

Master's Thesis – master Innovation Sciences

Open Innovation in Accelerator Programs

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Abstract

Introduction

Successful startup growth can bring economic and social benefits to society. Entrepreneurs, however, face many challenges, often related to a lack of resources, knowledge and network. To overcome these challenges startups can participate in an accelerator program, organised by a business accelerator. Here, startups receive support, mainly through network introductions and workshops, to enhance their business capabilities. However, where business accelerators induce developments to a startup's business exactly and to what extent they add to the contribution of the startup's personal network was yet unidentified and determined in this research.

Theory

As a business accelerator aims to induce business-related developments, startups within this research are examined on developments in their business model. These developments are induced by external sources that originate from outside the startup's organisational boundaries, either from their personal or the accelerator's network. This represents an inbound open innovation process that induces developments in a startup's business model.

Method

The research follows a comparative case study design, comparing 23 European, energy-related startups. Fifteen accelerated to eight non-accelerated. The author collected qualitative data to identify all business model developments that were induced by external actors. The business model developments were categorised according to the business model canvas components. This enabled the author to create a structured overview of all developments that were induced, to which startups, by which actor and whether this actor originated from the accelerator or the startup's personal network.

Results

Business accelerators only contribute meaningfully to the key partners and key activities components of startups through their mentors, their legitimacy and fundraising support. For key resources, participation in an accelerator program is beneficial, but startups are in principle capable of developing this component with their personal network. In the other components accelerator program participation did not make a difference. The most influential external actors appeared to be the accelerator itself, investors and universities.

Conclusion

The results show that the inbound open innovation process, facilitated by an accelerator program, provides additional developments on the left side of a startup's business model canvas, compared to developments induced by their personal network. This refers to the internal management of their organisation.

Discussion

Business accelerators do contribute to the development of startups that participate in their program, but they are not decisive for startup success. As they only facilitate additional developments in two components they do not provide as much value as they aim to.

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Introduction

The successful development of startups can stimulate prosperity in society through economic growth, new employment and learning opportunities, disruptive innovation, technological development or a nation's competitive position (Szarek & Piecuch, 2018). Whether a startup grows successfully, however, depends on numerous internal and external factors (Horne & Fichter, 2022). Startups, by definition, face challenges often caused by a lack of resources, knowledge or network (Oliva & Kotabe, 2018; Eftekhari & Bogers, 2015). To overcome such challenges, Berezcki (2019) identifies collaborations as essential and touches upon multiple collaboration opportunities, e.g. with SMEs, large corporates, funding schemes, startup competitions, angel investors, financial institutions such as banks and venture capital funds, research institutes and universities or business accelerators (Horne & Fichter, 2022; Berezcki, 2019; Spender et al., 2017). For successful startup growth, business accelerators can fulfil a critical role, e.g. by facilitating collaborations with the aforementioned actors (Moritz et al., 2022; Pustovrh et al., 2020).

A business accelerator runs an accelerator program, i.e. a process in which the participating startups are supported by the expertise and experience of investors and mentors to optimise their business model (Berezcki, 2019). An accelerator program is defined by Cohen et al. (2019, p. 1782) as: *'A fixed-term, cohort-based program for startups, including mentorship and/or educational components, that culminates in a graduation event'*. A business accelerator invests financially in its participants but mainly aims to transfer intangible resources such as business knowledge and network opportunities towards the startup (van Weele et al., 2017). This focus on the startups' business capabilities and organisation implies that an accelerator program induces changes in a startup's business model, rather than to its innovation.

The process of transferring external knowledge and expanding the network of a startup in an accelerator program can be understood as an open innovation (OI) process (Battistella et al., 2017; del Sarto et al., 2022; Pustovrh et al., 2020). Open innovation refers to knowledge exchange transcending organisational limits (Chesbrough, 2003), which is a key process in an accelerator program (del Sarto et al., 2018). Implementing an OI lens enables a better understanding of the external knowledge flow a business accelerator facilitates (del Sarto et al., 2018). From the startup's perspective, this is an inbound OI process (Chesbrough & Bogers, 2013), referring to a knowledge flow from external actors towards the startup.

How an inbound OI process that is facilitated by a business accelerator takes place exactly, and where it influences the business model of startups, is only partially revealed in academic literature (del Sarto et al., 2018). To a certain extent, this is because analyses on OI in startups are mainly aimed at technological knowledge transfer instead of business knowledge (Spender et al., 2017). Another reason is the lack of a qualitative examination of the interactions startups have with external actors, which forms a barrier to a more in-depth understanding of how certain knowledge is transferred, by whom, and where it affects the startup. To create more complete insights on where business accelerators induce developments to a startup's business model, this research aims to identify all relevant actors, interactions and other potentially influential factors facilitated in an accelerator program, building further upon del Sarto et al. (2022). Comparing this to the developments of startups that did not participate in an accelerator program, allows for a more robust comparison between accelerated and so-called non-accelerated startups (Pauwels et al., 2016). As an overview of these developments on startups is currently missing (Spender et al., 2017), creating and analysing such an overview can reveal the true contribution of accelerator programs on startups and improve our understanding of this OI process (del Sarto et al., 2018). Hence, this research aims to identify where the inbound OI process of startups, facilitated through an accelerator program, influences the business model. It does so by answering the following research question:

'Where does inbound open innovation in an accelerator program induce developments in the business model of a startup compared to non-accelerated startups?'

This research answers the research question by the means of a qualitative, comparative case study approach, interviewing accelerated and non-accelerated startups. The scope of this research includes renewable energy-related startups in Europe. To ensure a similar level of quality within the full sample, the non-accelerated startups are startups that had the potential to be a part of one of these programs but did not participate for various reasons. The business model developments will be structurally categorised using the business model canvas by Osterwalder & Pigneur (2010).

Academically, this research contributes to open innovation theory and business accelerator literature. For OI theory, this research examines and structurally categorises external influences that induce organisational development and business skills rather than technological product or service improvements, proposed by Spender et al. (2017). For accelerator literature it will reveal where external actors, that are facilitated in accelerator programs, are inducing developments to participating startups, affirming or rejecting the claimed positive effects of participation (Battistella et al., 2017; Bergmann & Utikal, 2021; Lizarelli et al., 2022; Polo García-Ochoa et al., 2020). Additionally, categorising startup developments induced through an OI process for both accelerated and non-accelerated startups in a business model canvas format is in itself an innovative way to identify the true contribution of accelerator programs.

From a practical perspective, this research can serve as a tool for both business accelerators and startups. Firstly, business accelerators can verify to what extent the results of this research apply to their accelerator program, enabling them to improve their program accordingly, e.g. strengthen their support where it appears to be ineffective, or diversify their support when it appears to be too focused. Additionally, as this research links external actors to specific business model developments, accelerators can facilitate an introduction with the actors they deem valuable for their startups according to their needs. In like manner, startups can use this information to connect with these actors themselves. For startups, this, and the analysis on the contribution of an accelerator on startup developments, can clarify for a startup whether it deems itself in need of an accelerator program or if it could develop its business model without one.

Theory

The three main concepts in this research are the business model, open innovation and business accelerators. These concepts are used to help interpret the process of knowledge transfer during an accelerator program. This chapter will first define startups and the business model, followed by an introduction to the business model canvas and its link to open innovation theory. Afterwards, it provides an elaboration of business accelerators and accelerator programs to clarify the context in which an open innovation process induces developments in a startup's business model. Lastly, it provides an elaboration on how these concepts are related and together lead to an innovative approach to identify the impact of business accelerators. It ends with a substantiated expectation of the difference between developments in accelerated and non-accelerated startups and the role that business accelerators have in this process.

Business models of startups

No global consensus exists on the definition of a business model, however, in this research it is defined as a concept that is comprised of the startup's activities and network that create, deliver and capture value and lead to a competitive advantage (Zott et al., 2011). As for the business model concept, a universal definition of a startup is absent (Bortolini et al., 2018). In this research, a startup is understood as a new venture that aims to find a repeatable and scalable business model under market conditions of great uncertainty (Blank, 2007; Ries, 2011).

Startups should be flexible regarding their business model and form it through experimentation and learning from customer validation (Ries, 2011), as implementing an adequate business model can increase their chance of survival (Weking et al., 2019). In addition, startups are likely to pursue developments in their business model when exposed to new, valuable, external knowledge due to the challenges founders encounter when setting up a company, such as limited resources and key decision-making in unknown situations (Debrulle et al., 2014). From which sources startups acquire external knowledge that influences their business model, and where it does so, is to be determined in this research.

The business model canvas (BMC) enables the operationalisation of an organisation and encompasses all aspects of a business model (Keane et al., 2018). The BMC is a template initiated by Osterwalder & Pigneur (2010) and is depicted in its original format in Figure 1, including the definitions of all nine components. The canvas can be divided into four business aspects, where on the left, key partners, key activities and key resources refer to the management infrastructure of the business and on the right, customer segments, customer relationships and channels refer to their customer interaction. The middle, the value proposition, represents the positioning of the innovation and the bottom two blocks represent the financial streams of the organisation (Carter & Carter, 2020). As all components are related, startups must develop all elements in relation to each other and search for the optimal balance to create, deliver and capture maximum value (Krumeich et al., 2013). By categorising startup developments per BMC component, this research can efficiently create a structured overview of all developments that are induced by open innovation.

