"Entrepreneurial Management" as a Strategic Choice in Firm Behavior: Linking it with Performance

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Abstract

Establishing the core principals of "entrepreneurial management" within an organization describes a certain strategic choice that affects a company in six dimensions, according to Stevenson (1983). Our aim is to empirically measure entrepreneurial management (it's existence and degree) and to link this measured strategic choice (for or against) entrepreneurial management with firm performance. Our argument here is that companies that follow core principals of entrepreneurial management should outperform other more administrative firms in certain measures of strategic performance. This paper builds on an empirical investigation published by Brown, Davidson & Wiklund (2001), who have developed and tested a reliable measurement instrument for Stevenson's definition of "entrepreneurial management" (Stevenson 1983, Stevenson & Jarillo 1990). In the first part of our paper we aim to replicate and to some extent improve this study. In the second part we link the measured degree of "entrepreneurial management" with firm performance. To our knowledge, even so Stevenson's definition of entrepreneurial management is commonly acknowledged and Brown et al. (2001) developed a reliable instrument to empirically capture this behavioral approach to management, the construct of entrepreneurial management never before has been linked to firm performance in an empirical study. Since most papers on corporate entrepreneurship and firm performance are based on Covin & Slevin's (1991) or Miller's (1983) concept of entrepreneurial orientation, we contribute to the literature on corporate entrepreneurship in a novel way, given the fact that the entrepreneurial management dimensions measured in our study can theoretically and empirically be clearly distinguished from the construct of entrepreneurial orientation as defined by Covin & Selvin (1991).

1 Introduction

Entrepreneurship, traditionally concerned with the start-up of new firms, has additionally become accepted as a firm-level phenomenon deserving scholarly attention. Especially under the aspect of today's environmental uncertainty, turbulence, and heterogeneity, organizations are facing a host of strategic and operational challenges (Eisenhardt and Brown 1998). To deal with these challenges successfully, one of the firms' core competencies might be the effective use of corporate entrepreneurship (Covin and Miles 1999). While aspects of corporate entrepreneurship are relevant

for any organization, vitality and flexibility are especially important for large firms with mainly inflexible and highly hierarchical structure. Moreover, corporate entrepreneurship can help to improve the corporation's competitive position in domestic and international markets by renewing its capabilities of acquiring and using new competence. The recent literature reveals a general although certainly not complete consensus around the position that successful corporate entrepreneurship is linked to improvement in firm performance (Ireland, Hitt et al. 2001; Antoncic and Hisrich 2003; Covin, Ireland et al. 2003; Kuratko, R. Duane Ireland et al. 2004). Most research about corporate entrepreneurship and firm's performance is based on Covin & Slevin's (1991) concept of *entrepreneurial orientation* that consists of three dimensions or behaviours: innovativeness, pro-activeness and risk taking. These three dimensions have been used to discriminate between entrepreneurial and less-entrepreneurial firm-behaviour (Covin & Slevin 1991).

The behavioural approach to entrepreneurship is relatively young. Howard H. Stevenson published the likely first article on this approach in 1983 and therefore could be named the founder of the behavioural approach (besides Gartner 1988/89). Stevenson (1983) holds that *entrepreneurial management* practices can help firms remain vital and contribute to firm and societal level value creation. He describes entrepreneurship as an "approach to management" which is characterized by "the pursuit of opportunity without regard to resources currently controlled" (Stevenson 1983:23). Stevenson (1983) argues that entrepreneurial value creation process can take place in any type of organization. According to Stevenson & Jarillo (1990:25) "entrepreneurship is more than just starting new business […] entrepreneurial management may be seen as a 'mode of management' different from traditional management". Based on Stevenson's (1983) conceptualization Brown, Davidsson & Wiklund (2001) developed an instrument to examine these propositions and measure entrepreneurial behaviour within an organization. In the following years over hundred articles reference aspects of Brown's, Davidsson's & Wiklund's paper. But surprisingly their survey and their achievement in creating a measurement for entrepreneurship as opportunity-based firm behaviour have been hardly mentioned. Nor has their measurement ever been linked to firm performance.

A reliable entrepreneurial measurement instrument would make it much easier for organizations to assess their degree of entrepreneurial management. Further, it could help to develop more effective strategies to enhance the entrepreneurial behaviour. Brown, Davidson & Wiklund's (2001) measure is believed to provide such a reliable measurement instrument. Therefore it is the point of departure for this paper. For further validation of the universality of the measure it would be interesting to know whether the results hold for other business cultures and in other languages (than Swedish). Generally, the entrepreneurship literature is characterized by a lack of reliable, internationally comparable data (Hisrich, Langan-Fox et al. 2007). Therefore this paper will start to close the gap by undertaking a follow up survey according to Brown, Davidsson & Wiklund (2001) in the Australian business context. Furthermore some improvements of the measure may be advisable. Particularly the Resource Orientation and the Reward Philosophy index didn't have a very satisfactory reliability. This might be solved by adding a few items to the scale. Including new items to an already existing scale instead of developing an entirely new one has several advantages, as Davidsson puts it:

> *"Replication provides us with much better truth criteria than other tools at our disposal. Replication therefore facilitates the building of cumulative knowledge, which is what research is all about [...]. Also importantly, replication has a sound, humbling effect that make us less prone to over interpret single study results regarding relative important explanatory variables; prematurely disregard antecedents that do not turn out significant in an individual study, or show*

an undue level of confidence in a result that happens to be (marginally) statistically significant in one study." (Davidsson 2004:188)

In fact the operationalization of this survey differs slightly from the archetype of the model as this study focused on different firms, in a different country, with a slightly different questionnaire (additional questions) and the intention to interview more than one person per company. This decreases the value of the replication as a test of internal validity while it actually increases the value as a test of external validity (Hubbard, Vetter et al. 1998). In other words, the theory test is even tougher. If the result of the original study was positively influenced by an artefact of the specific operationalization this influence does not carry over to the replication. Furthermore, if the replication isn't a simple copy, it may add value to both studies. Besides the aspect of further validation of the earlier study the comparison of the prior and the follow-up study might give some explanations and allows some interpretations.

Over and above aiming to improve the scale, this study is focusing on the relationship between the level of entrepreneurial behaviour and firm performance. Brown's et al. instrument has proven to be a reliable measurement instrument of entrepreneurial management. Nevertheless, most research about corporate entrepreneurship and firms' performance is still based on Covin & Slevin's (1991) concept of *entrepreneurial orientation*, but none research that would be known to the authors focuses on *entrepreneurial management* according Stevenson (1983) and Brown et al.

If both of these concepts – entrepreneurial orientation by Covin & Slevin (1991) and entrepreneurial management by Stevenson (1983) – are covering different but equally important aspects of corporate entrepreneurship, it seems even more surprising that no known study about the relation between Stevenson's concept and firm performance exists, whereas several studies examine the relationship between entrepreneurial orientation and companies' performance. Therefore this study contributes fundamentally to the corporate entrepreneurship research by abolishing this obvious lack of research in this area.

A sample of 994 employees (from 157 Australian public companies) was selected, including company sizes between 10 and 249 employees. The target respondents were the CEO and Top managers. The questionnaire was designed according to Brown et al. using items of a forced choice type, with pairs of statements representing the opposites of traditional managed companies and entrepreneurial managed companies, according to Stevenson's view (explained in more detail hereafter). Further, eight new questions for the entrepreneurial dimensions "Resource Orientation" and "Reward Philosophy" were included. Different from Brown et al. the scale was reduced from a 10-intervall to a 6-intervall scale. This reduction is due to the much smaller sample size. All analyses were conducted using Excel 2007 and SPSS16-17/PASW Statistics 18.

Even though there isn't a consensus about the definition of corporate entrepreneurship, it is crucial to find a suitable definition for this study. For the purpose of the current research, corporate entrepreneurship is defined according Stevenson as "a process by which individuals inside organizations pursue opportunities independent of the resources they currently control" (Stevenson & Jarillo 1990: 23). The focus thereby is on entrepreneurial management. Stevenson (1983) holds that entrepreneurial management, defined as a set of opportunity-based management practices, can help firms remain vital and contribute to firm and societal level value creation. Accordingly, corporate entrepreneurship refers to all innovative activities and orientations, entrepreneurial strategies and behaviour. As the current study is concerned with assessing the relationship between corporate en-

trepreneurship and firm performance, we will use Stevenson's conceptualisation of entrepreneurship as opportunity-based firm behaviour as a point of departure.

2 Stevenson's Definition of "Entrepreneurial Management"

Stevenson's conceptualizes entrepreneurship as opportunity-based management behaviour. He describes entrepreneurial behaviour and administrative behaviour as the two extreme opposites of an entrepreneurship continuum. This continuum describes the entire spectrum of possible firm behaviours with the promoter firms placed at the entrepreneurial end and the trustees at the administrative end. Whereas the promoter intent to pursue and exploit new opportunities regardless of resources controlled, the trustee strives to use his or her resource pool in the most efficient way on given purposes.

Although Stevenson only describes six dimensions in his first model (1983), in his later work two other key dimensions are mentioned that are important to his conceptualization of entrepreneurship. These dimensions are *Growth Orientation* (Stevenson and Jarrillo-Mossi 1986) and an *Entrepreneurial Culture* (Stevenson and Jarillo 1990). All dimensions will be discussed in more detail, since our measurements for corporate entrepreneurship are based on these dimensions (and so had been those by Brown et al. (2001).

Entrepreneurial focus (promoter)	**Conceptual dimension**	**Administrative focus (trustee)**
Driven by perception of opportunity	***Strategic Orientation***	Driven by controlled resources
Revolutionary with short duration	***Commitment to opportunity***	Evolutionary with long duration
Many stages with minimal exposure at each stage	***Commitment of resources***	A single stage with complete commitment out of decision
Episodic use or rent of required resources	***Control of resources***	Ownership or employment of required resources
Flat, with multiple informal networks	***Management Structure***	Hierarchy
Based on Value creation	***Reward Philosophy***	Based on responsibility and seniority
Rapid growth is top priority; risk accepted to achieve growth	***Growth Orientation***	Safe, slow, steady
Promoting broad search for opportunities	***Entrepreneurial Culture***	Opportunity search restricted by resources controlled; failure punished

Source: Brown et al. (2001), see Stevenson (1983).

Table 1: Stevenson's conceptual dimensions of entrepreneurial management

Strategic Orientation

Strategic Orientation describes what factors drive the formulation of strategy. It can be described as the philosophy that effects every decision about strategy. The pure promoter' strategy is solely driven by the opportunities that exist and not limited by the resources that may be required to exploit them. Because the strategy is opportunity-driven, almost any opportunity is relevant to the firm. Acquiring and marshalling the necessary resources represents a secondary step and only follows after an opportunity is identified. The other extreme, the pure trustee's strategy is to utilize the

resources of the firm most efficiently. Even though the trustee is aware that opportunities exists and are important, only opportunities that relate to existing resources are relevant as the strategy is resource-driven.

Commitment to Opportunity

The second dimension is also related to strategic issues. But whereas Strategic Orientation is about the identification and election of opportunities, the commitment to opportunity is about its pursuit. The promoter is *action-orientated* and therefore willing and able to act in a very short time frame. He or she can therefore chase an opportunity quickly (Stevenson 1983). This means the promoter is able to commit and decommit to actions rapidly. On the other hand, the trustee tends to be stationary. His decision process is time-consuming and, once made, leads to a commitment of long duration. Accordingly the trustee's administrative behaviour tends to be slow and inflexible as a result of multiple decision constituents, negotiated strategies, and an eye towards risk reduction (Brown, Davidsson et al. 1999). As a result, the promoter is more likely than is the trustee to pursue a given opportunity. Once the trustee decides to pursue an opportunity however, it would be with a much larger initial investment and with an intention to remain in this line of business for considerable time.

Commitment of Resources

While both, trustee and promoter need resources to pursue an opportunity, they differ in the way of the commit to these resources. The promoter attempts to maximize value creation by minimizing the resource set. Therefore his commitment of resources is multistage and with a minimum exposure at each stage or decision point. This commitment of resources in a multi-step manner allows the promoter to stop and change direction rapidly, if and when circumstances change. This flexibility allows the promoter to take new information about the opportunity or the environment into account and to change his strategy accordingly very quickly. Furthermore by minimizing the resources that the promoter must invest in order to initially pursue an opportunity, the amount of resources at risk that could turn out to be sunk costs is also minimized. However, the accumulation of resources creates an organizational pressure, (e.g. capital allocation system, formal planning systems, certain) that makes it difficult to maintain this type of resources commitment.

On the other hand, the trustee's commitment of resources is characterized by thorough analyses in advance and large single stage investments. Instead of minimizing the resources invested at once, his or her strategy to minimize risk is to use in-depth analyses of all available information before deciding to act. But once the decision to pursue an opportunity is made, the investment of resources is not easily reversed.

