Business incubators: the impact of their support
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Chapter 6

Implementing the SA Construct

This section addresses RQ3*: In what way are the identified supportive activities related to (a) the innovation strategy of the NTBFs and consequently to (b) the performance of an NTBF?*

To provide an answer to RQ3, we apply the adapted construct from chapter 5. We have conducted multiple linear regression analyses to analyze the relationship between at the one side, two supportive activities by UBIs: (a) finance mobilization, and (b) knowledge development and dissemination together with an innovation strategy, and at the other side, the performance of the NTBFs. In addition to the Independent Variables, one Moderator (i.e., absorptive capacity) is considered in the regression analysis to evaluate whether it amplifies the relation between the supports by UBIs and the performance of the NTBFs. Figure 6-1 presents a hypothesized model of these relations.

The chapter proceeds as follows. Section 6.1 reviews the perceptions of the entrepreneurs about the resources (supports) of the UBIs. Section 6.2 reports on the characteristics of sample NTBFs (e.g., educational background, prior work experience of the participants, the number of (co-)founders, and NTBFs industry). Section 6.3 develops the theoretical background and formulates the hypotheses of the research. Section 6.4 evaluates whether the multiple linear analysis technique is appropriate to test our model. Section 6.5 reports on the results of testing the model and the hypotheses.

6.1 The Supports by UBIs and the Capabilities of the NTBFs

Business Incubators (BIs) are considered as value-added innovation policies. They aim to stimulate entrepreneurship and innovation, and to fuel the economy (cf. Fini et al., 2011; Mian et al., 2016; Soetanto and Jack, 2016; van Weele et al., 2017). To acquire this aim, UBIs support NTBFs by providing different services, such as access to finances, physical infrastructure, knowledge development and dissemination, and access to the networks (cf. Bruneel et al., 2012; Samaeemofrad et al., 2016; van Weele et al., 2017; Lukes et al., 2019).

The theory of Resource-Based View (RBV) considers a firm as a bundle of resources. In contrast to the mature organizations, the resource bases of the NTBFs are developing and are yet not completed. Our previous chapters indicated that the NTBF's liabilities of smallness and newness lead to a scarcity of resources. Therefore, NTBFs consider UBI as a tool to address their liabilities and to help them developing their incomplete resources. Indeed, UBIs provide the sort of resources that are vital for NTBFs' growth and survival, and they can commercialize their ideas (cf. Soetanto and Jack, 2016; van Weele et al., 2017).

6.1.1 The Outcome of the Incubation Is A Challenge

However, the promising performances of the UBIs are still unclear. Some studies have revealed that NTBFs appear to have more chance of survival when they receive support from UBIs (see McAdam and McAdam, 2006; Bruneel et al., 2012; Stokan et al., 2015). However, other investigations have shown that UBIs do not have much impact on the success of the NTBFs (see Ratinho and Henriques, 2010; Schwartz, 2013). Recently, Dvouletý et al. (2018) revealed that the incubated NTBFs have a worse performance than unincubated NTBFs.

Prior studies (see Bruneel et al., 2012; Patton, 2014; van Weele et al., 2017) report that this disappointing outcome of the UBIs lies partly in the low usage of the UBIs' resources by NTBFs. Furthermore, some entrepreneurs are not willing to participate in the training and mentoring business sessions of the incubators or do not take part in the networking events. Moreover, the possibility of the insufficient quality of the

offered resources leads to the low usage of the UBIs resources by NTBFs. Thus, this ambiguity in the influence of supports by UBIs, has raised a research call to obtain more insight into their impacts on the performance of the NTBFs.

Nevertheless, it is a salient point to note that assessing the outcome of the incubator is a challenge in academia. Lukes et al. (2019) reviewed the empirical literature on the performance of business incubators. They stated that most of the previous investigations (54%) can be classified as a qualitative study, and only fewer scholars (15%) conducted a quantitative approach to evaluate the performance of business incubators (see Mian et al., 2016). One explanation for the low number of quantitative studies to assess the effectiveness of the UBIs is that measuring the outcome of the incubator is a challenging risk (cf. Lukes et al., 2019). As a result, there is a lack of studies on this matter (see Lukes et al., 2019).

6.1.2 Our Point of View

Going back to the low usage of incubators' resources, van Weele et al. (2017) have argued that while the offering supports and resources by UBIs are crucial for the NTBFs, they can be beneficial when NTBFs use them. The scholars' seminal contribution highlighted that NTBFs are not aware of their resource gaps. Meanwhile, the NTBFs suffer from the capabilities to utilize the resources to help them achieve successes and be productive (cf. Jensen and Clausen, 2017). NTBFs' capabilities (absorptive capacity) refer to (a) the firm's ability to use the resources, and (b) its ability to search for the resources and develop them (cf. Jensen and Clausen, 2017).

While previous studies pointed at the entrepreneurs' unwillingness in the usage of incubators' knowledge-based resources, we aim to stress that the entrepreneurs' ability in recognizing the value of external knowledge resources as provided by UBIs in order to assimilate it and to have effect at their performance. Thus, the focus of our study is on how such an impact of absorptive capacity moderates the degree to which the supports by UBIs affect the performance of the NTBFs.

6.1.3 Two Research Gaps

The above discussions lead us to point out that the research gap between the incubator and the NTBF's literature is two-folded: (1) the impact of incubators' resources on the performance of NTBFs is still under investigation, (2) empirically evaluating the NTBFs' absorptive capacity or learning ability will moderate the impact of incubators' resources on the NTBFs' performances. Therefore, we here address these two research gaps and aim to (1) assess how entrepreneurs perceive the offering supports and resources by the incubators, and (2) evaluate entrepreneurs' learning ability associated with acquiring external knowledge resources and utilize them.

6.2   Research Participants' Information

This section reports on the basic information about the participants and their NTBFs. The section addresses (A) the educational background of the participants, (B) prior working experience of them, (C) frequency of the number of (co-)founders, and (D) the industry of the participated NTBFs. The sample size of the study is 96.

A: Educational Background of the Participants

From the 96 participants, most information on the educational background of 72 participants (founders) in our survey is as follows. 31 (co-)founders are educated in economics and business, 16 (co-)founders in engineering, 15 in the computer science, and 10 (co-)founders in healthcare.