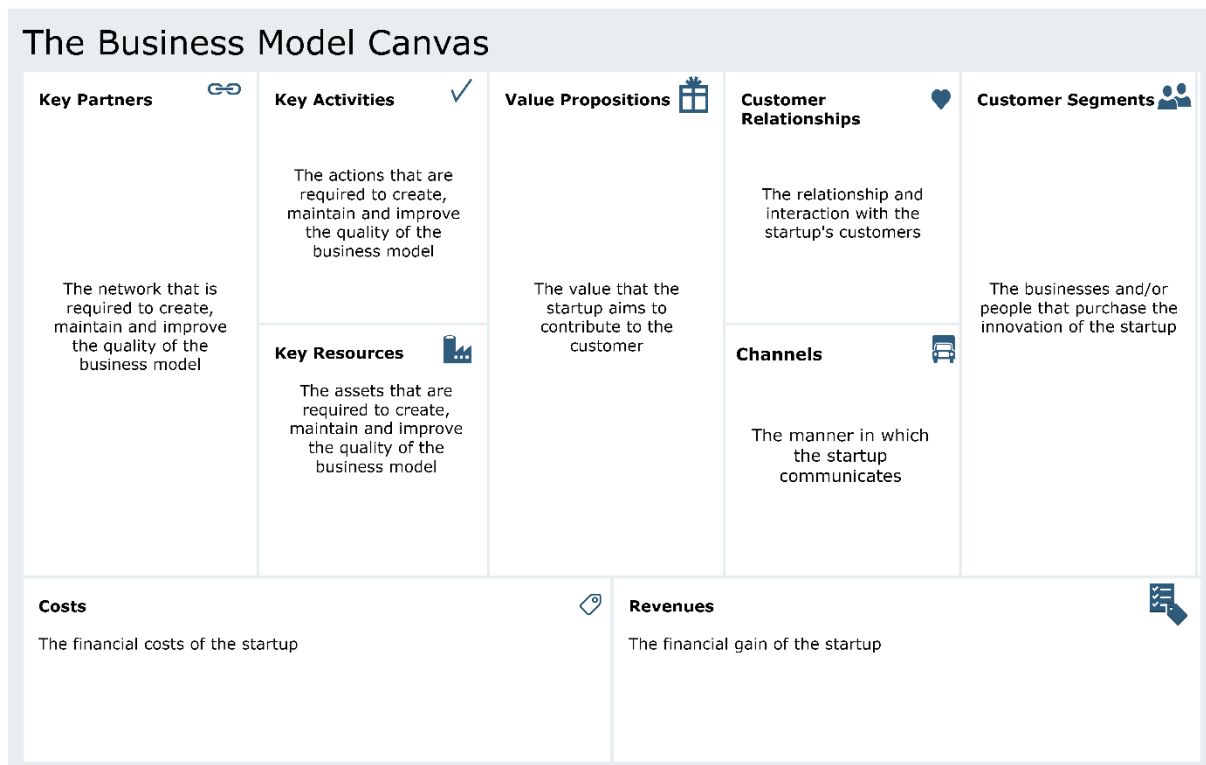


Figure 1: The business model canvas including the definition of each component following Joyce & Paquin (2016) and Osterwalder & Pigneur (2010)

Open innovation

The definition of open innovation by Chesbrough and Bogers (2014, p.17) is: ‘a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization’s business model’. This implies that external sources of knowledge can induce developments in a startup through inbound knowledge flows. Examples of such sources are customers, complementary firms, end-users, supply-chain partners, universities, research institutes and incubators (Svetina & Prodan, 2008). In the context of this research, it also includes different types of investors, experts and mentors that are introduced by the accelerator (Crişan et al., 2021).

Such external actors possess knowledge that can be of support to startups. Hence, startups should appropriate this external knowledge to pursue innovation and achieve growth (Chesbrough et al., 2018). To appropriate, access and acquire external knowledge, it requires adequate interaction with external actors as it enables startups to upgrade their innovative performance, improve their organisation and develop their business model (Caloghirou et al., 2004). Organisations that pursue these interactions have proved that through these OI processes external actors induce developments to their business model (Huang et al., 2013.; Peñarroya-Farell et al., 2021; Vanhaverbeke & William Chesbrough, 2014; Yun, 2017). Through an OI approach combined with a BMC categorisation, this research can reveal how startups develop their business model through interactions with external actors, and the role a business accelerator can play in this process.

Business accelerators

A business accelerator is the organiser of an accelerator program and is in this research seen as a facilitator of an OI process. Accelerator programs aim to stimulate and strengthen the growth of startups (Cohen & Hochberg, 2014; Crişan et al., 2021; del Sarto et al., 2022). They do this through three mechanisms: providing a financial investment; facilitating knowledge exchange through mentors, who provide guidance and strategic support, and experts, who provide workshops; and acting as a broker to introduce startups to a relevant network (Fowle, 2017). Besides these mechanisms, association with an

accelerator, referred to as legitimacy, can also be beneficial for startups as it confirms their success potential through the accelerator's reputation (Drori & Wright, 2018; van Weele et al., 2017).

In academia, there is an unsettled debate on the difference between accelerators and incubators. Here, an accelerator is defined as a startup support program that: does not primarily provide physical resources; offers pre-seed investment; focuses on business development and; has a duration of at least or equal to three months. It is retrieved from Pauwels et al.'s (2016) but differs in two aspects. Firstly, the criterion of focussing on smaller investors than venture capitalists is omitted, as the startups within reach of the author, from which the sample is retrieved, have all been associated with venture capitalists. Secondly, it puts a minimum to the duration. The author experienced that programs of a shorter duration do not provide support of similar quality, as programs of less than three months provide insufficient time for knowledge to be effectively transferred and appropriated. Incubators are here seen as a lesser version of accelerator programs meant for startups in an earlier stage.

The reason to view an accelerator program as an OI process is that external knowledge is purposively diffused towards the startup from a source outside their organisational boundaries (Battistella et al., 2017; del Sarto et al., 2022). Activities in which this diffusion occurs in such programs include coaching and mentoring services, a training curriculum, counselling services, investor events, location services and investment opportunities (Pauwels et al., 2016). Actors that are involved in this OI process are all representing external sources of knowledge for the startup (Spender et al., 2017).

During the program, the transfer of knowledge occurs during interactions with the 'accelerator itself', referring to investment and program managers, and with external actors that are introduced to the startup by the accelerator. Such actors are mentors, industry experts, peers, investors, and experts who provide workshops on business skills, pitching, leadership and more. In all these activities a successful transfer of knowledge is the main objective. A distinction is made between mentors and industry experts.

Mentors are actors that have extensive business experience, have expertise in a specific topic or business element and are often entrepreneurs themselves (van Weele et al., 2017). They are part of the accelerator's network, providing support voluntarily during the program on a regular basis and are matched to startups for optimal output of the collaboration. Their motives vary from altruism to connecting to startups as an angel investor. Industry experts are knowledgeable and/or skilful people from the startup's industry who sometimes also provide workshops. They differ from mentors based on the frequency of their support, which is here on an occasional or ad hoc basis, and incentive, as these actors do get financial compensation for their workshop or advice. Their purpose is, however, similar to a mentor's, which is stimulating the startup's growth.

Interrelatedness of business models, open innovation and business accelerators

Business models are developed through an open innovation process that is facilitated by the business accelerator, which is the accelerator program. The BMC enables a structured categorisation of the developments that external sources of knowledge induce to startups, and allows to examine the OI process where innovative, developing organisations are supported to grow their business successfully.

A holistic view of the inbound OI process of startups is depicted in *Figure 2*. The box in the middle represents the startup's business model, the arrows represent the inbound OI process, and the origin of these arrows represent the source of the OI process, i.e. the actors that the startups interact with. The outer-rectangle represents the network facilitated by the accelerator and the inner-rectangle represents the personal network of the startup. Green arrows represent OI processes that induced developments in the startups' business model, whereas red arrows represent OI processes that did not, relating to an ineffective inbound OI process. The figure aims to emphasise that accelerators provide additional sources of external knowledge that can induce developments in a startup's business model, besides sources within the startup's personal network. Yet, OI processes from both networks can be ineffective and fail to induce a development.

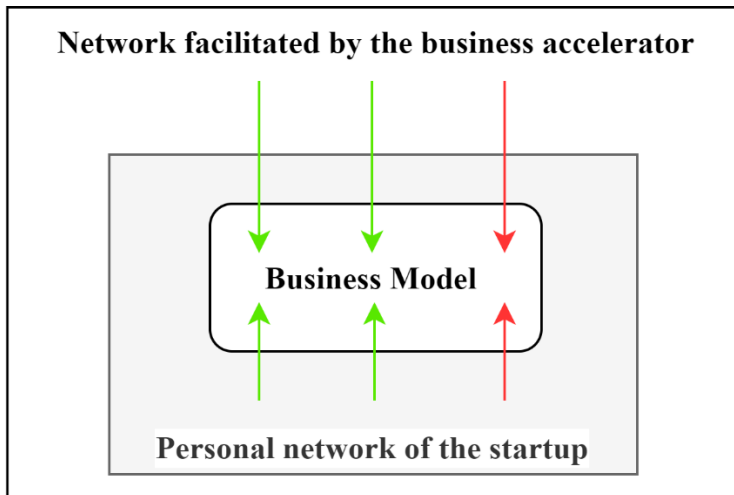


Figure 2: Representation of the open innovation process for accelerated and non-accelerated startups

Accelerated startups have access to a structural inbound knowledge flow from the accelerator program through program-alumni, peers, mentors, industry experts (Yua, 2019), and multiple networking events with investors, corporates, mentors and industry experts (Crişan et al., 2021), whereas non-accelerated startups must acquire external knowledge and a network themselves. Hence, it is expected that accelerated startups acquire knowledge on a higher level of quantity and diversity from external sources that induce developments to their business model than non-accelerated startups.

