

## **DO S&T START-UPS NEED AN INCUBATOR AFTER INCUBATION? EVIDENCES FROM AUSTRIA.**

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Recently, there has been an increased academic interest in the incubation of high technology start-ups. Studies in this field have investigated a) the different types of incubators, b) the different services provided by the incubator to the high technology start-ups and c) the difference between firms in and outside an incubator. It is proven that an incubator is an important success-factor for young firms in the first stage. While the entrepreneurship literature discusses the influence that incubators have on high technology start-ups, this literature does not explicitly address the time after the incubation.

This study combines the stated aspects leading to the following questions: “Do high technology start-ups need a different type of incubation after the incubation in the first stages?” and “Is there a need for support of the incubator from the start-ups in the stage after the incubation?”

To answer these questions a quantitative research design based on the principle agent theory is adopted. The information is collected through a questionnaire of 500 Austrian high technology firms which are or were tenant of high-tech incubators. The return rate of the questionnaire has been 28.8 percent.

The results indicate that shortly after the company is getting into the incubator, support programs and incubators are beginning to lose their influence on start-ups. However, the influence is getting stronger again with the increasing age of start-ups, especially if the incubator has been left recently. This indicates that a support after the incubation is being favored. Results are showing that after the incubation support is needed a) for a realistic rating of the market situation b) for a realistic market forecast c) for designing and developing an organizational culture.

Finally we conclude based on the results, that the time after incubation is still a potential prospective research area.

**Keywords:** incubation, start-ups, high-technology, new technology based firms

## **1 Introduction**

In recent studies there is an increased interest in the development of high technology firms. There are many studies which investigate the topic through a life cycle perspective. The questions are “What are the differences between all the stages?” or “What could be the best way to pass the stages to getting a mature firm?”. (Ossenkopf 2005), (Greiner 1972), (Galbraith 1982), (Kazanjian, Drazin 1989)

Other studies investigate the influence of incubators on firms generally and especially on high technology based firms. The studies outline the services (McAdam, McAdam 2008), the outcome for the incubator (Fukugawa 2006), the incubator in general (Aernoudt 2004) or finally the ideal incubation time (Hytti, Mäki 2007).

Less is written about the time after the incubation and how the incubators prepare the firms for their next life cycles stage and leads to the following research question:

*Do S&T start-ups need an incubator after incubation?*

This study identifies the incubator as a very important factor in the first life cycle stage of high technology based firms. But the influence of the incubator on the development is getting higher after the incubation. This is a quite interesting result because this means that the incubation is not finished and the start-ups are returning to their base – the incubator. The results also show that the firms develop a realistic view of their market potential after they leave the incubator. This indicates that incubators should give more assistance in terms of marketing management and sales management to the firm.

This paper is structured as follows: Section 2 reviews the literature in the field and discusses several life cycle models and the incubator literature. Additionally this section outlines the research gap in this field. Section 3 presents the hypotheses based on the literature review. Section 4 presents the used research design, the sample and the data collection process. Section 5 shows the results of the empirical data and the discussion of them. Section 6 draws a conclusion of this work and presents its practical and research implications.

## **2 Literature Review**

### **2.1 Life cycles**

Following the biology, the development of a company is seen as a pattern with a given course, similar to the development of an organism. The life cycle based approach is not only found in the description of corporate development. Because of its intuitive interpretability, the approach is also used for the representation of other objects such as products or industries. These theoretical models are suitable for the fundamental understanding of a growth stage of a company. If this basic knowledge has been acquired, it is possible to apply these patterns on their own organization, in order either to make preparations for upcoming stages or to carry out other attempts to arrange the development. (Ossenkopf 2005)

According to Greiner, the reason for his study of the growth stages of a company is the importance of its history for its future. He critically discusses the fixation of the management at the current situation or at the market-based dynamics without considering the importance of the company-specific history. This history is quite an important information tool which can lead to stagnation of the growth process and finally to the ultimate failure when it is ignored. The importance of company history is associated with the growth model insofar as knowing

relevant facts, for being prepared for impending crises and thereby converts these crises into opportunities. (Greiner 1972)

Greiner's model consists of five stages, each consisting of a period of evolution and a period of revolution. In this context the author describes the evolution as a partial stage in which a strong growth of the company exists. After that, the period of evolution will be replaced by a period of revolution. This concretely means a management crisis, which must be resolved before the company is able to build any further development steps to the next stage. (Greiner 1972)

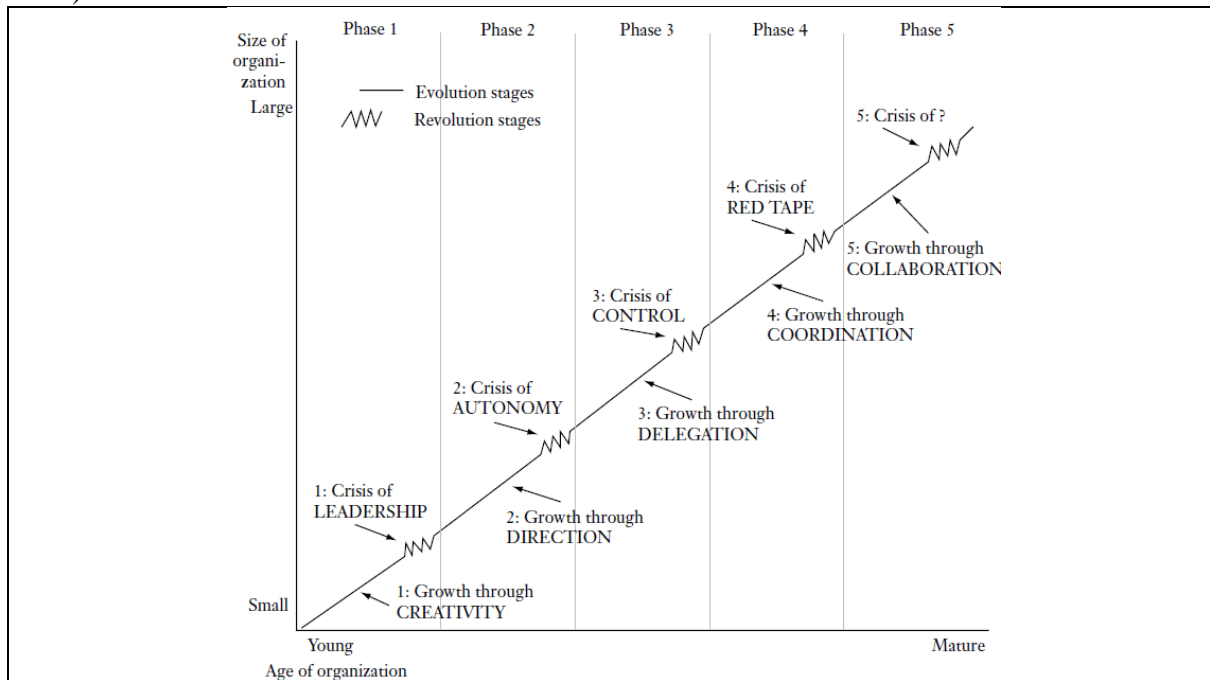


Figure 1: Lifecycle model (Greiner 1972)