Control of Resources

Related to the commitment of resources is the way those resources are owned and controlled. The promoter tries to further reduce as much as possible the amount of used and *owned* resources. The promoter is less concerned about the ownership of resources, but more concerned about having access to others' resources (e.g. financial capital, intellectual capital, skills, competencies). This strategy provides more flexibility and the opportunity to participate on the latest technology, knowledge and market development. However, as a firm grows it becomes increasingly difficult to follow this approach to resource control, as the growth quite often leads to resource accumulation.

In contrast, the trustee focuses on the ownership or employment of resources and the accumulation of further resources. His or her advantage in this strategy is an immediate access to owned resources

without being depended on markets. Furthermore the trustee might be able to use the resources he or she owns more effectively as he or she is familiar with them.

Management Structure

As the differences of commitment and control of resources were discussed above, the trustee's and promoter's management structure differs according to their use and control of resources. While the management structure of the entrepreneurially managed firm (promoter) is organic with multiple informal networks, the 'traditional' managed firm's structure (trustee side) is more formalized with a complex hierarchy. As the promoter doesn't own all the resources being used, those resources can't be managed within a formal organization. This creates the need of nontraditional means of organization. Therefore the promoter's management structure is designed to coordinate key non-controlled resources as well as to be flexible and to create an environment where employees are encouraged to create and seek opportunity.

On the other hand, the trustee's management structure is well suited for the internal efficiencies of allocating own resources. For this purpose there are clear roles and responsibilities, highly routinized work, and a layer of middle management to manage the use of the firm's resources (Hisrich, Peters et al. 2008). In other words, the trustee's management structure focuses more on efficiency and good administration rather than detecting and rapidly acting on changes in the environment.

Reward Philosophy

As the promoter is focused on pursuing opportunities for new entries which represent new value for the firm, the reward philosophy is toward compensations based on contributions towards the discovery and exploitation of opportunities. Consequently, employees often have the freedom to experiment with potential opportunities and are rewarded according to their value creation. A management structure of independent action and accountability enhances this evaluation. If the success of creating new value is related to a team, the entrepreneurial managed firm is also more comfortable in rewarding teams.

In contrast, in a firm managed more administratively, rewards are based on responsibilities (which is traditionally determined by the amount of resources that this employee controls), hierarchy, and on seniority. Consequently employees are rewarded with promotion, which provides a higher level of responsibility and therefore further scope of rewards. Furthermore, whereas the creation of new value requires a longer term view, the trustee's measure of performance is more related to short-term profit targets.

Growth Orientation

Even as all firms may desire to grow (unless environmental circumstances require systematic shrinking) the effort putting into it and the pace of growing are different in entrepreneurial and traditional managed firms. As the promoter has a great desire in rapid growth, the trustee prefers a slower growth at a steady pace, because anything faster could be unsettling for the firm. For their management structure isn't that flexible they prefer a more manageable pace of growth, by putting at risk the exploitation of opportunities within a given window of opportunity, but not the jobs and the power of top management (Stevenson & Jarrillo-Mossi 1986).

Entrepreneurial Culture

Entrepreneurial Culture describes the firm's culture to generate and value new ideas. The entrepreneurial managed firm encourages employees to generate ideas, experiment, and engage in other

tasks that might produce creative output. Because opportunity is the starting point, creative output is highly valued as it often is the source of opportunities for new entries. Therefore a much broader range of ideas are worth seeking and considering (Stevenson & Jarillo 1990).

In contrast, the trustee begins with an assessment of the resources under control. Using the currently controlled resources as a starting point, only ideas that relate to these resources are relevant. Due to this restriction, the flow of ideas judged worthy of considering automatically is much smaller. Therefore, promoters create a work environment full of ideas, while trustees create a work environment with just enough ideas to match the controlled resources.

3. Brown, Davidsson and Wiklund's measurement instrument – a scale for placement on the entrepreneurial management continuum

Brown, Davidsson & Wiklund (2001) took the challenge to create a measurement for Stevenson's (1983, Stevenson & Jarrillo-Mossi 1986, Stevenson & Jarillo 1990) definition of entrepreneurial management, hoping to develop reliable indices of the eight dimensions of Stevenson's conceptualization (described above), as well as combining them into an overall *scale for the placement of firms on an 'entrepreneurial management vs. administrative management'-continuum*. The following description provides a brief overview of Brown et al. (2001) study, as it is the basic work to our replicatory part of our study.

The items were developed according to Stevenson's (1983, Stevenson & Jarrillo-Mossi 1986, Stevenson & Jarillo 1990) detailed conceptualization. His eight dimensions of entrepreneurial management provide guidelines for the relevant construct domain and even some specific questions. The items were designed as a two-sided forced choice type Likert scale with pairs of statements, representing the opposite ends of the promoter/ trustee continuum. The respondents were asked to mark the number of the ten-point scale, which best represented the view of their firm. Out of 29 developed items, 20 were included in the final scales.

According to Stevenson's description of entrepreneurship as a management approach relevant to many different types of firms, Brown, Davidsson & Wiklund (2001) chose diverse sample with analysable sub-groups. The total sample consisted of 2455 Swedish firms, chosen by the sampling criteria: industrial sector (manufacturing, professional services, wholesale/ retail and other services), number of employees (10-49 and 50-249) and corporate governance. The response rate was 52,1% which is an effective sample of 1233 firms for the main analysis. Further, in this study Brown et al. (2001) 'replicated themself'. In other words, they had a large and stratified sample, large enough to test their theses on several, separate sub-samples. As internal replication they re-ran the factor analysis for different strata for a total of ten sub-sample analyses. As a results of this sub-sample analyses the cumulative variance explained is very similar in every analysis, the right number of factors in extracted in all analyses but one, and also very important, the extracted factors remain the same across sub-samples. Therefore they had made a much stronger case for the validity of their operationalization than if they had only examined one of the sub-samples (see Davidsson 2004).

Using factor analysis (principal components extraction and varimax rotation) Brown et al. (2001) were finally able to isolate six empirically distinct dimensions: Strategic Orientation, Resource Orientation, Management Structure, Reward Philosophy, Growth Orientation and Entrepreneurial Culture. Stevenson's Dimension commitment to opportunity, though certainly a theoretically

important aspect of entrepreneurial management, could not be empirically isolated as an independent dimension. The items developed for this dimension showed a clear conceptual overlap with Strategic Orientation and/or Commitment of Resources. Furthermore, the two dimensions Commitment of Resources and Control of Resources appeared to be overlapping as well and therefore merged into one factor named Resource Orientation (see Figure 3.1). Brown's et al. (2001) interpretation is that the isolated six empirical dimensions represent Stevenson's eight conceptual dimensions.

In order to examine the convergent validity they compared their entrepreneurial management scale with Covin & Slevin's (1989) entrepreneurial orientation scale. After testing reliability and the correlation between their six dimensions and Covin & Slevin's three dimensions (innovation, proactiveness and risk taking) they concluded that all nine dimensions are conceptually sound and empirically separable. In other words, they suggested that the construct of entrepreneurial orientation and entrepreneurial management are measuring different aspects of the broad and complex concept of firm-level entrepreneurship.

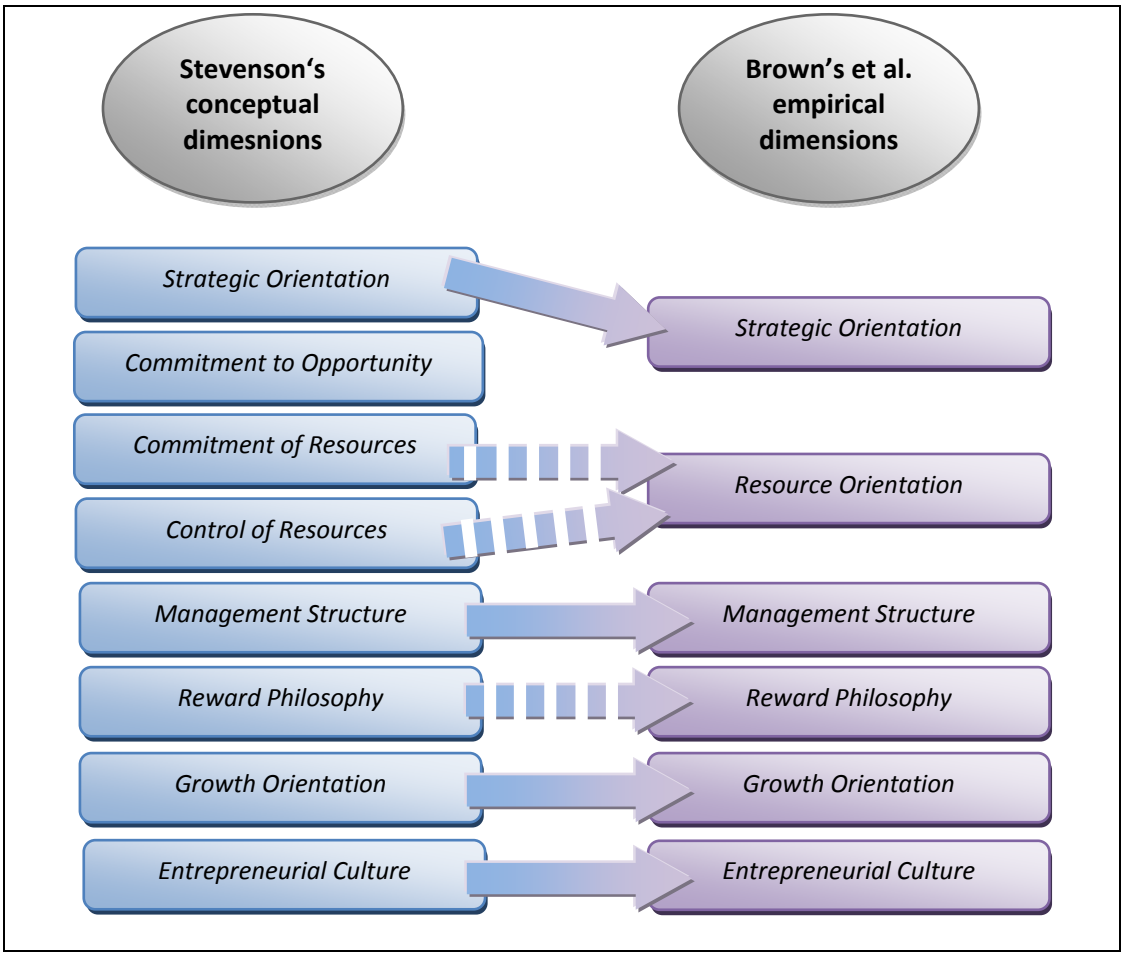


Figure 1: Stevenson's conceptual dimensions and Brown's et al. empirical dimensions

4. Research hypothesis

There is more than little empirical research focusing on the link between corporate entrepreneurship and company performance. In fact, there is extensive evidence of strong, statistically significant relationships between levels of entrepreneurship within a firm and a number of different indicators

of company performance (e.g. Miller & Friesen 1982; Zahra 1991; Morris & Sexton 1996). For example, Covin & Slevin (1986) reported a simple correlation of $r = 0,39$ ($p < 0,001$) between their entrepreneurial posture scale and a multi-item index of firm performance. Zahra (1991) reported a positive association between corporate entrepreneurship activities and profitability, growth, and risk-related measures of company performance. It is suggest that corporate entrepreneurship is positively associated with a company's growth and profit (Covin & Slevin 1991; Zahra 1991). Further, many researchers suggest that entrepreneurial orientation is positively related to a firm's financial performance, in particular (Miller 1983; Covin & Slevin 1989; Zahra 1993a).

Studying the research in this area so far, one comes to notice that several studies use Covin &Slevin's (1991) model of entrepreneurial orientation as a base for a measurement scale. Researchers have agreed that entrepreneurial orientation is a combination of three dimensions: innovativeness, pro-activeness, and risk-taking (e.g. Wiklund 1999). Innovativeness reflects a tendency to support new ideas, novelty, experimentation, and creative processes, thereby departing from established practices and technologies (Lumpkin & Dess 1996). Proactiveness refers to a posture of anticipating and acting on future wants and needs in the marketplace, thereby creating a first-mover advantage in comparison to competitors (Drucker 1993, Lumpkin & Dess 1996). Several studies show a positive relationship between those entrepreneurial orientation dimensions and firm performance (e.g. Zahra & Covin 1995; Brown 1996; Wiklund 1999). Zahra & Covin (1993) found that firms with an entrepreneurial orientation could target premium market segments, charge higher prices, and were faster to the market. These firms tend to monitor market changes, respond quickly, and capitalize on emerging opportunities. Innovation and pro-activity kept them ahead of competitors, leading to better financial results.

