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## **Business incubators: the impact of their support**

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# Chapter 4

## Operationalization of the Supportive Activities Construct

This chapter addresses RQ2: *How can the supportive activities be operationalized in a construct that enables us to measure the impact of the identified supportive activities by UBIs on the performance of an NTBF?*

In our answer to RQ1, we identified five main supportive activities offered by the UBIs to the NTBFs, viz. (1) *access to the networks*, (2) *knowledge development and dissemination*, (3) *finance and administrative mobilization*, (4) *growth control*, and (5) *creation of exposure*.

This chapter is based on the following publications:

1. Samaeemofrad, N., and van den Herik, H. J. (2018). **The Effectiveness of Finance Mobilization by Business Incubators on the Performance of NTBFs.** In the proceedings of the 2018 ICE/ITMC International Conference, Stuttgart, Germany 2018 (IEEE Xplore).
2. Samaeemofrad, N., and van den Herik, H. J. (2018). **The Relation between Support by Business Incubators and Performance of NTBFs.** In the proceedings of the 2018 ICE/ITMC International Conference, Stuttgart, Germany 2018 (IEEE Xplore).
3. Samaeemofrad, N., van den Herik, H. J., and Verburg, R. (2016). **A New Perspective on Business Incubators.** In the proceedings of the 2016 ICE/ITMC International Conference, Trondheim, Norway 2016 (IEEE Xplore).

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<sup>2</sup> The author would like to thank her co-author for co-operation and the publisher of the ICE/ITMC 2018 proceedings for their permission to reuse relevant parts of the article in this thesis.

To answer RQ2, we select two types of support, viz. (a) knowledge development and dissemination and (b) finance mobilization (here we disregard administrative mobilization) to evaluate their impact on the performance of NTBFs. Related literature has also studied the impact of “access to the networks” by investigating the growth and performances of NTBFs (see McAdam and McAdam, 2008; Schwartz and Hornych, 2008; Scillitoe and Chakrabarti, 2010; Bollingtoft, 2012; Ebbers, 2013; Soetanto and Jack 2016). In those investigations, the researchers have taken the importance of “knowledge development and dissemination” as supportive activity into account (see Peters et al., 2004; Grimaldi and Grandi, 2005; Bruneel et al., 2012; Soetanto and Jack, 2016). Only a few number of investigations have paid attention to the other type of supports such as finance mobilization, growth control, and creation of exposure. It appears that all of these type of supports have an influence on the growth and performances of the NTBFs. However, the entrepreneurship literature has depicted contradictory and inconclusive findings. This may be associated with the usage of different methods and approaches by researchers (cf. Soetanto and Jack, 2016; van Weele et al., 2017).

While previous investigations have focused heavily on networking and access to the network activities, I do not repeat this type of support into my research. I fully accept the positive outcomes. Meanwhile other researchers have highlighted the importance of training and business workshops for the growth of NTBFs. That is an interesting addition. However, they have overlooked the role of mentoring and coaching when performing their investigations. Therefore, I will include in my research all the training, provision of business advisory, mentoring and coaching activities under the term of “*knowledge development and dissemination*”. Furthermore, I will also consider the impact of “*finance mobilization*” support by UBIs, due to the vital role of fund raising in stimulating NTBFs to grow and establish themselves in their markets.

For these two topics, we develop a theoretical model that demonstrates the relations between on the one hand these two types of supports, and on the other hand

the performance of the NTBF. Then, the model will be operationalized to provide a construct that is able to measure the supportive activities by business incubators.

The structure of this chapter is as follows. Section 4.1 describes the importance of RBV. The model development is presented in section 4.2. Then, section 4.3 highlights the essentials of the proposed model. The operationalization of the measurement scale is addressed in section 4.4. Finally, the chapter conclusion is presented in section 4.5.

#### **4.1 The Importance of RBV**

In the strategic management literature, the resource-based view (RBV) has been used as one of the prominent theoretical frameworks to explain how firms are able (1) to achieve their competitive advantages and (2) to sustain the acquired advantages over time (cf. Eisenhardt and Martin, 2000; Barney et al., 2011). This theory explains that a firm is an agglomeration of resources and capabilities that are valuable, rare, inimitable, and non-substitutable (hereafter VRIN). Indeed, when firms have access to VRIN resources, they can obtain a sustainable competitive advantage (cf. Teece et al., 1997; Eisenhardt and Martin, 2000; Musiolik et al., 2012; Somsuk and Laosirihongthong, 2014). In the entrepreneurship studies, the support by UBIs has been considered as external resources to help the NTBFs grow. Therefore, the majority of previous investigations in analyzing the activities and processes of UBIs is conducted through the lens of RBV (cf. Eveleens et al., 2017). However, these studies have been performed almost solely with a rather limited role assigned to the NTBF's strategy (cf. Soetanto and Jack, 2016). It means that previous studies neglected the fact that NTBFs take various strategical approaches in receiving support by UBIs. We keep this issue as a point of attention.

Following the relation between firm resources and capabilities, studies on RBV can be divided into two research streams (Ethiraj et al., 2005). The first research stream (see, e.g., Barney, 1991; Peteraf, 1993) defines resources, including capabilities, whereas the second stream explicitly distinguishes resources from the capabilities (cf. Grant, 1991; Amit and Schoemaker, 1993). The second stream is characterized by the idea that (1) resources include both tangible and intangible

assets, but (2) that the capabilities represent a firm's capacity to utilize resources (see Amit and Schoemaker, 1993; Ethiraj et al., 2005; Cumming and Fischer, 2012). In this study, we follow the second research stream in developing our research path to the formulation of a conceptual model.

## 4.2 Model Development

In this section, we will present our theoretical model. Therefore, we develop four propositions in order to model the relations between each variable. In the subsections 4.2.1 to 4.2.4, the propositions that support the model are explained. The propositions are summarized in subsection 4.2.5 and depicted in Figure 4-5.

