneur-x-award
[299] https://startups.bancosantander.es/
[300] https://www.openbankproject.com/hackathon/
[301] http://actuaupm.blogspot.com/
[302] https://www.upm.es/

cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Banco Santander is partnering with Startupbootcamp in the New York FinTech program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

Open Up Challenge

Born in 2017 as an initiative by Nesta (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

The Factory

Located in Oslo, Norway, since 2015 The Factory is providing to start-ups working in the field of FinTech, Insurance, Property, Regulatory, Artificial Intelligence and Blockchain different acceleration programs based on their needs by taking part of their equity for their services. Apart from the formative program, selected ideas for 5-12% of the equity can therefore get seed funding from the organization, access the selected program and get space to work in the Factory offices plus benefits and perquisites offered by the GAN network. Three different programs are offered:

- Grundr Academy: a free online academy for aspiring entrepreneurs, intrapreneurs and early stage start-ups in which participants can learn the basics of entrepreneurship, from how to design a proper business model canvas and a complete business plant to how to pitch, from to how to test and sell the idea to how to draft legal contracts. The academy offers also the possibility to reach out experts in the network to get additional advices and a peer support network for sharing experiences. No equity is required for this program.

- Startup Academy: targeting the early stage start-ups, this 10-week incubation program offers selected team guidance in developing the concept, the business model, on how to do customer discovery activities and how to design a go to market strategy. Moreover, start-ups enrolled could get access to mentors and industry experts coming from the network of partners of The Factory and to investors. The organizer will provide seed capital but will require the start-up to sell part of their equity for the participation.
- Scaleup Academy: The program wants to offer to companies that have a ready MVP, some customers and have found the problem-solution fit the access to the network of partners and investors in order to get them scale faster. This acceleration program therefore will provide selected start-ups consultancy regarding the strength of the business model, strategic guidance and connections with mentors, board members and investors able to help them to validate their business model and concentrate on growth.

There is no clear evidence of when Banco Santander started to collaborate with The Factory as partner of the initiatives.

Blockchain and FinTech accelerator[303]

Powered by Nestholma, an international innovation platform, the blockchain and FinTech accelerator is a series of bootcamps in which the start-ups scouted by this organization get the opportunity to negotiate partnerships with financial institutions. The program has been organized in different locations across the world, and in Spain different banks like Bankia, BBVA and Banco Santander have approached Nestholma to find valuable start-ups able to solve their business issues.

Bankia

Bankia Accelerator[304]

Organized for three times from 2016 till 2019 this acceleration program, created by Conector Start-up Accelerator[305] exclusively for the bank, was targeting start-ups already established and with an MVP ready to be tested on the market to help them validate their businesses and provide resources to scale. Each edition was targeting start-ups from different sectors like education, energy, tourism, fashion, fintech and circular economy, providing to each start-up involved in the program formative courses and access to a wider network of corporations open to help these start-ups to grow. At the conclusion of each program a demo day was organized to match potential investors with participating start-ups.

[303] https://nestholma.com/blockchain-fintech-accelerator/
[304] https://www.bankia.com/en/communication/news/bankia-accelerator-by-conector-launches-call-applications-third-startup-acceleration-programme.html
[305] https://www.conector.com/

Bankia FinTech[306]

Created in 2016 by Insomnia exclusively for Bankia, the program aims at finding early stage start-ups with solutions to be tested and validated in order to develop POC projects with the bank. Start-ups working in the fields of InsureTech, LegalTech, Artificial Intelligence, Blockchain, Cryptocurrencies and more generally FinTech are invited to apply to follow a 7 months testing program, during which they have the opportunity to validate their solutions with the help of banking resources and infrastructure. The program is cost-free for start-ups and the POC has a value estimated around 24.000€ worth of services and infrastructure usage.

Bankademia[307]

Bankademia is the online portal of Bankia bank that provides for free to all users a collection of useful resources to start, finance and manage a start-up since its inception as an idea. The platforms therefore offers access to information regarding how to set up a bank in Spain, the differences of the legal entity forms, information on tax payments, a whole collection of public aid and calls for start-ups, business vocabulary for first time entrepreneurs and financial suggestions on how to manage money, both in the company and in the private pockets.

Actua UPM

Actua is the start-up competition organized by the Universitad Politècnica de Madrid to promote entrepreneurship among its own pool of students, researchers, professors and alumni. The competition in 2020 has reached its seventeenth edition and with the help of partners like Banco Santander and Bankia, is able to award selected promising businesses with money grants for a total value of 45.000€.

Blockchain and FinTech accelerator

Powered by Nestholma, an international innovation platform, the blockchain and FinTech accelerator is a series of bootcamps in which the start-ups scouted by this organization get the opportunity to negotiate partnerships with financial institutions. The program has been organized in different locations across the world, and in Spain different banks like Bankia, BBVA and Banco Santander have approached Nestholma to find valuable start-ups able to solve their business issues.

Banco Bilbao Vizcaya Argentaria

BBVA Open Innovation[308]

This platform from BBVA is a collector of all the initiatives carried out by the bank to promote innovation within and beyond the bank boundaries: from acceleration programs to open innovation initiative, from coworking spaces in innovation hubs to networking events. Hereafter a brief description of the main services.