B: Prior working experience of the founders

From the 96 participants, the majority of the (co-)founders (46) has work experience in the universities, R&D organizations, and high-tech firms. 18 (co-)founders had no previous work experience. 13 (co-)founders have experienced as a consultant before founding their NTBFs. The rest of (co-)founders (19) have working experience in business development, medicine and nursery, clinical research (healthcare), Non-Governmental Organization (NGO) and public sector.

C: The distribution of the number of founders

From the 96 participants, the distribution of the number of founders in the NTBFs is as follows: 45 NTBFs have been founded by two (co-)founders, 21 NTBFs have been founded with a single (co-) founder, 18 NTBFs have been founded with three (co-)founders, and 12 NTBFs have been initiated with four (co-)founders.

D: The industry of the NTBFs

From the 96 participants, the industry of their NTBFs consists of different sectors. 36 NTBFs are active in the Healthcare and MedTech industry, 19 NTBFs work in the Computer and Software industry (e.g., AI, Blockchain, IoT, and Robotics), and 10 NTBFs are in the Life Science and Biotechnology industry. The rest of the NTBFs (31) is active in other industries, such as Food and Agriculture, Complex Technologies, Mining, Real Estate, Environmental, and Social services.

6.3 The Development of Hypotheses

In this section, we continue our research on the constructs and develop our final hypotheses that will be tested in this chapter. Subsections 6.3.1 to 6.3.5 explain the theoretical and empirical findings as a background to develop our hypotheses. Subsequently, the obtained results from Chapter 5 will be discussed in terms of the retained variables. Then, we will continue our research. In Figure 6-1, we show six hypothesized relations (H1 to H6) among the retained variables. The hypotheses are discussed in the subsections 6.3.1 to 6.3.5.

Figure 6-1*: The Hypothesized Model Relationships*
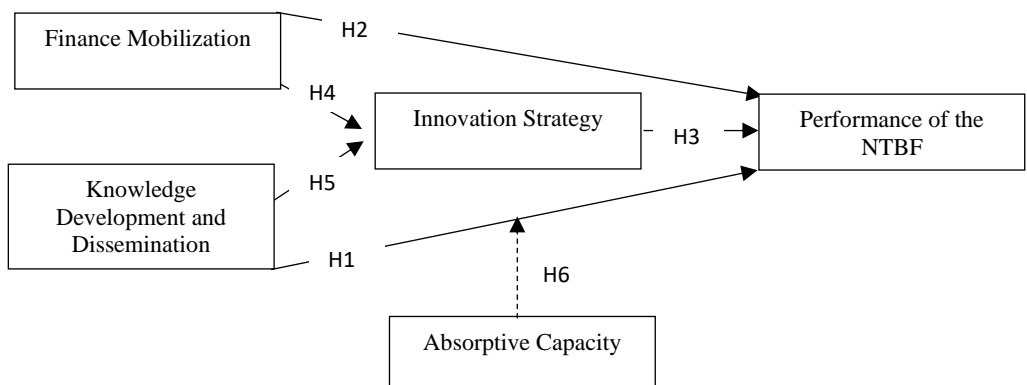
6.3.1 Knowledge Development and Dissemination and the Performance of the NTBFs

Knowledge development and dissemination (cf. supportive activities) refer to the provision of business training programs, mentoring and coaching facilities by UBIs that may influence the performance of their NTBFs. The operationalization of the original knowledge development and dissemination measures (Q13-Q26) has been explained in Chapter 5. In addition, subsection 6.4.1 will briefly review the results of the retained measures for further analysis.

Naïve entrepreneurs often suffer from the business knowledge and skills including: (1) personal skills (e.g., creativity, self-confidence), (2) management skills (e.g., planning, leadership), and (3) technical skills (e.g., presentation, communication) (see Albort-Morant and Oghazi, 2016). Previous studies (see Arenius and Autio, 2002; Kirwan et al., 2006) state that knowledge is the most prominent resource for NTBFs. Obtaining relevant business knowledge and keeping up to date with recent changes in their fields influence the success of the NTBFs (cf. Kirwan et al., 2006). One approach to overcome the liability of business knowledge and experience appears to have access to business training and customized coaching and monitoring. UBIs, accelerators, and Science Parks are such entities that aim to facilitate these services. The training and mentoring services include how to develop a new business, build new teams, conduct marketing and sales, and be familiar with the laws and obligations of their host countries. Such services (e.g., training and monitoring) are helpful to develop the abilities and capabilities of the entrepreneurs to manage more effectively their business (Bae et al., 2014; Huynh et al., 2017). Therefore, it appears that UBIs' training and mentoring support services have the potential to help entrepreneurs to fill their knowledge gap, and consequently, improve the performance of their NTBFs (see Albort-Morant and Oghazi, 2016; Dahms and Kingkaew, 2016).

The above argument leads us to hypothesis H1.

H1: Knowledge development and dissemination are supportive activities that have a positive impact on the performance of the NTBFs.

6.3.2 Finance Mobilization Supportive Activity and the Performance of the NTBFs

Most entrepreneurs start their business with only a few numbers of financial resources. In the early stages of their NTBFs, their limited revenue flows cannot meet the expenses of their research and developments (Kirwan et al., 2006). Therefore, they attempt to raise funds from different financial resources such as grants, venture capitalists, university funds, strategic alliances with corporates, and governments. In this regard, UBIs help NTBFs to access the finance, which we call Finance Mobilization.

A finance mobilization supportive activity by UBIs refers to the type of services that UBIs facilitate to have access to different capital and financial resources for their NTBFs. We assume that UBIs can help their NTBFs effectively to have access to finances and to raise funds. Subsequently, their support influences the performance of the NTBFs. Hence, we test the following hypothesis.

H2: Finance mobilization has a positive impact on the performance of the NTBFs.

The operationalization of the five original finance mobilization measures (Q27-Q31) has been presented in Chapter 5. Subsection 6.4.1 will summarize the results of the retained measures for further analysis.

6.3.3 Innovation Strategy and the Performance of the NTBFs

In a well-known investigation, March (1991) identified two types of innovation strategies, namely (1) explorative and (2) exploitative. The first type is the explorative strategy by which the firms develop new products, services, or pursue new markets. With the second type of innovation strategy, the exploitative strategy, firms concentrate on improving and developing their current services, products, or

markets. (March, 1991). Via the exploration strategy, NTBFs create new technologies and products and consequently develop new markets. Through conducting the exploitation strategy for the current market, NTBFs attempt to implement incremental innovations in their products. In parallel, through exploiting in their current products and technologies, development in the current markets will be achieved (see Soetanto and Jack, 2016). Thus, we may assume that the innovation strategy has a certain influence on the performance. Therefore, we formulate the following hypothesis.