### 4.2.1 Innovation Strategy

Generally speaking, every innovation strategy is to be considered as indicating the importance of R&D activities. The innovation efforts may have (1) a product orientation, or (2) process orientation, or (3) a product and process orientation (see Peeters and de la Potterie, 2006; Verbano and Crema, 2015). Later, Soetanto and Jack (2016) classified the innovation strategies into two groups: (1) exploration strategies, and (2) exploitation strategies. An exploration strategy pushes the NTBF to seek new abilities or new knowledge to launch new products or to achieve new markets. In contrast, an exploitation strategy pushes the NTBF to build on their existing product line or to pay effort on developing their current market participation. Exploration and exploitation can be employed over both product and market areas (cf. Maine et al., 2012; Soetanto and Jack, 2016). Therefore, four types of innovation strategies can emerge. They contain exploration and exploitation of both areas (products and market).

Although the concept and definition of the exploitation and exploration relating to market and product is quite a challenge, Soetanto and Jack (2016) have conceptualized them and in this study, we rely on them. According to their conceptualization, the *first* type of innovation strategy is *product exploration* which refers to all activities that launch new products. It contributes to the R&D activities

and leads to radical innovations (cf. Maine et al., 2012; Soetanto and Jack, 2016). The **second** type of innovation strategy is a *market exploration*, which contributes to creating new markets. The **third** type of innovation strategy is *product exploitation*, which focuses on the existing products and refers to incremental innovation. The **fourth** type of innovation strategy is *market exploitation* of which the objective is to further develop the current markets (Soetanto and Jack, 2016). Keeping the balance between exploration and exploitation is essential for the survival of the NTBFs (Soetanto and Jack, 2016). Therefore, the NTBFs attempt is to combine each two of these four strategies to achieve superior performance. The combinations create four mixed strategies. Table 4-1 presents a combination of exploration and exploitation strategies.

**Table 4-1:** Innovation Strategy

Product domain	Market domain	Strategy outcome	Explanation
Exploitation	Exploitation	The exploitation strategy	NTBFs develops both their current markets and products
Exploration	Exploration	The exploration strategy	NTBFs launch new product while attracting new markets
Exploration	Exploitation	The ambidextrous product improvement	NTBFs launch new products in current markets
Exploitation	Exploration	The ambidextrous market growth	NTBFs develop existing products in new markets

For NTBFs, their growth and development can be obtained through (1) the creation of new products, (2) entering into new markets, and (3) a combination of these two ways (see Bøllingtoft, 2012). This may lead to four possible approaches (see Table 4-1). Each of these approaches is considered to be a NTBF innovation strategy.

**Definition 4.1:** *Innovation Strategy* is defined as an engagement in both exploitation, exploration and ambidextrous strategies across the technology and market domains and implement them (Soetanto and Jack, 2016).

A well-established innovation strategy enables an NTBF (1) to build up and expand competitive advantages and (2) to survive in or broaden their market position (Prajogo, 2016). Apparently, an innovation strategy is one of the leading factors that influence the performance of the NTBF (cf. Sandberg and Hofer, 1987; Prajogo, 2016). Therefore, understanding the NTBF innovation strategy is essential for evaluating their performance and, in particular, for improving the performance.

A number of scholars (see Voss and Voss, 2013; Soetanto and Jack, 2016) examined the innovation strategy within the context of NTBFs. However, Soetanto and Jack (2016) concluded that there is still a scarcity of investigation on the possible role of UBIs on the relation between innovation strategy and the performances of NTBFs.

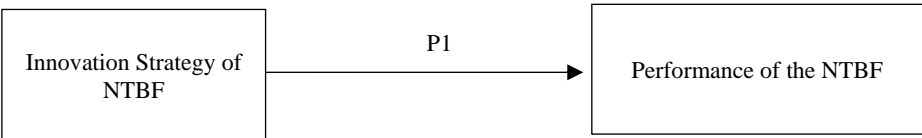
**Definition 4.2:** *Performance of the NTBFs* is defined as the growth of the NTBFs by taking into consideration to what extent NTBFs meet their milestones and achieve their objectives (Soetanto and Jack, 2016).

Similarly, based on the relation between innovation strategy and the performance of NTBF, we posit the following proposition (P1).

**P1:** *Innovation strategy (explorative, exploitative, and ambidextrous) is positively related to the performance of the NTBF.*

Figure 4-1 shows the relation between innovation strategy and the performance of the NTBF.

**Figure 4-1:** Innovation Strategy and Performance of the NTBF



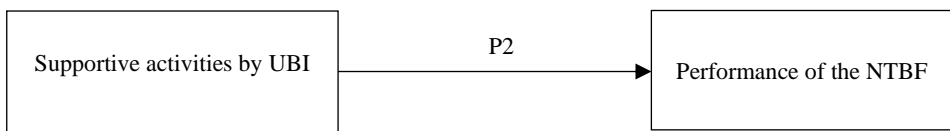


#### 4.2.2 Supportive Activities by UBIs

As mentioned earlier, from an RBV perspective, firms are bundles of resources and capabilities which enable them to develop their products and obtain their target performance. In the RBV theory, resources can be defined as ‘tangible and intangible assets that firms use to conceive of and implement their strategies’ (Barney and Arikan, 2001, p.138). With regard to these concepts within RBV, UBIs can be viewed as a tool including the required resources to be intended externally for being used by NTBFs. The resources seem to be able to: (1) overcome NTBFs’ liabilities of smallness, newness and weak ties (which have effect upon knowledge possession), and (2) have an impact on the performance of NTBFs (see Samaeemofrad et al., 2016; Eveleens et al., 2017). Our argument on the relation between the support by UBIs and the performance of NTBFs leads us to the following proposition (P2).