[306] https://www.bankiafintech.com/fintech/es/
[307] https://www.bankia.es/en/bankademia/my-finances/grants-and-subsidies?langMI=en
[308] https://openinnovation.bbva.com/en

- **Open Space**[309]: located in different cities across Spain and South America, the open spaces of BBVA are innovation hubs created to draw closer the actors of the FinTech ecosystem to facilitate learning, the exchange of ideas and collaboration, in order to grow the local financial innovation ecosystem. This facilitation is provided through formative masterclasses and networking events where different actors of the value chain can meet and discuss about relevant topics for the growth of the industry.
- **Open Innovation Acceleration program**[310]: Held in 2019 and hosted in the Open Space located in Madrid, this acceleration program targeted early-stage and seed start-ups in the Spanish FinTech ecosystem to help them grow their businesses. Developed in cooperation with Adventurees[311] (an innovation platform company), the program provided to start-ups a series of formative meetings delivered along nine months and mentoring and coaching from employees of both organizations.
- **Open Talent**[312]: Organized since 2009, Open talent is an international start-up competition focused on FinTech solutions. Participating start-ups compete in a two-round pitch competition (one at country level, the second one at international level) to win an equity investment of 100.000€ provided by the BBVA and Anthemis Ventures Partnership.
- **Open Marketplace**[313]: Started in late 2018, Open Marketplace is the open innovation platform of BBVA created to match demand of innovation coming from different business units with offering already available on the market provided by start-ups. By collecting supply of innovation disclosing the needs of each business unit, the goal of the bank is to arrange POC and Pilot projects with these start-ups in order to innovate the offering and help them stablish themselves on the market. During the first year of service, the bank received more than 300 proposals of possible solutions, from which 16 Pilot tests have been created to validate the product.

BBVA Anthemis Venture Studio[314]

Since 2018 BBVA is partnering with Anthemis Group, a venture builder studio located in London, to create new product and services in the FinTech area able to satisfy the innovation needs of the bank. The studio will create value for BBVA deploying capital and resources to build and support businesses that address unfulfilled needs, attracting the best entrepreneurs and helping them envision solutions and implement them. Anthemis will become a bridge between the VC funds of BBVA and start-ups, incubating and growing new projects until they are ready to be invested in due to a successful implementation on the market. The great advantage provided by Anthemis to BBVA is the fact that the venture builder has connections with academics and all actors of the value chain, comprising the authorities, and could therefore understand better where pain point could arise and how to address them.

[309] https://openinnovation.bbva.com/en/open-space
[310] https://www.bbva.com/en/bbva-launches-its-first-ever-start-up-acceleration-program/
[311] https://www.adventurees.com/
[312] https://openinnovation.bbva.com/en/open-talent
[313] https://openinnovation.bbva.com/en/open-marketplace
[314] https://www.bbva.com/en/bbva-and-anthemis-partner-to-build-the-next-generation-of-financial-services-startups/

BBVA Momentum[315]

BBVA Momentum is a five months program created to help social impact growth-stage start-ups focused on sustainable products and solutions for social and environmental problems to scale and expand their businesses. The program provides selected companies training, strategic consultancy, access to external funding, contacts and visibility provided by a full range of professionals who are going to support the projects along all the period. The program is developed in collaboration with Inter-American Development Bank, the Financial Times Corporate Learning Alliance and the Aspen Network of Development Entrepreneurs.

FinTech House Lisbon[316]

Located in the Portuguese capital city, the FinTech House is an innovation hub focused on financial innovation born with the goal of connecting start-ups with investors, talent, regulator and incumbent corporations. To accomplish their goal the organization uses the spaces of the palace in which they are located as coworking spaces for start-ups, to create thematic events in which incumbents and newcomers could dialogue, and provide an easier point access to all the actors of the value network for all its partners. BBVA is the only banks that is actually partnering with the FinTech House, gaining early access to innovation being developed there.

Blockchain and FinTech accelerator

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Caixa Bank

Premio Emprenderos XXI[317]

Organized since 2014by Caixa bank, this program is a start-up competition open to companies less than three years old established in Portugal or in Spain. Applications are open for innovative young companies working in every domain, as far as they can be considered start-ups with some element of scalability in their business model. The program has 2 distinct competitions inside: a regional competition, in which 17+2 start-ups (one for each region of Portugal and Spain) are selected as “company with an high impact on the local territory” and could win 5.000€, and an international competition within each domain identified by the jury. For this second described phase, eight categories are available to choose from and a prize of 15.000€ will be assigned to each winner of the category in which they applied. On top of cash prizes winning start-ups could benefit of an international guidance program (Moon-shot Thinking, organized by ESADE Business School) and access to a dedicated demo day in front of a selected panel of investors.

[315] https://www.momentum.bbva.com/en/
[316] https://www.thefintechhouse.com/
[317] https://www.emprendedorxxi.es/en/

Barcelona Engagement Program powered by Plug & Play[318]

The exclusive program, organized in partnership with the innovation platform Plug & Play[319], aims at discovering innovative FinTech and Insurance projects located in Barcelona. These businesses, selected in the early phase, will be supported by innovation experts and employees of the group to solve actual banking problems. This agreement will also serve the bank in terms of idea scouting, since Plug & Play host each year numerous events all around the works and can therefore link the corporate partner with one of the best solutions available on the market.

Zone2boost[320]

Launched in mid-2019 and Located in Barcelona, Zone2boost is a joint venture between Caixa Bank (40%), Ingenico Group321 (20%) and Global Payments322 (40%) created with the aim of investing in promising early-stage start-ups in order to develop POC and pilot projects to be integrated in the network of partnering companies. Zone2boost is therefore an open innovation program focused on developing solutions in FinTech and retail payments domains, offering a testing environment composed by partner's client data to validate the start-up solutions on top of formative lectures provided by IESE Business School. Start-ups could be accepted in the program at all stages and are followed and helped throughout their growth with specific tailored offerings: for early stage companies an incubation period is planned, during which they could start developing and testing an MVP; after successful market tests, a syndicated investment of maximum 200.00€ (5% of equity) is planned to support the growth of the start-up; in the latest stage, when the product has been validated and the company is growing, further investments of external partners will be facilitated thanks to the intermediation of the organizing consortium and partnership possibilities will be evaluated for integration in partner's offering. Moreover all start-ups could use coworking spaces provided by the joint venture, where they could meet other participants to the program an work side by side with the sponsoring corporations.