H3: Innovation Strategy has a positive impact on the performance of the NTBFs.

The operationalization of the thirteen original finance mobilization measures (Q0-Q12) has been presented in Chapter 5. Subsection 6.4.1 summarizes the results of the retained measures for further analysis.

6.3.4 Supportive Activities by UBIs, Innovation Strategy and Performance of NTBFs

Soetanto and Jack (2016) state that the literature on the business incubators pays less attention to the relations between on the one side (A) the NTBF's innovation strategies and, (B) the supportive activities by UBIs, and on the other side (C) the performance of the NTBFs. Indeed, the majority of the studies concentrates on the incubation process but have overlooked the impact of the support by UBIs on (1) the NTBF's innovation strategies and consequently on (2) their performance. This means that there is a real gap between the literature and the procedures. The literature on the NTBFs mainly focuses on the outcomes of the NTBFs during the participation in the incubation programs. At that point, there is a scarcity of concentration on the impact of the support by UBIs on the NTBFs' innovation strategies. Therefore, we attempt to address this research gap and increase our understanding about the relations between UBIs' support (e.g., knowledge development and dissemination, and finance mobilization), NTBF's innovation strategy and their performances. Hence, the following two hypotheses are formulated.

H4: Finance mobilization has a positive impact on the innovation strategy and, therefore, on the performance of the NTBFs.

H5: Knowledge development and dissemination have a positive impact on the innovation strategy and therefore on the performance of the NTBFs.

6.3.5 Amplifying the Impact of Knowledge Development and Dissemination

We expect that absorptive capacity will amplify the impact of knowledge development and dissemination on the performance of the NTBFs. Previous studies (see Oakey, 2012; Schwartz, 2013; van Weele et al., 2017) reported that NTBFs do not make benefit from the UBIs' resources. As a result, the outcome of the incubators is in general disappointing. Low quality of the knowledge resources of incubators, or a flawed intention of entrepreneurs to take part in training sessions, are possible reasons for this outcome as already announced by Patton, (2014) and Lalkaka, (2001).

We assume that (a) the entrepreneurs' ability to acquire knowledge, (b) their ability to utilize and (c) to assimilate them might have an impact on taking advantage from knowledge development and dissemination supports by UBIs. Therefore, we develop the following hypothesis.

H6: Absorptive capacity has a positive moderating effect on the relation between (a) knowledge development and dissemination and (b) the performance of the NTBFs.

Figure 6-1 depicts all the hypothesized assumptions. In the next sections (6.4 to 6.6), we will test these hypotheses to see whether our data has to reject them or cannot reject them. Section 6.4 elaborates the measures to be tested within the mentioned hypotheses.

6.4   Research Design

Our data set and the process of collecting the sample to test (1) the formulated hypotheses and (2) the model are already presented in chapter 5 (Section 5.1). Moreover, the measures that we used to operationalize our model, are explained in brief in Chapter 4 (Section 4.4), and Chapter 6 (Section 6.3). Here in subsection 6.4.1,

we discuss the remaining measures to continue the analysis. The method is validated in subsection 6.4.2. After that, the appropriateness of linear regression analysis to analyse our data is evaluated in subsection 6.4.3.

6.4.1 Measures

This subsection explains (a) the dependent variables, (b) the independent variables, (c) the moderators, and (d) control variables to be examined by regression analysis. Chapter 4 has presented the operationalization of the measures of all variables. This subsection briefly reviews them. In addition, the *measures* of the control variables are provided in this subsection. Appendix C reports all the measurement scales of the model.

A: Dependent Variable

We use the performances of the NTBFs as a dependent variable. Entrepreneurship studies and research reports categorize the measurement scales of the firm's performance into two categories: (1) objective performance measures and (2) subjective performance measures.

Objective Measures

Objective measures include (a) growth-related criteria and (b) profitability-related criteria. Ad (a) previous studies argue that growth-related criteria can be more reliable and acceptable with respect to financial measures (see Soetanto and van Geenhuizen, 2019). It seems that among the objective measurement criteria, the growth in the number of employees (job growth) can be considered as an acceptable measure of performance for small firms. However, some of the growth-related criteria such as sales growth, are useful measures in established firms and are not accurate for new and small businesses. Ad (b), profitability-related criteria (e.g., return on invest (ROI), return on assets (ROA)) are not appropriate measures to evaluate the performance of small and new businesses. The reason is that most of these firms have not reached the profit-making point (see Garrett and Covin, 2013).

Subjective Measures

Subjective measures refer to the founder's evaluation about the perceived success, their goals, and milestones achievement. In our empirical study, we use a single measure (i.e., the founder's anticipation) on five items (viz. Goal Achievement (2 items); Skill Development (1 item), and Satisfaction on Income and Business Development (2 items)). Therefore, we asked founders to indicate to what extent they are satisfied with the measurement items on their NTBFs' performance on a 7-point scale from strongly dissatisfied to strongly satisfied. We assume that the participants are acknowledged about the performance of their NTBFs. The measurement scale for the performance of NTBFs is an adapted and modified version from the work by van Gelderen et al. (2005). A reliability assessment of the performance scale is $\alpha = 0.8$, which is a high Cronbach's Alpha coefficient.

Different Dimensions

As measuring the performance of NTBFs has different dimensions, the combination of them can be beneficial for empirical investigation (see Soetanto and van Geenhuizen, 2019). Moreover, considering only objective or subjective measures contains a bias as well. Thus, in order to overcome the research bias and to capture different aspects of the performance of NTBFs, we consider both objective and subjective measures. As an objective measure, we use the changes in the number of employees (job growth) and ask participants to indicate the number of employees that they have hired since last year. Then, we transform the changes in job growth into a 7-point scale.