The sheer number of studies relying on Covin & Slevin's scale indicates the success and validity of this measurement instrument. Most empirical studies support the proposition that the relation between a firm's entrepreneurial orientation and performance is positive, i.e. that firms which adopt a more entrepreneurial strategic orientation perform better (Zahra 1991; Wiklund 1999; Zahra, Neubaum et al. 2000). However, the small number of studies using different measurement instruments to maybe capture different aspects of the corporate entrepreneurship and performance relationship is surprising. One reason, why most researchers seem to rely on entrepreneurial measurement scales that have been tested before (i.e. Covin & Slevin's 1993 measurement instrument of entrepreneurial orientation) could be that finding a suitable measurement for corporate entrepreneurship and companies' performance can be challenging. Lyon, Lumpkin and Dess (2000), suggested the challenges in measuring the strength of the relationship between entrepreneurship and performance are possibly due to problems with the operationalization and measurement of entrepreneurship. In this regard to explore new aspects of the complex and comprehensive field of corporate entrepreneurship and firm performance it is important to test different measurement instruments. Therefore *this paper focuses in particular on the relationship between entrepreneurship as opportunity based firm behaviour according to Stevenson (1983) and firm performance*. Gagnon, Sicotte et al. (2000) state that it is justified to believe that Stevenson's model is adequate to identify the behaviour of managers in terms of their actions in different processes. In their remarkable study Brown et al. (2001) developed a measurement instrument based on Stevenson's conceptualization, which is the only measurement instrument known to the author that measures corporate entrepreneurship according to Stevenson's behavioural approach. However, to our knowledge this instrument never has been re-used or linked to firm performance.

However, Brown et al. (2001) discovered a substantial positive correlation between the items of the two concepts by Covin & Slevin 1993 and by Stevenson (1983), which shows that they are both measuring different aspects of corporate entrepreneurship. Yet, the fact that none of the correlations was very high, suggests that the aspects of entrepreneurship discussed by Stevenson as well as Covin & Slevin are conceptually sound and empirically separable. But if both of these concepts are covering different equally important aspects of corporate entrepreneurship, it seems even more surprising that several studies examine the relationship between entrepreneurial orientation and performance using Covin & Slevin's scale, whereas no known study about the relation between Stevenson's concept and firm performance exists. Therefore this study should contribute to the corporate entrepreneurship research by abolishing this obvious lack of research in this area. As Brown et al. (2001) instrument has proven to be a reliable measurement instrument of entrepreneurial management and researchers generally agree on the positive relationship between entrepreneurship within an organization and its performance, it can be assumed that entrepreneurial behaviour according to Stevenson is positive related to firm performance.

Hypothesis:

There is a significant positive relationship between the adaption of an entrepreneurial management style, measurable in the degree of firm level entrepreneurial behaviour, and companies' financial performance.

Brown's et al. (2001) measure of Stevenson's conceptualisation of entrepreneurship as opportunity based firm behaviour is a reliable measurement instrument of the degree of entrepreneurship within an existing firm. More than a hundred studies where counted that cite their work. However, no attempt has been made so far to validate or further develop this instrument of measurement. Therefore, using Brown's et al. measurement scale as a basis for this paper, will not only help testing the hypothesis. Additionally, it will lead to a further validation of Davidsson's, Brown's & Wiklund's measure by examining the scale in the context of another country (Australia).

Further, in the area of corporate entrepreneurship and firm performance, there seem to be a lack of research with a longer time frame. Zahra, Jennings et al. (1999) were only able to find two studies which recognized the possibility that the effect of entrepreneurship is long-term in nature (Zahra 1991; Zahra & Covin 1995). The short time period used (1–2 years), or high attrition among companies in the sample, meant that the long-term effects of entrepreneurship on a company's performance were unclear. As there seem to be an obvious research gap in exploring the relationship of corporate entrepreneurship and companies' performance over a longer time frame, this paper will further contribute to entrepreneurial research by including companies' performance over a longer period (3-4 years) into the analyses.

5. Research model and methods

As Entrepreneurial behaviour is a mental construct the model of this paper is a latent variable model (see Bartholomew & Knott 1999). The research model is displayed in figure 2. The underlying construct of this model is entrepreneurial management. This construct consists of six aspects, the entrepreneurial dimensions defined by Stevenson. Those dimensions are the latent variables of the model. In other words, those dimensions are what the measurement instrument in this paper intent to measure, even though they can't be measured directly, as they are not directly observable.

Rather, their affect can be measured with the help of separate items (questions of the questionnaire), which add up to a scale. With the help of those items, which are supposed to tap the entrepreneurial dimensions, the degree of entrepreneurial behaviour for each company can be concluded. Finally this degree of entrepreneurial management will be examined in regard to its relationship to firm performance (hypotheses).

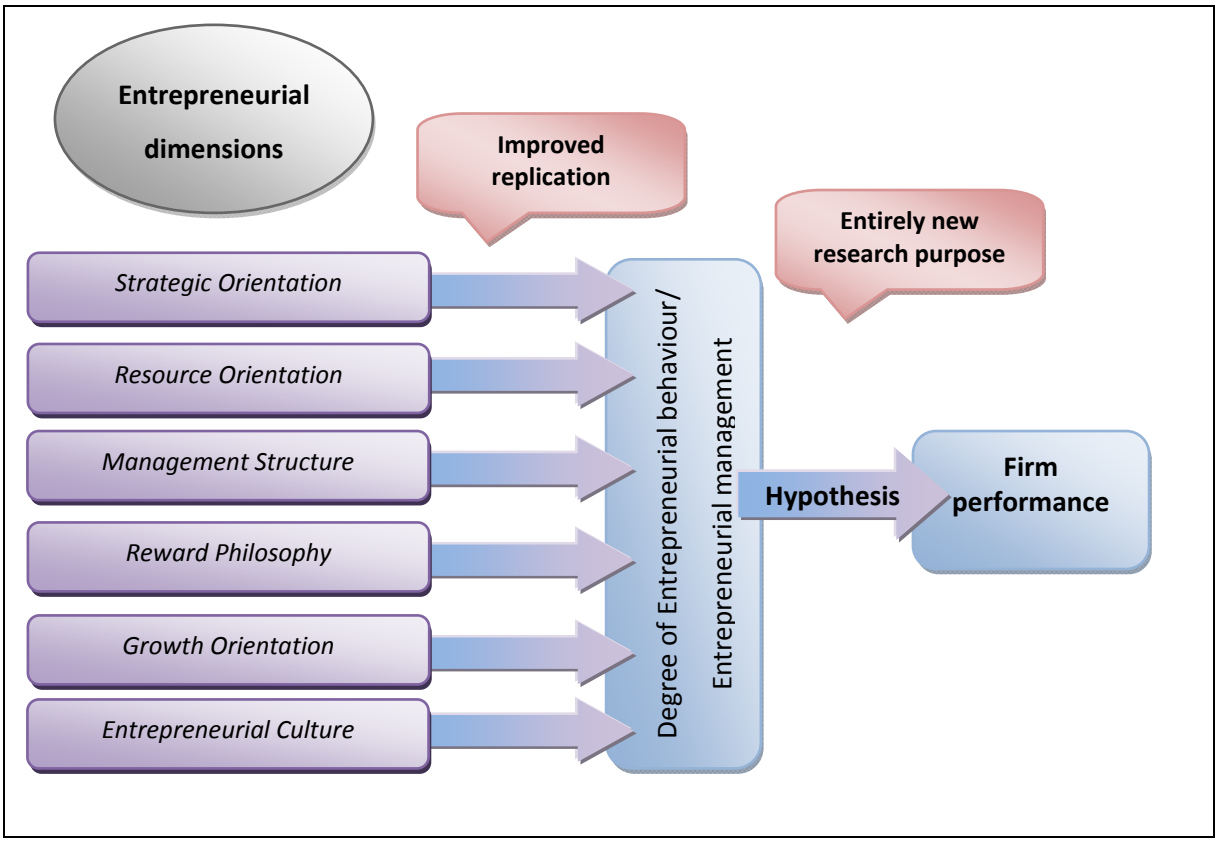


Figure 2: The relationship between entrepreneurial management and firm performance as research model

Before being able to test the hypothesis the measurement instrument of the degree of corporate entrepreneurship will be developed on basis of Brown's et al. scale. As one aspect of this paper is the improvement and further development of the scale some additional questions for the dimensions Resource Orientation and Reward Philosophy will be developed, hoping to achieve better reliability (Cronbach's alpha value) for those dimensions. In a second step the hypothesis will be tested. Daily & Dalton (1992) note that the multidimensionality of organizational performance makes it unlikely that any one corporate performance measure could sufficiently capture those multiple performance dimensions. Therefore, this paper will concentrate on companies' financial performance. To test the hypothesis, three different financial performance measures will be tested individually regarding their relationship to the companies' degree of entrepreneurial management with the help of a regression analysis. The measures of organizational performance served as the dependent variable, with Brown's et al empirical dimensions as independent variable. The data needed to calculate the performance measures was extracted from a commercially available database, which regularly publishes the annual financial data of more than 35 million public and private companies worldwide. The financial performance over three to four years was included into the study. The values of those years were merged into one indicator by generating the average for this time period. One indicator for the six dimensions of entrepreneurial management was generated by adding the scores for each question and dividing it by the number of questions. In case that all three analyses show a significant

positive relationship between performance measures and the degree of entrepreneurial management the hypothesis would be supported. In case of a negative outcome of the regression analyses the hypothesis will be declined.

A sample of 994 employees (from 157 Australian companies) was selected in a two-step manner using two different commercially available databases. First of all the companies were chosen with regard to the selecting criteria Brown et al. (2001) referred to for their research in Sweden. One of the selecting criteria according to Brown et al. was the size of the companies. Only companies were chosen which employed between 10 and 249 employees. Another sampling criterion was the industrial sector, which was divided in four groups of manufacturing, professional services, wholesale/retail and other services. Furthermore the sample was also divided according to the corporate governance structure into independent firms, members of company groups with fewer than 250 employees and members of company groups with 250 employees and more. Beyond we chose publicly traded companies in Australia as performance data for those firms were easier available. After utilising a sample of firms the next step was to generate a list of employees working within these firms to participate in the survey. For this task a second database was used. We were able to sent questionnaires to all key managers of each firm.

6 Scale Improvement

Browns et al developed items for each of Stevenson's eight entrepreneurial dimensions. However, after intensive pretesting they were only able to successfully isolate six empirically distinct factors from Stevenson's eight conceptual dimensions. Those six empirical dimensions were: Strategic Orientation, Resource Orientation, Management Structure, Reward Philosophy, Growth Orientation, and Entrepreneurial Culture. Unfortunately, they experienced three problems. Firstly, they were unable to extract a separate factor for Stevenson's dimension Commitment to Opportunity. As the items intended not to tap this dimension and new items tend to overlap with Strategic Orientation or Commitment of Resources the dimension dropped out of the analysis. Secondly, the reliability of the factor Reward Philosophy (alpha = 0,58) wasn't very satisfying. Finally, the two conceptual dimensions Commitment of Resources and Control of Resources merged into one factor, which they named Resource Orientation. Unfortunately this factor turned also out to have a less than satisfactory reliability (alpha = 0,58). Brown, Davidson & Wiklund's interpretation of the analysis was that their six empirical dimensions represent Stevenson's eight conceptual dimensions.

A closer look at Stevenson's two dimensions Commitment of Resources and Control of Resources shows that the boundary between those dimensions is indeed indistinct. This observation makes it relatively easy to agree that merging those two dimensions into Resource Orientation can be done without any loss of information on entrepreneurial behaviour. On the other hand, the case of the dimension Commitment to Opportunity isn't that simple. The dropping of this dimension seems remarkable as dealing with opportunity has been discussed at one of the key aspects of entrepreneurship itself (e.g. Stevenson 1983, Stevenson & Gumpert 1985, Hills & Lumpkin 1997, Venkataraman 1997, Shane & Venkataraman 2000, Shane 2000, Gaglio & Katz 2001, Shane 2003, Shane & Eckhardt 2003). One possible explanation is that opportunity recognition is indirectly reflected in the remaining dimensions. However, this argument doesn't seem very satisfying. Another explanation would be, that Stevenson couldn't capture the core of this dimension in his conceptualisation what therefore made it impossible for Brown et al to tap it. Brown et al. argue

Commitment to Opportunity would overlap with Strategic Orientation and/or Commitment to Resources and would therefore be indirectly represented in their scale. Even though this would be another interesting point for further research, it would go far beyond this paper. Therefore we will accept Brown's et all explanation and will concentrate on the improvement of the reliability of the dimensions Reward Philosophy and Resource Orientation by creating new items for the related scales.