Day one matchmaking events[323]

Caixa Bank, though its own business unit dedicated to innovative companies Day one, is providing a tailored set of service to start-ups in order to help them grow and to create a strong local entrepreneurial ecosystem. On top of traditional banking servicer modelled to match start-up needs, a matchmaking service is performed organizing dedicated meeting with potential corporation from the bank's network that could be interested in start-ups solutions.

[318] https://www.caixabank.com/comunicacion/noticia/caixabank-and-the-international-platform-plug-and-play-create-a-programme-to-start-up-collaboration-programme-to-boost-innovation-in-fintech-services_en.html?id=42145
[319] https://www.plugandplaytechcenter.com/
[320] https://www.zone2boost.com/en/index.html
[321] https://www.ingenico.it/
[322] https://www.globalpaymentsinc.com/
[323] https://www.caixabank.es/empresa/dayone_en.html#

Start4big[324]

Started in the beginning of 2019 as a join initiative between Aigues de Barcelona[325], Caixa Bank, Naturgy[326], Seat[327] and Telefonica[328], Start4big is a cross-sector open innovation initiative. The program is run twice a year and in each batch different challenges are proposed, targeting growth-stage start-ups to provide valuable solutions for the development of a pilot project in cooperation between all interested parties. Each of these challenges must be proposed by at least two partners of the initiative, meaning that start-ups have the possibility to cooperate with different corporation on the same project, accessing different network of customers and resources at the same time. These challenges regard topics like Biometric Authentication, Augmented and Virtual Reality, Smart Cities and Circular Economy and Sustainability, which are usually cross domain and could be applied in different contexts. The initiative has no limits on the number of projects that could be developed during these challenges, therefore multiple pilot projects could be run in parallel even with different corporation of the program during each session as long as they match the requirements of each challenge. Start-up evaluation for admission is performed both by an external independent commission and by a pool of interested corporate partners, who then have a final world on who to admit.

Sweden

Handelsbanken

As far as October 2020, with the research process described in the previous paragraph of this thesis, no initiative for start-ups has been found.

Skandinaviska Enskilda Banken

Entrepreneurship and Innovation initiatives[329]

SEB Bank is supporting entrepreneurship and innovation across Sweden and Nordic countries through a whole set of programs, co-developed with external subjects or sponsored, covering all the phases of a start-up, from the inception of the idea to fundraising.

These programs are categorized in different block based on the stage of the project and can be summarized in this classification:

- **Plan initiative**: these initiatives are addressing start-ups in the early and seed stage, and entail monetary prizes, business development support and mentoring from sponsoring companies.
- **Start initiatives:** this category entails free-of-charge consulting services to help people set up their companies and starting to develop their businesses and seminars on growth topics.

[324] https://start4big.com/
[325] https://www.aiguesdebarcelona.cat/
[326] https://www.naturgy.com/en/home
[327] https://www.seat.com/
[328] https://www.telefonica.com/es/home
[329] https://sebgroup.com/about-seb/corporate-citizenship/our-corporate-citizenship/entrepreneurship-and-innovation

- **Develop initiatives**: these initiatives are sponsored with the objective to help entrepreneurs in growing their businesses, and basically offers them co-working spaces and related access to events and formative sessions inside innovation hubs located across all Sweden.
- **Grow initiatives**: targeting start-ups that are already present on the market, these initiatives aim at improving and enlarging their networks, linking them with other entrepreneurs to share their experience or matching them with established corporations and investors for business growth.

Mastercard Lighthouse Program

Organized by Mastercard and NFT venture capital firm since the beginning of 2019, the program is aiming at building partnership between financial corporations and ready to scale start-ups from FinTech and cybersecurity field established in northern Europe and Baltic countries. The banks involved in the program are Danske Bank, Nordea, Op-Pohjola Group, Commerzbank, SEB and Swedbank. Each batch admits cumulatively around 15 (fifteen) scale-ups hosted for free in one of the cities in which the program is held and provides them, along five months, the opportunity to participate to different networking workshops. In these reunions the program brings banks, investors, advisors and start-ups together to explore the possibility of creating partnerships and close investment and financing rounds. All participants will remain in the Alumni network of the program, but the start-ups able to build the largest partnerships will also win some prizes: top three of them are invited to attend the annual Slush event and the overall winner will also be enabled to participate to Mastercard's StartPath Pitch Day in New York, all for free.

Copenhagen Fintech

Operative since 2018, the consortium was born with the goal of establishing Copenhagen as one of the leading FinTech hubs all around the world. Three different levels of collaboration are active: partners, which are responsible of the creation and the development of the ecosystem; sponsors, that are organizations that will benefit with the establishment of Copenhagen as a leading FinTech ecosystem; members, which have the right of actively participating to events. Between the partners different industries are represented, like e-commerce, telecommunication, enterprise IT and software providers and consulting firms, on top of financial institutions like Danske Bank, BNP Paribas, ING Group, Jyske bank, Nordea and Nykredit. Different initiatives, all hosted in the dedicated LAB in Copenhagen, are available for start-ups of different stages to provide a comprehensive offering able to foster the growth of the ecosystem, all without requiring equity to the start-ups involved.

First of all, the Copenhagen FinTech LAB is a coworking space designed to host start-ups and consortium-related events. Start-ups can access the spaces to work or organize meeting whenever they want, participate to the events, and services like mentoring and matchmaking with investors and corporate are provided. Price-controlled services in the area of legal, tax and human resources are also offered to hosted start-ups. The consortium provides to early stage start-ups the possibility to enrol into a 3 months tailored incubation program, in which customized strategic and business development coaching and consultancy is provided by the partners, sponsors and members of the initiative.