In previous studies, Greiner identified five dimensions for representing a growth context. These are 1st Age of the Organization, 2nd Size of the Organization, 3rd Phases of Evolution, 4th Phases of the Revolution, 5th Growth Rate of the Industry. (Greiner 1972)

The model, which was introduced in the Eighties by Galbraith, was developed in collaboration with several business leaders. According to the author the reason for developing this model was the inability of managers to think in developmental stages. Practices that lead to successful growth in one stage will be developed into a debilitating factor in the following stage. Galbraith's scheme represents the growth stages of a high technology company and is strongly connected to the business idea. During the development this business idea will be scanned for their technical, production or marketing realization and affects the organizational structure of the individual stages. Galbraith views that his model as a guide for the successful development of a company. By identifying development stage in which the company is, it should be possible to read the future characteristics of the model, as shown in Figure 5. Furthermore the company is able to set clever strategic maneuvers. (Galbraith 1982)

Similar to Galbraith's model, the growth stages which Kazanjian formulated in the late eighties have not been developed for companies in general but for "New Technology-Based Ventures", in short TBNVs. TBNVs are characterized by the role that technology plays in relation to corporate strategy. For example, the technologically relevant main focus includes research and development of prototypes. According to Kazanjian and Drazin the reason for

the specialization in TBNVs is the important role that they occupy in the economy, as well as their peculiarities that distinguish them from other companies. The growth stages which have to be passed are sequential and directed. Furthermore each growth stage is accompanied by activities and structures and dominant problems. These problems are a set of difficulties in the individual stages. The solution of a conflict set will cause new problems. If the company is unable to implement appropriate changes in order to solve a set of problems, it is generally not possible to make development steps in the subsequent stage. The reflexive of the problems resulted from the previous solution, corresponds to the same basic idea as in Greiner's model. However, the dominant set of problems differs from the crises in that they are product-or performance-related. This means that they have their origin, for example, in technical development or marketing management, while according to Greiner crises are arising from the company itself. Furthermore, Kazanjian and Drazin illustrated that the dominant stage problems are predictable, while the crisis are surprising for the management. (Kazanjian, Drazin 1989)

## **2.2 Conclusion life cycles**

The theoretical parts show that the mentioned models have been pointed out of being the ideal growth stages which are not universally valid. Nevertheless, it should be seen as a guide for recommended procedures. For example, Galbraith refers in his article to the use of his model which will improve the growth rate of a company.

By comparing the different models it is clear that the incubator has a very limited influence on these companies. How long will an incubator have influence on a company and does the incubator will contribute anything to the development of the company beyond his time?

## **2.3 Incubator**

The word “incubator” origins from Latin language and its meaning is to “breed”. The use of this word seems rather appropriate since they can be deemed as „breeder” for start-ups. In the Roman culture, the visit of a temple in order to gain a vision for the future or to prevent disease was called “incubation”. (Aernoudt 2004)

Both descriptions are appropriate to describe a business incubator: First, they provide a start-up with a “safe” environment for their first steps and second, they support the start-ups and their founders to develop visions.

The first incubators (and similar institutions) developed in the 50ies of the last century. The first incubator was the “Stanford Research Park” in the USA. Europe followed with “Sophia Antipolis” in France in 1969 and with the Cambridge Science Park in Great Britain in 1970. The number of business incubators in Europe increased rapidly in the 1980ers and the 1990ers. (Storey, Tether 1998)

The “National Business Incubator Association” (NBIA) defines incubation, that is, the activities of an incubator as follows:

*“Business incubation is a dynamic process of business enterprise development. Incubators nurture young firms, helping them to survive and grow during the start-up period when they are most vulnerable. Incubators provide hands-on management assistance, access to financing and orchestrated exposure to critical business or technical support services. They also offer entrepreneurial firms shared office services, access to equipment, flexible leases and expandable space — all under one roof.”*(National Business Incubator Association (2011))

Grimaldi and Grandi (2005) propose to categorize incubators in four types: Business Innovation Centers (BICs), University Business Incubators (UBIs), Independent Private Incubators (IPIs) and Corporate Private Incubators (CPIs). While BICs and UBIs tend to be founded by governmental institutions to support regional development or specific technologies, IPIs and CPUs tend to be funded by private organizations. The latter types are much more profit-orientated and start-ups only stay a in the incubator for a short time. UBCs often are a mixture of both models, that is, they are both publicly and privately funded and oriented. (Grimaldi, Grandi 2005)

However, another author point out that most literature describes either the incubator, the start-ups, the founder or the management team in an isolated way, while a systematic description of the dynamic interaction of all stakeholders is missing. This study will react to this statement since it analyzes the internal processes of the founders, their view of success and their interaction with external actors, in particular with the incubator. (Phan, Siegel & Wright 2005)

Mian (1997) developed a model for evaluation of the service and success of an incubator. The model consists of three components: 1) Performance Outcome 2) Effectiveness of Management Policies and Practices and 3) Services and Value Added. These components describe the tasks to be performed by an incubator and the keys to success with which a performance evaluation of incubators is possible. (Mian 1997)

Colombo and Delmastro (2002) examined start-ups of university incubators and compared them with ordinary start-ups. The start-ups in the incubator have a higher chance to receive public funding than others. Furthermore, the start-ups within the incubator have a higher qualified management board and a significant higher employment growth. (Colombo, Delmastro 2002)

Löfsten and Lindelöf (2002) found similar results: Start-ups within the university incubator have a higher employment growth; however, they have the same profitability, since the generation of jobs is a major objective. University incubators motivate people to found start-ups (e.g., well-educated graduates), who usually do not belong to the majority of founders. (Löfsten, Lindelöf 2005)

Mian (1996) analyzed six University Technology Business Incubators (UTBI) and their start-ups in Italy and evaluated their services. According to the survey, the incubators have a high value for the New Technology-Based Firms (NTBF). Among all services, the provided resources and facilities, the help with business plan creation and networking with the incubator teams have the highest value for the NTBF. (Mian 1996)