**P2:** *The supportive activities by UBIs (knowledge development and dissemination, and finance mobilization) positively impact the performance of the NTBF.*

**Figure 4-2:** Supportive Activities by UBIs and the Performance of the NTBF



In our research, we will investigate two external resources, viz. (a) knowledge development and dissemination and (b) finance mobilization. For NTBFs, knowledge development and dissemination are very important (see Bergek and Norrman, 2008; Soetanto and Jack, 2013; Samaeemofrad et al., 2016). From our discussions with entrepreneurs (see Samaeemofrad et al., 2016), we learn that access to the knowledge resources and expertise adds critical values to the development process of the NTBFs (see also Macpherson et al., 2004; Mian et al., 2016). The NTBFs possibly are able to access the knowledge resources by training programs, coaching, and mentoring activities offered by the UBIs. These services aim to increase the entrepreneurs’

business knowledge and thus have influence on the performance of the NTBFs (Somsuk and Laosirihongthong, 2014; Soetanto and Jack, 2016).

Our interviews show that in addition to the standard training programs and coaching, entrepreneurs expect to learn by doing and interacting, instead of only following a classroom approach. Following the statement on VRIN resources noted above, we will concentrate on knowledge development and dissemination by the UBIs that are characterized as VRIN resources and might impact the performance of the NTBFs (see Eveleens et al., 2017).

**Definition 4.3:** *Knowledge development and dissemination* supportive activity is defined in our study as knowledge-based supports by business incubators which aims to increase the entrepreneurs' business knowledge through the access to the training sessions, workshops, business advisors and mentors (Eveleens et al., 2017).

The above choice and the argument on the relation between this support by the UBIs and the performance of the NTBFs leads us to the following sub-proposition (P2a).

**P2a:** *Knowledge development and dissemination when seen as a supportive activity have a positive impact on the performance of the NTBF.*

The second external resource is a finance mobilization (see Bergek and Norrman, 2008; Soetanto and Jack, 2013; Samaeemofrad et al., 2016). Fundraising is one of the greatest challenges for entrepreneurs in the lifecycle development of their NTBFs (McAdam and McAdam, 2008). The entrepreneurs suffer the most from (1) shortage of finance knowledge and (2) constraints in accessing the funding resources. These two factors severely restrict the growth of the NTBFs (McAdam and McAdam, 2008). Therefore, entrepreneurs tend to join UBIs to receive assistance for their finance-related challenges. UBIs also attempt to address the challenge through their networks or their own capital resource. This supportive activity by UBIs is called finance mobilization.

**Definition 4.4:** *Finance Mobilization* refers to the activities in facilitating the access to different capital resources for NTBFs.

Through the lens of RBV, finance mobilization can be characterized as a VRIN resource and might have an impact on the NTBF's performance (see Eveleens et al., 2017). This argument on the relation between (a) finance mobilization by UBIs and (b) the performance of NTBFs leads us to P2b.

***P2b: Finance mobilization has a positive impact on the performance of the NTBF.***

Previous studies highlighted that a firm's resources and strategies are highly correlated (see Soetanto and Jack, 2016; Eveleens et al., 2017). For NTBFs, their innovation strategy is crucial while they compete for rare resources. However, in the context of UBIs, less investigations have concentrated on the impact of UBI's supports on the innovation strategy taken by NTBFs (Soetanto and Jack, 2016). As a direct consequence, we highlight this research gap. We address that the growth in the performance of NTBFs may be achieved through the relation between the UBI's resources and NTBF's innovation strategy. Accordingly, we suggest the following proposition (P3) and its two sub-propositions (P3a / P3b).

#### ***4.2.3 Supportive Activities and Innovation Strategy***

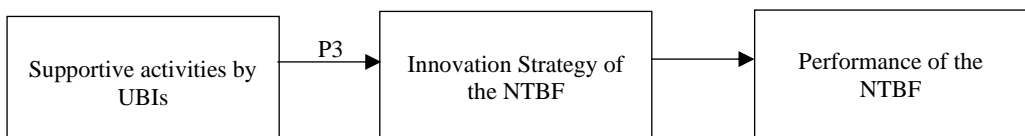
***P3: Supportive activities by UBIs have positively impact on the innovation strategy and thus on the performance of the NTBF.***

***P3a: Knowledge development and dissemination have a positive impact on the innovation strategy and therefore on the performance of the NTBF.***

***P3b: Finance mobilization has a positive impact on the innovation strategy and, therefore on the performance of the NTBF.***

Figure 4-3 shows the relation between the supportive activities (knowledge development and dissemination and finance mobilization), NTBFs' innovation strategy and the performance of NTBFs.

**Figure 4-3:** Support by UBIs, Innovation Strategy, and NTBF's Performance



4.2.4 Capabilities of the NTBFs

For the growth of the NTBFs, access to the support by UBIs is necessary, but it is not sufficient. NTBFs also need to be equipped with capabilities (see Newbert, 2007).

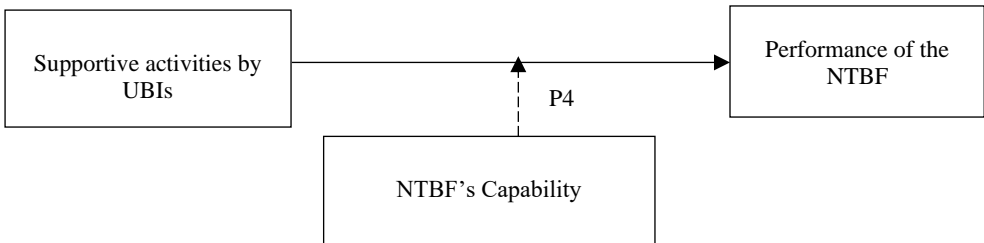
**Definition 4.5:** A *capability* is defined as a firm’s capacity (a) to utilize its inputs such as resources and (b) to combine and transfer them into their desired objectives efficiently (Amit and Schoemaker, 1993; Teece et al., 1997; Dutta et al., 2005).

Indeed, capabilities are intermediaries between (1) a firm’s resources and (2) its performance (Dutta et al., 2005). Due to the importance of the capabilities in strategic management literature, previous researchers have deeply studied this notion (see Newbert, 2007; Koryak et al., 2015). Newbert (2007) has identified roughly 27 types of capabilities. In this study, we will build our framework based on the relevant capabilities in using the support by UBIs. The amplification role of the capability on the relation between the support by UBIs and NTBFs’ performance lead us to formulate the following proposition (P4).