B: Independent Variables

In our study, we have three independent variables (innovation strategy, knowledge development and dissemination, and finance mobilization). The *innovation strategy* measure builds on the construct developed by Soetanto and Jack (2016). The thirteen-item scale is explained in Table 4-2 (Chapter 4). The measure concentrates on the innovation strategies of the NTBFs from both: (1) market domain, and (2) technology

domain. The *knowledge development and dissemination* supportive activity measure is adapted from Hackett and Dilts (2008), St-jean and Audet (2009), and Samaeemofrad et al. (2016). It reflects the extent to which UBIs provide training, mentoring and coaching supportive activities for the NTBFs. The thirteen-item scale is provided in Table 4-3 (Chapter 4). The *finance mobilization* measure focuses on financing NTBFs with the support of BIs. The five-item scale is presented in Table 4-4 (Chapter 4), which is adapted from our observations and interviews with founders and UBI's managers (see Samaeemofrad et al., 2016).

The Application of PCA

As reported in Chapter 5, we applied Principal Component Analysis to all the 31 items of the independent variables. The analysis confirmed the presence of innovation strategy, knowledge development and dissemination, and finance mobilization (see Table 5-12). The results have shown that five items associated with innovation strategy, thirteen items associated with knowledge development and dissemination, and five items associated with finance mobilization were examined through Promax rotation technique, and then retained for further analysis. All the remaining items have Eigenvalues higher than one, component loadings greater than 0.60, and cross-loadings below 0.30. The items associated with the innovation strategy scale (see Table 4-2) have shown the component loadings below 0.6. Therefore, nine items of innovation strategy were excluded from further analysis. In the end, the original thirteen-item scale for innovation strategy was reduced to the five-item scale.

C: Moderator Variables

As depicted in Chapter 5, the six items associated with absorptive capacity and seven items associated with finance capability were examined through Varimax rotation technique (see Table 5-13). The results have shown that the original six-item scale related to the absorptive capacity is reduced to a three-item scale and the original seven-item scale referring to the financial capability is reduced to a one-item scale. However, financial capability is not supported by sufficient items and should be

excluded from further research (see Table 5-14). Thus, we continue the analysis with one Moderator (i.e., absorptive capacity).

The measurement scale of absorptive capacity concentrates on the founders' capability in the usage of knowledge development and dissemination support by UBIs. We assume that absorptive capacity amplifies the relation between (A) knowledge development and dissemination by UBIs and (B) the performance of the NTBF. The six measurement items associated with absorptive capacity are obtained from the Jiménez-Barrionuevo et al. (2011) study. The items are presented in Table 4-5, Chapter 4.

D: Control Variables

For testing our model and the hypotheses, we control the effect of three NTBF items: (1) size, (2) age, and (3) the level of innovativeness. The measurement scales of these three control variables are presented in Appendix C. Below, the reasons for including these control variables in our research are provided.

Size

NTBF's size is expected to have an impact on the innovative performance and growth of the firms (cf. Becchetti and Trovato, 2002). Small firms can grow if they become innovative and flexible (Lenihan et al., 2010). Furthermore, in comparison with large firms, while small firms have a flexible organizational structure, these firms are more able to implement small incremental innovations (see McGuirk et al., 2015). Thus, it appears that small firms may be more innovative than larger firms (see Freel, 2005; Soetanto and Jack, 2016).

However, some studies provided contradictory evidence in terms of the effects of the size on the firms' innovation performance (see Roper and Hewitt-Dundas, 2008; Roper et al., 2008). Roper et al. (2008) argue that "size" effects on the innovation process, do not produce innovation. Roper and Hewitt-Dundas (2008) report that large firms are more innovative than small firms. Therefore, according to

the above arguments, we control the impact of size on the performance of NTBFs. NTBF's size is measured with the number of employees (FTEs).

Age

NTBF's age is found (1) to be related to the firm's growth and (2) to have impact on their performances. In the case of small firms, the younger firms grow faster than older ones (see Löfsten and Lindelöf, 2001; Sternberg, 2014). Furthermore, younger NTBFs have fewer routines, and they seem to be more innovative (see Soetanto and Jack, 2016). The age of the NTBF is measured by asking the foundation year of the NTBFs.

Level of Innovativeness

NTBF's level of innovativeness reflects the degree of tendency to be creative, pursuit new ideas, and novel solutions to obtain competitive advantages. The variable shows that high-level innovative NTBFs acquire different innovation strategies in comparison with low or medium-level innovative firms. The level of innovativeness is included as a control variable as it may have an impact on the performance of the NTBFs (see Soetanto and Jack, 2016). This variable is measured whether the NTBF has a patented technology (=1) or not (= 0).

6.4.2 Method Validity

In this subsection, three potential biases are discussed with which BIs and NTBFs investigations are confronted. The potential biases are: (1) sample selection bias, (2) social desirability bias, (3) and common method bias.

Ad (1) *Sample selection bias* within the context of UBIs may be presented when sample has been conducted within a single or a very small number of UBIs because the entrepreneurs of a particular UBI might overestimate the effectiveness of the UBI's support (Siegel et al., 2008). Therefore, we attempted to conduct our survey in different UBIs to minimize the possibility of the influence of this bias. In addition, we selected the NTBFs of the UBIs that we felt they were representative of the

population under the study (in terms of background of the entrepreneurs, age of the NTBF, and sector), and included the UBIs which support NTBFs from different technology-based industries in different level of growth stage. The reason is that different types of tech-based industries need access to special facilities and knowledge. Thus, in this situation, UBIs should offer a mix of resources to fulfill their NTBFs' needs (Baraldi and Havenvid, 2016; van Weele et al., 2017). As a consequence, this high level of variation within our sample lead to the increase of the generalizability of our findings. Further, our data shows that the participated entrepreneurs have different perspectives on the support by their UBIs, which depicts that the influence of this bias is minimized or did not occur.

Ad (2) *Social desirability bias* also is another limitation which our research is confronted. This type of limitation occurs when the participants answer questions in a manner which is favored by others. Thus, in our study we guaranteed to the participants that the data is kept confidential and minimized the potential impact of this bias.

Ad (3) *Common method bias* occurs when the subjective measures are used and lead to the variation in responses (Podsakoff et al., 2003). As our data is gathered by a usage of a self-reported assessment from participants, it might generate a potential common method bias especially our dependent and independent variables are self-reporting measures. Hence, to check whether our data is influenced by this error, Harman's one-factor test (see Definition 6.1) was conducted on all variables. The results (18.393% which is under the criteria) showed that the relationships among (a) the performance of the NTBFs, (b) their capabilities, (c) innovation strategy, (d) finance mobilization and (e) knowledge development and dissemination, it is not possible to influence by common method bias. This test is conducted by using principal component analysis in SPSS (see Appendix H).