Method

This section provides an overview of this research and specifies the research sample. Then, it elaborates on how data are collected and analysed. It justifies the implemented methodology throughout this chapter according to Korstjens & Moser's (2018) qualitative research requirements; credibility, transferability, dependability, confirmability and reflexivity.

Research overview

This exploratory, inductive research uses a qualitative, comparative case study approach to answer the research question. A comparative case study approach enables the researcher to compare situations differing in their social context and activities, yet present in the same field (Bartlett & Vavrus, 2017), as is the case for accelerated and non-accelerated startups. The qualitative data are acquired by interviewing accelerated and non-accelerated startups to draw a robust comparison between startups that did and did not participate in an accelerator program.

To touch upon Korstjens & Moser's (2018) reflexivity criterion, referring to the critical self-reflection of the role of the author in their research, the author hereby mentions his employment and therefore first-hand experience at the Rockstart accelerator program. This enabled contact with numerous startups in the energy field, both accelerated and non-accelerated. Additionally, it increased the expertise of the author in the field of business accelerators, startups and their OI approaches which contributes to the quality of this research. Acknowledging that a critical view on Rockstart can contribute to the quality of its accelerator program, the author wants to emphasise its effort to draw a non-biased conclusion and respect the academic value of non-biased research.

Sample

The accelerated startups are alumni of Climate KIC, Norrsken, Rockstart, Shake'Up, Startup Wise Guys, Sustainable Ventures and Yes!Delft. The non-accelerated startups have been identified as potential participants of Rockstart's energy accelerator program. The startups have gone through their due diligence process and were either rejected by a selection committee were in the last stage of the selection process, or rejected an offer to participate themselves. By comparing actual participants to potential participants, the difference in quality between the two groups is minimised, for potential participants had a realistic chance to participate themselves. This comparison increases the robustness of the results, as it implies that the non-accelerated startups possess, or nearly possess, a level of quality that would have enabled them to participate in an accelerator and undergo the same trajectory. More information on the sample can be found in Appendix B: Sample.

All interviewees were aware of the author's position at Rockstart and were assured their answers were kept anonymous. Outreaches were sent to the founders of these startups on their personal email and/or LinkedIn account and interviewed on Microsoft Teams. The author reached out to 65 founders, who were deliberately chosen according to their previous interaction with Rockstart, and every non-respondent received two reminders. With seven rejections due to time constraints and thirty-five non-respondents, the response rate was 46%. Eventually, 23 startups were interviewed for this research. However, the respondents are unequally distributed, as 15 startups participated in an accelerator program and 8 did not. Startups that were sampled as non-accelerated appeared to have participated in another accelerator program after their discussions with Rockstart. For accelerated startups this amount suffices, this amount resulted in theoretical saturation, as minimal new sorts of developments arose during the last three interviews (van Rijnsoever, 2017). For developments in non-accelerated startups theoretical saturation is not reached. Non-accelerated startups all have their unique manner to acquire external knowledge and therefore often new types of developments arose during the interviews. Hence, due to the unforeseen unequal distribution, the lower amount of non-accelerated startups in this sample creates a limitation of this research.

The author acknowledges that this case study, with a sample of energy-related startups within Europe, is unlikely to be generalisable for other sectors and regions, negatively influencing the transferability of

the findings. By aiming to contribute to the academic gaps and practical implications mentioned in this research, the results can still add value to academia and society, although the results are not perfectly transferable to another context (Bryman, 2016).

Data collection

The data are collected through semi-structured interviews, providing a general structure to the sequence of questions by using an interview guide, yet keeping the opportunity to dive further into the comments of the interviewees (Bryman, 2016). The interviews were held only with the founders or co-founders of these startups and had a duration of approximately 30 minutes. When approved, the interview was recorded, whereas otherwise extensive minutes were taken during the interview. Each interview was conducted following the interview scheme (Appendix A: Interview scheme)

First, the author asked for information on their organisation to create an overview of the research sample. Second, the author asked questions about their interactions with external actors and the knowledge that was or was not transferred from those actors towards the startups. This reveals to what extent the interviewees have been involved in an inbound OI process and with whom. Thirdly, the author asked whether the startup participated in an accelerator program. If this startup did, they were asked about their motivation to participate, which external actors they interacted with due to the accelerator program, their opinion of the program and how an accelerator induced developments to their business model. If the startup did not participate in an accelerator, they were asked about their motive to not participate, their opinion of accelerator programs and whether an accelerator program would have made a difference in their development. Further questions to non-accelerated startups were aimed at identifying what type of external actors induced developments in their business model in the absence of an accelerator.

Data analysis

The interviews are transcribed and coded on Condens.io (Condens.io, 2020), a tool for qualitative data analyses. Codes are used to systematically interpret the data to draw a substantiated conclusion (Bryman, 2016). The author follows an abductive coding approach (Vila-Henninger et al., 2022), where it codes the interview transcriptions twice, each time with a particular pre-determined set of categories.

The first set of categories follows the interview scheme; startup information; external actors; open innovation; accelerator program; other comments. The author aimed to provide a sample overview with the 'startup information' category, a list of all actors that induced developments to the startups with 'external actors', more details on how this process occurs with 'open innovation' and information regarding the startup's experiences and opinion of accelerator programs with the 'accelerator program' category. The 'other comments' was meant for comments that could be interesting for this research but did not fit the other categories. The second set of categories encompassed the nine BMC components, as defined in *Table 1*. These two categories together indicated for each code which component it developed, by whom this development was induced and from which network the source that induced the development originated.

Component	Criteria
<i>Key Partners</i>	<ul style="list-style-type: none"> - Direct introduction to an external actor with whom the startup was unfamiliar and can extract value from on a regular basis, excluding customers, e.g. mentors or investors <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Indirectly a wider network due to this initial introduction
<i>Key Activities</i>	<ul style="list-style-type: none"> - Direct influence on business activities, e.g. pitching strategy, visiting events, setting goals, financial statements <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Direct influence on organisational actions, e.g. setting up a team, self-development plans <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Direct influence on administrative aspects, e.g. legal and tax-related issues, financial reporting
<i>Key Resources</i>	<ul style="list-style-type: none"> - Directly influence through access to assets, e.g. financial capital, human capital (labour), Intellectual Property (IP) or office space <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Direct or indirect access to industry-specific knowledge on an occasional or ad hoc basis e.g. receiving fundraising advice when preparing a new round or market knowledge on highly specific topics <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Receiving knowledge through workshops
<i>Value Proposition</i>	<ul style="list-style-type: none"> - Directly influencing the positioning of the innovation in any context
<i>Customer Segments</i>	<ul style="list-style-type: none"> - Directly influencing the customer focus of the company <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Direct and indirect access to new customers
<i>Customer Relationships</i>	<ul style="list-style-type: none"> - Directly influencing the interaction with current customers
<i>Channels</i>	<ul style="list-style-type: none"> - Directly influencing the manner of communication on any level
<i>Costs</i>	<ul style="list-style-type: none"> - Directly influencing the financial costs of a startup
<i>Revenues</i>	<ul style="list-style-type: none"> - Directly influencing the financial gain of the startup

Table 1: Operationalisation of Business model canvas components

After categorising all codes to the BMC components, codes that convey a similar message were grouped to provide a more concise view of the influence external actors had on the startups, following the method of 1st and 2nd order categories proposed by Gioia et al. (2013). To contribute to the credibility, dependability and conformability of this research, the ungrouped codes are added to this research (Korstjens & Moser, 2018). It reveals from which comments these groups are created and its disclosure intents to create transparency towards the reader on how the results lead to the answer to the research question.

Results

The results that are retrieved from the interviews are depicted in *Table 2*. This table shows the developments that are induced per BMC component and refer to each startup to whom they were induced. In brackets, it states the actor that was the source of the inbound OI process that induced the development¹. The developments per BMC component are divided into three columns, the first representing the outer-rectangle and the second and third column the inner-rectangle of *Figure 2*: ‘Developments in accelerated startups induced by network facilitated by the accelerator’, ‘Developments in accelerated startups induced by their personal network’ and ‘Developments in non-accelerated startups induced by their personal network’ respectively. Underlined references indicate failed attempts to induce a development. All comments are grouped to provide a concise overview of the interview results. The list of ungrouped comments is given in Appendix C: Ungrouped codes per BMC component. The interview transcriptions from which the comments are retrieved are available upon request.