**P4:** The NTBFs’ capabilities amplify the impact of support by UBIs.

Figure 4-4 demonstrates the moderating impact of NTBFs’ capability on the relation between the supportive activities (knowledge development and dissemination, and finance mobilization), and the performance of the NTBF.

**Figure 4-4:** The Moderating Role of the NTBFs’ Capability



In this study, we concentrate on the NTBFs’ ability on (a) using the knowledge development and dissemination, and (b) finance mobilization supportive activities

by UBIs for the identification of the relevant capabilities. Therefore, the relevant capability for the knowledge development and dissemination support is called *absorptive capacity*. Consequently, the relevant capability to the finance mobilization support is called *financial capability*. We describe them below.

#### *Absorptive Capacity*

The concept of Absorptive Capacity (AC) relies on macroeconomic studies. It refers to the economy's ability to exploit and absorb external resources and information (see Adler, 1965). The origin of the AC conceptualization is rooted in Cohen and Levinthal's (1989) investigation. A review of literature conducted by Pi (2021) showed that Cohen and Levinthal (1989, 1990) conceptualized AC into three processes (1) external knowledge recognition (EKR), (2) external knowledge assimilation (EKA), and (3) external knowledge utilization (EKU). Later, Zahra and George, (2002) expanded AC to the four dimensional concept including (1) external knowledge acquisition, (2) external knowledge assimilation, (3) knowledge transformation, and (4) knowledge exploitation (see Pi, 2021). Lewin et al., (2011) divided AC into two groups: (a) internal AC which represents the selection and replication of new knowledge, and (b) external knowledge which represents the exploration of knowledge in an external environment and its assimilation. Recently, Song et al., (2018) has classified AC into three groups: (1) absorptive knowledge base (existing knowledge within the firms), (2) absorptive effort (investment in external knowledge), and (3) absorptive process and diffusion.

The adjacent literature suggests that AC plays two roles that both correspond to the external knowledge. The first role describes that AC helps the firms to identify the accessible knowledge flows. The second role of AC indicates to what extent the firms are able to make benefit from the external knowledge. The first role is labeled potential absorptive capacity and the second role is seen as a realization of the absorptive capacity (Escribano et al., 2009).

**Definition 4.6:** *From the organizational perspective, **Absorptive Capacity** is defined as a firm's ability to recognize the value of new information, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1990, p.128).*

AC has been identified as a well-performing learning ability for firms to obtain knowledge from outside the organization and utilize it. Based on the importance of the AC in NTBFs and the impact of UBI's knowledge development and its dissemination supportive activity, we formulate the following sub-proposition (P4a).

**P4a:** *The NTBF's absorptive capacity amplifies the impact of knowledge development and dissemination on the performance of the NTBF.*

#### *Financial Capability*

UBIs attempt to provide their NTBFs with the access to a range of different funding resources. They include venture capitals, bank loans, governmental funding as well as grants through the finance mobilization activities. Moreover, UBIs support their NTBFs by providing administrative services. As mentioned earlier, in this study, we focus on the type of support, a VRIN resource. Obviously, access to administrative support is not considered as VRIN resources (see Eveleens et al., 2017). Hence, we only evaluate the impact of finance mobilization on the performance of the NTBFs.

Due to the liability of the smallness of the NTBFs, they aim at survival by being equipped with sufficient financial support. They will accelerate their likelihood to survive (cf. Rivard et al., 2006). Accordingly, we provide a definition for the NTBFs' capability in fundraising.

**Definition 4.7:** ***Financial capability** is defined in our study as NTBFs' ability in (1) fundraising, and (2) benefiting from the accessibility of capital resources.*

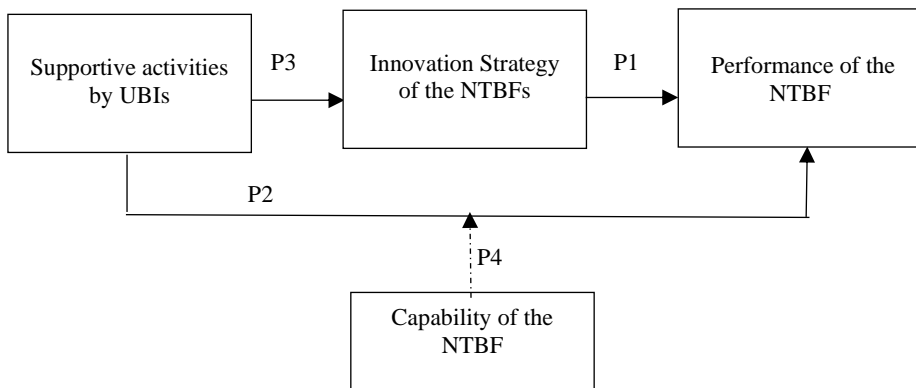
As this study aims to investigate the extent to which NTBFs have access and utilize UBIs financial support, sub-proposition (P4b) is formulated.

**P4b:** *The NTBF's financial capability amplifies the impact of financial mobilization on the performance of the NTBF.*

### 4.3 Summarizing the Model

The four propositions integrate the two supportive activities into a theoretical model that relates (a) knowledge development and dissemination and (b) finance mobilization with innovation strategy and NTBFs' performance. Absorptive capacity and financial capability are considered to *moderate* the relation between UBIs' support and NTBFs' performance. Figure 4-5 summarizes the model and illustrates the propositions.

**Figure 4-5:** A Theoretical Model



### 4.4 Operationalization of the Measurement Scales

This section operationalize the measurement scales related to the variables that are depicted in Figure 4-5. The measurement scales are based on the utilized scales. However, we have adapted them to ensure their appropriateness in relation to the NTBFs. The evaluation of the scales is conducted through the interviews and discussions with four NTBFs entrepreneurs, three UBI's managers and eight scholars. Relying on the concepts in the literature, the discussions and interviews were tuned to be held with experts about the activities of the NTBFs in the UBIs.