In developing new items, we followed the guidelines in scale development made by DeVellis (2003). According to him the first step in developing a scale is to determine clearly what is intended to be measured. This first step is very important, because the more vague the idea about what should be measured is, the harder it will be to generate good items. The second step is to generate an item pool. This item pool should contain a large number of items that are relevant to the content of interest so it can function as a rich source from which a scale can emerge. After generating the item pool one need to determine a response format for those items. There are many possible types of scales and different formats of questions that might have different influence on the success of the measurement. Therefore it is essential to choose the most suitable format carefully (step three). Step number four should be having the initial item pool reviewed by experts. This review serves multiple purposes in order to maximize the content validity of the scale. Reviewers can for example evaluate the items clarity and conciseness or rate how relevant each items is to what should be measured. After having the item pool reviewed DeVellis (2003) recommends to consider the inclusion of validation items. It is often advisable to include some additional items in the same questionnaire that will help detecting various response biases and determining the validity of the final scale. The sixth step would be to administer items to a development sample. In other words it means utilizing a representative sample to fill out the questionnaire in order to generalize the data. The further step is the evaluation of the performance of the individual items and the factor analysis. DeVellis (2003) describes this step as the heart of the scale development process. Finally, the eighth and last step is to optimize the length of the scale by dropping 'bad' items.

Fortunately in this case, the first step is fairly simple as we can rely on Brown, Davidsson & Wiklund's definition of Reward Philosophy and Resource Orientation. But it ought to be mentioned that their definitions also rely on Stevenson's conceptualization of entrepreneurial management. By measuring Resource Orientation we want to describe to what extend an organisation controls and commits to resources. In other words, it should be examined whether the organisation commits small amounts of resources in a multi-step manner or large amounts of resources (all resources needed to undertake a project) right at the beginning of a project and also, whether it tend to own as many resources as possible or as little as necessary. Measuring Reward Philosophy should capture how an organisation rewards and compensates employees. That means it should be measured whether an organisation's reward system is more driven by the creation of value in the longer term or is more oriented in achieving short-term profit targets (Stevenson 1983).

After clarifying what the objects of the measurement scale are, the next step is to generate an item pool. This often difficult task was facilitated by the fact that Stevenson's conceptualisation is fairly detailed and provides a good guideline for the development of further questions (Stevenson 1983; Stevenson & Gumpert 1985). The items' format was an extended Likert Scale with pairs of statements representing the opposite end of the entrepreneurial firm/traditional firm continuum (e.g. Schnell, Hill et al. 2005:187). The advantage of using this scale in a survey is that the statements can define and clarify one another (Bortz and Döring 2002). However, it can also be a risk as participants might be confused if the question doesn't clearly appear as opposite statements to

them, especially, if the content is very complex (Harms 2004). Therefore even though this implies that each item needs two opposite statements, we started to collect statements for both sides separately trying to stay as close to Stevenson's definitions as possible. Only afterwards the opposite statement to each statement was crafted. We avoided creating pairs of opposite statements by simply changing a statement from a positive to a negative wording or vice versa. Further, for questions the same style was adopted that Brown et al. used for their items to ensure they wouldn't stand out against the later in the final scale. Due to the length of the final scale the number of new items needed to be cut down. Therefore the items were searched for redundancies and checked for the length and the reading difficulty level. Finally we selected three new items developed for Reward Philosophy and five new items for Resource Orientation.

To ascertain the construct validity researchers should consider the inclusion of validation items. There are at least two types of items to consider. The first type of items serves to detect undesirable response tendencies. Respondents might be influenced by other motivations than the researcher assume. One type of motivation is social desirability, what means an individual is motivated to present himself/herself in a way that society regards as positive (DeVellis 2003). Strahan and Gerbasi (1972) developed a 10-item scale that can be useful for detecting those motivations. Beyond there are other sources for detecting response biases (Anastasi 1968) that could be included in the scale. In this survey the primary interest is not about any personal information of the respondent but about the organisation she or he is employed with. It can be argued that this will weaken the risk of social desirability. Still it could be argued that employees could tend to present his or her firm as entrepreneurial and innovative as possible. To reduce this tendency the statements for the entrepreneurial firm appear on the right as well as on the left side of the scale, as already mentioned earlier.

The second type of items that can serve as evidence of the scale validity is the inclusion of other measurement instruments measuring the same phenomenon. For this purpose Brown et al. chose the Miller (1983) and the Covin & Slevin (1986; 1988; 1989) entrepreneurial orientation scale and included it in their survey instrument. Their results reveal that both constructs, entrepreneurial orientation (Miller 1983, Covin & Slevin 1989) and entrepreneurial management (Stevenson 1983) are reliable (α= 0,73) and positively related (sig. correlation 0,58). In other words they generated a valid measure of entrepreneurship as defined by Stevenson which is only partly overlapping with the entrepreneurial orientation construct and therefore gauge different and distinct factors of entrepreneurship. However, as Brown's et al. (2001) items are part of the questionnaire we hereby included a valid construct.

As a pre-test (this refers to DeVellis fourth step in scale development, the review of the items) the questionnaire was handed out to some entrepreneurship academics and a number of business students. During the pre-test we experienced some difficulties with the scale. Attempting to use the same survey design as Brown et al. we used a 10-items scale. This 10-items scale represents the in Stevenson's conceptualization described promoter-trustee-continuum. Therefore, dividing the whole range of infinite, only marginal different behaviour between the two extremes (pure entrepreneurial management and pure administrative management) into 10 groups seems to be a clear simplification already. Unfortunately we experienced that the participants of the pre-test often had difficulties with so many gradual variations to choose from, as the differences between two sequent numbers seemed to be too small to justify a reasonable decision between them. In fact for the questionnaire the differences between some items of the scale seem marginal. Another reason why we were concerned to simply replicate Davisson, Brown & Wiklund's survey was the number of participants, for we were afraid of getting too little answers per item to get some significant results, if the scale

had too many intervals. In consequence we reduced the number of intervals to 6. Further we clearly defined the meaning of each of those values in the introduction of the questionnaire. This modification of the scale shouldn't be a problem for the attempt to verify Brown's et al. scale, as Davidson (2004:176) argues the "real power of a theory is demonstrated through replication. If a theory is any good, it will show its effect in several slightly different empirical samples, and also be robust against (valid) variations in operationalization."[1]

7. Data collection

A mailed questionnaire (with a pre-addressed stamped envelope and a personalized cover letter, addressed to the respondent) was used to collect the data (questionnaire and cover letter can be requested from the authors). With expiration of the time limit for answering the questionnaire provided email addresses were used to send out almost 200 reminder emails. Additionally, some people from the mailing list were called to ask for permission to send them the questionnaire via email. Even after the remainder only a total number of 34 responses were achieved. After allowing for undeliverable surveys (approximately 12,3% or 122 questionnaires of the total sample, N= 994), this describes a response rate of 3,9%.

About the reasons of the low response rate can only be speculated. First of all, it is not difficult to imagine that CEOs and top manager generally have a busy schedule. Additionally, the general economic situation might have influenced the result as well. As this survey unfortunately fell just right within the economic crisis and the exact days the Australian stock markets crashed, it would make it even harder to convince CEOs and top manager to spend time on filling out a questionnaire. Further, one factor might be the cultural background. Only a few years ago Loane & Bell (2006) conducted a survey about entrepreneurial firms in Australia, Ireland and Canada. They achieved a response rate for Australian companies significantly smaller than the response rates in Ireland and Canada. Another aspect might be that even though the recipients of the survey were personally addressed in the cover letter, they weren't called on the phone prior to sending out the questionnaires. This probably diminished the chance of a higher response rate. An additional influencing factor might be that the institution (University of Wuppertal) was likely to be generally unknown to most of the recipients of the survey.

8. Results

8.1 Descriptive Analysis and testing of the scale

Presenting the results is divided in two parts, exploring the data file (chapter 6.1) and testing the research hypothesis (chapter 6.2).

Item	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 1	3.74	4	5	1	6	1.483
item 2	4.12	4	5	1	6	1.493

[1] Further as a result of pre-testing we had two little changes on two of the original questions from Davidsson, Brown & Wiklund. We changed the word order of question 3, turning it into a passive sentence, for a better understanding. We also changed one word in question 17, which seemed to be likely to negatively influence the participants. However both changes didn't have an impact of the content of the questions.

item 3 (reversed)	3.74	4	5	1	6	1.483
	3.86					

Table 2: Descriptive Measures of Strategic Orientation

The maximum and minimum values for the *Strategic Orientation* questions indicate that the responses are spread across the full range of the 6-item scale. The standard deviation has a value lower than 1.5 for all three questions and is therefore equally acceptable. According to the responses there seems to be two groups of firms, those whose Strategic Orientation is more entrepreneurially and those whose Strategic Orientation tendencies are more towards the administrational side (U-shaped distribution). However, the group of firms tending towards an entrepreneurial Strategic Orientation is significantly bigger.

Index	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 4	4.09	4	5	1	6	1.334
item 5 (reversed)	3.50	3	3	1	6	1.261
item 6 (reversed)	3.06	3	3	1	6	1.301
item 7	3.68	4	4/ 5	1	6	1.319
item 8 (reversed)	3.59	4	2/ 5	1	6	1.417
item 9	2.68	3	2	1	5	1.065
item 10 (reversed)	2.53	2	2	1	5	0.929
item 11 (reversed)	3.44	3,5	4	1	6	1.284
item 12	3.41	4	4	1	6	1.158
	3.33					

Table 3: Descriptive Measures of Resource Orientation

For the dimension *Resource Orientation* we formulated 5 new questions (item 8-12 had not been used by Brown et al. 2001). The results for question 9 and 10 differ from the rest. Whereas the mean for the other items varies between 3 and 4, question 9 and 10 has a significant lower value. The same occurs for the median and the mode. Even the standard deviation which lays between 1.16 and 1.42 for the other items has a lower value for question 9 and 10. Taking a closer look at the values for minimum and maximum one get a first idea, what the cause of these significantly lower values might be. The responses for question 9 and 10 are not spread across the entire range of the scale, but only across the first five items of the scale. There could be problems with the formulation of the questions. The way the questions were formulated could be too strong on the entrepreneurial end so that none of the participants could identify their company with this extreme. Further, question 9 contains the expressions “long term commitment” and “short period of time” which might be too vague. Question 10 uses the formulation “even though this strategy may increase the risk of failure” which might be misleading as obviously every firm tries to reduce the risk of failure. The new questions 8, 11 and 12 seem to perform equally well in comparison to the adopted questions. In total, gain we find a U-shaped distribution with the bigger share of respondents on the entrepreneurial side of the scale.

Index	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 13	2.38	2	2	1	5	1.074
item 14 (reversed)	3.41	3,5	2	1	6	1.351
item 15	3.56	4	4	2	5	0.991
item 16 (reversed)	4.32	4	4/ 5	2	6	1.093
item 17	3.79	4	4	1	6	1.225
	3.49					

Table 4: Descriptive Measures of Management Structure

The results for the dimension *Management Structure* didn’t turn out ideally. Observing the minimum and maximum value of questions 13, 15 and 16 one can see that the responses of those questions

didn't cover the complete range of the 6-item scale. Question 13 and 16 cover 5 values and question 15 only covers 4 values. The values for the standard deviation are accordingly low. The high values of mean, median and mode of question 16 indicate a negatively skewed deviation. On the opposite, the low values for question 13 suggest a positive skewed deviation. Reasons for not covering the full range of the scale could be the formulation of the questions, which might prevent respondents to choose an extreme answer, or the number of responses. As Brown et al. (2001) didn't experience any troubles with those questions in their survey the problem might be based on the second reason here.

Index	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 18	4.15	4	5	1	6	1.209
item 19	3.56	3,5	3/ 5	1	6	1.260
item 20 (reversed)	4.03	4	4/ 5	2	6	1.167
item 21	4.35	5	5	2	6	0.981
item 22	3.42	4	4	2	5	1.146
item 23(reversed)	3.48	3	2	2	6	1.202
	3.83					

Table 5: Descriptive Measures of Reward Philosophy

For the dimension *Reward Philosophy* we created three new questions (question 21 to 23). Even though the responses for question 19 cover the full range of the scale and median and mean are exactly 3.5 and 3.56, the distribution shows that the responses are almost spread equally between 2 and 5 on the scale, so firms seem neither extremely entrepreneurial, nor administrative. This leads to question 20 to 23, where difficulties with the range can be discovered as well. Question 20, 21 and 23 only have a range of 4, whereas question 22 even has a range of only 3 values. Question 22 and 23 are similar to the deviation of question 19. Their responses are piled up only in the middle of the scale.