¹ The author acknowledge that conferences are not actors, but includes them here as they act as a source for external knowledge, as they are events that facilitate interactions with external actors

BMC Component	Developments in accelerated startups induced by the network facilitated by the accelerator	Developments in accelerated startups induced by their personal network	Developments in non-accelerated startups induced by their personal network
<i>Key partners</i>	<p>Direct introductions to investors</p> <ul style="list-style-type: none"> - A1; A4; A6; A9; A11; A12; A13; A15 (accelerator) - A2; A9; A10; A13 (events) <p>Introductions to mentors</p> <ul style="list-style-type: none"> - A1; A2; A3; A4; A5; <u>A6</u>; A7; A11; A13; A14 (accelerator) <p>General network or collaboration opportunities</p> <ul style="list-style-type: none"> - <u>A5</u>; A6; A8; <u>A9</u>; A10; A13 (accelerator) - A3 (investor) 	<p>Direct introductions to investors</p> <ul style="list-style-type: none"> - A5 (investors) - A15 (incubator) <p>General network or collaboration opportunities</p> <ul style="list-style-type: none"> - A3; A6; A12; 14 (investors) - A6 (peers) - A9 (startup hub) 	<p>Direct introductions to investors</p> <ul style="list-style-type: none"> - NA1; NA2; NA3; NA6 (investors) - NA2; NA3; NA5; (conferences) - NA3 (regional institutions) - NA3; NA4 (ex-colleagues) - NA4 (university) - NA6 (incubator) - NA7 (acquirer) <p>General network or collaboration opportunities</p> <ul style="list-style-type: none"> - NA6 (incubator) - NA6 (experience)
<i>Key activities</i>	<p>Business know how / overall strategy</p> <ul style="list-style-type: none"> - <u>A2</u>; (mentors) - A3; (experts) - A6; A7; A8; A10; A11; A14 (accelerator) - A6; A7; A11 (workshops) <p>Administrative support (financial, legal, HR, reporting, etc)</p> <ul style="list-style-type: none"> - A7; A12 (experts) - A8; A10 (accelerator) - A14 (mentors) <p>Support on setting up a team</p> <ul style="list-style-type: none"> - A3 (experts) - A5 (accelerator) - A6 (peers) <p>Pitching strategy</p> <ul style="list-style-type: none"> - A5; A7 (workshops) 	<p>Business know how / overall strategy</p> <ul style="list-style-type: none"> - A4 (incubator) - A5; A8 (investor) <p>Administrative support</p> <ul style="list-style-type: none"> - A8 (investors) <p>Support on setting up a company</p> <ul style="list-style-type: none"> - A9; <u>A15</u> (investors) - A10 (university) - A15 (incubator) 	<p>Business know how / overall strategy</p> <ul style="list-style-type: none"> - NA2; NA6 (peers) - NA5; NA6 (incubator) <p>Administrative support</p> <ul style="list-style-type: none"> - NA4 (peers) - NA4 (investors) - NA7 (owner) <p>Support on setting up a company</p> <ul style="list-style-type: none"> - NA1; NA3; NA7 (investor) - NA3 (books & podcasts) - NA4 (university)
<i>Key resources</i>	<p>Funding</p> <ul style="list-style-type: none"> - A1; A2; A3; A5; A6; A7; A9; A10; A11; A12; A14; A15 (accelerator) - A14 (mentor) <p>Fundraising support</p> <ul style="list-style-type: none"> - A1; A4; A8; A9; A12; A13; A14 (accelerator) <p>Location</p> <ul style="list-style-type: none"> - A11; A12; A14 (accelerator) <p>Human capital</p> <ul style="list-style-type: none"> - A13 (accelerator) <p>Market knowledge</p> <ul style="list-style-type: none"> - A3 (mentors) - <u>A9</u> (workshops) 	<p>Funding</p> <ul style="list-style-type: none"> - A3; A5; A7 (universities) - A8; A12; A13 (investor) - A10 (university) <p>Human capital</p> <ul style="list-style-type: none"> - A3; A5; A8; A10 (universities) <p>Intellectual property</p> <ul style="list-style-type: none"> - A10; A11 (university) <p>Market knowledge</p> <ul style="list-style-type: none"> - A8 (conferences) - A13 (investors) 	<p>Funding</p> <ul style="list-style-type: none"> - NA1; NA3; NA4 (investor) - NA2; NA5 (university) - NA6 (regional institution) <p>Human Capital</p> <ul style="list-style-type: none"> - NA2; NA3; NA8 (university) - <u>NA7</u> (head-hunter) <p>Intellectual property</p> <ul style="list-style-type: none"> - NA5 (university) <p>Market knowledge</p> <ul style="list-style-type: none"> - NA4 (investor; policy maker) - NA5 (conferences; peers) - NA6 (advisor) - NA7 (acquirer)
<i>Value proposition</i>	<p>Value proposition</p> <ul style="list-style-type: none"> - A6; A12 (accelerator) - A6 (peers) - A14 (mentors) <p>Market positioning</p> <ul style="list-style-type: none"> - A3; A7 (mentors) <p>Foreign value proposition</p> <ul style="list-style-type: none"> - A3 (mentors) <p>Value Proposition towards investors</p> <ul style="list-style-type: none"> - A13 (accelerator) - A14 (mentors) <p>Model simplification</p> <ul style="list-style-type: none"> - A3; A11 (mentors) 	<p>Value proposition</p> <ul style="list-style-type: none"> - A9 (investors) - A2; A5 (experts) - A13; A14 (customers) 	<p>Value proposition</p> <ul style="list-style-type: none"> - NA1; NA2; (experts) - NA3; NA5; NA7; NA8 (customers) - NA4 (corporates) - NA5 (scale-up program) - NA8 (policy makers)
<i>Customer segments</i>	<p>Customers</p> <ul style="list-style-type: none"> - <u>A1</u>; A2; <u>A5</u>; <u>A6</u>; A9; A11; A12; <u>A15</u> (accelerator) - A3; <u>A7</u>; (mentors) 	<p>Customers</p> <ul style="list-style-type: none"> - A1 (conferences) - A5 (customers) <p>Pilots</p> <ul style="list-style-type: none"> - A8 (incubator) - A14 (conferences) 	<p>Pilots</p> <ul style="list-style-type: none"> - NA2 (incubator) <p>Customers</p> <ul style="list-style-type: none"> - NA2 (investor) - NA6 (incubator) - NA7 (peers) - NA8 (customers)
<i>Customer relationship</i>	<p>Negotiate and interact with customers</p> <ul style="list-style-type: none"> - A3 (mentors) 	<p>Structural customer feedback</p> <ul style="list-style-type: none"> - A1; A3; A4; A5; A7; A9; A11; A14 (customers) <p>Customer advisory board</p> <ul style="list-style-type: none"> - A1 (customers) 	<p>Structural customer feedback</p> <ul style="list-style-type: none"> - NA3; NA4; NA7; NA8 (customers) <p>Customer relations department</p> <ul style="list-style-type: none"> - NA7 (acquirer)
<i>Channels</i>	<p>Communication support</p> <ul style="list-style-type: none"> - A2 (workshops) 	<p>Publication</p> <ul style="list-style-type: none"> - A1 (university research) - A9 (prize) <p>Word-of-mouth marketing</p>	<p>Marketing</p> <ul style="list-style-type: none"> - NA7 (interns) <p>Publicity on events</p> <ul style="list-style-type: none"> - NA8 (conferences)

		<ul style="list-style-type: none"> - A4; A7; A9 (customers) - A6; A8; A9 (investors) - A9; A13 (experts) Publicity on events <ul style="list-style-type: none"> - A8; A11; A14 (conferences) 	
Costs		Cost advice <ul style="list-style-type: none"> - A5 (suppliers) Tax benefits / Subsidies <ul style="list-style-type: none"> - A8 (university) 	
Revenues	Pricing strategy <ul style="list-style-type: none"> - A3; A7; A9 (mentors) - A5 (accelerator) 		

Table 2: Startup developments per BMC component

Developments in the business model canvas components

This section provides details on the developments per BMC component. It tells to which startups particular developments in the component are induced, discusses the differences and similarities between the influence of the accelerator's network and personal network, and touches upon the external actors that were the source of the OI processes through which developments were induced.

Key partners: Introductions to investors and mentors, and providing other general network or collaboration opportunities appeared to be a strength of accelerator programs. Every accelerated startup experienced developments in this component (A1; A2; A3; A4; A5; A6; A7; A8; A9; A10; A11; A12; A13; A14; A15). It appeared, however, that both accelerated (A3; A5; A6; A9; A12; A14; A15) and non-accelerated startups (NA1; NA2; NA3; NA4; NA5; NA6; NA7) create key partnerships for knowledge sharing, acquiring business advice or funding opportunities with investors, peers or others through their personal network as well. Direct introductions to investors are frequent for both groups, although the effectivity of these introductions was said to be higher when having been through an accelerator program (A1; A4; A6; A8; A9; A11; A12; A13; A14; NA2), as participation would create legitimacy amongst potential partners. The useful introductions to mentors and greater effectivity with which introductions to investors are made for accelerated startups are the main differences between the two groups in this component.

For accelerated startups, the accelerator itself induced developments to all accelerated startups, but also accelerator events (A2; A9; A10; A13) and an investor from the accelerator (A3) induced developments to this group. From the personal network, investors (A3; A5; A6; A12; A14; NA1; NA2; NA3; NA6) were the main external actor, besides multiple others as conferences (NA2; NA3; NA5), incubators (A15; NA6), ex-colleagues (NA3; NA4; NA6), peers (A6), a startup hub (A9), university (NA4), regional institutions (NA3) and an acquirer (A7). Hence, actors that can provide a financial investment as accelerators and investors are most frequently the cause of new partners.