Prior to our discussion meetings with the experts, the concepts, definitions and purposes of our meeting have been explained to them. After the extensive discussion Negin Samaeemofrad operationalized the measurement scales (questionnaire). At the end of all discussions, the scales were precisely formulated by Negin Samaeemofrad and approved by the project leader Jaap van den Herik. The measurement scales are applied to Innovation Strategy (4.4.1), Knowledge Development and Dissemination (4.4.2), Finance Mobilization (4.4.3), Absorptive Capacity (4.4.4), Financial Capability (4.4.5), and Performance of the NTBFs (4.4.6). The questionnaire is a 7-point Likert scale, where 1 means for “*strongly disagree / extremely dissatisfied*” and 7 for “*strongly agree / extremely satisfied*”.

#### **4.4.1 Innovation Strategy**

In line with Soetanto and Jack (2016) and Voss and Voss (2013), we consider innovation strategy for NTBFs as an employment of exploitation and exploration strategies across both technology and market domains. The scale for measuring innovation strategy is adapted from Soetanto and Jack (2016). The reason to adapt this measurement scale is that it considers both technology and market domain while other studies concentrated on technology and product side. We believe that the final acceptance of the product’s innovation will be accepted by the market (or not). The original scale is a list of twelve items. However, when presenting the scale to the participants in the preparatory evaluation study, it transpired that one of the twelve items created ambiguity for the entrepreneurs. Therefore, we expanded the scale to the thirteen items.

Consequently, the final measurement scale now proposes a list of thirteen items which evaluates the state of NTBFs’ innovation strategy. The scale is presented in Table 4-2. According to this scale, the participants are asked to evaluate the domains of the innovation strategy of their NTBFs. In this measurement scale, a scale of 1 means that an entrepreneur strongly disagrees with the fulfillment of that specific aspect of innovation strategy in their firm. A scale of 7 means that an entrepreneur



strongly agrees with the accomplishment of that particular aspect of the innovation strategy in their business.

**Table 4-2:** Innovation Strategy Measurement Scale

Please indicate the extent to which you agree or disagree with the following statements	
Technology exploitation	1. we frequently refine the technology and innovation behind the existing products and services 2. we regularly add small adaptations to existing products and services 3. we regularly attempt to optimize resources, i.e., we use as less time and less money in producing our existing products and/or services 4. we regularly monitor our existing products and/or services to be aligned with customer needs
Technology exploration	5. we invent new products or services 6. we experiment with new products or services 7. we invest in the development of technology or ideas on products or services that are completely new to our company
Market exploitation	8. we increase our economies of scale in our existing markets 9. we introduce improved but existing products and services for our existing markets 10. our company expands services for existing clients
Market exploration	11. we frequently utilize new opportunities in new markets 12. our company regularly uses or tries to build new distribution channels 13. we regularly search for new approaches in new markets
1= strongly disagree; 2= disagree; 3= somewhat disagree; 4= neither agree nor disagree; 5= somewhat agree; 6= agree; 7= strongly agree	

#### ***4.4.2 Knowledge Development and Dissemination***

A vital resource for the growth of the NTBFs is the possession of knowledge (Jiménez-Barrionuevo et al., 2011). However, because the NTBFs are new, they suffer from a lack of knowledge to develop business. Therefore, UBIs attempt to meet NTBFs knowledge-based needs through the activities named by knowledge

development and dissemination (see Bergek and Norrman, 2008; Samaeemofrad et al., 2016). This attempt can be emphasized by providing training programs, and facilities on mentoring and coaching.

The measurement scale of this activity is based on the literature related to the mentoring studies and training experiences. Thus, the measurement scale of this type of support by UBIs is divided into the parts viz. (1) training and (2) mentoring and coaching. The scale is based on the work by Hackett and Dilts (2008), St-jean and Audet (2009), and Samaeemofrad et al. (2016). Hackett and Dilts (2008) and Samaeemofrad et al. (2016) highlights UBI training programs, and St-jean and Audet (2009) points to essential scales for the mentoring aspect.

The first part of the scale consists of six items (UBI training program):

1. Marketing strategy and sales management skills,
2. Negotiation and communication skills,
3. Human resource management,
4. Business strategy and agile management,
5. Financial statements, tax, contracts and protectability, and
6. Information technology and data management.

Then this list was presented to the participants of the evaluation study. They were invited to select the items that are provided by UBIs to the NTBFs. The participants reduced the items to five items because the last item was not related to the training sessions by UBIs:

1. Marketing strategy and sales management skills,
2. Negotiation and communication skills,
3. Human resource management,
4. Business strategy and agile management, and
5. Financial statements, tax, contracts and protectability.

The second part consists of eleven items:

1. Advisor's availability
2. Advisor's expertise and experience
3. Advisor's understanding of your situation,
4. Organization of meetings between the two parties (duration, frequency, and efficiency),
5. Relationship of trust between the two parties and Compliance with moral contract,
6. Mutual liking of the two parties,
7. Increase in self-confidence as a result of the mentoring experience,
8. Access to a more extensive network of contacts,
9. Real, observable results for your venture,
10. Advisor presents to you his/her successes and failures, and
11. Receive business advise from advisors.

Then the participants of the evaluation study selected eight items out of this eleven. These eight items should be provided to the NTBFs (see Table 4-3).

The measures reveal the extent to which founders of NTBFs are satisfied with the received support by the UBIs on knowledge development and dissemination. The measures are on a 7-Likert scale. They are presented in Table 4-3. A scale of 1 means that an entrepreneur is extremely dissatisfied with that specific aspect of knowledge development and dissemination support by UBIs. A scale of 7 means that the entrepreneur is extremely satisfied with that aspect of knowledge development and dissemination support.