In a survey of 13 incubators and 131 start-ups, Hytti and Mäki (2007) concluded that a duration of two years within an incubator is the ideal time. Within these two years, the services are most effectively used. Innovative, technology-oriented start-ups use the service of search for funding, patent inquires or business strategy development more frequent than less innovative and less technology-oriented start-ups. Successful start-ups most often take advantage of different services. (Hytti, Mäki 2007)

McAdam and McAdam (2008) analyzed the services provided by an incubator on the different life stages on the basis of 18 High-Technology-Based Firms (HTBF) in two different incubators. In the beginning especially office services and facilities are the basic factors for a rapid market entry so start-up companies can focus on strategic tasks. The legitimacy of the company by the incubator has been seen as a major advantage. In the course of time this advantage will become a reversal effect when a company should provide company values like experience or continuity to their customer. (McAdam, McAdam 2008)

Rice (2002) investigated the interaction between start-ups and the incubator management team. The results of this study are represented in a theoretical model in which the cooperation between these two parties is demonstrated. The core elements are “counseling” and “networking”. Businesses consulting for sudden or short-term challenges and long-term strategic development by the incubator management team are the results of this model. Because of the existing network of the incubator to industry and to public authorities the output of the incubation process can be improved. (Rice 2002)

Scillitoe und Chakrabarti (2010) assumes that the incubator management team will often spend too much time in understanding the high-tech products of companies instead of checking their technical feasibility. As a consequence of this the incubation process will be delayed significantly. High-tech start-up companies gain a greater benefit from the incubator management team when they get support in business and strategic issues instead of receiving technical support.(Scillitoe, Chakrabarti 2010)

Clarysee et. al. (2005) investigated seven incubators in Europe including their start-up companies. Due their high-tech orientation start-ups are often very profitable but on the other hand they are too small for financial investors and for acting on large markets. Especially these companies are results of universities and called spin-outs. They are an essential part of successful start-ups, job creation and scientific technology transfers. The lack of objectives and target strategies, lack of organizational structures within the spin-outs and the false use of the incubator type are reasons for an unsuccessful technology transfer and spin-off from universities.(Clarysse et al. 2005)

The conclusion of Fukugawa (2006) is quite similar. NBTFs in a university incubator show a higher tendency to cooperate with a research institution. This cooperation has a fundamental impact on their performance. Therefore incubators with a university background are more efficient in terms of technology transfers.(Fukugawa 2006)

There exists a lot of written literature about the influences of incubators but only little information about the ideal storage period and how to get the best benefit during this period. (Hytti, Mäki 2007) How can incubators design the storage period for start-ups more efficient? How much time should the incubator and start-ups spend together after the incubation? Is there incubation after incubation? Are start-up companies truly independent after incubation time?

### **3 Definition of the hypothesis**

#### **3.1 Influence of incubators and subsidiary institutions on company development during and after incubation**

As discussed above in the literature review, the goal of an incubation is to assist start-ups in their early beginning and help them growing during the incubation period. At the end of the incubation period the start-ups should be young companies which doing their strategic and operational leading by them self. In this case the influence of the incubators and support programs should decrease after the company has left the incubator.

Start-ups, which have been in an incubator, are rating the network of the incubators as very helpful. They have an advantage over other companies in getting public financial support. These facts suggest that the influence of incubators and support programs is much stronger during the incubation period than after leaving the incubator. Based on these suppositions the first hypotheses were built. These two hypotheses examine the influence of the incubator (H1a) and of the support programs (H1b).

**H1a** The influence of the incubator decreases after leaving the incubator.

**H1b** The influence of the support programs decreases after leaving the incubator.

### **3.2 Use of planning and control instruments during and after incubation**

During the incubation, the incubators support the construction of planning and controlling instruments, which are installed in the company and also used after the incubation period.

*“Management Control Systems help managers leverage their attention, liberate them from decisions that can be delegated and controlled by exception, and supply information when the informal network is overloaded.”*(Davila, Foster 2007)

Furthermore the following hypotheses have to prove that the usage of management control systems can be a performance advantage for the company.

The relevance of management control systems will increase after the incubation period, because the assistance of the incubator is no longer given.

**H2a** After incubation the importance of management control systems increases instead during the incubation period.

**H2b** Start-ups which are using management control systems can have a performance advantage.

### **3.3 Assessment of market conditions and market development**

One of the main reasons for young entrepreneurs to fail is a lacking or wrong assessment of the market situation. Becker et al. show in their 2011 research paper that company founders of start-ups would deal with commercialization/marketing, market potential and competitors more strongly if they were to recreate the company one additional time.

Since the incubators take an important role in strategic planning, creation of business plans etc. it is safe to assume that support towards assessment of the market situation is given too. How far this support may lead to a realistic estimate concerning market development or market status can be evaluated using the following hypothesis.

**H3a** During incubation period the assessment of market conditions and market development is more realistic than after the incubation period.

### **3.4 Development and sustainability of corporate culture**

During the incubation not only commercial control and planning systems are imparted by the incubator but also values or code of conduct concerning corporate culture.

A strongly developed corporate culture is important in order to utilize employee potential. Thereby it should be possible to alter employee awareness and behavior in a way so they see themselves as stakeholders and company representatives and realize the connection between their efforts and corporate success. This awareness impacts product quality, customer satisfaction, employee satisfaction, internal communication and, finally, corporate success.(Pittrof 2011)

**H4a** The vision and mission is also transported to the employees after the incubation period.

**H4b** Internal code of conduct which was created during the incubation period is carried over by employees even after the incubation phase.

## 4 Research design

During the past years studies have shown that companies which have emerged out of incubators show a longer life span. Bergmann shows in his study that 87 percent out of these companies are still around three years after leaving the incubator.(Bergmann 2003)

Hytti & Mäki have shown in their paper from 2007 that three years is the optimal time to remain in an incubator. They assessed that the satisfaction with start-ups is highest if time spent in the incubator was less than three years or at least has not been extended.(Hytti, Mäki 2007)

On the other hand, in 2009 Jung and Fuchs concluded that a time frame of 1.5 to 2 years in an incubator is too limited. A more flexible approach concerning the incubation time or some sort of post care is deemed reasonable.(Jung, Fuchs 2009)

After consideration of those controversial study results decisions concerning the scientific design have been made.

First it shall be examined in what way the impact of the incubator affects the start-up of the company and how strongly this force of influence coming from the incubator changes the first five years of company life. Then focus shall be put on the rate of success this influence has created considering the company's rate of growth.