Index	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 24 (reversed)	3.76	4	3/ 5	1	6	1.437
item 25	2.94	3	2/ 3	2	6	1.029
	3.35					

Table 6: Descriptive Measures of Reward Philosophy

Looking at the results for the dimension of *Growth Orientation* it can be observed that the range for question 25 again is only 4. In consequence, the standard deviation shows a low value of 1,03. In total, the results hint to an in two groups divided scale, like it could be found in some questions before already, indicating a clear distinction of entrepreneurial and administrative firm behaviour.

All questions of the dimension *Entrepreneurial Culture* only have a range of 4. Accordingly the values for the standard deviation are very low. The new questions 26 and 28 have a negatively skewed deviation whereas question 27 has a slightly positively skewed deviation.

Index	Mean	Median	Mode	Minimum	Maximum	Standard Deviation
item 26 (reversed)	4.85	5	5	2	6	0.989
item 27	3.85	4	5	2	6	1.258
item 28 (reversed)	4.18	4	4	2	6	1.086
	4.29					

Table 7: Descriptive Measures of Entrepreneurial Culture

The descriptive analyses show some difficulties with the range as some questions (13 out of 28) only reached a range of 4 or even 3 instead of 5 or 6. This could be an effect of the sample size as it was a problem for adopted (and thereby previously empirically approved) questions and new questions

alike. The first two dimensions Strategic Orientation and Resource Orientation performed well in this regard. Their graphs display curves with two peak points and therefore allow for discerning entrepreneurial and administrative enterprises. The questions of the dimension Reward Philosophy caused some problems with the range, however the results were still acceptable. The distribution curves of questions related with Reward Philosophy are all (beside the last question) negatively skewed, indicating a more administrative approach to management in this dimension. The results for the dimension Management Structure seem to be very diverse what makes it hard to detect any characteristics they have in common. The outcomes for the questions for Growth Orientation are very diverse as well. The number of only two questions makes it even more difficult to interpret the outcomes at this stage of analysis. For the dimension Entrepreneurial Culture more companies ranked themself towards the entrepreneurial side.

In sum, it can be observed that most distribution curves of the single questions are negatively skewed (for 21 out of 28 questions). In other words, the companies in this research sample tend towards the entrepreneurial management style. This result could suggest that the answers were partly motivated by social desirability as Wiklund (1999:80) state that currently, "entrepreneurship' is a very popular term and there is a tendency to regard it as something inherently good, something firms should always pursue". However, certain techniques were used to minimise the risk of social desirability. Further, the assumption that this could be related to specific company characteristics can't be confirmed as the research sample is very diverse. The only characteristic the companies have in common where the cultural background (Australian firms), the maximum size and the fact that the sample only consists of public companies. The first two characteristics might have a positive influence on the general tendency towards entrepreneurial management. However, the results are not significant enough to draw a conclusion about a general effect connected with the Australian culture or the maximum company size and the degree of entrepreneurial management.

Finally, it can be observed that some of the new questions should be checked for their formulation, but generally the new questions did perform equally to the transferred questions. However, new questions as well as adopted questions might perform better for a bigger sample size. Concluding this could be an interesting option for further research, as according to the first impression the new questions seem to provide the tools for further development of the scale.

8.2 Factor analysis

Factor analysis refers to a variety of statistical techniques whose common objective is to represent a broad set of variables in terms of a smaller number of hypothetical variables. It is based on the fundamental assumption that some underlying factors, which are smaller in number than the number of observed variables, are responsible for the covariation among the observed variables (Lewis-Beck 1994, Stevens 1996 or Tabachnick & Fidell 2001). In this case we have a set of 28 items, from which (ideally six) different dimensions as underlying latent variables should be extracted, describing the dimensions of the construct of entrepreneurial management behaviour.

There are two different types of using factor analysis. The *exploratory* factor analysis is used as an expedient way of ascertaining the minimum number of hypothetical factors that can account for the observed covariation. It is often used for possible data reduction. The *confirmatory* factor analysis is used as a means of confirming a certain hypothesis that there are a certain anticipated number of underlying dimensions and that certain variables belong to those dimensions (Lewis-Beck 1994). In practice, the division between exploratory and confirmatory factor analysis is not always clear-cut. In

the context of this study the focus will be more on the confirmatory part as it is based on the assumption of six existing empirical dimensions as variables describing the construct of entrepreneurial management behaviour. There is already an assumption about what items describe which dimension, analyses will hopefully confirm this assumption.

Before starting a factor analysis there are two main issues to consider in determining whether a particular data set is suitable for factor analysis: the sample size and the strength of the relationship among the variables or items (Pallant 2005). In this case the sample size might be a critical issue for the purpose of a factor analysis. The reason is that in small samples the correlation coefficients among the variables might be less reliable. Factors obtaining from small data sets do not generalise as well as those derived from larger samples. However there is little agreement among authors concerning how large a sample should at last be. Tabachnick & Fidell (2001) suggest including at least 300 cases for factor analysis. However, they mention that a smaller sample size should be sufficient if solutions have several high loading marker variables. Stevens (1996) argues that the sample size requirements advocated by researchers have been reducing over the years as more research has been done on this topic. Nunnally (1978) recommends a 10 to 1 ratio: that is, 10 cases for each item. Others suggest that 5 cases for each for each item is adequate in most cases.[2] Unfortunately, for this case none of those recommended requirements can be achieved. However, we have more than five cases for each item theoretically connected with one latent variable but Resource Orientation. Still, there should be an awareness of difficulties with the factor analysis that might result from the sample size. Generalisations should be derived with great care. According to Brosius (2008) there are four steps of a factor analysis: generating correlation matrix, factor extraction, factor rotation and finally factor scores and interpretation.

Latent variables construct

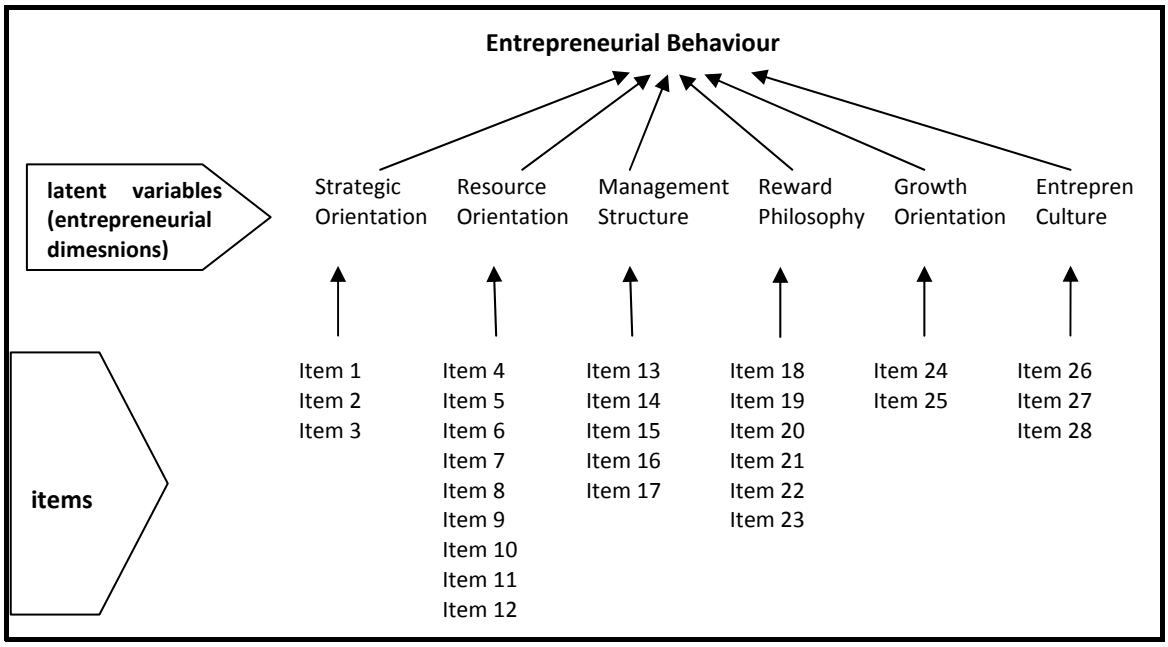


Figure 3: Latent variables and the underlying construct

2 See discussion in Tabachnick and Fidell (2001)

8.2.1 Eigenwert Analyses

Every factor analysis should start with an assessment of the data for this analysis. The ultimate quality one seeks in an item is a high correlation with the true score of the latent variable. Consequently, it is most important for the analysis that the items which assemble a latent variable (dimension of entrepreneurial management) are highly intercorrelated. The correlation matrix display how intercorrelated the items are (the correlation matrix for this study can be found in the appendix). The very first step is to look for significant correlation coefficients, recommended are strength of correlations of 0.3 and above and p values for significances < 0.5 (Tabachnick and Fidell 2001; Pallant 2005). Due to the small sample size even p values < 0.1 seem acceptable. The correlation matrix for this study shows several significant correlation coefficients above 0.3. However, not all items that were expected to measure the same dimension are highly intercorrelated. On the other hand, some items that were assumed to measure different dimensions seem to be highly intercorrelated.

Beside the correlation matrix there are two further statistical measures, which help to assess the factorability of the data. The first one is the Bartlett's test of sphericity (Bartlett 1954), which should be significant (p<0.05) for the factor analysis to be considered appropriate. For this study the Bartlett's test of sphericity is smaller 0.0005 and therefore significant. The second measure is the Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy (Kaiser 1970, 1974). The KMO index ranges from 0 to 1, with 0,6 suggested as the minimum value for a good factor analysis (Tabachnick & Fidell 2001). Yet in the KMO index for the underlying data reaches only 0,391. However this divergence didn't seem enough to already reconsider the use of factor analysis but clearly indicates that generalizations should only be stated with extreme care.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.391
Bartlett's Test of Sphericity	Approx. Chi-Square	583.158
	Df	378
	Sig.	.000

Table 8: Kaiser-Meyer-Olkin Measure and Bartlett's Test for the purpose of assessing factorability

The main object of the extraction step in exploratory factor analysis is to determine the minimum number of common factors that would satisfactorily produce the correlations among the observed variables. Given an exact fit between the factorial model and the data, the communalities and the number of common factors can be obtained through the estimation of the rank of the adjusted correlation matrix (the adjustment of the correlation matrix requires inserting the communalities in the main diagonal). However, this might work in theory, but in actually collected data samples there will most certainly be sampling errors. As the ultimate criterion for determining the minimum number of common factors is how well the assumed common factors can reproduce the observed correlations, the objective of factor extraction can be explained as finding criteria by which to decide *when to stop extracting common factors*. This involves determining when the discrepancy between the reproduced correlations and the observed correlations can be attributed to the sampling variability (Lewis-Beck 1994).

There are a variety of approaches that can be used to identify the number of underlying factors or dimensions. Some examples are principal components; principal factors; image factoring, maximum likelihood factoring; alpha factoring; unweighted least squares; and generalised least squares. The

most commonly used approach is principal components analysis, which will be used in this analysis. However, the main reason for choosing this approach for this study was a better comparability with Brown's et all study as they too used the principal component analysis.

Determining the number of factors, which best describes the underlying relationship among the variables, involves balancing conflicting needs: the need to find a simple solution with as few factors as possible, and the need to explain as much of the variance in the original data set as possible. Tabachnick & Fidell (2001) recommend to experiment with different numbers of factors until a satisfactory solution is found. Techniques that can be used to assist in the decision concerning the number of factors to retain are for example the Kaiser's criterion, the scree test and parallel analysis.

Kaiser's criterion or Kaiser's eigenvalue rule (e. g. Nunnally 1967) is based on retaining only factors that explain more variance than the average amount explained by one of the original items. Using this rule, only factors with an eigenvalue of 1 or more are retained for further investigation. Unfortunately, this criterion often results in extracting too many factors (Zwick & Velicer 1986).

This extract of the 'total variance explained' (the complete table can be found in the appendix) shows that nine factors have a total eigenvalue of more than 1. According to the recommendation to retain only factors with an eigenvalue of 1 or more this would suggest retaining nine factors. Those nine factors would explain 77,993% of the variance of the model which would fulfil the need to explain as much of the variance in the original data set as possible. On the other hand, nine factors wouldn't serve the need for a simple solution. And it would imply to consider the existence of nine, not six, seven or eight dimensions of entrepreneurial management. Further, this method could overestimate the number of factors, as was mentioned earlier already. Besides, Kaiser's criterion is not a fast statistical rule but rather a guideline. Therefore it should be explored whether another number of factors would be more suitable for this model.