Definition 6.1: *"A **Harman One-Factor Analysis** is a post hoc procedure that is conducted after data collection to check whether a single factor is accountable for variance in the data" (Tehseen et al., 2017, p. 155).*

According to this test, the data is not limited by common method bias if no single factor emerges. The total variance of a single factor (less than 50%) indicates that common method bias has no influence on the data. (cf. Podsakoff et al., 2003; Tehseen et al., 2017).

Furthermore, to avoid this bias, we conducted proper measurement tools and check their validity and reliability. The results show that our construct is both valid and reliable (see section 5.5).

6.4.3 The Appropriateness of Linear Regression Analysis

In this subsection, we test the general trends in our sample and examine whether it fits to the linear regression techniques. In this regard, four types of analysis will be conducted, namely: (A) skewness analysis, (B) residual analysis, (C) heteroscedasticity analysis and (D) multicollinearity analysis. Finally, the subsection will conclude on the results of (E) the model diagnostics.

A: Skewness Analysis

Definition 6.2: *Skewness Analysis reveals the asymmetrically distribution of variables.*

The skewed-data can be negative or positive (cf. Sarstedt and Mooi, 2019). A positive skew occurs when the frequency of the observations is clustered on the left side of the distribution and produces a long right tail. A negative skew occurs when the frequency of the observations is clustered on the right side of the distribution and produces a long-left tail (see Fields, 2018; Sarstedt and Mooi, 2019). Table 6-1 reports the level of skewness of all the variables.

Table 6-1: The Results of the Skewness Analysis

Variables	Skewness	Corrected Skewness
Main Variable		
Innovation Strategy	-.853	-.853
Knowledge Development	-.661	-.661
Finance Mobilization	-.121	-.121
Absorptive Capacity	**-1.072**	**-0.700**
Performance	-.231	-.231
Control Variable		
Age	.564	.564
Level of Innovativeness	-.107	-.107
Size	**3.321**	**0.525**

The Table shows that the significant skewness belongs to the *size* of the NTBFs (control variable), and *absorptive capacity* (moderator). To decrease the level of skewness, we apply Log Transform function in SPSS. Following its application, the function corrects the skewness of the size of the NTBFs from 3.321 to 0.525, and absorptive capacity from -1.072 to 0.700. Indeed, this correction influences the quality of data, and makes it fit for further analysis.

B: Residual Analysis

Definition 6.3: *Residual is an error between the value which a model predicts and the value it observes in a dataset (Field, 2018).*

Residual plots are graphs that have on the horizontal axis the dependent variable and on the vertical axis the residuals. The linear regression techniques will be applicable when the points in the residual plots are randomly dispread.

In this paragraph, residual plots are created between the performance of the NTBFs (dependent variable) on the horizontal axis, viz. finance mobilization, knowledge development and dissemination, innovation strategy (independent variables), absorptive capacity (moderator), the age of the NTBF, the size of the

NTBFs, and the level of NTBF's innovativeness (control variables) on the vertical axis. Appendix G provides all the residual plots among all variables.

Field (2018) states that a sample of data is normally distributed when 95% of the points in the residual plots are between −1.96 and +1.96; 99% of them are between −2.58 and +2.58; and 99.9% (i.e., nearly all of them) are between −3.29 and +3.29.

According to these scales, we observe that the distribution of data in the eight residual plots (see Appendix G) are in the right range. In addition, any error or bias has not been observed by us among the distributed data. Hence, we may conclude that (1) the level of an error in our model is acceptable, (2) our model is a strong representation of data, (3) and the linear regression techniques are appropriate for analysing our data.

C: Heteroscedasticity Analysis

Definition 6.4: *Heteroscedasticity is a situation in regression analysis in which the variance of the residual is not consistent (cf. Sarstedt and Mooi, 2019).*

The used syntax for Heteroscedasticity analysis[3] was installed as a Custom Dialogue in SPSS and then ran among the mentioned variables. The syntax can be found online (the link is provided in footnote 3).

To test the heteroscedasticity (not homoscedasticity), we conducted Breusch-Pagan and Koenker tests (see Table 6-2). Table 6-2 reports the results of the Breusch-Pagan and Koenker tests. The p-values of the Breusch-Pagan and Koenker tests are above 0.05 which provide an evidence that our data is homoscedastic and is not constrained by heteroscedasticity effects. However, the residual plots in the previous step approve the homoscedasticity of the data.

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[3] https://sites.google.com/site/ahmaddaryanto/scripts/Heterogeneity-test

Table 6-2: Breusch-Pagan and Koenker Tests

Test	p
Breusch-Pagan	0.889
Koenker	0.844

D: Multicollinearity Analysis

Definition 6.5: *Multicollinearity is a condition when two or more variables are highly correlated (Field, 2018).*

Thus, multicollinearity skews the results of the regression model. As the multicollinearity increases, it impacts on the interpretation of being variate due to the existence of high correlations between variables (cf. Hair et al., 2014).

In this section, we conduct multicollinearity analysis among all the variables. The computation of the Variance Inflation Factor analyses possible multicollinearity effects. Below, its definition is provided.

Definition 6.6: *Variance Inflation Factor quantifies the severity of multicollinearity in an ordinary least squares regression model (cf. Webster, 2013).*

Variance Inflation Factors (VIF) of the all variables were calculated based on the procedure explained by Aiken et al. (1991). The results revealed that the highest value of VIF is 1.351, which is far below the critical value of 10 or higher that would represent the multicollinearity effects (see Tabachnick and Fidell, 2007). Since all the VIFs are below 10 (threshold criterion of VIF), we may conclude that our analysis is not influenced by multicollinearity effects.

6.4.4 Model Diagnostics Conclusion

Based on the outcome of the four analytical tests for measuring the appropriateness of linear regression analysis (see 6.4.3), we may conclude that the linear regression analysis is an appropriate technique to analyse our data. The four outcomes that we achieved are as follows.

(1) The results of the skewness analysis show that the distribution of all the variables except for the team size of the NTBFs and absorptive capacity, are in the range of linear regression. As reported in Table 6-1, the two variables mentioned above revealed a high level of skewness.