Key activities: This component underwent developments in nearly all startups, both accelerated and non-accelerated. The accelerator's network mainly induced developments through transferring business know-how and advice on overall strategy (A3; A6; A7; A8; A10; A11; A14), but also administrative support (A7; A8; A10; A12; A14), setting up a team (A3; A5; A6) and their pitching strategy (A5; A7). The latter is notable, as pitch training is part of every accelerator program, but is only mentioned twice as a positive development. Two accelerated startups are listed with underlined references, as these startups deemed the support by mentors (A2) and workshops (A9) on key activities ineffective. For this component, the accelerator does contribute to the key activities of its startups but is not a necessity as the personal network of accelerated (A4; A5; A8; A9; A10; A15) and non-accelerated startups (NA1; NA2; NA3; NA4; NA5; NA6; NA7) induced similar developments. One non-accelerated startup experienced ineffective support, this time from its investor (A15).

The external actors that induced developments in key activities are highly diverse within each column. For accelerated startups the sources were the accelerator itself (A5; A6; A7; A8; A10; A11; A14), workshops (A5; A6; A7; A11), experts (A3; A7; A12), mentors (A2, A14) and peers (A6). For non-accelerated startups these sources were their investor (A5; A8; A9; NA1; NA3; NA4; NA7), incubator

(A4; A15; NA5), peers (NA2; NA4), the university (NA4), conferences (A8), acquirer (NA7) and even books and podcasts (NA3). The variety of sources that induce developments to key activities can be explained by the wide spectrum of a startup's needs in this component, e.g. support on strategy, finance, legal matters, human resources, pitching and more. This influences the actor they seek to acquire support from, as each external actor has their own expertise.

Key Resources: Funding (A1; A2; A3; A5; A6; A7; A9; A10; A11; A12; A14; A15) and fundraising support (A1; A4; A8; A9; A12; A13; A14) are developments that together were induced by the accelerator to all accelerated startups. These two aspects are frequently mentioned as the main motivation to participate (A1, A2, A4, A6, A8, A9, A10, A11, A12, A13, A15). Workshops are only mentioned as few as four times to induce developments on the key resources component (A3; A6; A7; A14), even though they are a substantial part of each accelerator program. Accelerated startups also received a location (A11; A12; A14), human capital (A13) and market knowledge (A3). The personal network of both accelerated and non-accelerated startups also played a meaningful role in this component. It induces similar developments as the network of the accelerator does, however also inducing three developments of IP with startups from both groups (A10; A11; NA5) but omitting fundraising support. Hence, the personal network of startups is capable of inducing similar developments. However, the fact that the accelerator is a source of funding for all accelerated startups and provides fundraising support that non-accelerated startups do not receive, participation in an accelerator program provides an advantage on this component compared to non-accelerated startups.

For accelerated startups, nearly all developments were induced by the accelerator itself, except for two that were induced by mentors (A3; A14). From the personal network, investors played a relevant role in providing funding (A8; A12; A13; NA1; NA3; NA4) and market knowledge (A13; NA4), but a more prevalent external actor here was the university, providing funding (A3; A5; A7; A10; NA2; NA5), human capital (A3; A5; A8; A10; NA2; NA3; NA8) and IP (A10; A11; NA5). Others were conferences (A8), a regional institution (NA6); policy makers (NA4), peers (NA5), advisors (NA6) and an acquirer (NA7). Almost every startup found external actors to develop this component, either through the accelerator or in their personal network, mainly because funding and other types of resources are vital for the survival of a startup.

Value Proposition: The accelerator provided support on the startup's value proposition for seven startups (A3; A6; A7; A11; A12; A13; A14). The support was aimed at better positioning their innovation in the market (A3; A7), simplifying their business model (A3, A11), their proposition towards investors (A3) or internationally (A13; A14) and their value proposition in general (A6; A12; A13). Some accelerated startups specifically mentioned that they did not let their value proposition be influenced, as they thought this was their own responsibility (A2; A4; A5; A13). Five accelerated startups developed their value proposition outside of the accelerator (A2; A5; A9; A13; A14). Non-accelerated startups all developed their value proposition from five different sources. There is no notable difference in value proposition developments between accelerated and non-accelerated startups.

In the accelerator, mentors (A3; A7; A11; A12; A14), the accelerator itself (A6; A12; A13) and peers (A6) influenced the value proposition of startups. Outside of the accelerator, this varied from experts (A2; A5; NA1; NA2), investors (A9), corporates (NA4), scale-up programs (NA5) and policymakers (NA8) to mainly customers (A13; A14; NA3; NA5; NA7; NA8). As each startup in this sample has customers, relying on their input is a valid and perhaps more accessible source of external knowledge to develop this component than participation in an accelerator program.

Customer Segments: This component includes the most underlined references. Startups specifically referred to the lack of customer introductions during their accelerator program (A1; A5; A6; A7; A15). Five accelerated startups did receive customers from the accelerator (A2; A3; A9; A11; A12). From the personal network, both accelerated and non-accelerated startups acquired new customers and pilots through various sources, as investors (A5; NA2), conferences (A1; A14), peers (NA7), existing customers (A5; NA8) or their incubator (A8; NA2; NA6). Considering the failed or lack of customer

introductions and the fact that startups are equally capable of acquiring new customers without an accelerator program, the accelerator does not seem to contribute to developments in this component directly.

Customer Relationship: Except for one startup that received support on negotiating and interacting with customers (A3), this component is untouched by the accelerator. Four non-accelerated startups developed customer relationships, induced by their customers (NA3; NA4; NA7; NA8) and their acquirer (NA7). Not only for non-accelerated startups customers induced developments. For eight accelerated startups, customers from their personal network induced developments that led to structural customer feedback (A1; A3; A4; A5; A7; A9; A11; A14) and even a customer advisory board (A1). It is clear that, in this sample, participation in an accelerator program does not contribute to this component, whereas customers do.

Channels: Developments in the channels of the startups are again almost untouched by accelerators, other than one startup that received communication support through a workshop (A2). Other accelerated startups developed this component through their personal network through publications (A1), a prize (A9), but mainly word-of-mouth marketing (A4; A6; A7; A8; A9; A13) and visiting events to increase visibility (A8, A11, A14). Two non-accelerated startups mentioned developments in their channels, either through hiring new marketing interns (NA7) or being invited to speak at conferences (NA8). Again, the accelerator itself does not contribute to developments in this component. However, it is notable that accelerated startups do develop this component relatively more than non-accelerated startups. This could imply that participation in an accelerator program indirectly induces developments in the channels of startups.

Costs: This component has only seen two developments (A5; A8) and is therefore practically neglected by all startups. The personal network of accelerated startups induced developments in their costs in the form of advice from suppliers (A5) and receiving tax benefits and subsidies due to a collaboration with a university (A8). Due to the low number of references, the author concludes that there is no difference between accelerated and non-accelerated startups in this component.

Revenues: Only four accelerated startups have seen developments that directly induced development to this component, all originating from advice on their pricing strategy from the accelerator (A3; A5; A7; A9). Since revenues are often the main indicator of the startup's success, it should be notified that all developments in the business model are indirectly aimed at improving the revenue. An accelerator does contribute, however moderately, to the revenue component of startups.

The following paragraphs first point out the most relevant external actors and reflects on *Figure 2*. Then, it summarises the abovementioned results, elaborates to what extent developments are induced in each component and touches upon the impact of the accelerator and the difference between accelerated and non-accelerated startups for each component.

For key partners, key activities, key resources, value proposition and revenues, *Figure 2* appeared to be correct. The actors from the accelerator's network that induced the most developments were the accelerator itself and also, but less frequently, the mentors. From the personal network, the external actors that induced the most developments were investors, the university and customers. However, the external actors in the personal network that induce developments to the startups appears to vary for each startup.

The two components that underwent the most developments also were the only components that showed a meaningful difference between the two groups. The first is key partners. Non-accelerated startups lack useful mentor support and effective introductions, yet are able to develop this component widely through their personal network. The second is key resources. Where many startups have proven to be adequately capable of developing this component through varying actors in their personal network, the fundraising support and greater ease with which funding is acquired form an advantage for accelerated startups.

Components where the accelerated appears to moderately contribute compared to the personal network of the startups are key activities, value proposition and revenue. The key activities component is strongly developed by the accelerator, but non-accelerated startups successfully find actors that induce similar developments. Then, for the value proposition component, which also sees relatively many developments, the only difference is the variety of developments that are induced. However, non-accelerated startups are equally capable of developing this component as accelerated startups. Now, the revenue component is induced more by the accelerator than for non-accelerated startups, but since this occurred only four times the difference is minimal.

Components that are moderately influenced and experience no difference between the two groups are customer segments and customer relationships. The former experiences the most failed attempts from the accelerator, implying that an accelerator attempts to contribute here but does not always succeed. For the latter, the impact of the accelerator is neglectable and customers appear to be the main driver of developments in this component. The costs component is considered neglected within this sample.

For channels, as only the personal network of accelerated startups induce multiple developments, the accelerator might have had an indirect impact on its startups for this component.