**Table 4-3:** Knowledge Development and Dissemination Measurement Scale

Regarding content of training programs, the process of mentoring, and coaching support by BIs, please indicate the extent to which you are satisfied or dissatisfied with the following services offered to your venture.	
UBI training programs & coaching	<p><i>Training:</i></p> <ul style="list-style-type: none"> <li>(1) Marketing strategy and sales management skills</li> <li>(2) Negotiation and communication skills</li> <li>(3) Human resource management</li> <li>(4) Business strategy and agile management</li> <li>(5) Financial statements, tax, contracts, Protectability</li> </ul> <p><i>Mentoring and Coaching:</i></p> <ul style="list-style-type: none"> <li>(1) Advisor's availability</li> <li>(2) Advisor's expertise and experience</li> <li>(3) Organization of meetings with your adviser (duration, frequency, and efficiency)</li> <li>(4) There is a relationship based on trust, respect and compliance with a moral contract between you and your adviser</li> <li>(5) Increase in self-confidence as a result of the advisory experience</li> <li>(6) Access to a more extensive targeted network of contacts due to the collaboration with an adviser</li> <li>(7) Achieve real, observable results for your business through the advisory process</li> <li>(8) Adviser offers guidance regarding your successes, failures and methods for improving your business practice</li> </ul>
	1= strongly dissatisfied; 2= dissatisfied; 3= somewhat dissatisfied; 4= neither satisfied nor dissatisfied; 5= somewhat satisfied; 6= satisfied; 7= strongly satisfied

#### 4.4.3 Finance Mobilization

Most NTBFs lack financial support, but they try to overcome this by joining UBIs to increase their opportunity in accessing the capital resources (see Chen et al., 2009; Samaeemofrad et al., 2016). Thus, one of the principal supports by UBIs is *finance mobilization*.

To measure the finance mobilization activities, we adapted the measurement scales based on the scales developed by Hackett and Dilts (2008) and our interviews with UBIs managers and entrepreneurs (see Samaeemofrad et al., 2016). In terms of defining the measurement scale for the financial mobilization, Hackett and Dilts (2008) asked participants how to access to the sources of capital (e.g., banks, venture

capitalists, and business angels). In addition to the previous measurement scale, Samaeemofrad et al. (2016) revealed that UBIs also offer loans to their tenants and facilitate strategic alliances with established firms to raise funding. Hence, based on the obtained findings in our interviews with entrepreneurs, we asked participants to indicate their satisfaction with the support by UBIs on facilitating their access to all the identified approaches of capital sources. The measurement scale is presented in Table 4-4. They are on a 7-Likert scale. A scale of 1 means that an entrepreneur is extremely dissatisfied with that specific aspect of finance mobilization support by UBIs. A scale of 7 means that the entrepreneur is extremely satisfied with that aspect of finance mobilization support.

**Table 4-4:** Finance Mobilization Measurement Scale

To what extent are you satisfied with the following statements?
<p><i>Our business incubator helps us to raise funding from:</i></p> <ol style="list-style-type: none"> <li>1. Governmental financial programs</li> <li>2. Venture Capital funds/ Private investors</li> <li>3. Philanthropy</li> <li>4. Loan from its financial resources</li> <li>5. Strategic alliance with established firms</li> </ol>
1= strongly dissatisfied; 2= dissatisfied; 3= somewhat dissatisfied; 4= neither satisfied nor dissatisfied; 5= somewhat satisfied; 6= satisfied; 7= strongly satisfied

#### ***4.4.4 Absorptive Capacity***

As mentioned earlier, UBIs attempt to support their NTBFs through knowledge development activities. Therefore, the acknowledgment of the NTBFs' ability in the usage of this support is essential for successful cooperation. This ability is called *absorptive capacity*. It concentrates on the NTBFs' ability in acquiring, assimilating, transforming and implementing the information.

Below we discuss (A) the development of Absorptive Capacity, (B) a new measurement scale of AC issues divided into R&D-related issues and non-R&D-

related issues, and (C) a new model using Pi's (2021) division and the removal or modification of the remaining AC issues.

*A: The development of the Absorptive Capacity model*

One of the main comprehensive studies on absorptive capacity considers four dimensions for its construct (see Zahra and George, 2002). The first dimension is *acquisition capacity* meaning that a firm can identify the important knowledge outside of their organization. The second dimension is called *assimilation* meaning that a firm can interpret and understand the knowledge. The third dimension is *transformation* which internalizes the new knowledge. The fourth dimension is called *implementation*; it is the way along which firms can use the acquired knowledge (see Zahra and George, 2002; Jiménez-Barrionuevo et al., 2011; Saemundsson and Candi, 2017). Other previous investigations revealed that absorptive capacity is a multidimensional construct (see Jiménez-Barrionuevo et al., 2011; Saemundsson and Candi, 2017).

*B: A New Measurement Scale of AC Issues With R&D and Non-R&D-Related Issues*

Recently, Pi (2021) has divided the measurement scale of AC into two groups: R&D-related and non-R&D-related measures. The R&D related measures concentrate on the input or output of R&D activities of the firms. Previous investigations used for instance, the size of R&D personnel, the number of R&D publications or R&D expenditures to operationalize AC associated with R&D related measures (see Cohen and Levinthal, 1990; Deeds, 2001; Gao et al., 2008). The combination of these measurement scales can be used as one dimension (Pi, 2021).

The non-R&D related measures concentrate on the process of absorbing external knowledge within the firms. These types of measures are grouped into (a) one-dimensional and (b) multi-dimensional indicators. Within one-dimension measures, researchers have defined only one question or a set of questions that measure the overall estimation of AC (see Szulanski, 1996; Su et al., 2013). For multi-dimensional measures, researchers have to develop different scales for the whole

process of AC, such as acquisition, assimilation, transformation and implementation (see Jiménez-Barrionuevo et al., 2011; Ali et al., 2013; Zobel, 2017)

Within our context of study, there is a salient point that not all the NTBFs have R&D activities. Duchek (2013) states that the provision of non-R&D related measures are more applicable in measuring AC than R&D related indicators. Furthermore, Pi (2021) concludes that the multi-dimensional non-R&D related indicators appear to be an appropriate measurement that scales well in quantitative investigations. Assuming this idea, we selected a number of multi-dimensional non-R&D related measurement scales to evaluate *the moderating impact* of AC on the relation between the support by UBIs and the performances of NTBFs in our study.