On top of that, for the duration of the program, free office space in the LAB is provided and start-ups can access consultancy services at lower fares.

For start-ups that already found product market fit and are therefore in later stage of their lives, four programs are available:

1. Nordic fast track program: targeting non-Danish start-ups, the program aims at facilitating their entering in the Nordic markets offering them a two months acceleration program and free hosting and services provided in the LAB spaces. This program will benefit start-ups by connecting them with the most relevant stakeholders in the market that they want to enter.
2. Global Impact partnership program: the program goal is to link Nordic FinTechs with scaling opportunities in south-eastern Asian regions provided by global partners with local presence in these countries, all of that taking into account sustainable development goals targets like the improvement of financial literacy and inclusion and the tracking of the societal impact produced by these financial organization.
3. Partnership fast track program: partners of the consortium propose some challenges to be solved related to FinTech domain and interested start-ups could apply to have a chance of starting a proof of concept project with them. Selected start-ups will be put in contact with partners' business units proposing the challenge and will get 50.000 (fifty thousand) Danish koruna (around 6.700€). During the development of the POC project these start-ups could also access the LAB workspaces spaces and services.
4. Global scaleup program: in this program, start-ups of the network from Nordic countries are invited to apply if they have already found their product-market fit and they want to start to expand internationally. The program, which is developed along maximum four months, provides scale-ups three days of 1:1 tailored strategic consulting with international experts, individualized sessions with the Denmark's Ministry for foreign affairs, mentoring and coaching from corporations partners of the consortium and access to FinTech founders who have already experienced the internationalization of their start-ups and therefore can provide useful advices.

Startup Wise Guys FinTech Accelerator

Born in 2018, the accelerator is currently accelerating the fourth batch of selected start-ups working on FinTech, PropTech, RegTech, InsurTech, Analytics and Cybersecurity solutions. Hosted by Swedbank in Vilnius, Lithuania, the accelerator is targeting start-ups in early stages, providing selected ones a seed investment between 50 and 100 thousand euros in exchange for the participation to the program and a percentage of equity around 8-10%. The program is involving also other banks from the Nordic countries, like Op Pohjola bank and SEB. During the four months of the program, due to the stage of the start-ups involved, an intensive formative program is delivered, covering topics like how to do customer discovery, marketing and sales to how to deal with corporations and how to raise funds. On top of these services, legal consulting is also offered, and corporations could also provide some great opportunity to set up POC projects.

Swedbank

Startup Day[330]

The Startup Day is a yearly festival organized since 2016 by a pool of Estonian Universities, Science parks and Governmental entities to promote entrepreneurship in the region. The festival, lasting for two or three days, wants to provide to participants the tools, knowledge and connections that could enable them to accelerate their growth and is supplying them through formative events with top experts from the sector, industry-tailored matchmaking events and a pitching platform to showcase the innovation to participating investors. Since 2019 Swedbank became one of the main organizers of the initiative, providing their networking capabilities to participants.

Futurepreneurs[331]

Organized since 2017 by Sunrise Valley Science & Technology Park[332] and sponsored by Swedbank, the Futurepreneurs initiative is a formative program for people willing to become entrepreneurs. The business development training aims at training participants from the idea stage to present a project that could catch the attention of potential investors. The sessions are led by experts of the subject matter and participants are follower my mentors from the organizing companies. The program accepts applications from teams with ideas focusing on Sustainable Development Goals (SDGs) without requiring equity.

Tehnopol[333]

Tehnopol is a science and business campus for innovative tech companies, located in Tallin (Estonia), created by the collaboration of different institutional partners like the city of Tallin[334] and the Estonian Enterprise Agency[335], corporations like Swedbank and other actors of the research and innovation field like EstBAN[336], ESA a and EIT InnoEnergy. Inside Tehnopol facilities different services are available to start-ups: from coworking space in modern office space to business consulting and innovation testing. An incubation program for start-ups working in the fields of ICT, Healthcare and Green Technologies is also organized, providing participating companies with laboratories and facilities to build and test their prototypes and access to the great network that Tehnopol and partners have developed during the years of activity in their respective fields.

Co-creation spaces[337]

As the name suggests, Swedbank co-creation spaces is the innovation hub of the bank, located in Riga (Latvia) in the company country headquarter. The aim of these spaces is to help FinTech start-ups to grow while building their network inside the bank environment where they can receive support and exchange knowledge between peers and with company employees.

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[330] https://www.startupday.ee/
[331] https://futurepreneurs.eu/
[332] https://ssmtp.lt/en/
[333] https://www.tehnopol.ee/en/
[334] https://www.tallinn.ee/
[335] https://www.eas.ee/
[336] https://estban.ee/
[337] https://www.swedbank.lv/about/swedbank/about/dobe?language=ENG

This space is a co-working and event space that supports collaborative development of new ideas, shortening the distances between banking needs and supply of solutions.

Mastercard Lighthouse Program

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United Kingdom

Barclays Bank

Eagle Labs[338]

The Eagle Labs is a Barclays' initiative started in 2015 that entails the creation of a wide network of innovation hubs across all United Kingdom to support entrepreneurship and start-up creation in the country. Up today, more than 25 hubs have been created, usually in collaboration with other innovation-supporting organizations like Nesta, Codebase or local science and technology parks. Eagle Labs are actually offering different services to support entrepreneurship across all domains, like offering coworking spaces with included mentorship provided by local or national industry experts, the organization of vertical events on relevant

[338] https://labs.uk.barclays/

entrepreneurial topics with the participation of corporation and investors and access to rapid prototyping facilities to build and test their products.