Lastly, although the BMC does not allow for this personal characteristic to be included in the framework, thirteen startups mentioned that participating in an accelerator program would be most beneficial for first-time founders. The reasoning was their lack of network (A1; A2; A10; A13; NA1; NA2; NA8), lack of business skills due to minimal experience (A8; A14) or a technical or academic background (A3; A11), or just for the convenience of additional overall support (A12; A13; NA3).

Conclusion

To answer the following research question: ‘*Where does inbound open innovation in an accelerator program induce developments in the business model of a startup compared to non-accelerated startups?*’, the author interviewed 23 startups to identify where external actors influence startups in their organisation and the contribution of an accelerator in this process. The research follows a comparative case study approach where the sample exists of accelerated and non-accelerated startups, to draw a conclusion on the open innovation process that business accelerators facilitate for their startups.

Inbound open innovation in an accelerator program proved to add onto developments induced by the personal network of the startups on the key partners and key resources components. The productive relations with mentors, the legitimacy of participation increasing the effectivity of network introductions and acquiring funding, and the fundraising support are the key contributions of an accelerator to its startups. The revenue component is, though minimally, also developed by the accelerator through its support on the startup’s pricing strategy, as opposed to non-accelerated startups that did not develop this component. For the key activities and value proposition components the role of the accelerator is beneficial but not crucial. Here, the accelerator strongly induced developments, but non-accelerated startups underwent similar development through their personal network. For the other components the accelerator did not add a direct contribution.

Inbound open innovation appears to mainly induce developments on the left and centre of the BMC for both groups, referring to the startup’s internal business and product positioning. The contribution of accelerators, however, only appeared meaningful on the left side. These findings represent an unequally divided focus of developments in the BMC and conflict with the idea that all components must be developed in relation to each other.

Discussion

This research has contributed to all gaps mentioned in the introduction and hereby created a better understanding of where open innovation in accelerator programs induces developments in startups, what these developments entail and by which actors they are induced. Firstly, by focussing on the business model of startups rather than their innovation (Spender et al., 2017), this research set a foundation for identifying the influence of open innovation and accelerator programs, not only combined but also separately, on business model developments of startups. Secondly, the qualitative approach (del Sarto et al., 2018), including 23 semi-structured interviews and a thorough examination of the transcriptions, reveals the type of developments that are induced, by which sources they are induced and from which network these sources originate (del Sarto et al., 2022). Thirdly, although the sample is not perfectly distributed, the comparison with non-accelerated startups strengthens the robustness of the findings (Pauwels et al., 2016), and reveals that business accelerators only adds on developments that startups can retrieve from their personal network on two BMC components. Lastly, categorising the developments in the BMC (Spender et al., 2017), appeared to be an efficient manner to create an overview of these developments.

The BMC, however, also has its limitations. As the BMC focuses on the organisation on a firm level, it lacks comprehension of more intangible aspects of a startup's relation with its surroundings. Two examples in this research are the inability to, with the framework alone, explain the legitimacy of participation in an accelerator program and the potential indirect effect of accelerators on channels, or any component for that matter. Legitimacy is an intangible social construct that is more dependent on the reputation of the business accelerator, rather than an internal asset that a startup can develop itself. Hence, it falls outside the scope of this framework, in spite of the fact that it has a substantial effect on the key partners component. Then, the developments in the channels component that are induced mainly in accelerated startups, however, not by the accelerator, could indirectly be caused by the accelerator. Unfortunately, the BMC does not include indirect influences to this extent and can therefore not confirm this speculation.

Further theoretical limitations arise due to the open innovation approach, as the theory focusses on knowledge transfers across organisational boundaries. Therefore, developments that are caused by other mechanisms than interactions with external actors are omitted. The founding team's industry experiences (Hashai & Zahra, 2022), behavioural learnings (Sekliuckiene et al., 2018) and new personnel (Brattstrom, 2019), are examples of other causes than can induce developments in a startup's business model, but are excluded in an open innovation approach as they all arise internally. Hence, identifying all developments caused by open innovation does not provide a holistic view of a startup's development.

These three limitations give rise to suggestions for further research to either widen or dive deeper into the findings of this research. For the first, categorising developments in another framework than the BMC, e.g. the Social Enterprise Business Model (Sparviero, 2019), could encompass a wider range of developments. For the second, zooming in on striking findings, e.g. potential differences in the legitimacy of business accelerators or potential indirect effects of participation in an accelerator program, can clarify notable findings of this research. For the third, researching startup developments that are induced internally, performed in parallel with a comparative case study, could reveal a truly holistic view of startup developments and their sources.

From this research follows also practical advice that is substantiated by the results. For business accelerators, the results create awareness that their key contribution currently lies in the key partners and key activities component and can urge them to spread their focus to develop all components in relation to each other and create a more optimal balance. Additionally, as they are now aware which external actors induce certain developments, they can improve their program by aligning the introductions between startups and external actors they facilitate accordingly. Similarly, startups themselves can now also identify which actors to interact with to induce certain developments and

consider whether facilitating such interactions is achievable. Looking at the results, these actors are most likely to be active investors or a university. If they deem sources for such developments to be unreachable, e.g. if they are first-time founders who lack a network and business know-how, participation in an accelerator program can be recommended. On the other hand, when the left side of their business model, i.e. the management infrastructure, seems sufficient, e.g. by having active investors or extensive business experience, participation in an accelerator program might not be as necessary. When a startup's future focus lies on the right and bottom of the BMC, by improving customer interaction and optimising financial streams respectively, they should be aware that these are not the strengths of a business accelerator.

To conclude, accelerator programs simplify the accessibility of external sources of knowledge for an effective open innovation process but are not decisive for startup success. Non-accelerated startups appeared to be sufficiently capable of facilitating their own open innovation process to acquire external knowledge. Nevertheless, as business accelerators often provide funding and do, though moderately, add onto the personal network of the startup, they proved to contribute to startup development. Albeit not as much as they aim, or sometimes claim, to do.

Appendix A: Interview scheme

Category	Questions	Suggestions
Startup Information	<ol style="list-style-type: none"> 1. Founding year? 2. What country is your company based? 3. Amount of employees? 4. Amount of funding received? 5. What sector would you scale your innovation? 	
Actors	<ol style="list-style-type: none"> 1. Which of the following types of actors had significant influence on your organisation: 2. Where did you meet these actors? 3. How did you meet these actors? 4. Did I miss any important other actors? 5. Did you attend any conferences? <ul style="list-style-type: none"> - What type of actors did you meet here? 	<ul style="list-style-type: none"> - Corporates - Incubators - Angels - Investors - VCs - Universities - Research Institutes - Advisors / Mentors / Coaches - Industry Experts - Peers (startups) - Policy makers
Open Innovation	<p>Per actor that the startup has been in contact with:</p> <ol style="list-style-type: none"> 1. Did this actor provide knowledge on a business, organisational or strategic level? <p>Yes:</p> <ol style="list-style-type: none"> 2. What did you learn from this knowledge? 3. How did this induce development in your organisation? <p>No:</p> <ol style="list-style-type: none"> 4. What type of knowledge was exchanged? 5. How did this induce development in your organisation? 	
Accelerator program	<ol style="list-style-type: none"> 1. Did you participate in an accelerator program? <p>Yes:</p> <ol style="list-style-type: none"> 2. Which one and why? 3. To what extent did this influence your connections outside of your organisation? 4. Do you think you would have these same connections if you did not participate in the accelerator program. 5. Was this accelerator program sector specific? <p>No:</p> <ol style="list-style-type: none"> 6. Why not? 7. Do you think you would have the same connections outside of your organisation if you would participate in one? <ul style="list-style-type: none"> - Why? 8. Does an accelerator program positively influence startup development in your opinion? <ul style="list-style-type: none"> - Why? 	
Ending	<ol style="list-style-type: none"> 1. Do you have any comments? 2. Do you think we have missed any important aspects? 3. Do you have any questions for me? 	

Table 3: Interview scheme

Appendix B: Sample

From all fifteen startups that participated in an accelerator program, eight participated in a program that took equity (A1; A4; A5; A7; A8; A9; A12; A15). The seven other accelerated startups participated in a free program (A2; A3; A6; A10; A11; A13; A14). This had no meaningful influence on this research².