In order to improve the quality of analysis, we corrected their skewness by applying the Log Transformation (LT) in SPSS. After the conduction of the Log Transformation;

(2) the distribution of all variables is set in a range for linear regression;

(3) the residual plots report that the outliers are not significant in the analysis. Thus, the linear regression analysis would be an appropriate technique;

(4) the heteroscedasticity analysis shows that our data is homoscedastic; and

(5) the multicollinearity analysis reveals that the Variation Inflation Factor of all variables is below the critical value. Thus, multicollinearity effects would not constrain our analysis.

According to the above reports and results, we may conclude that the linear regression analysis is an appropriate technique for our data analysis.

6.5 Data Analysis

This section reports the results of the data analysis. Table 6-3 demonstrates the mean values, the standard deviations of all the variables and the correlations among them. The correlations among the independent variables is relatively modest, ranging from 0.05 to 0.45. Not surprisingly, there is a positive correlation between the size of the NTBFs and the age of NTBFs (.258), meaning that as the NTBFs get older, they get larger as well. In addition, we observe that the performance of the NTBFs has positive correlations with three variables: (1) knowledge development and dissemination (.277), (2) finance mobilization (.276), and (3) absorptive capacity (.398). Here we remark that the correlation between the performance of the NTBFs

and absorptive capacity (.398) is a strong and significant positive correlation (see Table 6-3).

Table 6-3: Descriptive Statistics and Correlation Analysis

	Mean	S.D	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Performance	4.1180	.83832	.114	**.277**	**.276**	**.398**	.084	.025	.009
(2) Innovation Strategy	4.8742	1.13753		.134	.053	**.200**	.008	.026	-.035
(3) Knowledge Development cs	4.8064	1.01060			**.450**	.119	.074	-.106	-.123
(4) Finance Mobilization	3.8685	1.26092				**.227**	.191	-.077	-.042
(5) Absorptive Capacity (LT)	.5119	.27883					.079	.042	-.060
(6) Team Size (LT)	.5220	.31037						.140	**.258**
(7) Level of Innovativeness	.5618	.31820							.080
(8) NTBF's Age	2.00	1.108							

Furthermore, there are correlations between absorptive capacity and innovation strategy (.200), absorptive capacity and finance mobilization (.227). However, they are not significant. There is also a strong positive correlation between knowledge development cs and finance mobilization (.450).

After the statistical analysis of the variables, we conduct the stepwise multiple regression analyses on the performance of the NTBFs. We distinguish three models. In Model 1, all main variables are used to test H1, H2, and H3. In Model 2, the absorptive capacity (a moderating variable) is introduced. In Model 3, two-way interactions between finance mobilization and knowledge development cs, innovation strategy and absorptive capacity are used to test H4, H5, and H6. Table 6-4 depicts the results of the regression analysis.

6.5.1 Model 1

In Model 1 (the first step) of the stepwise multiple regression, we introduce all main variables (e.g., dependent, independent variables, and control variables,) to test

H1 to H3. In this Model, all the introduced variables are regressed with the performance of the NTBFs. This step tests the effects of knowledge development cs (H1), finance mobilization (H2), and innovation strategy (H3) on the performance of the NTBFs. The Model shows one significant regression coefficient, which is a positive relationship between knowledge development cs and the performance of the NTBFs ($\beta = 0.277$, p <0.01), meaning that **H1 cannot be rejected**. However, we have not observed any significant regression on the interactions either between innovation strategy or finance mobilization on the performance of the NTBFs. Thus, **H2 and H3 must be rejected**.

6.5.2 Model 2

In Model 2 (the second step), we introduce the Moderator variable viz. absorptive capacity. The interesting outcome of this model is that there is a significant regression coefficient on the interaction between absorptive capacity and the performance of the NTBFs ($\beta= 0.370$, p < 0.001). Model 2 retains the significance of the regression coefficients on the interaction between knowledge development cs and the performance of the NTBFs ($\beta = 0.233$, p < 0.05).

6.5.3 Model 3

Finally, in Model 3 (the third step), we introduce the two-way interactions of adopting finance mobilization and knowledge development cs in the innovation strategy to be used to test H4 and H5. Meanwhile, the moderation effect of absorptive capacity on the interaction between the knowledge development cs and the performance of the NTBFs is evaluated (H6). Hence, we see that the results from Model 3 show that the interactions of innovation strategy with either knowledge development cs or finance mobilization are non-significant meaning that **H4 and H5 must be rejected**. However, the result reveals a positive moderation effect of absorptive capacity with a considerable regression coefficient on the interaction between the knowledge development cs and the performance of the NTBFs ($\beta = 0.443$, p < 0.001). Thus, the findings show that **H6 cannot be rejected**.

Table 6-4: Regression Results

Variables		Model 1	Model 2	Model 3
Main effects				
NTBF Size (CV) (Log Transformed)		0.064	0.070	.034
NTBF Age (CV)		0.044	0.070	.061
Level of Innovativeness (CV)		0.055	0.053	.016
Knowledge Development cs	H1	**0.277****	**0.233***	.083
Finance Mobilization	H2	0.189	0.152	.134
Innovation Strategy	H3	0.078	0.050	.013
Moderating Variables				
Absorptive Capacity			**0.370***	.005
Two-way interactions				
Finance Mobilization * Innovation Strategy	H4			0.173
Knowledge Development cs * Innovation Strategy	H5			0.114
Knowledge Development cs * Absorptive Capacity (moderation effect)	H6			**0.443***
R^2		0.077	0.212	0.196
Adjusted R^2		0.066	0.194	0.187
F		7.161**	11.439***	20.947***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
Independent Variable: The performance of the NTBFs

In summary, we have three results.

(Result 1) the results of the regression analyses do not lead to rejection for H1, which predicts that knowledge development cs supportive activities have a positive impact on the performance of the NTBFs.

(Result 2) The results also support H6, which predicts that absorptive capacity amplifies the relation between knowledge development and dissemination with the performance of the NTBFs.

(Result 3) With regard to the innovation strategy and finance mobilization, our study tested their impacts on the performance of NTBFs. The findings however fail to confirm their influences on the performance of NTBFs (H4 and H5 must be rejected). Table 6-5 summarizes the results for testing the hypotheses.