The second design principle aims at measuring the way in which control and planning instruments are being used and how their utilization has changed the company over its first five years. The following planning and control instruments in correspondence with Davilla and Foster 2005 have been closely examined (Davila, Foster 2005):

- (i) Budgeting
- (ii) Cash-position-analysis
- (iii) Deviation analysis
- (iv) Customer profitability analysis
- (v) Customer acquisition costs

The third part of the scientific design pays close attention to evaluate the start-up company's market position. Especially whether the start-ups self-assessment concerning its rate of growth is correct and how those values are presented over the first five years of company life span.

Finally, the fourth part examines the development of corporate culture and its sustainability; in particular the company's vision, mission and endorsement of an internal code of conduct.

In a further step the manner in which survey data is to be collected has been chosen. The final decision selected a quantitative inquiry using an online questionnaire regardless of the risk of a low return rate.

After a six week time span the return rate was at 28.8%, or 144 usable questionnaires. This high return rate had been achieved after several preparations had been made beforehand. Upon selection of the sample it was agreed to perform a simple random sample. 497 companies from foundation centers from the provinces of Austria were selected. In addition the questionnaire was designed in a way so the questions could be answered in a fast and simple manner. Open questions were avoided if possible.

Afterwards the questionnaire was pretested. This pretest was concluded on one hand by scientific personnel with experience in quantitative science and on the other hand by a start-up company thereby also covering the questionnaires target audience.

Each and every one of the 497 start-up companies was contacted after the finalization of the questionnaire to give notice of the questionnaire to come and to gain the personal information



of the company's owners. During this process 297 companies could be won over to participate in the poll. To further increase the return rate and to boost the motivation a reminder e-mail was sent and all participants were offered to be informed about the polls outcome. Finally 144 companies participated in the survey.

#### **4.1 Dependent variables**

One of the central aspects of this study is the development of control in company external factors "incubator" and "sponsors" during the first years of the start-up. Furthermore, it is determined whether selected management control systems are utilized regardless of company age or if a change of behavior can be monitored after usage of management control systems over the company age. In addition it shall be assessed if MCS have any influence on the company's development of sales – performance. Compared to this is the self-evaluation of the start-ups concerning market development or market potentials. It is measured how self-evaluation changes with increasing experience. In order to be able to work on the fourth hypothesis complex the variables for vision/mission and the utilization of a rule of conduct have to be introduced.

Considering these aspects the following conditional variables ensue:

- (i) Force of impact through advisors form foundation centers, measured on a likert scale ranging from "1 ... very low influence" to "7 ... very high influence"
- (ii) Force of impact through aid establishments, measured on a likert scale ranging from "1 ... very low influence" to "7 ... very high influence"
- (iii) Usage of Management Control Systems: Budgeting, Cash-position-analysis, Deviation analysis, Customer profitability analysis, Customer acquisition costs; for each "Yes" or "No".
- (iv) Change of turnover from 2009 to 2010: "Turnover increased" or "Turnover remained static or decreased"
- (v) Market situation: market share in percent and market growth rate in percent.
- (vi) Organizational culture
  - (a) Vision and mission inbound and outbound: "The vision and mission of the company inspires the employees." and "The vision and mission of the company is communicated clearly to third parties"; likert scale from "1 ... strongly disagree" to "7 ... strongly agree".
  - (b) "A company related code of behavior defines the characteristics and activities of the employees" and "The company is using a system which reduces the operation related risks and insecurities".

## 4.2 Independent variables

All conditional variables are seen in a direct relation to time since the way these variables change over the first company years is deemed of especially high interest. In addition management control systems are used as independent variable in order to evaluate the performance factor development of sales and the direct impact of management control systems on the development of sales.

Therefore two independent variables are produced:

1. Age of the company in the following scale: “1 year”, “2 years”, “3 years”, “4 years”, “5 years” and “older than 5 years”.
2. Usage of Management Control Systems: Budgeting, Cash-position-analysis, Deviation analysis, Customer profitability analysis, Customer acquisition costs; for each “Yes” or “No”.

## 5 Results

### 5.1 Descriptive statistics

Table 1 displays the number of employees of all interviewed companies and figure 2 shows the course of employee numbers of the first years. On average start-ups have two self-employed persons and ten employees (full or part time). It is noted that with increased company age the number of employees increases as well. In the founding year the average number of employees is four whereas in older companies there are around seventeen.

Table 1 Employees statistic of the respondents

	N	Min	Max	Mean	Std. Dev.
Self-employed persons	115	0	19	2,02	2,188
Employees (full-time or part-time)	126	0	110	10,43	18,235

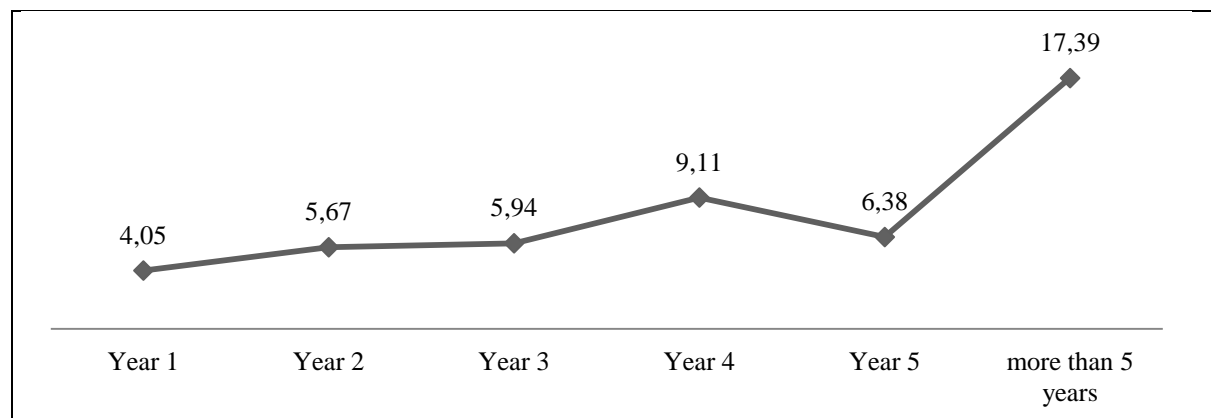


Figure 2: Employees statistic over 5 years of the respondents

Table 2 shows the age of the company its turnover and amount of subsidiaries in 2010. It is shown that 27% of all respondents were still in the incubation time when the questionnaire was filled out and 54% were around for five years or longer.