*C: A New Model Using Pi's (2021) Division*

Subsequently, we further based our measurement scale for absorptive capacity on the study by Jiménez-Barrionuevo et al. (2011). They have developed multi-dimensional non-R&D indicators for measuring absorptive capacity. In their investigation, we find:

The acquisition dimension including (1) *interaction*, (2) *trust*, (3) *respect*, (4) *friendship*, and (5) *reciprocity* aspects.

The assimilation dimension including (6) *common language*, (7) *complementarity*, (8) *similarity*, (9) *a double class of compatibility aspects (compatibility 1, and compatibility 2)* ,

The transformation dimension including (10) *communication*, (11) *meetings*, (12) *documents*, (13) *transformation*, (14) *time*, and (15) *flows* aspects.

The implementation dimension including (11) *responsibility*, and (12) *application* aspects.

Table 4-5 explains the mentioned scales developed by Jiménez-Barrionuevo et al. (2011 ).

**Table 4-5:** The Absorptive Capacity Measurement Scale

Acquisition

- 1.(INTERACTION) There is close personal interaction between the two organizations.
- 2.(TRUST) The relation between the two organizations is characterized by mutual trust.
- 3.(RESPECT) The relation between the two organizations is characterized by mutual respect
- 4.(FRIENDSHIP) The relationship with this organization is one of personal friendship.
- 5.(RECIPROCITY) The relationship between the two organizations is characterized by a high level of reciprocity.

Assimilation

1. (COMMON LANGUAGE) The members of the two organizations share their own common language.
- 2.(COMPLEMENTARITY) There is high complementarity between the resources and capabilities of the two organizations.
- 3.(SIMILARITY) The main capabilities of the two organizations are very similar/overlap.
- 4.(COMPATIBILITY1) The organizational cultures of the two organizations are compatible.
- 5.(COMPATIBILITY2) The operating and management styles of the two organizations are compatible.

Transformation

- 1.(COMMUNICATION) There are many informal conversations in the organization that involves commercial activity.
- 2.(MEETINGS) meetings are organized to discuss the development and tendencies of the organization.
- 3.(DOCUMENTS) Our team publishes informative documents periodically (reports, bulletins, etc.).
- 4.(TRANSMISSION) The important data are transmitted regularly to our team.
- 5.(TIME) When something important occurs, all members of our team are informed within a short time.
- 6.(FLOWS) The organization has the capabilities or abilities necessary to ensure that knowledge flows within the organization and is shared among all members.

Implementation

- 1.(RESPONSIBILITY) There is a clear division of functions and responsibilities regarding use of information and knowledge obtained from outside.
- 2.(APPLICATION) There are capabilities and abilities needed to exploit the information and knowledge obtained from the outside.



Following the discussion with experts in the field, we see that the first three aspects of the acquisition dimension were merged into one scale. Within the transformation dimension the (1) communication and (2) meetings aspects merge to the one scale, the (3) documents and (4) transformation aspects also shape one scale. The (5) time and (6) flows aspects merge into one aspects. From the remaining scales it has to be decided whether they should be removed from or modified on the list. As a result, the most related scales to the NTBFs are remained or modified, and a list of six measurement scales remain.

The new list of six modified items for the measures will evaluate the absorptive capacity. It is depicted in Table 4-6. Here, entrepreneurs are requested to evaluate their knowledge exchange interactions with all persons (e.g., customer, users, advisors, etc.) from whom they obtain information. A scale of 1 means that an entrepreneur strongly disagrees with the presence of the statements within NTBFs. A scale of 7 means that an entrepreneur strongly agrees with the presence of the statements within NTBFs.

**Table 4-6:** The Modified Absorptive Capacity Measurement Scale

<p><b>Indicate the characteristics of your relationship between your venture and all persons (customer, users, advisors, etc.) from whom you obtain or exchange new information or useful knowledge to develop your activities this relationship or in your organization, showing your degree of agreement or disagreement with the following statements:</b></p>
<p><u>Acquisition</u> (INTERACTION / TRUST / RESPECT ) Your firm has a close relationship with its customers that is characterized by mutual trust and respect.</p>
<p><u>Assimilation</u> (COMMON LANGUAGE) Our team is able to understand knowledge from outside our business focus or industry-niche.</p>
<p><u>Transformation</u> (COMMUNICATION / MEETINGS) There are few informal conversations and formal meetings in our organization to discuss the development of our business practice. (DOCUMENTS / TRANSFORMATION) Our team publishes informative documents periodically (e.g., reports, bulletins). (TIME / FLOWS) When something important occurs, all members of our team are informed within a short time, and the knowledge is shared among all members of the organization.</p>
<p><u>Implementation</u> (APPLICATION) We frequently pivot our business based on the obtained knowledge from outside.</p>
<p>1= strongly disagree; 2= disagree; 3= somewhat disagree; 4= neither agree nor disagree; 5= somewhat agree; 6= agree; 7= strongly agree</p>

#### ***4.4.5 Financial Capability***

All NTBFs are required to be equipped with a unique capability to benefit from finance mobilization by business incubators (see Eveleens et al., 2017). We define this capability as an NTBF's ability in fundraising and acquiring the required financial resources. Previous literature on the incubators demonstrated that business angels and venture capitalists (VCs) set explicit criteria to evaluate the *financial capability* of the new ventures (see Kollmann and Kuckertz, 2010). Kollmann and Kuckertz (2010) concluded that in the early stages of the ventures, business angels invest more than venture capitalists. Indeed, VCs prefer to invest in NTBFs at the development stages. Therefore, VCs and business angels have different sort of financial capability measurement scale. In this research, we aim (1) at studying the NTBFs that are still in BIs, and (2) measuring the NTBF's ability in fundraising. For this purpose, we will build a new scale based on business angel measures which cover the measures by VCs as well. We adapted the measurement scales by Maxwell et al. (2011). They highlighted eight criteria to evaluate the potential of NTBFs in obtaining capital.