Rise Barclays[339]

Active since 2015, the four Rise FinTech Labs located in Londo, New York, Mumbai and Tel Aviv are Barclays' innovation hubs for FinTech start-ups. Inside these innovation hubs a comprehensive set of services are delivered to FinTech projects which are already on the market, establishing these hubs as catalysts for financial innovation across all these regions. Some of the services delivered are coworking spaces, access to dedicated events and matchmaking opportunities on top of peer networking and mentoring provided by directly by Barclays business units. Inside these spaces usually are run also the other initiative for start-ups provided by Barclays, like the acceleration program organized with Techstars or the Female Innovation Lab created with Anthemis.

Female Innovators Lab[340]

Located inside The Rise spaces in New York, The Female Innovator Lab is a incubation program open to female-lead teams or solo female entrepreneurs with the mission of identifying and helping primising projects in the FinTech area to grow. Created in cooperation with Anthemis, this incubator provides to founders tailored resources and mentorship in order to develop their projects, bringing them till their first funding rounds.

Techstars FinTech accelerator[341]

The initiative was created in 2014 as a joint initiative between techstars and Barclays group. Techstars is an american innovation platform that organizes sector specific-accelerators all around the world in collaboration with proposing corporations and organizations that want to innovate. Corporations therefore let techstars perform technology and start-up scouting and during the program they can mentor participating businesses providing coaches from their pool of employees. Techstars is also a Venture Capital firm, requiring to participant start-ups to sell part of their equity (6% for 20 cash + 100k€ convertible loan) to access the program and receive mentorship, perquisites and access to a wider nedtowk of investors and corporations that could help their company scale faster. Open to growth stage start-ups from all over the world, this accelerator is focused on smart FinTech solutions.

FinTech Scotland[342]

FinTech Scotland is an independent FinTech ecosystem developer created to facilitate the innovation of the financial industry throughout the region. To accomplish this goal, FinTech Scotland creates reports about the state of the industry and the technological trends, organize formative and networking events in order to favour the encounter and the exchange of ideas between different players of the value network, and support established industry players in creating acceleration programs to find valuable start-ups to help to grow.

[339] https://rise.barclays/
[340] https://rise.barclays/female-founders/programmes/female-innovators-lab/
[341] https://home.barclays/who-we-are/innovation/barclays-accelerator/
[342] https://www.fintechscotland.com/

Banks like Barclays, Lloyds Bank, HSBC and different banks pertaining to NatWest group are supporting this initiative together with other value network organizations, providing a good contact point for start-ups that wants to present their product and services and need guidance to scale their ideas.

Unreasonable Impact[343]

Started back in 2016 by the bank and Unreasonable Group[344], an innovation platform based in Colorado and in London, the Unreasonable Impact is an acceleration program for growth-stage start-ups with the potential to "employ thousands of people worldwide in the next future while solving societal and environmental challenges", therefore is open to application from disparate domains. The two-week program is designed to provide to these ventures formative resources, mentoring, guidance and networking opportunities to rapidly scale and create jobs in their relevant fields. These initiatives are run two times a year in different locations across all the world.

Business Start-up Tips[345]

Inside main Barclays website, there is a full section of formative resources dedicated to start-uppers created to support them along all the phases of their project. Starting from suggestions on how to write a business plan, the website offers also advices on which legal entity choose to best fit the start-up ambitions, tools to predict cashflows and formative material regarding skills needed to succeed in the entrepreneurial journey, among other useful information regarding the bank's services tailored for the start-ups.

Open Up Challenge

Born in 2017 as an initiative by Nesta (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

[343] https://unreasonablegroup.com/initiatives/unreasonable-impact/
[344] https://unreasonablegroup.com/
[345] https://www.barclays.co.uk/business-banking/business-insight/make-your-start-up-a-success/

HSBC

Accelerator 2030[346]

Organized in 2018 in Hyderabad, India, by T-Hub accelerator in partnership with HSBC, the program aimed at accelerating FinTech start-ups from all over the world in order to help the bank in finding new solutions to improve customer service, rule-compliance, due diligence processes, daily cash management of firms and facilitating payments. Targeting early stage companies already with legal entity, T-Hub and HSBC were offering to participants a two-month acceleration experience providing formative sessions, coaching and networking opportunities.

Openlab Innovation Challenge

This open innovation initiatives was run in 2019 in Malaysian division of the bank, in order to attract valuable projects to help HSBC find innovative ideas to improve their products and services. Selected start-ups get the opportunity to develop new products in cooperation with banking representatives and test them in the bank's sandbox environment before pitching their results to a panel of HSBC executives, who than had the opportunity to decide to integrate the solution inside the banking portfolio proposing collaborations or investments to the selected start-ups.

DIFC FinTech Hive[347]

Located in Dubai, the Hive is an innovation hub dedicated to FinTech ecosystem created in 2017 to promote the rising and the spread of innovative solutions into the financial sector. The Hive is sponsored by more than 200 financial corporations from all over the world and is offering to start-ups a wide array of services like coworking space, networking events, acceleration programs and POC financing initiatives promoted by interested partners , other than being able to tap into each of the partners network for consulting and mentoring and into the pool of investors that all these companies are able to provide.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access

[346] https://t-hub.co/hsbc-accelerator-program/
[347] https://fintechhive.difc.ae/introducing

to the global ecosystem of founders and mentors. HSBC is partnering with Startupbootcamp in the Dubai FinTech program, in Mexico City FinTech program and in Mexico City scale-up program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

Open Up Challenge

Born in 2017 as an initiative by Nesta (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

FinTech Scotland

FinTech Scotland is an independent FinTech ecosystem developer created to facilitate the innovation of the financial industry throughout the region. To accomplish this goal, FinTech Scotland creates reports about the state of the industry and the technological trends, organize formative and networking events in order to favour the encounter and the exchange of ideas between different players of the value network, and support established industry players in creating acceleration programs to find valuable start-ups to help to grow.