**Table 2: Structural data of the respondents**

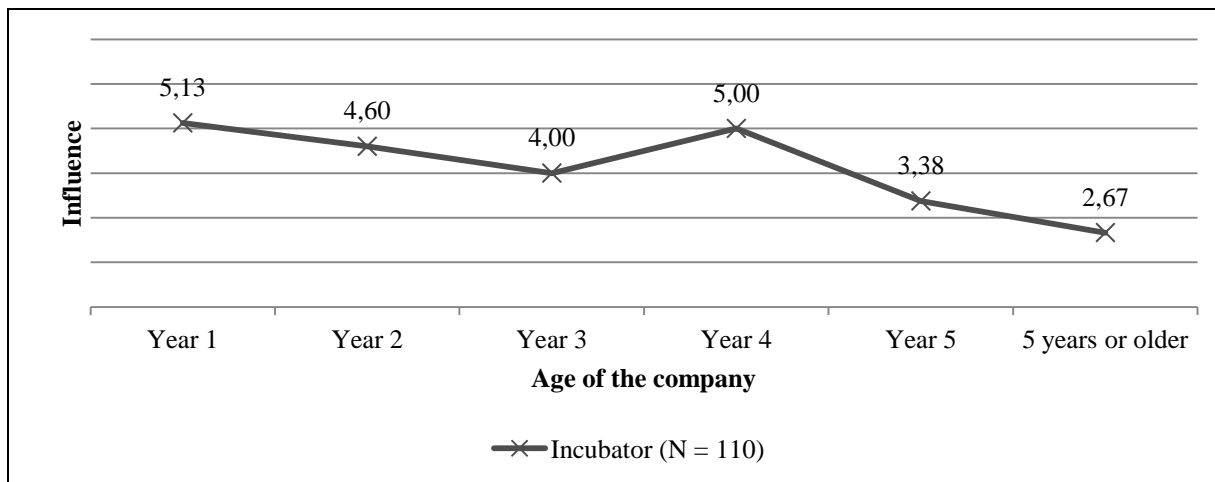
Age of the company		Turnover 2010		Subsidies 2010	
1 – 2 years	26.90 %	≤ 100,000 EUR	39.30 %	≤ 40,000 EUR	53.60 %
3 – 4 years	19.40 %	100,001 EUR – 400,000 EUR	30.80 %	40,001 EUR – 100,000 EUR	22.60 %
5 years or older	53.70 %	> 400,000 EUR	29.90 %	> 100,000 EUR	23.80 %

The majority of companies between the ages 1-2 declared that their turnover was less than 100.000 EUR per year. Approximately 30% declared a turnover of more than 400.000 EUR per year – the bigger part of these companies were around for five years or longer. However, subsidiaries show a different picture. Half of the 54% of companies that benefit from less than 40.000 EUR per year consist of companies that have been in existence for five years or longer.

## 5.2 Influence of incubators and subsidiary institutions on company development during and after incubation

Hypothesis H1a assumes that the influence on start-ups from the incubator / founding organization decreases in the years after having left the incubator.

Comparison of mean values show however that the influence of the incubator returns to its start value after four years. After having conducted a variance analysis the statistical significant outcome shows that during the fourth year of company existence the influence of the incubator increases greatly. Therefore hypothesis H1a cannot be verified because in the fourth year the influence of the incubator increases significantly.



**Figure 3: Influence of the incubator**

**Table 3: Statistics of the influence of the incubator**

	Statistics <sup>a</sup>	df1	df2	Sig.
Brown-Forsythe	5,652	5	38,455	,001
a. Asymptotic F-distributed				

Hypothesis H1b measured the de- or increase in influence of subsidiary institutions after having left the incubator. With the help of a comparison of mean values per year and a following variance analysis it was ascertained that in the fourth year of company age a significant increase in influence through subsidiary institutions can be noted.

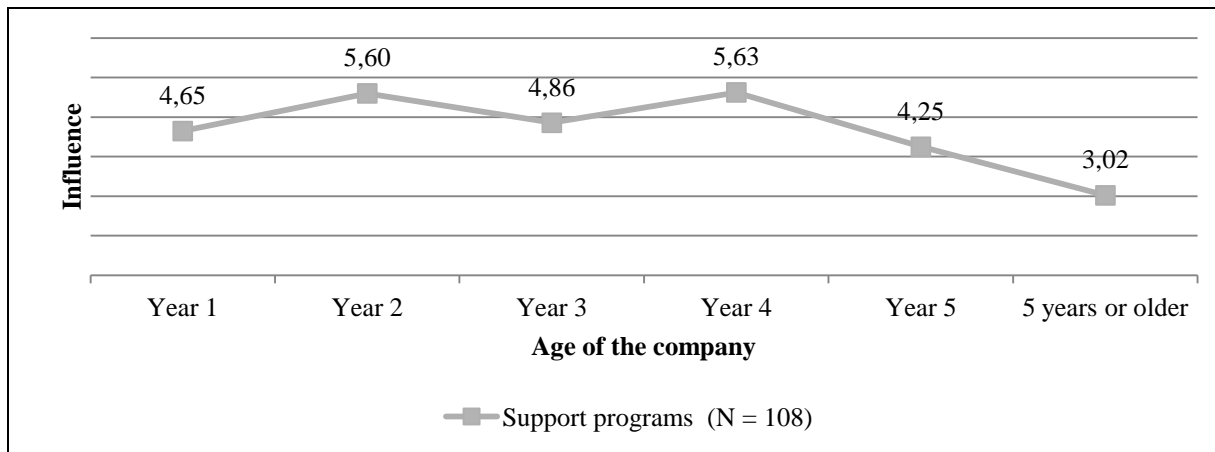


Figure 4: Influence of the support programs

Table 4: Statistics of the influence of the support programs

	Statistics <sup>a</sup>	df1	df2	Sig.
Brown-Forsythe	5,515	5	41,758	,001
a. Asymptotic F-distributed				

According to this result hypothesis H1b had to be dismissed as it had been shown that after having left the incubator an influence decrease was only short lived. In the fourth year the influence level had returned to its base level.

### 5.3 Use of planning and control instruments during and after incubation

After having left the incubator companies should be able to develop and use planning and control systems by themselves. An interpretation concerning the usage of these planning and control systems shows that there is a different development over the first five years.