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.838	20.849	20.849	5.838	20.849	20.849
2	3.277	11.702	32.551	3.277	11.702	32.551
3	2.432	8.685	41.236	2.432	8.685	41.236
4	2.364	8.443	49.679	2.364	8.443	49.679
5	2.188	7.815	57.495	2.188	7.815	57.495
6	1.883	6.723	64.218	1.883	6.723	64.218
7	1.519	5.424	69.642	1.519	5.424	69.642
8	1.256	4.487	74.129	1.256	4.487	74.129
9	1.082	3.864	77.993	1.082	3.864	77.993
10	.964	3.442	81.436			
11	.897	3.203	84.638			
12	.764	2.727	87.366			

Extraction Method: Principal Component Analysis.

Table 9: Part of the table 'Total Variance Explained'

From table 9 it is obvious that the first factors have a relatively high eigenvalue, whereas the eigenvalues of the factors below are smaller and decline steadily. The assumption for this survey was that the model could be explained sufficiently with six factors. But even seven factors would be in accordance with theory as two of Stevenson's (1983) theoretical dimensions were merged into the dimension Resource Orientation. In the case of seven factors the cumulated variance explained would be 69,642%. For six factors the cumulated variance explained would still be 64,218% (Brown et

al. reached a value of 63,6%). The results for Kaiser's eigenvalue criteria therefore appear to be satisfying and comparable to the study we replicate.

Carttell's scree test (Cattell 1966) is another widely used method for factor extraction. This approach involves plotting the amount of variance explained (based on factor's eigenvalue) by each successive factor. Because each factor explains less variance than the preceding factors, an imaginary line connecting the markers for successive factors generally runs from the top left of the graph to the bottom right. The purpose of this plot is to find the 'elbow' as a point below which factors explain relatively little variance and above which they explain substantially more (DeVellis 2003). In the plot this elbow usually appears as a point at which the shape of the curve changes direction and becomes more horizontal. Looking at the scree plot for this survey (figure 4) there is obviously a clear break between the third and fourth component. Components one and two, and to some extent three, explain or capture much more of the variance than the remaining components. Certainly, extracting only three components would be an oversimplification for this model, as only 41.236% of the variances in the model would be explained (see table 9). Interestingly, it appears to be a little inflexion point of the plot at component no. 7, as there is a change in gradient. This might be a hint that the assumption of six or seven variables could find at least some support from empirical evidence.

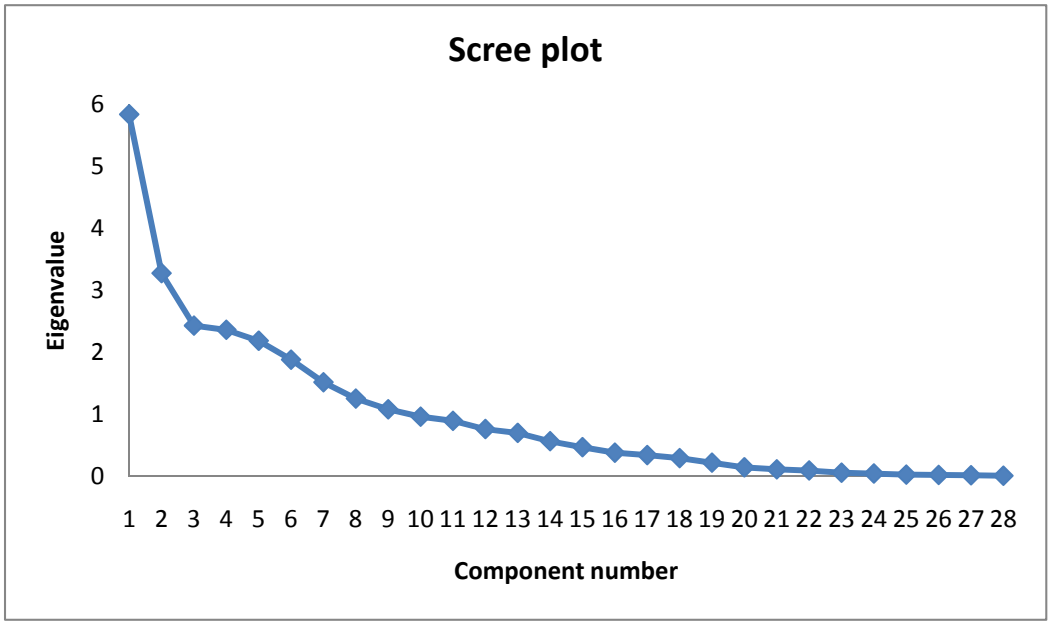


Figure 4: Scree plot of Eigenvalues for Carttell's factor extraction test

Methods like Kaiser's criterion and Carttell's scree test are techniques to explore the minimum of factors, which can explain the model satisfactorily. Yet, these techniques don't provide any information whether the relation between the extracted factors and the components of the data set can be reasonably explained or whether the relation is random and doesn't have any significance or explanatory value for the model. Therefore, one needs to take a look at the *component matrix* before deciding on a number of factors to retain. The component matrix shows the loadings of each of the items on the four components. Especially for the first three factors most items load quite strongly well above 0,4. Furthermore, for the factors 4 to 6 there are little less items with loadings above 0.4 but still several items with factors above 0,3. However very few items load on factors 7 to 9 and most of these loadings are just above 0,3. These findings support to retain only six factors for further investigation.

An additional check for the appropriateness of the number of factors that were extracted is to generate the correlation matrix that would result if the extracted factors were the only factors of the model. That matrix is called the *reproduced correlation matrix*. The closer the values in the reproduced matrix are to the values in the original correlation matrix the better do the factors represent the true underlying model. The reproduced correlation matrix also shows the residuals, which display how the reproduced correlations deviate from the observed correlations. As the reproduced matrix should be very similar to the original correlation matrix, the residuals should be close to zero. In this case there are 184 (48.0%) nonredundant residuals with absolute values greater than 0.05 for a model with 6 factors. This can be seen as an indicator for the fit of the overall model. More precise information provides the single residuals. The reproduced correlation matrix can be found in the appendix.

	Component								
	1	2	3	4	5	6	7	8	9
Q 1	,682			-,394					
Q 2	,609		-,334	-,312		-,383			
Q 3	,693					-,385			
Q 4	,636		-,393						
Q 5	,446				-,551	,307			
Q 6	,390		-,438	,622					
Q 7		,745							
Q 8	,639	-,372				,316			
Q 9	,447			-,380	,403			-,336	
Q 10					,568	,518			
Q 11	,715		-,322		,300				
Q 12	,561	,384		,440					
Q 13		,454			,308	,374	-,309	,407	
Q 14			,415	-,455	,454				
Q 15		,565						,394	
Q 16			,495	,675					
Q 17	,539		,327		,484	-,397			
Q 18	,559	-,491	,320						-,317
Q 19	,620	,430						-,387	
Q 20	,346		,456	,487			-,426		
Q 21		,324					,764		
Q 22		,635				,343			
Q 23	,507		,677						
Q 24	-,385					,461			,573
Q 25		-,307					,533	,519	
Q 26	,442	-,514	,335						
Q 27	,540	,338	-,321		,337		,335		
Q 28	,417				-,519	,344			

Extraction Method: Principal Component Analysis.
9 components extracted; only absolute values above 0.3 are displayed

Table 10: Component matrix for 9 extracted components

8.2.2 Factor rotation

After identifying a suitable number of factors for the model, the next step is to try to interpret them. Therefore factor rotation involves finding simpler and more easily interpretable factors through rotation, while keeping the number of factors and communalities of each variable fixed. There are two main approaches to rotation, resulting in either orthogonal or oblique factor solutions. Orthogo-

nal factors are the result of keeping factors perpendicular (statistically independent) with respect to one another in the process of rotation. When this is done, the true value of an item on any given factor is independent of its true value of an item on any other factor that has been extracted. In other words, knowing an item's value on one factor tells you nothing about its value on any other factor. Alternatively, oblique rotation can be used, which means factors are rotated so that the axis corresponding to each successive factor is fitted optimally without the constraint of keeping them perpendicular.

According to Tabachnick & Fidell (2001), orthogonal rotation results in solutions that are easier to interpret and to report. However, they do require the researcher to assume that the underlying constructs are independent. Oblique approaches allow for the factors to be correlated, but they are more difficult to interpret describe and report. In practice the two approaches (orthogonal and oblique) often result in very similar solutions, particularly when the pattern of correlations among the items is clear (Tabachnick & Fidell 2001). Consequently, it might be advisable to conduct both orthogonal and oblique rotations to choose the clearest. The ideal case of a 'simple structure' involves each of the variables loading strongly on only one component, and each component being represented by a number of strongly loading variables, ideally all items connected with a single dimension of entrepreneurial management.

Within the two broad categories of rotational approaches there are a number of different rotational techniques (e.g. orthogonal: Varimax, Quartimax, Equamax; oblique: Direct Oblimin, Promax). The most commonly used orthogonal approach is the Varimax rotation method, which attempts to minimise the number of variables that have high loadings on each factor. The most commonly used oblique technique is Direct Oblimin. The Promax rotation is particularly suitable for lager samples and therefore not suitable in case of our sample.[3] To achieve a good comparability with Brown's et al. study we should also take into account what methods they had used. For this and the reasons explained before, we first use Varimax rotation.

The result of the varimax rotation for a 6 factor model is shown in table 6.10. There are only values more than 0,3 displayed and the highest value for each item is highlighted. First of all, it shows that every item (besides item 21 and 25) has a loading significantly higher than 0,4. The loadings of the items 21 and 25 are only 0,336 and -0,361. Comparing these results with the component matrix (see table 10) of the 9 factor model, it is obvious that exactly those two items had the highest loadings on factor 7 and 8 which didn't retain in this model.

Further, in an exploratory factor analysis the varimax rotation can be used to help identify the nature of the underlying latent variable represented by each component. But in this case some assumption about the underlying latent variables already exists. Already the questionnaire was designed with an idea about what question should be measuring which dimension. The first three questions were supposed to measure the dimension Strategic Orientation. Indeed all three questions have their highest loadings (all above 0,65) on component 2. Those questions are obviously measuring the same latent variable. But there are two other items, question 4 and question 16, which have their highest loading on the same component, unexpectedly. Questions 4 to 12 were expected to measure the dimension Resource Orientation. The highest loadings for these items are mainly scattered over components 3 to 5, with only one exception for item 8, which highest loading is on component 1. Through including all loadings with a value higher than 0,3 into the investigations we can see that

3 For a comparison of the characteristics of each of these approaches, see Tabachnick und Fidell (2001, p.615)

three third of the questions 4 to 12 are loaded on component 3. Beside questions of the dimension Resource Orientation, question 27 is the only other question loading on this component.

Questions 13 to 17 were assumed to measure the dimension Management Structure. The highest loadings of those questions are wide spread over components 2, 4, 5 and 6. Therefore according to this matrix it seems like those items wouldn't describe the same underlying latent variable. Interestingly this was one of the two dimensions that Brown et al. (2001) had some problems with as well. Questions number 18 to 23 were intended to measure the underlying latent variable Reward Philosophy. The highest loadings of those items are split between component 1 and 4. Questions number 24 and 25 should measure the dimension Growth Orientation. Both items have their highest (and single) loading on component 6. Finally questions 26 to 28 were intended to measure Entrepreneurial Culture. The highest loadings for those questions are on components 1, 3 and 4 and therefore don't support the assumption of one common underlying latent variable.

	Component					
	1	2	3	4	5	6
Q 1		,775				
Q 2		,756				,411
Q 3	,450	,651				,314
Q 4		,700	,351			
Q 5		,357		,627	-,313	
Q 6			,812			
Q 7	-,341			,534		,501
Q 8	,632		,347			
Q 9					,689	
Q 10			,387		,634	-,336
Q 11			,796			
Q 12			,735			
Q 13				,433	,461	
Q 14					,780	
Q 15				,533		
Q 16	,383	-,624				,406
Q 17	,333				,423	,647
Q 18	,725	,351				
Q 19		,306		,635		
Q 20	,687					
Q 21				,336		
Q 22				,766		
Q 23	,750					,314
Q 24						-,617
Q 25						-,361
Q 26	,692					
Q 27			,711			
Q 28		,365		,572		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 13 iterations.