Banks like Barclays, Lloyds Bank, HSBC and different banks pertaining to NatWest group are supporting this initiative together with other value network organizations, providing a good contact point for start-ups that wants to present their product and services and need guidance to scale their ideas.

Lloyds Group

LORCA[348]

As the full name of the office suggest, the London Office for Rapid Cybersecurity Advancement is an innovation hub located in England created in 2018 to reinforce and expand the cybersecurity industry, providing a platform where demand and supply of innovation can be matched easily. The innovation hub is sponsored by the United Kingdom Department for Digital Culture Media & Sport[349], is administered by Plexal[350], Deloitte and the Center for Secure Information Technologies and has different partnering corporations like Lloyds, AWS and Dell. The innovation hub on top of offering Coworking space is also organizing matchmaking events for networking and open innovation purposes and is also running an accelerator to help promising ideas scale both in UK and abroad.

Launch Innovation Lab[351]

This initiative, created by FinTech Scotland especially for Lloyds bank, is an call to start-ups to participate in the bank's open innovation project aiming at improving the customer engagement and awareness on theme like personal goals, financial plans and environmental impact. The program is offering start-ups the possibility to collaborate with bank's business divisions to co-developing solutions and getting access to business leaders, designers, industry experts and mentors in order to build a solid partnership leading eventually to business contracts.

Resource center[352]

The resource center is a formative section of Lloyd banking main website which provides useful information on entrepreneurial themes in order to help start-ups start and grow. The website offers information on how to set up a business un the United Kingdom, how to make market research and write a business plan and how to finance the new company, open to everyone. Among the resources available, in the Lloyds bank academy section, there are also information on how to build skills and capabilities needed to succeed in the digital world.

Startupbootcamp

Founded back in 2010 in Copenhagen, Startupbootcamp is an innovation platform part of Rainmaking group offering (already seen in the Hub Program by Danske Bank). The core mission of the initiative is to support entrepreneurs throughout all the stages of the growth offering them industry specific three months acceleration programs in more than one hundred cities all around the world. Early stage Start-ups selected for the acceleration program have

[348] https://www.lorca.co.uk/
[349] https://www.gov.uk/government/organisations/department-for-digital-culture-media-sport
[350] https://www.plexal.com/
[351] https://www.fintechscotland.com/what-we-do/lloyds-banking-group-launch-innovation-lab/
[352] https://www.lloydsbank.com/business/resource-centre/business-guides.html

to sign a shareholders' agreement to participate, selling between 6 to 8% of their equity to obtain 15 thousand euros of investment to cover living expenses, more than 450 thousand euros worth of services and six months of free collaborative office spaces in the location of the events. Start-ups during the program get mentoring and connections with industry leaders. Great exposure to international investors, industry partners, media and the local start-up ecosystem is provided thanks to a concluding Demo Day in which start-ups could showcase their business to the audience composed by these stakeholders. Once graduated from the program start-ups will become Alumni community and will continue to have access to the global ecosystem of founders and mentors. Lloyds Group and its subsidiaries are partnering with Startupbootcamp in the London FinTech & InsureTech program. Partners have different advantages like the possibility to access in each batch to different ideas and the opportunity to test innovations and build partnerships with participating start-ups.

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Natwest Group

Entrepreneur Accelerator[353]

Launched back in 2015 and hosted in twelve different bank's innovation hubs located across all United Kingdom, the Entrepreneur Accelerator is a six-month acceleration program delivered for free to seed-stage high-growth potential start-ups based in UK. The program is differentiated in two different path, one tailored for FinTech companies and one for all the other start-ups, and provides all of them formative events, access to the banks' network and mentoring. For FinTech there is also the possibility to get a personal coach with banking experts, technology and intellectual property reviews from partners, an investment strategy review, international networking opportunities thanks to privileged access to FinTech events and the possibility to pitch the idea to NatWest Innovation teams during a final demo day.

Business Builder[354]

The Natwest Business Builder is an online platform created to support entrepreneurs along their journey providing them formative resources to. The platform is structured in modules covering the common elements present in each business plan and is also providing to registered users access to a community of like-minded people and the possibility to participate to bank-sponsored events during which they can refine their skills and network.

Open Up Challenge

Born in 2017 as an initiative by Nesta (an English non-profit foundation focused on innovation promotion) and UK governmental Open Banking Limited organization (created by the competition and market authority to develop software standard and guidelines to foster competition and innovation in retail banking industry in UK), this initiative involves also different banks, like Danske Bank, Allied Irish Bank, Banco Santander, Barclays Bank, HSBC, Lloyds Bank and Natwest Group as leading sponsors of the event. The program is structured as a challenge where a problem to be solved is specified and incentives to solvers are awarded to address the issue: an independent panel of judges select participants based on assessment and eligibility criteria, and these start-ups receive funding via a conditioned grant that could be increased over time (up to 300 thousand pounds per project – around 330.000 €) upon the

[353] https://www.business.natwest.com/business/business-services/entrepreneur-accelerator.html
[354] https://natwestbusinessbuilder.com/

achievement of some thresholds of specific key performance indicators, like user adoption, usage and dropout rates. The challenge poses no restrictions upon the nationality of participant start-ups, but all of them must serve and benefit directly United Kingdom customers and must be already launched on the UK market at the time of the application.