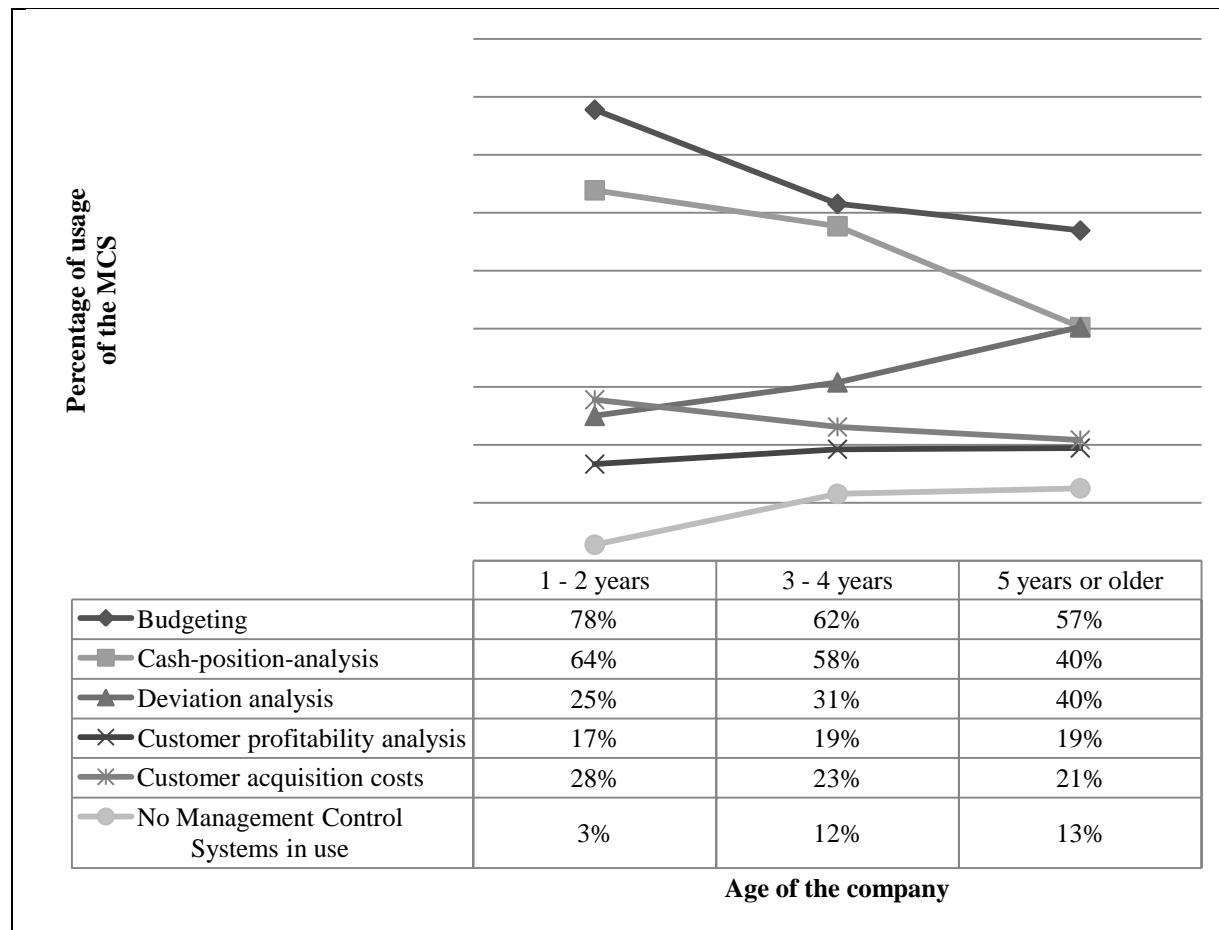


Figure 5: Usage of Management Control Systems

Therefore hypothesis H2a can be confirmed for deviation analysis and customer profitability analysis. Both management control systems show an increased use after having left the incubator.

Interestingly the results also show that budgeting, cash-position analysis and customer acquisition costs as management control systems are on the decline after leaving the incubator. Only 62% out of the three to four year old companies state the use of budgeting as part of their MCS. Cash-position analysis shows a similar loss of importance. The number of companies not using MCS at all increases at an alarming rate – from 3% to over 12% after having left the incubator.

Hypothesis H2b states that the use of management control systems lead to a performance advantage. Therefore selected management control systems according to Davila were studied in order to ascertain their influence on turnover rate. However no statistical significant results could be linked to an increased turnover. As a consequence hypothesis H2b could not be verified. Comparison of turnover development and management control systems was

achieved using a cross-classified table; statistical summary utilized a chi-square test. The following table sums up these results.

**Table 5: Statistics of the influence of Budgeting on the turnover**

		Turnover 2009 - 2010			Sum
		Turnover increased	Turnover remained static or decreased		
Budgeting	No	7,37%		20,00%	27,37%
	Yes	21,05%		51,58%	72,63%
Sum		28,42%		71,58%	100,00%
	Value	df	asymptotic significance 2-tailed	exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	,039	1	,842	1,000	,529
correction for continuity	,000	1	1,000		
Likelihood Ratio Test	,040	1	,842		
Exact Test (Fisher)					
linear-to-linear coherence	,039	1	,843		

**Table 6: Statistics of the influence of cash-position analysis on the turnover**

			Turnover 2009 - 2010		Sum
			Turnover increased	Turnover remained static or decreased	
Cash-position-analysis	No		10,53%	30,53%	41,05%
	Yes		17,89%	41,05%	58,95%
Sum			28,42%	71,58%	100,00%
	Value	df	asymptotic significance 2-tailed	exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	,251	1	,616	,651	,396
correction for continuityb	,073	1	,787		
Likelihood Ratio Test	,253	1	,615		
Exact Test (Fisher)					
linear-to-linear coherence	,249	1	,618		

**Table 7: Statistics of the influence of deviation analysis on the turnover**

			Turnover 2009 - 2010		Sum	
			Turnover increased	Turnover remained static or decreased		
Deviation analysis	No		21,05%	42,11%	63,16%	
	Yes		7,37%	29,47%	36,84%	
Sum			28,42%	71,58%	100,00%	
	Value	df	asymptotic significance 2-tailed		exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	1,932	1	,165		,238	,123
correction for continuityb	1,332	1	,248			
Likelihood Ratio Test	1,999	1	,157			
Exact Test (Fisher)						
linear-to-linear coherence	1,911	1	,167			

**Table 8: Statistics of the influence of customer profitability analysis on the turnover**

			Turnover 2009 - 2010		Sum	
			Turnover increased	Turnover remained static or decreased		
Customer profitability analysis	No		21,05%	60,00%	81,05%	
	Yes		7,37%	11,58%	18,95%	
Sum			28,42%	71,58%	100,00%	
	Value	df	asymptotic significance 2-tailed		exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	1,196	1	,274		,384	,208
correction for continuityb	,646	1	,422			
Likelihood Ratio Test	1,143	1	,285			
Exact Test (Fisher)						
linear-to-linear coherence	1,184	1	,277			