The identified criteria are:

- (1) entrepreneur's character (I can evaluate and react to risk quite well),
- (2) entrepreneur's experience, (Our team have a direct and relevant experience),
- (3) adaption (Our customers easily adapt to our product),
- (4) product status (Our product is ready to go to market),
- (5) protectability (People cannot easily copy our product / service),
- (6) customer engagement (Our product meets the customer need),
- (7) route to market (We have a realistic marketing plan), and
- (8) market potential (There is a large market for our product).

We will build our construct based on these eight items and will operationalize them on a 7-point Likert scale. A scale of 1 means that entrepreneurs strongly disagree with that ability in their NTBFs or in themselves. A scale of 7 means that

entrepreneurs strongly agree with the presence of the under questioned ability within their NTBFs or by themselves. The measurement scale is listed in Table 4-7.

**Table 4-7:** Financial Capability Measurement Scale

<b>Please indicate the extent to which you rate yourself regarding your ability in raising capital.</b>
(1) I am able to evaluate and react to risk well (2) Our team have a direct and relevant experience (3) Our customers easily adapt to our product (4) Our product is ready to market (5) People cannot easily copy our product / service (6) Our product meets customer need (7) We have a realistic marketing plan (8) There is a large market for our product (Over 20 \$ Million)
1= strongly disagree; 2= disagree; 3= somewhat disagree; 4= neither agree nor disagree; 5= somewhat agree; 6= agree; 7= strongly agree

#### ***4.4.6 Performance of the NTBF***

Within the entrepreneurship literature, different types of indicators have been used to measure the performance of the NTBFs. These indicators are classified into two categories: (1) objective measurement, and (2) subjective measurement. Objective measures would be used to measure the financial and growth performance of the firm, for example, sales, profitability, growth in the number of employees, and ROI (see Wu, 2007; Eveleens et al., 2017). Subjective measures are based on people's judgment, such as the anticipation of success, survival, goal, and achievements (see Wu, 2007; Soetanto and Jack, 2016; Eveleens et al., 2017). However, none of the objective or subjective measures is superior to the other one. For measuring the performance of NTBF, the usage of objective scales includes some challenges. For instance, financial statement scales might not be achieved in some NTBFs, such as profitability or turn-over. Furthermore, the subjective measures may include psychological biases (see Soetanto and Jack, 2016; Eveleens et al., 2017). In order to overcome the bias and benefit from the advantages of both objective and subjective measurements, we employ both of them.

For objective measure, we measure the changes in the number of employees since last year.

For subjective measure, we follow the work by van Gelderen et al. (2005) and consider three self-reporting criteria for measuring the performance of NTBFs:

- (1) goal achievement,
- (2) skill development, and
- (3) satisfaction.

We measure goal achievement by asking how entrepreneurs feel they have achieved their business goals and planned milestones. The skill development will be measured by asking about the extent that entrepreneurs have developed their skills such as financing knowledge, communicating, and marketing since they are in the incubator. Satisfaction can be measured by asking the participants to rate the level of their satisfaction with their income, and business development.

The measurement scale of the performance of NTBFs is presented in Table 4-8. A scale of 1 means that an entrepreneur extremely dissatisfies with that aspect of performance. A scale of 7 means that entrepreneurs extremely satisfy with their performance outcome.

**Table 4-8:** The Performance of NTBFs Measurement Scale

<p><i>a) By how many employees did your company increase since last year?</i></p> <p><i>b) Regarding measuring the performance of NTBFs, participants are asked to indicate to what extent they are satisfied with the following statements?</i></p> <p>(Goal achievement):</p> <ol style="list-style-type: none"><li>(1) Meet the planned milestones as scheduled</li><li>(2) Able to achieve the defined business goals</li></ol> <p>(Skill development):</p> <ol style="list-style-type: none"><li>(3) Developing my business and management skills</li></ol> <p>(Satisfaction):</p> <ol style="list-style-type: none"><li>(4) I am satisfied with the income</li><li>(5) I am satisfied with the process of business development</li></ol>
<p>1= strongly dissatisfied; 2= dissatisfied; 3= somewhat dissatisfied; 4= neither satisfied nor dissatisfied; 5= somewhat satisfied; 6= satisfied; 7= strongly satisfied</p>

#### 4.5 A Partial Answer to RQ2

In this chapter, we addressed RQ2: *How can the supportive activities be operationalized in a construct that enables us to measure the impact of the identified supportive activities by UBIs on the performance of NTBFs?*

We performed three important steps of the research envisaged. First, we developed our theoretical model, which explains (a) the relation between the supports by UBIs, (b) the performances of the NTBFs, and (c) their innovation strategy. Second, in our study, we investigated the moderating role of NTBFs' capabilities and were able to show the moderating role of the capabilities of the NTBF on the impact that the supportive activities by the NTBFs have on the performances of the NTBFs (see Figure 4.5). Third, our model has been operationalized and the measurement scales for each variable have been addressed (see section 4.4). In the next chapter, we complete the answer to the RQ2 and explain the validity and reliability of the proposed measurement scale.

Furthermore, in this chapter, we explained the results of our discussions and interviews with experts in terms of ensuring that our scale really represents the variables measured. As a result, the twelve items of innovation strategy (see subsection 4.4.1) turn to the thirteen items (see Soetanto and Jack, 2016). The six items of the first section of knowledge development and dissemination decrease to five items. Then, the eleven items associated with the mentoring and business advice activities of knowledge development and dissemination decreases to eight items (see subsection 4.4.2). The scales associated with absorptive capacity are modified to six items (see subsection 4.4.4). Next chapter will presents the validity and reliability of the construct in detail.