FinTech Innovation Lab London

Launched in 2012 by Accenture, the Innovation Lab is a three months acceleration program for early and growth-stage start-ups with a beta of the technology or the product already available. Applications can be submitted by everywhere around the world and each year 20 start-ups are selected. The equity-free accelerator program provides start-ups with access to stakeholders from more than 40 financial institution partners (like Deutsche bank, ING, HSBC, Intesa Sanpaolo, Lloyds, Natwest group, Nordea, Op-Pohjola, OTP, Rabobank and Societè Generale) who can provide mentoring and advices to refine the start-ups value proposition and opportunities of drafting POC and pilots connecting them with the right decision makers inside their corporations. The mentoring services are not just offered by the financial institutions, since Accenture provides the start-ups with their own know how and also investors, alumni entrepreneurs and legal experts are involved to provide start-ups an acceleration experience able to speed-up the development of their businesses.

FinTech Scotland

FinTech Scotland is an independent FinTech ecosystem developer created to facilitate the innovation of the financial industry throughout the region. To accomplish this goal, FinTech Scotland creates reports about the state of the industry and the technological trends, organize formative and networking events in order to favour the encounter and the exchange of ideas between different players of the value network, and support established industry players in creating acceleration programs to find valuable start-ups to help to grow. Banks like Barclays, Lloyds Bank, HSBC and different banks pertaining to NatWest group are supporting this initiative together with other value network organizations, providing a good contact point for start-ups that wants to present their product and services and need guidance to scale their ideas.

Appendix B – Code commented

This short appendix explains the lines of code written in R language to implement the different clustering algorithms. The appendix is divided in two sections, the first regarding k-means algorithm implementation and the second one regarding k-medoids.

K-means

The code utilized to implement k-means algorithm is organized in four main blocks:

- Block 1: general setting and data retrieval.
- Block 2: estimation of number of clusters with elbow method.
- Block 3: estimation of the number of clusters with silhouette method.
- Block 4: application of k-means algorithm with selected number of clusters obtained with the analysis of results of block 2 and 3, and storage of data for further analysis.

Execution order:

Block 1, then Block 2, Stop to identify the proper number of clusters, and to conclude Block 4.

Block 1, then Block 3, Stop to identify the proper number of clusters, and to conclude Block 4.

Block 1: general setting and data retrieval

```
# additional function packages are installed
library('dplyr')
library('cluster')
library('Rtsne')
library('ggplot2')
library('purrr')
# retrieval of the data on which to perform the clustering analysis
banks <- read.csv2("~/R/Modello2/Modello2R/Modello2.csv", sep = ";")
#Selection of needed columns to run the algorithm
programs = banks %>% select (Netandmatch, formative, incubator, accelerator, challenge, corpinc, corpacc, testlab, provider, recip, ecosystem, bankimprovement, local, crossborder, global, cultback, cultb2b, cultb2c, intback, intfront, creation, development, scaling)
```

Block 2: estimation of number of clusters with elbow method

```
#seed setting for replicability of results
set.seed(500)
# function to compute total within-cluster sum of squares while running the k-means clustering algorithm to identify k clusters among the data contained in programs, starting with
```

nstart = 5000 different combination of k initial centroids, and iterating a maximum of iter.max = 1000 times on each different selection of centroids, calculated for each k between 1 and 15

```
wss <- function(k) {
  kmeans(programs, k, iter.max = 1000, nstart = 5000)$tot.withinss
}
# Compute total within-cluster sum of squares for k = 1 to k = 15
k.values <- 1:15
# extract total within-cluster sum of squares for 2-15 clusters
wss_values <- map_dbl(k.values, wss)
# Plot total within-cluster sum of squares for k = 1 to k = 15
plot(k.values, wss_values,
    type="b", pch = 19, frame = FALSE,
    xlab="Number of clusters K",
    ylab="Total within-clusters sum of squares")
```

Block 3: estimation of the number of clusters with silhouette method.

```
#seed setting for replicability of results
set.seed(500)
```

function to compute average silhouette for k clusters while running the k-means clustering algorithm to identify k clusters among the data contained in programs, starting with nstart = 5000 different combination of k initial centroids, and iterating a maximum of iter.max = 1000 times on each different selection of centroids, calculated for each k between 1 and 15

```
avg_sil <- function(k) {
  km.res <- kmeans(programs, k, iter.max = 1000, nstart = 5000)
  ss <- silhouette(km.res$cluster, dist(programs))
  mean(ss[, 3])
}
# Compute and plot average silhouette for k = 2 to k = 15
k.values <- 2:15
# extract average silhouette for clusters from 2 to 15
avg_sil_values <- map_dbl(k.values, avg_sil)
```

```
# Plot average silhouette for k = 1 to k = 15
plot(k.values, avg_sil_values,
    type = "b", pch = 19, frame = FALSE,
    xlab = "Number of clusters K",
    ylab = "Average Silhouettes")
```

Block 4: application of k-means algorithm with selected number of clusters obtained with the analysis of results of block 2 and 3, and storage of data for further analysis.

```
#seed setting for replicability of results
set.seed(500)
#run the k-means clustering algorithm to identify k clusters among the data contained in programs, starting with nstart = 5000 different combination of k initial centroids, and iterating a maximum of iter.max = 1000 times on each different selection of centroids, calculated for optimal k identified with elbow or silhouette method.
clusters <- kmeans(programs, k, itermax = 1000, nstart = 5000)
# Save the cluster number in the dataset as column 'strategiccluster'
banks$strategiccluster <- as.factor(clusters$cluster)
# write results on selected file
write.csv(banks, "~/R/Modello2/Modello2R/result.csv", row.names = TRUE)
```