**Table 9: Statistics of the influence of Customer acquisition costs on the turnover**

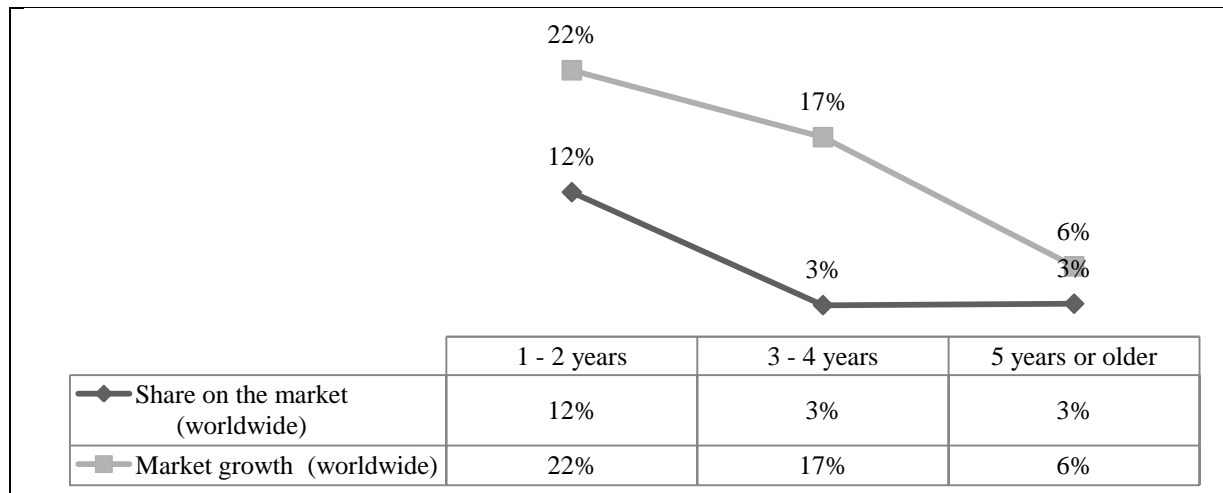
			Turnover 2009 - 2010		Sum
			Turnover increased	Turnover remained static or decreased	
Customer acquisition costs	No		20,00%	57,89%	77,89%
	Yes		8,42%	13,68%	22,11%
Sum			28,42%	71,58%	100,00%
	Value	df	asymptotic significance 2-tailed	exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	1,240	1	,265		
correction for continuityb	,705	1	,401		
Likelihood Ratio Test	1,192	1	,275		
Exact Test (Fisher)				,283	,199
linear-to-linear coherence	1,227	1	,268		

**Table 10: Statistics of the influence on the turnover if no management control systems are used**

			Turnover 2009 - 2010		Sum
			Turnover increased	Turnover remained static or decreased	
Keine	No		25,26%	62,11%	87,37%
	Yes		3,16%	9,47%	12,63%
Sum			28,42%	71,58%	100,00%
	Value	df	asymptotic significance 2-tailed	exact significance 2-tailed	exact significance 1-tailed
Chi-Quadrat (Pearson)	,079	1	,779		
correction for continuityb	,000	1	1,000		
Likelihood Ratio Test	,081	1	,776		
Exact Test (Fisher)				1,000	,539
linear-to-linear coherence	,078	1	,780		

## 5.4 Assessment of market conditions and market development

Hypothesis H3a states that company self-evaluation towards the share on the market and market growth is more realistic during the time of incubation than afterwards. This assumption is backed up since the experience of consultants from the incubators might help in the assessment of the market situation.



**Figure 6: Trend of the share on the market and the market growth**

However, the results clearly differ from these assumptions. During the years of incubation a growth of 22% per year and a market share of 12% are projected. In general average market

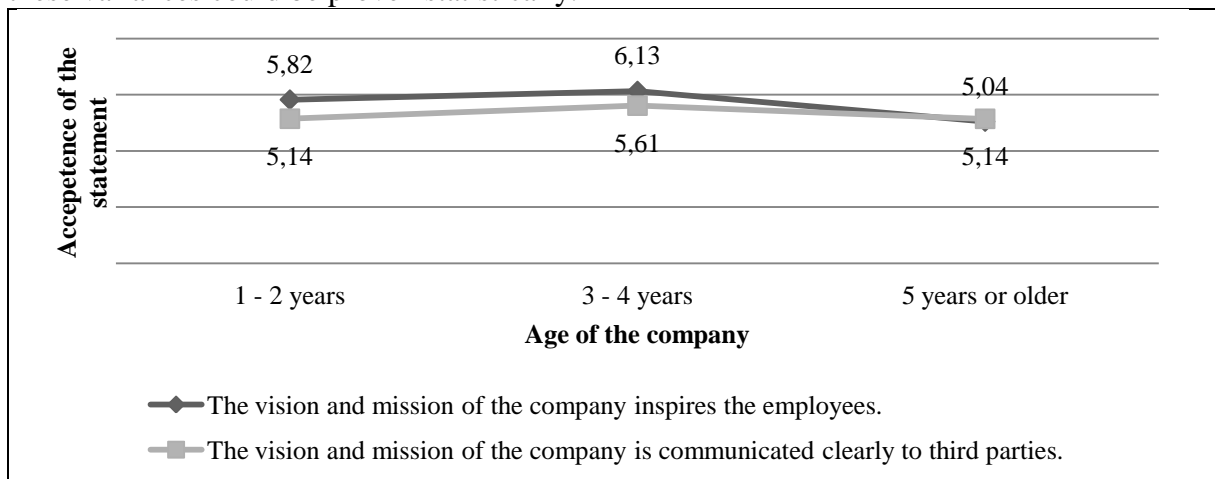
growth is not branch independent, however, considering the share on the market (on average 12% with company age between one and two years) these numbers can be called unrealistic. Over the course of time and/or increase in experience these numbers settle on more realistic values. Therefore hypothesis H3a cannot be verified since start-ups tend to assess their market growth and share on the market way more unrealistic during the incubation phase than after.

**Table 11: Statistics of the trend of the share on the market and the market growth**

		Statistics <sup>a</sup>	df1	df2	Sig.
Share on the market (worldwide)	Brown-Forsythe	2,584	2	33,622	,090
Market growth (worldwide)	Brown-Forsythe	6,737	2	54,938	,002
a. Asymptotic F-distributed					

## 5.5 Development and sustainability of corporate culture

Hypothesis H4a focuses on the question whether corporate culture that has been created during the incubation phase is being continued in a lasting way after having passed the incubation time. Results show shortcomings concerning mission and vision within the company over prolonged time. Using an analysis of variances it was measured to what extent these variances could be proven statistically.