Table 6-5: The Result of the Hypotheses Testing

Hypotheses		Result
Hypothesis 1	Knowledge development and dissemination supportive activities have a positive impact on the performance of the NTBF.	Cannot be rejected
Hypothesis 2	Finance mobilization has a positive impact on the performance of the NTBF.	Rejected
Hypothesis 3	Innovation Strategy has a positive impact on the performance of the NTBF.	Rejected
Hypothesis 4	Finance mobilization has a positive impact on the innovation strategy and therefore, on the performance of the NTBF.	Rejected
Hypothesis 5	Knowledge development and dissemination have a positive impact on the innovation strategy and therefore on the performance of the NTBF.	Rejected
Hypothesis 6	Absorptive capacity has a positive moderating effect on the knowledge development and dissemination and thus on the performance of the NTBF.	Cannot be rejected

Figure 6-2 depicts the moderation impact of absorptive capacity on the relation between (a) knowledge development cs support and (b) the performance of the NTBFs. The Figure shows that the performance of the NTBFs associated with knowledge development cs is higher with high absorptive capacity compared to the low or medium absorptive capacity. The computation and interpretation of the moderator's figure has been adopted from PROCESS MACRO syntax developed by Hayes (2018)[4]. If H2 and 3 rejected even presisten research we have 4 topics 2 approve 2 rejected.

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[4] https://processmacro.org/download.html

Figure 6-2: Interaction of Knowledge Development and Dissemination and Absorptive Capacity
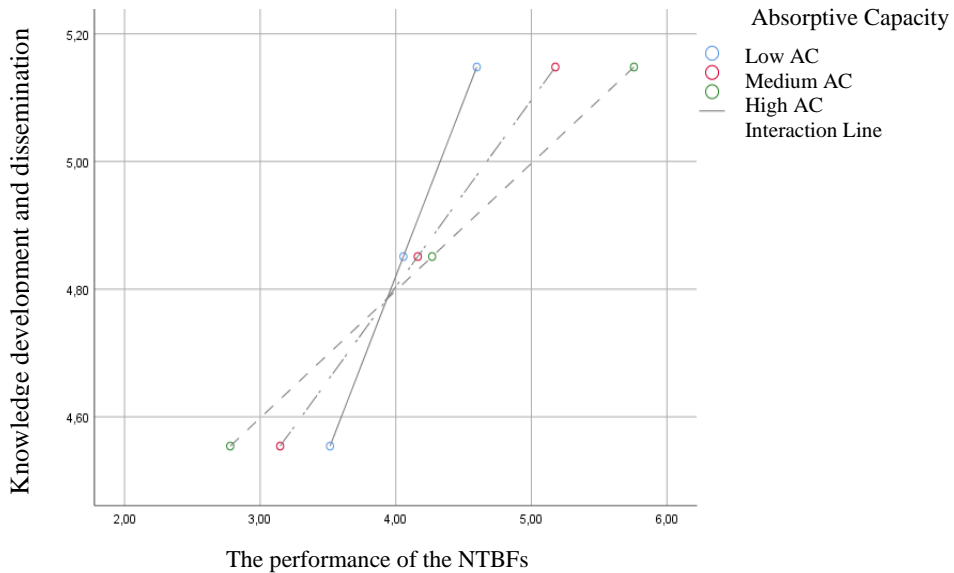
Thus, according to Figure 6-2, the impact of knowledge development cs on the performance of the NTBFs is stronger when NTBFs have a high absorptive capability. In other words, as NTBFs have more abilities in acquisition, assimilation, transformation and implementation of external knowledge resources. Hence, NTBFs can benefit more from the knowledge development cs supports by UBIs. Consequently, knowledge development cs has a positive impact on the performance of the NTBFs.

6.6 Discussion

In this section, four topics have been evaluated: (1) knowledge development and dissemination, (2) finance mobilization, (3) innovation strategy, and (4) absorptive capacity. Our empirical results support the positive impact of two topics (i.e., knowledge development and dissemination (H1), and absorptive capacity (H6)) on the performances of the NTBFs cannot be rejected, but, they do not support the impact of the other two topics (i.e., finance mobilization (H2), and (H3) innovation strategy)

on the performances of the NTBFs. Consequently, the hypothesis related to the rejected topics were rejected as well (i.e., H4 and H5).

This section explains how entrepreneurs evaluate the impact of supports by UBIs and relates that impact to the performance of the NTBFs. Subsection 6.6.1 reviews the influence of knowledge development and dissemination support on the performance of the NTBFs. Subsequently, subsection 6.6.2 does a similar review for finance mobilization and the performance of the NTBFs. Subsection 6.6.3 addresses the findings resulting from testing the innovation strategy hypothesis. Finally, the results of assessing the moderating impact of absorptive capacity on the relation between the incubator's knowledge-based supports and the performance of NTBFs are presented in Subsection 6.6.4.

6.6.1 Knowledge Development and Dissemination Support

With regard to the supports by UBIs, we test the influence of two sorts of supports on the performance of the NTBFs. The findings do not lead to rejection of the hypothesis that knowledge development and dissemination (H1) have an impact on the performance of the NTBFs. Indeed, we find that the type of support with the aim of enriching marketing, sales, business management, HR, communication, and laws and regulations knowledge has a positive impact on the performance and growth of the NTBFs. Our data reveals that the entrepreneurs in our sample are satisfied with the training, coaching and mentoring supports by the incubators. As stressed in the incubator's literature, access to the knowledge resources of the incubators is provided in many incubators and has been identified by entrepreneurs as the most important resource provided by the incubators. In contrast, while the entrepreneurs lack business knowledge and entrepreneurial experience, UBI teams focus more on this type of resource to provide them to their NTBFs (cf. McAdam and McAdam, 2006; Soetanto and Jack, 2016; van Weele et al., 2017). Thus, it is no surprise to see that knowledge development and dissemination supportive activities positively impact on the performance of the NTBFs. Our findings are in line with previous studies showing

that entrepreneurs are satisfied with the knowledge resources of UBI and have revealed their have a positive impact on the performance of the NTBFs (see Soetanto and Jack, 2016; van Weele et al., 2017).