Table 11: Rotated component matrix

8.2.3 Interpretation of varimax rotation

Unfortunately, the questions cannot be assigned to the expected dimension that clearly. Only the dimensions Strategic Orientation and Growth Orientation can be clearly assigned. Strategic

Orientation has all its highest loadings on factor 2. Growth Orientation has all its highest loadings on factor 6. Therefore, it can be argued that those two dimensions could be extracted. The questions for the dimension Resource Orientation have their highest loadings scattered across the first five factors. If you take the second highest loadings into consideration as well, most of those questions have high loadings on the third factor. So it can be assumed carefully, that the factor 3 is actually measuring the dimension Resource Orientation. The questions for the dimension Reward Philosophy load equally on factor 1 and 4. Only from the results of the factor rotation it is impossible to decide on one of them. The questions for the dimension Management Structure have their highest loadings scattered over factor 2, 4, 5 and 6. The similar scenario can be observed for the dimension Entrepreneurial Culture. The questions for this dimension are distributed over factor 1, 3 and 4. However, due to the small sample size one should not generalize from the results. A statement that the six distinguished dimensions of entrepreneurial management as defined by Stevenson (1983) do not exist would clearly over burden the underlying data of this study.

8.2.4 Reliability analysis

While developing a measurement scale one need to be aware of two characteristics: reliability and validity. Both of these factors can influence the quality of the data obtained. The validity of a scale serves as an indicator for the adequacy of a scale as a measure of a specific variable. In other words, it refers to the degree to which it measures what it is supposed to measure. There are three different types of scale validity: content validity, criterion-related validity and construct validity. *Content validity* concerns item sampling adequacy – that is, the extent to which a specific set of items reflects a content domain. In theory, a scale has content validity when its items are a randomly chosen subset of the universe of appropriate items. *Criterion-Related Validity* means an item or scale is required only to have an empirical association with some criterion or 'gold standard'. Thus criterion validity per se is more an issue because it is not concerned with the understanding of a process but merely with predicting it. In fact, criterion related validity is often referred to as *predictive validity. Construct validity* is directly concerned with the theoretical relationship of a variable to other variables. It is the extent to which a measure 'behaves' the way that the construct it purports to measure should behave with regard to established measures of other constructs. Unfortunately there is no one clear-cut indicator of a scale's validity. Therefore every analysis underlies the assumption of scale validity.

Reliability refers to the extent to which a measure is free of random measurement error (Tharenou et al. 2007). Whereas validity concerns whether *the* variable is the underlying cause of item correlation, reliability concerns how much *a* variable influence a set of items. Even reliability has different aspects but the most important question in regard to the reliability of a scale is internal consistency. *Internal consistency* is concerned with the homogeneity of the items comprising a scale. If the items of a scale have a strong relationship to their latent variable, they will have a strong relationship to each other. Although we cannot directly observe the linkage between items and the latent variable, we can certainly determine whether the items are correlated to one another. A scale is internally consistent to the extent that its items are highly intercorrelated. High inter-item correlations suggest that the items are all measuring the same thing. It further can be concluded that strong correlation among items imply strong links between items and latent variable (DeVellis 2003). Internal consistency is typically equated with Cronbach's coefficient alpha (in short Cronbach's alpha; Cronbach 1951).

In general, a more reliable scale increase statistical power for a given sample size (or allow a smaller sample size to yield equivalent power), relative to less reliable measures. However, while different levels of reliability are required, depending on the nature and purpose of the scale, Nunnally (1978) recommends a minimum level of 0.7. According to others the alpha value is already significant for a value of 0,6 and above (e.g. Hair, Anderson et al. 1998). However, Cronbach's alpha values are dependent on the number of items in the scale. When there is a small number of items in the scale (fewer than ten), Cronbach's alpha values can be quite small.

Index	Cronbach's alpha	Corrected item-total correlation	Cronbach's Alpha if Item Deleted
Strategic Orientation	**,814**		
Item 1		,626	,783
Item 2		,701	,706
Item 3		,667	,742
Resource Orientation	**,648**		
Item 4		,393	,604
Item 5		,310	,625
Item 6		,396	,604
Item 7		-,193	,735
Item 8		,419	,597
Item 9		,196	,647
Item 10		,299	,628
Item 11		,692	,526
Item 12		,552	,570
Management Structure	**,547**		
Item 13		,232	,533
Item 14		,281	,515
Item 15		,382	,456
Item 16		,194	,554
Item 17		,488	,370
Reward Philosophy	**,610**		
Item 18		,249	,605
Item 19		,471	,508
Item 20		,327	,572
Item 21		,215	,610
Item 22		,226	,610
Item 23		,582	,458
Growth Orientation	**,295**		
Item 24		,182	-
Item 25		,182	-
Entrepreneurial Culture	**,261**		
Item 26		,088	,295
Item 27		,125	,241
Item 28		,222	,012

Table 12: Reliability analysis with Cronbach's alpha for the scale

Another information of interest is the corrected item-total correlation. As the set of items should be highly intercorrelated, each individual item should correlate substantially with the collection of remaining items. We can examine this property for each item by computing its item-total correlation. The uncorrected item-total correlation correlates the item in question with the entire set of candidate items, including itself. The corrected item-scale correlation correlates the item being evaluated with all the scale items, excluding itself. As every item will necessarily correlate with itself, the corrected version makes more sense. Generally applies the higher the value the better the item. Nunnally (1967) recommends a value of 0.4 or more for the item-total correlation, whereas others

recommend a minimum of 0.3 (e.g. Pallant 2005). Here, due to the large number of items and the small sample size, a minimum of 0.3 seems sufficient. Low values may indicate that the item is measuring something different from the scale as a whole.

Table 12 shows the results for the reliability analysis for this study (all generated reliability statistics can be found in the appendix). Looking at the Cronbach's alpha value of 0.814 for Strategic Orientation it shows to be higher than the recommended minimum level of 0.7. This value comes very close to the result provided by Brown et al. (2001), who extracted an alpha value of 0.82. None of the items could be removed from the scale without reducing Cronbach's alpha coefficient.

The alpha coefficient for Resource Orientation is 0.648 and therefore higher than the alpha value detected by Brown et al. (2001) with 0.58. In other words, one of the objectives of this paper, to gain a better reliability for the dimension of Resource Orientation through including new questions, has been achieved. Further, the new items seem to perform quite well in regard to the scale reliability. According to Hair, Anderson et al. (1998) the alpha value above 0.6 indicates the reliability of the scale. By removing item 7 an even higher alpha value of 0.735 could be reached. Surprisingly, item 7 is one of the adopted items, not one of our newly edited questions.

The scale of the dimension Management Structure shows a dissatisfactory result for Crobach's alpha. With a value of 0.547 it is significant lower than the alpha in Brown's at al (0.78). Further, all but one item in this scale have a lower corrected item-total correlation than recommended. Through exclusion of factor 16 a slightly higher Cronbach's alpha coefficient of 0,554 could be obtained. But even according to Hair, Anderson et al. (1998) it would still be under the minimum value of 0,6 to achieve reliability. Therefore, Management Structure cannot be proven replicable, but however, the small sample size does not allow any generalization based on this result.

In addition to the dimension Resource Orientation we also added new question to the dimension of Reward Philosophy in order to achieve a better reliability for the scale. With an alpha coefficient of 0.610 (in comparison to 0.58 in Brown's et al. study) the scale for Reward Philosophy is reliable. Nevertheless, both items 21 and 22 show low item-total correlations of 0.215 and 0.226. Anyhow, their exclusion from the scale wouldn't lead to any changes of the alpha value. Therefore, in regard to the principle of simplicity it could be advisable to exclude them. The newly added item 23 on the other hand produces the highest item-total correlation for this dimension and therefore seems to capture an additional aspect of Reward Philosophy.

The scales of the last two dimensions, Growth Orientation and Entrepreneurial Culture, perform very poorly in the reliability analysis with values of 0.295 and 0.261. All corrected item-total correlations are below 0.23. By removing item 26 a slightly higher alpha coefficient of 0.295 could be reached for Entrepreneurial Culture, but this would still be far from reliable. For the dimension Growth Orientation the value for Cronbach's alpha after deleting one of the items even turned out negative due to a negative average covariance among items. As this violates reliability model assumptions they are not displayed in the table. Surprisingly, the outcome of the factor rotation in the factor analysis seemed promising for Growth Orientation, as both items were exclusively loaded on one dimension. Concerning Growth Orientation, the ongoing economic crises possibly stunted the perception of items related to growth.

In sum the scales of the dimensions Strategic Orientation, Resource Orientation and Reward Philosophy achieved alpha coefficients above 0,6, which means they are reliable (Hair, Anderson et al. 1998). The reliability of the scale of the dimension Management Structure couldn't be verified, as the alpha value lies just below the recommended minimum. Unfortunately, the dimensions Growth

Orientation and Entrepreneurial Culture performed really poorly. A methodological explanation for the poorly performing items might be the small number of items in the scale. As mentioned earlier a small number of items (less than 10) might cause lower alpha values.

The aim of including new question for the dimensions Resource Orientation and Reward Philosophy was to try to comprise some aspects of those dimensions that seem to be missing in the scale of Brown's et al. study. In the case of Resource Orientation this attempt succeeded as all new questions add to the alpha value making it significant. But even in the case of the dimension Reward Philosophy one of the three added questions produces a significant alpha value.

9 Evaluation of the scale – results

The scale analysis of this exemplary study provides some interesting results. The analysis found some significant characteristics of the measurement instrument. However, some problems that occurred could be related to the small number of responses, as for some items the maximum span of values remained under-utilized. In this context, the reduction of the 10-item scale from Brown's et al. study to a 6-item scale turned out to be the right decision to make. Furthermore, in regard to the low response rate this reduction of the size of the scale was beneficial, if not necessary. However, the under-utilized range in values of some questions could also be related to the wording of the questions. For further research the wording of some questions should be reconsidered.

Another peculiarity was that exactly two dimensions, Strategic Orientation and Resource Orientation, don't show a normal distribution curve. The graphs of 6 out of 12 questions are split into two groups. Their curves have two peak points, reassembling a U-shaped distribution. According to those questions it can be assumed that a classification of the companies into two groups (administrative and entrepreneurial group) could be easily accomplished. Even though participants were forced to position their company at either the entrepreneurial or the administrative side, due to the 6-item scale, the results could have still be piled up in the middle. Reasons for the U-shaped distribution could have something to do with the nature of those two dimensions (Strategic Orientation and Resource Orientation) or underlying characteristics of the entrepreneurial management construct. Possibly Strategic Orientation and Resource Orientation forces a company more than the other dimensions to position itself clearly on one of those sides more than the other dimensions do.

Further it is obvious that the distribution curves are mostly (for 21 out of 28 questions) skewed towards the entrepreneurial side. This could be caused by a general tendency to answer accordingly to social expectations. Participants want to present their company in a desirable way. In this study we minimized the risk of answers motivated more by social desirability than the actual situation in the participant's company by reversing some questions. On the other hands, the effect could also be interpreted in the way that most of the participating companies implemented a more entrepreneurial management style. This observation could be caused by cultural characteristics (Australia, a young and pioneering, fast growing country) or by industry and firm size specific strategies. Another reason for a tendency towards the entrepreneurial side could be the flow of time. Stevenson's approach, novel in 1983, has – in the meanwhile – gained strong influence in mainstream management and on the advice given by strategic management consultants. E.g. flexible capital structures, flat hierarchies, networks and value based compensations are more common practice today than they used to be back when Brown et al. conducted their original survey.

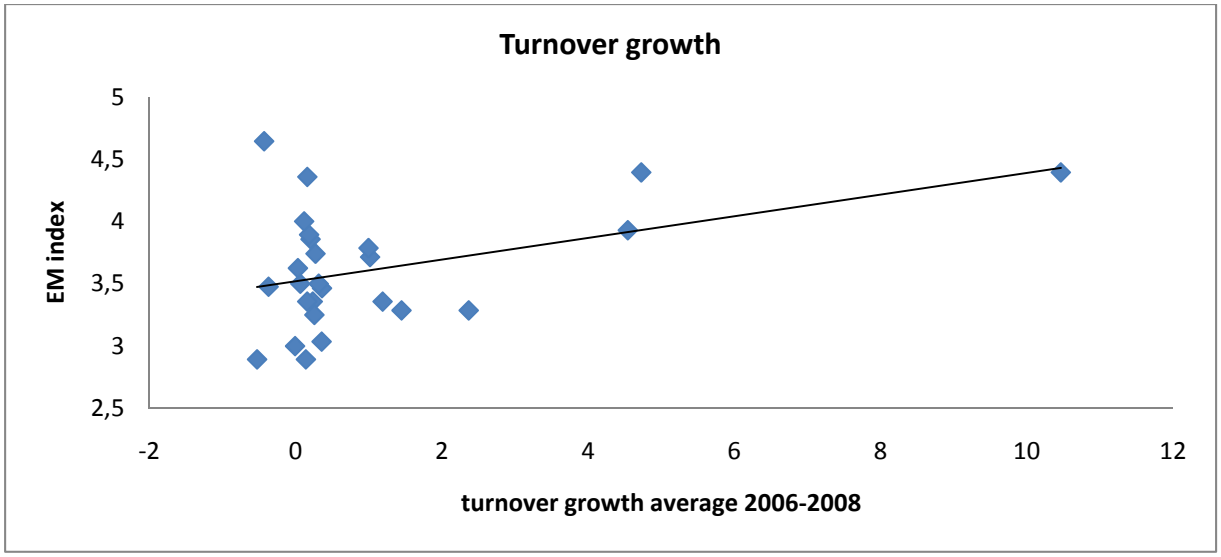
In general, a high level of correlations between items indicates that they are measuring one common underlying construct of entrepreneurial management. But by far not all correlations proved to be significant. Yet, the factor extraction didn't turn out like expected too. However, according to the eigenvalue rule 9 factors could still be extracted, whereas the scree plot indicates that the assumption of three, six or seven factors might be applicable as well. This finding is supported by the component matrix which indicates six dimensions, totally in accordance to the underlying construct. The low number of significant correlations could indicate that the implication of just some – nowadays modern – principles of entrepreneurial management – e.g. outsourcing – does not suffice to create "entrepreneurial management" in its full account throughout the organization. Likely, to be a more entrepreneurial organization, it is not enough to score "entrepreneurial" just on some modest items, but neglecting other dimensions. In short: The missing significance of so many correlations could be caused by the fact that too many companies don't head for entrepreneurial management consequently enough, but only pick some attributes which can easily be adopted within an organization that is still administrative at its core.