K-medoids

Block 1: general setting and data retrieval and estimation of number of clusters with silhouette method

```
# additional function packages are installed
library('dplyr')
library('cluster')
library('Rtsne')
library('ggplot2')
# seed setting for replicability of results
set.seed(500)
# retrieval of the data on which to perform the clustering analysis
banks <- read.csv2("~/R/Modello2/kmedoids/modellokmedoids.csv", sep = ";")
```

```
# Selection of needed columns to run the algorithm

programs = banks %>% select (Netandmatch, formative, incubator, accelerator, challenge, corpinc, corpacc, testlab, provider, recip, ecosystem, bankimprovement, local, crossborder, global, cultback, cultb2b, cultb2c, intback, intfront, creation, development, scaling)

# creation of the dissimilarity matrix utilizing a given measurement of distance, identified by metric

dismatrix <- daisy(programs, metric)

# Initialize silhouette vector

silhouette <- c()

silhouette = c(silhouette)

# Compute and plot average silhouette for k = 2 to k = 40

for (i in 2:40) {

  clusters = pam(as.matrix(dismatrix), diss = TRUE, k = i)

  silhouette = c(silhouette, clusters$silinfo$avg.width)

}

plot(1:40, silhouette, xlab = "Clusters", ylab = "Silhouette width")

lines(1:40, silhouette)
```

Block 2: application of k-medoids algorithm with selected number of clusters obtained with the analysis of results of block 1, and storage of data for further analysis.

```
# After the identification of the appropriate k through the usage of average silhouette width as a measure of clusters adequacy, k-medoids algorithm is applied giving in input the matrix containing the different observations, the selected number of clusters k and a suitable metric to perform the analysis. The metric allowed by Partitioning around medoids algorithm are Euclidean distance and Manhattan distance, but only the first one has been tested out due to characteristics of data.

pam_sample = pam(programs, k, metric)

#assign values of clusters to a variable and add this variable to the summary file to be printed and saved in apposite folder

a <- programs %>%

mutate(cluster = pam_sample$clustering)

banks$cluster <- a$cluster

write.csv(banks, "~/R/Modello2/kmedoids/resultsnumerical.csv", row.names = TRUE)
```

Appendix C – Main cluster characteristics

Total diversifier

Total assets: 4th quartile

Business model and geography: Cross border in Central and South Europe.

Bank improvement strategy: Strong development of sensing, seizing and re-configuring capabilities due to concurrent engagement in multiple initiatives, both provided by third parties and by corporate programs.

Ecosystem development strategy: Development of sensing capabilities through lightweight programs able to engage a big number of start-ups, useful tools to build positional knowledge.

Skewed diversifier

Total assets: Top 3rd quartile

Business model and geography: Cross border in North Europe.

Bank improvement strategy: Bank focused in providing through third party events scaling support in entering new markets and in reaching new customer, enabling the development of sensing capabilities. Through internally developed test laboratories, seizing and re-configuring capabilities could also be built.

Ecosystem development strategy: *(Same as total diversifier)*

Development of sensing capabilities through lightweight programs able to engage a big number of start-ups, useful tools to build positional knowledge.

Ecosystem Grower

Total assets: 4th quartile

Business model and geography: Cross border in Central, East and South Europe.

Bank improvement strategy: Relying exclusively on multiple incubation and acceleration programs provided by third parties for cultivation of back and front-end B2C solutions limits the ability to directly develop sensing capabilities.

Ecosystem development strategy: Providing incubation and acceleration enable the bank to build ecosystem knowledge regarding different industries and a deep knowledge of start-up needs and challenges, which can be transferred to FinTech start-ups while engaging throughout third parties.

FinTech Enthusiast

Total assets: 4th quartile.

Business model and geography: Cross border in North Europe.

Bank improvement strategy: *(Same as total diversifier)*

Strong development of sensing, seizing, and re-configuring capabilities due to concurrent engagement in multiple initiatives, both provided by third parties and by corporate programs.

Ecosystem development strategy: No identifiable strategy due to limited involvement in ecosystem development programs.

Worldwide scouter with no ecosystem support

Total assets: Cross Border 4th quartile, Local Universal 2nd quartile.

Business model and geography: Cross border in Central Europe, Local universal in North Europe.

Bank improvement strategy: Building sensing capabilities while engaging with third party's organized programs and re-configuring capabilities through test labs directly provided by the bank.

Ecosystem development strategy: No identifiable strategy due to limited involvement in ecosystem development programs.

Worldwide scouter with local business development

Total assets: Mostly in 4th quartile, with some in 2nd and 3rd also.

Business model and geography: Cross border in Central, South and East Europe.

Bank improvement strategy: (*same as worldwide scouter with no ecosystem support)*

Building sensing capabilities while engaging with third party's organized programs and re-configuring capabilities through test labs directly provided by the bank.

Ecosystem development strategy*: (similar to ecosystem growers, but at lower extent)*

Providing incubation and acceleration enable the bank to build ecosystem knowledge regarding different industries and a deep knowledge of start-up needs and challenges, which can be transferred to FinTech start-ups while engaging throughout third parties.

Autonomous FinTech Developer

Total assets: Dispersed.

Business model and geography: Either cross border or local universal, in Central and South Europe.

Bank improvement strategy: Relying exclusively on structured internally developer programs like corporate accelerators and test laboratories, programs able to strengthen seizing and re-configuring capabilities.

Ecosystem development strategy: *(similar to ecosystem growers, but at a lower extent)*

Providing incubation and acceleration enable the bank to build ecosystem knowledge regarding different industries and a deep knowledge of start-up needs and challenges, which can be transferred to FinTech start-ups while directly engaging with them through corporate programs.

Tester

Total assets: 2nd and 3rd quartile.

Business model and geography: Either cross border or local universal, in Central, East and South Europe.

Bank improvement strategy: No identifiable strategy due to limited involvement in banking improvement programs.

Ecosystem development strategy: No identifiable strategy due to limited involvement in ecosystem development programs.

Disengaged

Total assets: 1st quartile.

Business model and geography: Local Universal, in South, East and North Europe.

Bank improvement strategy: /

Ecosystem development strategy: /