Ref.	Founded	Country	Funding (incl. grants and debt)	FTE	Sector	Accelerator	Exit / Merge
Accelerated							
A1	2019	NL	€ 615.000	9	Real estate	Rockstart	-
A2	2018	DE	€3.000.000	22	Energy reporting	Climate KIC	Exit: 2022
A3	2017	PT	€ 510.000	14	Energy management	Climate KIC	-
A4	2019	UK	€1.000.000	6	Mobility	Rockstart	-
A5	2020	UK	€ 750.000	3	Energy utilities	Rockstart	-
A6	2016	DE	€5.500.000	17	Power utilities	Climate KIC	Merge: 2021
A7	2018	DE	0	7	Power utilities	Rockstart	-
A8	2016	NL	€850.000	14	Mobility	Rockstart	-
A9	2018	NL	€2.000.000	11	Energy platform	Rockstart	-
A10	2019	NL	€1.500.000	8	Energy generation	Yes!Delft	-
A11	2021	FR	€ 58.000	3	Energy platform	Shake'Up	-
A12	2019	UK	€1.200.000	24	Energy platform	Sustainable Ventures	Exit: 2022
A13	2020	SE	€2.300.000	10	Energy platform	Norrskan	-
A14	2018	DE	€2.000.000	19	Real estate	Climate KIC	-
A15	2017	LT	€200.000	2.5	Mobility	Startup WiseGuys	-
Non-Accelerated							
NA1	2020	NL	€1.000.000	7	Cloud infrastructure	-	-
NA2	2015	NO	€1.500.000	9	Power utilities	-	-
NA3	2017	NL	€2.300.000	14	Energy platform	-	-
NA4	2018	DK	€1.600.000	5	Service Platform	-	-
NA5	2020	NL	€1.200.000	8	Energy storage	-	-
NA6	2020	BE	€900.000	7	Energy reporting	-	-
NA7	2018	DE	0	20	Power utilities	-	Exit: 2022
NA8	2018	NL	0	22	Energy storage	-	-

Table 4: Overview of the research sample

² The only difference between these two groups arose in the value proposition component, as accelerated startups that did not exchange equity for their participation are more frequently influenced on their value proposition than startups that did exchange equity for their participation. One argument is that, as there is a financial risk involved for the investing business accelerators and not for the 'free' programs, business accelerators require a further developed value proposition to allow them to participate as this enables better assessment of their potential, hence less developments in these startups appear in their value proposition component. This explanation is, however, an assumption made by the author based on its knowledge on the topic.

Appendix C: Ungrouped codes per BMC component

BMC Component	Developments in accelerated startups due to the accelerator	Developments in accelerated startups due to their personal network
<i>Key Partners</i>	<p>A1: We used different mentors in different periods of time</p> <p>A1: We still have monthly contact with two mentors of our accelerator, providing advice and perhaps investor connections in the future</p> <p>A1: The community is very beneficial, you probably won't find such mentors or mentor relationships anywhere else</p> <p>A1: We had introductions to investors who might be interesting for us in the future</p> <p>A2: We got in touch with investors through the accelerator's pitching events</p> <p>A2: We met mentors in our accelerator program</p> <p>A3: Our angel investors provide a lot of network opportunities.</p> <p>A3: We got a mentor that was very useful, he was an ex-special forces</p> <p>A4: The introductions to investors from the accelerator were transformational</p> <p>A4: We met a mentor through the accelerator that is still involved in the company</p> <p>A5: The mentors are still involved after the program, they provide fantastic value.</p> <p>A5: The people from corporates we have met are often not the decisionmakers</p> <p>A5: The accelerator did not really help with partners or customers but their mentors were very helpful</p> <p>A6: My accelerator helped with collaboration opportunities</p> <p>A6: The mentor relations were not that helpful</p> <p>A7: Mentors were of great help</p> <p>A8: Our accelerator was great for networking</p> <p>A9: Being in the community helps, also with pitching and speaking to investors</p> <p>A9: Introductions to corporates weren't the strongest part of the accelerator program</p> <p>A10: Our accelerator introduced us to investors</p> <p>A10: We went there for support and the network</p> <p>A11: The accelerator provided introductions with investors</p> <p>A11: It is interesting to have many different mentors</p> <p>A12: Our accelerators provided a lot of introductions with investors</p> <p>A13: For fundraising with VCs the accelerators were amazing, 80% of the investors I talked to came through our accelerators</p> <p>A13: Their dinners and events are the most useful, because there you meet the most people. These 'shallow' connections can provide doorways to connections that do provide value</p> <p>A13: We had a lot of dinners and parties, ... these are very good at facilitating relationships</p> <p>A13: It is difficult to say which introductions create value, but they might do so over time</p>	<p>A3: Angel investors provide a lot of network opportunities, other investors just want to multiply their money</p> <p>A5: Angel investors were highly relevant to ... and introductions to other investors</p> <p>A6: A foreign angel investor matched us with our merging company</p> <p>A6: Our merging company helped us to collaborate with a corporate in London</p> <p>A9: Our startup-hub connects us with peers for business advise</p> <p>A12: Our group of angels helped a lot with network</p> <p>A14: Our first angel knew many investors, programs and other relevant connections for us</p> <p>A15: We did an incubator where they had demo days with investors</p>

	<p>A13: Providing a list of mentors is not enough, the value lies in these indirect connections that might be useful after you have met these people.</p> <p>A14: One mentor introduced us to our first investor</p> <p>A15: We got introductions to investors</p>	
<i>Key Activities</i>	<p>A2: Coaches and mentors told me how to do business, but I already knew how to do business. Our team was very senior so general feedback from our mentors was useless</p> <p>A3: The accelerator introduced us to many people who helped with building a company, overall strategy and set goals as a CEO</p> <p>A5: Our accelerator helped with practicalities of a team A5: Our accelerator helped us with our pitching strategy</p> <p>A6: Peers from our accelerator helped us greatly with team issues and doing business A6: The masterclasses were excellent</p> <p>A7: Accelerator workshops were highly relevant for our company A7: Our accelerator very much improved our pitch A7: The accelerator helped us with business things we otherwise would not have looked at A7: Mentors helped us with organisational finance</p> <p>A8: Our accelerator increased our team focus and reporting habits, and our business model in general</p> <p>A9: We did not think the workshops were too helpful, mainly because they were online</p> <p>A10: Mentors helped us with organisational issues and basic company finance A10: Our accelerator advised us on HR, legal and tax related issues</p> <p>A11: Business plans and models would have been very different and not as accurate as it is today (if we not participated) A11: We could not do without the business skills we learned in the accelerator workshops</p> <p>A12: Experts in different areas come and talk how to structure your finance, support for a first founder.</p> <p>A14: Mentors helped us with personal development, this has been of support, also emotionally</p>	<p>A5: Angels were highly relevant on strategy and business...</p> <p>A8: Our angels helped us financially and strategically A8: Our investors obliged us to report regularly and extensively</p> <p>A9: Our angels helped us with operational aspects</p> <p>A10: The university helped with setting up the company</p> <p>A14: Our angel investor increases his participation we seem to be in trouble</p> <p>A15: Our VC tried to overmanage our company, it was a negative experience A15: We joined an incubator before we had a product, they had great influence on our company</p>
<i>Key Resources</i>	<p>A1: The funding and support for follow-on investments were ideal for closing our round and later</p> <p>A2: The funding without equity was motivation for us to participate</p> <p>A3: Mentors had so much experience and connections that if they did not know the answer, they made a call and knew it within five minutes A3: The funding was highly relevant</p>	<p>A3: Universities provide us with R&D funding and cheap human capital, master's students</p> <p>A8: Universities provide us with a lot of trainees A8: Our investors helped us with acquiring further funding A8: In our sector conferences are useful for knowledge and use cases A8: Conferences provide us with a lot of industry knowledge</p> <p>A10: We receive patents from the corporate and university, from which we are a spinoff</p>

	<p>A4: The accelerator's support with VC fundraising was very helpful</p> <p>A5: The initial funding was a motive to participate</p> <p>A6: The funding was very helpful,</p> <p>A7: One motivation was the direct financial input on our company</p> <p>A8: Our accelerator helped us with further fundraising</p> <p>A9: The accelerator program caused us a few angel investors, which then introduced us to relevant connections</p> <p>A9: The funding without equity and connections were a motivation to participate</p> <p>A9: Fundraising support was one of the main motivations to participate</p> <p>A9: We expect the value of the accelerator to grow when we have to fundraise with VCs</p> <p>A10: We went there (the accelerator) for the funding part really, and for the network</p> <p>A11: The accelerator provided a location and funding</p> <p>A12: Our accelerator helped us with funding and a location</p> <p>A12: Structuring our investment was definitely the most valuable</p> <p>A12: Our accelerator helped a lot with our connections and investors, who later invested in the company*</p> <p>A13: We met our current chairwoman through our accelerator</p> <p>A13: For fundraising with VCs the accelerators were amazing, 80% of the investors I talked to came through our accelerators</p> <p>A14: We received a location, which was very helpful</p> <p>A14: From a VC fundraising perspective, the accelerator was fundamental</p> <p>A14: One mentor introduced us to our first investor</p> <p>A15: One reason to participate was the investment, for sure</p>	<p>A10: The RVO helped us acquiring European funding</p> <p>A10: The university helped us with employees</p> <p>A11: Universities provide us with patents through special licences</p> <p>A11: The university became a key partner of ours through special licenses</p> <p>A12: Our group of angels helped a lot with funding</p> <p>A13: Our angels brought a lot of knowledge, advice and funding</p>
<i>Value Proposition</i>	<p>A3: Mentors helped a lot with positioning ourselves better than our competition</p> <p>A3: Mentors helped with our value proposition and internationalisation, as mindsets are different in different countries</p> <p>A3: Mentors taught us how to simplify our solution for decision-makers of our customers</p> <p>A6: Our accelerator helped us very much with our value proposition</p> <p>A6: Our peers in the accelerator helped with our value proposition</p> <p>A7: Mentors helped us to position ourselves in the market</p> <p>A11: Mentors helped us simplify our model and business, and how to deliver our key message</p> <p>A12: The accelerator program helped us with commercialization and navigating our value</p>	<p>A2: We reached out to industry experts ourselves for advice on our innovation</p> <p>A5: We reached out to very many industry experts, all voluntarily, for advice on our innovation</p> <p>A9: We have many angel investors, we mainly use them to challenge our ideas on multiple aspects of our innovation</p> <p>A13: We built our value proposition through talking to customers, in our case both supply and demand side</p> <p>A14: Each pilot, which we acquired at conferences, contributed to our value proposition</p>