6.6.2 Finance Mobilization Support

The hypothesis that finance mobilization is a supportive activity that has a direct impact on the performance of the NTBFs (H2) had to be rejected. With regard to the measurement scales of this variable, it appears that our sample entrepreneurs were not satisfied with the UBIs' supports in terms of access to the different sources of finance capitals. Previously, Lofsten (2010) found that except for the provision of access to the bank loan, there is a very limited connection between financial mobilization by UBIs and the performance of the NTBFs (measured as sales and employment growth) (see Lukes et al., 2019).

This finding should be cautiously interpreted as similar studies (see Soetanto and Jack, 2013; van Weele et al., 2017) have found that the most important reason for entrepreneurs to join incubators is to get access to the financial resources. Indeed, access to the financial resources is the main expectation of entrepreneurs from incubators. However, in the context of Europe, the most sort of resources that they have received from UBIs, is knowledge development and dissemination supports by UBIs (see van Weele et al., 2017).

Referring to the contributions by van Weele et al. (2017), one explanation for why our sample of entrepreneurs have stated dissatisfaction about finance mobilization, leading to no impact on their NTBFs' performances, might be associated with insufficient quality of financial resources by UBIs. As highlighted above, another explanation can be related to the mismatch between the entrepreneurs' expectations and the incubators' resources to access more funding resources, whereas the entrepreneurs experienced more knowledge-based resources instead of financial resources (see Bruneel et al., 2012; Samaeemofrad et al., 2016; van Weele et al., 2017).

6.6.3 Innovation Strategy

With regard to the innovation strategy, our study concentrates on its impact on the performance of the NTBFs (H3). Our data led to a clear rejection that innovation strategy had any impact on the performance of NTBFs. We adopted the measurement scale from Soetanto and Jack (2016) and our findings were not in line with their results. However, all the variables representing innovation strategy were non-significant. Thus, we were forced to reject the statement that innovation strategy has an impact on the performance of the NTBFs. Hence, we did not find any relation between innovation strategy and the performance of the NTBFs. Consequently, we also did not observe any influence of (a) knowledge development and dissemination (H5), and (b) finance mobilization (H4) supports on the innovation strategy of the NTBFs. Consequently, we did not find any impact on the performance of NTBFs. A possible explanation might be that the measurement scales developed by Soetanto and Jack (2016) were not sufficiently strong to identify the small differences representing the innovation strategy.

6.6.4: Absorptive Capacity

In examining the moderating impact of absorptive capacity on knowledge development and dissemination support by UBIs (H6), we have found no reason to reject the statement that absorptive capacity moderates and amplifies the relation between this support by UBIs and their performance. Surprisingly, we found that absorptive capacity or "learning ability" of the entrepreneurs has a direct impact on the performance of the NTBFs. Our data shows that as entrepreneurs have a stronger learning ability, they can benefit more from training, coaching, and mentoring supports by incubators and then will have impact on their NTBFs' growth. This finding is in line with van Weele et al. (2017) that the knowledge development supportive activity is stronger when entrepreneurs have the ability to use them.

We discovered that a larger ability in acquiring, assimilating, transforming, and implementing external knowledge resources led to more usage of knowledge

resources by the incubators, and thus to more impact on the performance. Our finding is in line with extant literature reporting that the low usage of the incubator's resources backfires on the envisioned capabilities of the entrepreneurs (Oakey, 2003; van Weele et al., 2017). Therefore, this finding suggests that any business incubator team needs to take a stronger intervention approach to increase the entrepreneurs' self-awareness about their low ability in the usage of the knowledge resources. The UBIs should help them to develop this type of capability. It is important to note that the NTBFs would not always stay in UBIs. Thus, for NTBFs it is recommended to develop their capabilities to be able to survive and to grow after the initial leaving from business incubators and to become independent (cf. Lukeš et al., 2019).

6.7   Answer to RQ3

This chapter provided an answer to RQ3. Below, we summarize the answer.

Following our data analysis given in this chapter, with the implication of a multiple regression analysis, we are able to provide a final answer to RQ3*: Are the identified supportive activities related to (a) the innovation strategy of the NTBFs and consequently to (b) the performance of an NTBF?*

Our findings show that knowledge development and dissemination have a positive impact on the performance of the NTBFs. However, our data could not support that finance mobilization has impact on the performance of the NTBFs. Thus, Hypothesis 1 cannot be rejected, but Hypothesis 2 must be rejected. With regard to the innovation strategy, our data did not find any relation between innovation strategy and the performance of the NTBFs. Therefore, Hypotheses 4 and 5 which explain the two-way relations between the supports by UBIs, innovation strategy and the performance of the NTBFs, must be rejected. We also tested whether the relation between knowledge development and dissemination, and the performance of the NTBFs is affected by absorptive capacity. Hence, the moderating impact of this variable has been evaluated. Figure 6-2 shows that absorptive capacity can amplify the relation

between support by UBIs and the performance of the NTBFs. This indicates that hypothesis 6 cannot be rejected.

In our paper, we reported that prior investigations (Bruneel et al., 2012; van Weele et al., 2017) argued that three reasons are associated with low usage of incubators' resources: (a) the insufficient quality of the incubators' resources, and (b) a mismatch between NTBFs' demands and incubators' supplies, and (c) a mismatch between the resources that entrepreneurs need and want from business incubators. Our findings indicate an additional reason for the low usage of incubators' knowledge-based resources: (d) the lower absorptive capacity of the NTBFs in making benefit from incubators' resources, the lower usage of incubators' resources. Furthermore, according to the literature review by Escribano et al. (2009), firms are not able to take advantages from external knowledge resources by being exposed to them (see Cohen and Levinthal, 1990).

Accordingly, in this chapter, we highlighted the role of the business incubator team to create awareness and help entrepreneurs to enhance their absorptive capacity. As far as the NTBFs are not aware of how to acquire external knowledge resources, assimilate, and utilize them, they will not able to make benefits from the incubators' supports. Besides, the incubator team should consider that although their NTBFs received the same amount of external knowledge flows, they may not derive equal advantages. It occurs because NTBFs have different ability to acquire and utilize incubators' knowledge resources (cf. Giuliani and Bell, 2005; Escribano et al., 2009). Thus, the incubator teams needs to evaluate the absorptive capacity of their NTBFs (1) to help them develop this ability, and consequently (2) to provide a tailored knowledge development and an adequate dissemination support for them. We thereby provide only a partial explanation for the managers of the incubators associated with the low impact and usage of their training, coaching, and mentoring services from their NTBFs' points of view.