**Figure 7: Trend of the mediation of the vision and mission to employees and third parties**

**Table 12: ANOVA Statistics of the vision and mission of the company**

ONEWAY ANOVA						
		Sum of Squares	df	Mean square	F	Sig.
The vision and mission of the company inspires the employees.	Between groups	22,095	2	11,047	4,941	,009
	Within groups	214,633	96	2,236		
	Total	236,727	98			
The vision and mission of the company is communicated clearly to third parties.	Between groups	3,885	2	1,943	,777	,462
	Within groups	244,927	98	2,499		
	Total	248,812	100			

The ANOVA showed that a statistically significant decrease in transporting mission and vision to employees had happened in companies five years or older. As a consequence hypothesis H4a can only be verified to some extent specifically towards communication of mission and vision to third parties.



Hypothesis H4b reassesses if internal code of conduct was carried over by employees even after the incubation phase. It has been shown that especially systems adding to risk reduction have a statistically significant increased level of acceptance. Hence this hypothesis can be verified. Internal code of conduct is not only carried on after the incubation phase but becomes more important with increasing age of the company.

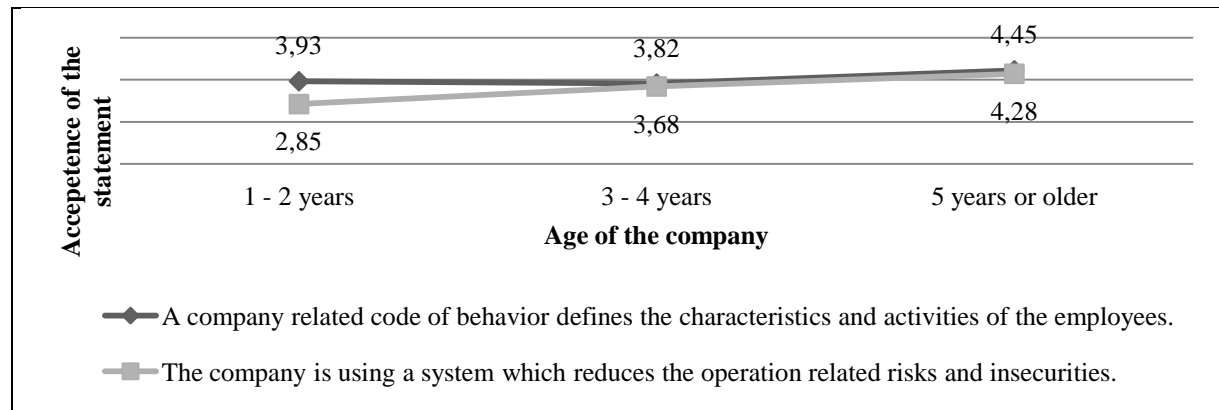


Figure 8: Trend of the mediation of the code of behavior and risk reducing systems

Table 13: ANOVA Statistics of the code of behavior and risk reducing systems

ONEWAY ANOVA						
		Sum of Squares	df	Mean square	F	Sig.
A company related code of behavior defines the characteristics and activities of the employees.	Between groups	7,934	2	3,967	,979	,379
	Within groups	380,747	94	4,050		
	Total	388,680	96			
The company is using a system which reduces the operation related risks and insecurities.	Between groups	34,389	2	17,194	4,212	,018
	Within groups	371,483	91	4,082		
	Total	405,872	93			

## 5.6 Discussion

The purpose of this study was to investigate how the influence of incubators and support programs changes over the first years of a company which was founded in an incubator. The results are showing that shortly after leaving the incubator the influence decreases. In the following year a trend reversal can be observed. The influence of incubators and support programs increases significantly. This increase points out that the start-ups want again the support of the incubator and the support programs. The next step was to examine how the usage of MCS changes over the first several years and if there is a performance advantage if MCS are used. We found out, that the usage of some MCS is going back after leaving the incubator.

The conclusion of these first results is that start-ups searching the assistance of incubators again – after a period of about one year after leaving the incubator – and on the other hand they need the assistance again to influence strongly establishing the usage of MCS.

In the matter of market forecasting and market potential the results are indicating some room of improvement on assistance by the incubator. The start-ups are showing a nonrealistic self-assessment according the market potential and market forecast, especially in the first two

years. Older start-ups – 5 years or older – are showing a more realistic rating. Incubators and support programs have to improve their assistance in the field of market forecasting and market potential.

In terms of company culture, it became clear that the values and behavioral norms which are developed during the incubation period, has been deep seated. In contrast of that, the mediation of the vision and mission for the employees must be increased to make them more sustainable.

## **6 Conclusion**

This study combines the research on start-up life cycles and incubators. It is proven that an incubator is one of the important success factors for young start-ups. To be in an incubator give the high technology start-ups time to develop their product and increases the chance to survive. On the live cycles perspective it is proven that start-ups are passing different life cycle stages. In all this different stages there are different difficulties which must be negotiated by them. This study especially investigates the time in the incubator and shortly after the incubation based on a quantitative research design.

The results indicate that shortly after the start-ups are getting into the incubator, support programs of the incubators are beginning to lose their influence on the development of them. That is quite interesting because the start-ups are already in the incubators but the influence of them is going down. However, the influence is getting stronger again with the increasing age of start-ups, especially if the incubator has been left recently. The results also show that the usage of MCS increases after the start-ups left the incubator. This indicates a strong implementation of the incubator in the start-up's MCS like proven in other studies (Flanschger 2012).

Another interesting result is that the assessment of the market is getting more realistic after the start-ups left the incubator. During the incubation start-ups tend to overestimate the development of the market.

Finally we conclude based on the results, that the time after incubation is still a potential prospective research area. The results were derived by investigating 500 start-ups which were or are tenant of Austrian incubators.

### **6.1 Limitation**

This study has some limitations. First, this study is based on a quantitative research design so there is a trade off in research deepness. Second, the investigated sample only includes new ventures from the research intense high technology industries, therefore, the results cannot be transferred to non-research intense industries. Third, the investigated start-ups are situated in Austria, so further research should also include start-ups from other countries.

### **6.2 Managerial Implication**

This indicates that a support after the incubation is being favored. Results are showing that after the incubation support is needed a) for a realistic rating of the market situation b) for a realistic market forecast c) for designing and developing an organizational culture and d) for designing and implementing sustained MCS.

### 6.3 Further Research

This study provides some avenues for further research. First, a longitudinal study of the firms could uncover the individual stages in the life cycle. Second, a qualitative based study would allow richer results by means of analyzing the process of incubation. Third, it would be interesting to compare data of high technology start-ups and normal start-ups to learn from the differences of them in this research field.

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