	<p>A13: The accelerator steered our value proposition towards investors, which is different from the one for customers</p> <p>A14: One mentor was a great sales coach, helping with our value proposition, also to investors</p>	
<i>Customer Segments</i>	<p>A1: We did not receive customers from the accelerator</p> <p>A2: We demanded that the accelerator brought us customers, which they did</p> <p>A3: Mentors added a lot on how to reach customers abroad</p> <p>A5: The accelerator did not really help with partners or customers</p> <p>A6: We did not receive many customers</p> <p>A7: Mentors brought us into contact with customers, however there was no follow-up</p> <p>A9: The accelerator provided introductions to new customers</p> <p>A11: The accelerator provided introductions with potential customers</p> <p>A12: The accelerator helped us a lot in finding customers A12: Our first adopters came through the accelerator program</p> <p>A15: A very time consuming program takes you away from finding customers which is eventually what it is all about</p>	<p>A1: We mainly received new customers from conferences</p> <p>A5: We get new customers from customers</p> <p>A8: Our incubator brought us pilots</p> <p>A14: Conferences really contribute a lot, it often brings us pilots directly</p>
<i>Customer Relationship</i>	<p>A3: Mentors taught us how to negotiate and interact with customers</p>	<p>A1: We created a customer advisory board with five customers, after we already implemented customer feedback sessions</p> <p>A3: We implement constant customer feedback, unrelated to the accelerator</p> <p>A4: Customer feedback is key, we should always first focus on the customer</p> <p>A5: Customer feedback is massively important, we receive new customers through customers</p> <p>A7: We implement customer feedback twice a year at least, we also do roadmapping with them</p> <p>A9: Customer feedback is key, we try to improve our platform continuously</p> <p>A11: We have different customers, so for each one incorporating feedback is very important</p> <p>A14: Corporates are our customers and we ask a high level of openness to implement feedback, now through a regular process a short time ago</p>
<i>Channels</i>	<p>A2: We participated in an sector specific accelerator providing workshops in communication</p>	<p>A1: We did a publication with a university, causing more customers</p> <p>A4: Customers get us more customers</p>

		<p>A6: Our foreign investor helped us to many customers</p> <p>A7: Customers get us more customers</p> <p>A8: Our angel investor brings us new customers due to his industry presence A8: Conferences act as channels to reach potential customers</p> <p>A9: We won a price which gave us great publicity A9: Our angels helped us with our marketing strategies A9: Customers and industry experts in our network get us more customers A9: We work together with our customers on our platform for marketing purposes from both sides</p> <p>A11: Conferences are important for us as we are in a small market and every stakeholder is present there to speak with</p> <p>A13: Our new COO was an industry expert who knew how to reach the right people</p> <p>A14: Conferences act as channels for us</p>
<i>Costs</i>		<p>A5: Different customers (especially suppliers) support us with costs and what they expect from the industry</p> <p>A8: Collaborating with a university provided us with tax benefits</p>
<i>Revenues</i>	<p>A3: Mentors contributed to our pricing strategy, mainly for abroad.</p> <p>A5: Rockstart helped with practicalities as pricing</p> <p>A7: Mentors helped us with our pricing</p> <p>A9: Mentors helped us with pricing</p>	

Table 5: Ungrouped startup developments per BMC component for accelerated startups

BMC Component	Developments in non-accelerated startups to due personal network
<i>Key Partners</i>	<p>NA1: Our angel investors provided a lot of connections to further investors</p> <p>NA2: Conferences had great influence because all stakeholders are there, it's like an accelerator pitching event but more efficient due to international reach and sector focus.</p> <p>NA3: We received support from entrepreneurial initiatives as regional organisations</p> <p>NA3: My cofounder had a great network in our industry already</p> <p>NA3: We met many industry experts, investors and customers on conferences</p> <p>NA3: Investors provided us many network introductions</p> <p>NA4: In the beginning a lot comes from goodwill from your personal network</p> <p>NA4: Our university incubator provided us with our first investor and connections outside my own network</p> <p>NA5: We go to conferences to learn and socialize, not to sell our product</p> <p>NA6: We became part of a community through our incubator</p> <p>NA6: Half of our connections came from our investors and half of our own network.</p> <p>NA6: We received 101 coaching and network opportunities but never funding in our incubators</p> <p>NA7: We received the network from our acquirer which our competitors don't have.</p>
<i>Key Activities</i>	<p>NA2: I learned from peers how to negotiate with external partners and exploit our true value</p> <p>NA3: Our investor helped us with business development support</p> <p>NA4: Our university incubator taught us the basics in setting up a company</p> <p>NA4: Our angels provided a lot of support on hiring and administrative issues</p> <p>NA5: We did an incubator which was helpful on a business aspect</p> <p>NA7: We put a lot of effort in HR from the beginning to engage our employees strengthened by our owner/investor</p> <p>NA7: Our previous owner helped a lot with growing the team, and things as the payroll and contracts</p>
<i>Key Resources</i>	<p>NA2: Universities provide us with human capital and research funding</p> <p>NA3: Universities supplied quite some human capital, which is cheap labour</p> <p>NA3: We get quite some knowledge from books and podcasts, we give our new employees a reading list</p> <p>NA4: Our eleven angel investors all had industry knowledge, it was all smart money</p> <p>NA4: Accelerators are usually too much pitch and PowerPoint stuff</p> <p>NA5: We have exclusive patent licences with a university and research institute</p> <p>NA5: We have advisors, in and outside our advisory board, from our personal network and the university</p> <p>NA5: Knowledge should not be too theoretical, but about conversations with the market and potential customers</p>

	<p>NA5: We share industry knowledge with peers in our building on an informal basis</p> <p>NA5: Conferences provide us with industry knowledge and connections</p> <p>NA6: With our incubator we wrote a business plan</p> <p>NA6: We learned the most from startups who were 2-3 years older than us,</p> <p>NA6: I have one external advisor voluntarily, who is effective for a fresh look into the company</p> <p>NA6: We received subsidies from Flanders region</p> <p>NA7: We have unique knowledge through our acquisition company</p> <p>NA7: We tried to find a business developer through a head-hunter but they could never understand the product</p> <p>NA8: We have had students to work and do internships here from universities</p>
<i>Value Proposition</i>	<p>NA1: We test our value proposition with experts from our network. Currently, we are hiring an external person</p> <p>NA2: We test our value proposition and regulations with industry experts through our customers</p> <p>NA3: We test our value proposition with all our customers personally</p> <p>NA4: Before we started we tested our value proposition within my personal network for different types of customers</p> <p>NA4: An accelerator is too much power pointing stuff, I want to dive deeper into the value proposition, which for me differs per customer</p> <p>NA5: We implement customer feedback to achieve a standardised product for all</p> <p>NA5: In the scale-up program we are going to do we will receive information about market positioning, business model, organisation</p> <p>NA8: As there was no legislation for our technology, we changed a lot according to policy, that was created in parallel</p>
<i>Customer Segments</i>	<p>NA2: We did pilot based incubators, which made sense as you are discussing your innovation with a potential customer</p> <p>NA2: Our angel investors provided a lot of connections to customers</p> <p>NA4: we might have participated if there was a bigger focus on introductions with customers and decisionmakers in large corporates who could become our customers</p> <p>NA5: Knowledge should not be too theoretical, but about conversations with the market and potential customers</p> <p>NA6: Our incubator provided us with customers</p> <p>NA7: In the beginning we exchanged customers with peers in our industry</p> <p>NA8: Current customers provide us with new customers, as municipalities and schools</p>
<i>Customer Relationship</i>	<p>NA3: We have regular contact with other startups, as they are our customers</p> <p>NA4: We do each sale in deep collaboration with the customer</p> <p>NA7: Our acquisition company had a whole customer relation department</p> <p>NA7: We implemented a lot of customer feedback</p>

	NA8: we align very much for each use case with each customer
<i>Channels</i>	NA7: We brought in some interns for marketing purposes NA8: We had talked on many conferences as we are unique, this has increased our reach
<i>Costs</i>	
<i>Revenues</i>	

Table 6: Ungrouped startup developments per BMC component for non-accelerated startups

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Annotation Sustainable Entrepreneurship and Innovation

Requirements

1. It is about newly developed or to be developed sustainable production processes, products, and/or services created by firms (within established firms and/or new start-ups);
2. These activities need to be new to the current business activities of these firms;
3. It needs to include some form of data collection about these new business activities.

Fulfilment of requirements

Besides my master's thesis I followed an internship at Rockstart's Energy fund. During this internship I was involved in scouting, assessing and supporting startups in the renewable energy field to pursue successful growth. This inspired me to find out to what extent an accelerator program actually has a positive impact on startup development.

The startups are selected for the originality, sustainability impact potential and high quality of their innovations and entrepreneurial personality. An accelerator program then induces new business activities, expressed as improvements of the startup's business model and the way they manage their organisation and innovation to increase the startup's chance on success. It does so through teaching the sustainable startups new business skills and strategies and providing them with unique networking and funding opportunities.

The data of this research will aim to cover all developments to the startup's business model and identify all external actors they have been in contact with. These data are collected through interviews with founders of startups that participated in an accelerator program and founders of startups that did not.