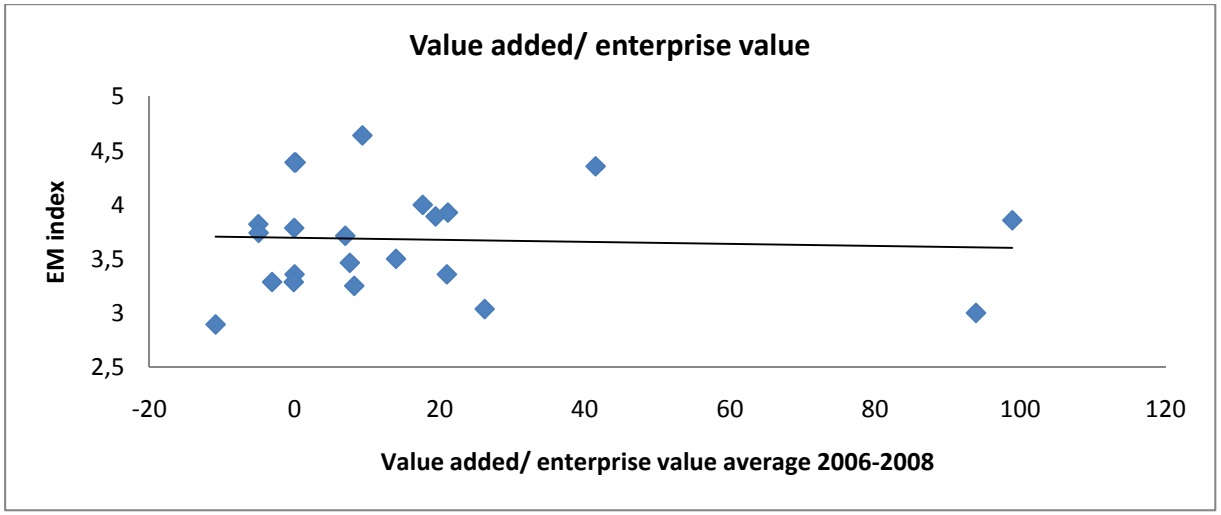
Moreover, the development of any scale always requires checking whether the measurement instrument is in fact measuring the underlying construct or whether it might measure some secondary factors. The challenge in the case of the model of entrepreneurial management is the complexity of the model itself. In this paper even though the extraction of the individual dimensions turned out to be difficult, the overall result of testing the scale was still quite acceptable, especially when taking into account the sample size. The –nothing more than moderate – results from the factor analysis partly arise from the approach of the analysis. With an exclusively exploratory factor analysis the results might have turned out a bit better. The minimum requirement of any confirmatory factor analysis is that one hypothesizes beforehand the number of common factors. However, the hypothesis must be based on an understanding of the nature of the variable under consideration, as well as on expatiations concerning which factor is likely to load on which variables. For this factor analysis we relied on the results of Brown's et al. study and expected therefore to get similar results. Therefore, to concentrate on only one possible outcome out of the almost limitless variety of options is obviously restricting the results (Lewis-Beck 1994), but the only way to strive for replication effectively.

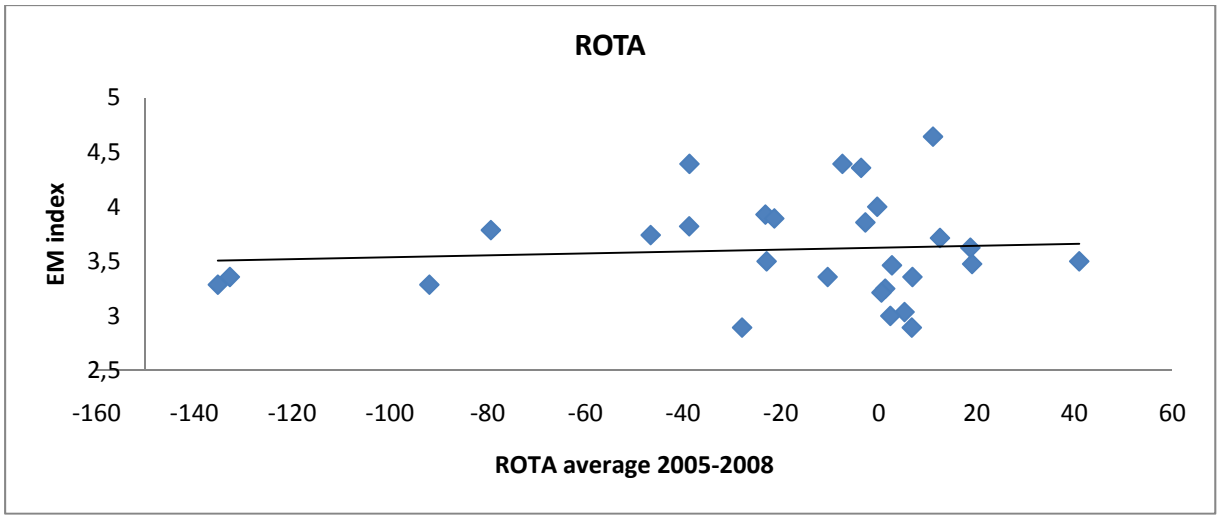
One of the objectives of this paper is to gain a better reliability for the dimension of Resource Orientation and Reward Philosophy by including new questions. Generally, the reliability analysis didn't result in a satisfactory alpha value for all associated variables. The reliability of the dimensions Growth Orientation and Entrepreneurial Culture can't be verified (and due of the small sample size, can't be denied in general either, but is put in question). The alpha values for the other dimensions are between moderate to extensive. The dimensions Resource Orientation and Reward Philosophy could achieve a clearly better alpha value than in the study of Brown et al. Therefore the objective of this paper in that respect has been achieved. Further, the new items seem to perform quite well in regard to the scale reliability. Generally the new questions did perform equally to the replicated questions. However, new questions as well as replicated questions might perform even better for a bigger sample size. Concluding the study was partly successful and provides many interesting options for further research, as the new questions certainly provide tools for further development of the measurement of "entrepreneurial management".

10 Linking Entrepreneurial Management to Firm Performance

Based on the survey results, an Entrepreneurial Management Index has been calculated for each firm. Firms can reach an index score from zero (absolutely administrative) to five (very entrepreneurial). We have used five performance indicators. These indicators have been selected because they are likely to especially capture the impact of entrepreneurial performance and are of strategic relevance, namely turnover growth, value added (enterprise value), return on total assets, and return on shareholder funds. Scatterplots for all performance measures and EM index indicate no empirical linkage between the index score and firm performance. Accordingly, tests for correlations didn't bring any significant results for both, Pearsons *r* and non-parametric tests. Our explorative study therefore failed to show any significant influence of Entrepreneurial Management on firm performance. However, due to the small sample size and the diversity of the sample set, this result should not be overemphasized. Further empirical research with narrower (i.e. less heterogeneous) but bigger samples is needed for drawing conclusions. For the moment, a simple saying that "entrepreneurial management is always the better strategic choice" does not hold in the light of empirical results.







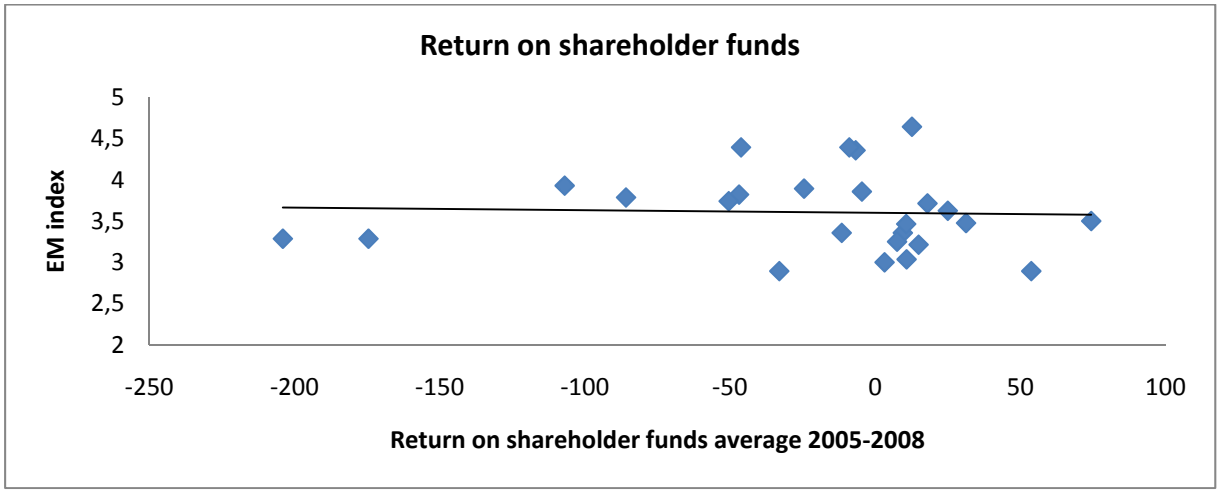


Figure 5: Performance Measurements in Relation to Entrepreneurial Management Index

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Appendix: List of items

		Strategic Orientation	
1.	As we define our strategies, our major concern is how to best utilize the resources we control.	1 2 3 4 5 6	As we define our strategies, we are driven by our perception of opportunity. We are not constrained by the resources at (or not at) hand.
2.	We limit the opportunities we pursue on the basis of our current resources.	1 2 3 4 5 6	Our fundamental task is to pursue opportunities we perceive as valuable and then to acquire the resources to exploit them.
3.	Opportunities control our business strategies.	1 2 3 4 5 6	Our business strategies are significantly influenced by the resources we have.
		Resource Orientation	
4.	Since our objective is to use our resources, we will usually invest heavily and rapidly.	1 2 3 4 5 6	Since we do not need resources to commence the pursuit of an opportunity, our commitment of resources may be in stages.
5.	All we need from resources is the ability to use them.	1 2 3 4 5 6	We prefer to totally control and own the resources we use.
6.	We like to employ resources that we borrow or rent.	1 2 3 4 5 6	We prefer to only use our own resources in our ventures.
7.	In exploiting opportunities, access to money is more important than just having the idea.	1 2 3 4 5 6	In exploiting opportunities, having the idea is more important than just having the money.
8.	We divide a project into several stages and decide about the required resources for each stage individually, before starting it.(multiple step commitment)	1 2 3 4 5 6	Before starting a project we decide which resources are needed throughout the project and clearly commit those. (full commitment)
9.	Our managers are dedicated to the same	1 2 3 4 5 6	Our managers devote their efforts to the same projects

	projects with long term commitment.		only for a short period of time and are then challenged by a new project.
10.	To maximize our return we invest as little resources as possible even though this strategy may increase the risk of failure.	1 2 3 4 5 6	We believe that the chances of success are better the more resources we invest.
11.	Borrowing, renting and contracting resources when we need them keep us up to the latest market developments and technologies.	1 2 3 4 5 6	Owning and controlling the resources we need makes us independent of market changes.
12.	We prefer the stability and the rapid availability of using resources that we own and are familiar with.	1 2 3 4 5 6	We like the flexibility of borrowing or renting resources we need for a project.
		Management Structure	
13.	We prefer tight control of funds and operations by means of sophisticated control and information systems.	1 2 3 4 5 6	We prefer loose, informal control. There is a dependence on informal relationship.
14.	We strongly emphasize getting things done even if this means disregarding formal procedure.	1 2 3 4 5 6	We strongly emphasize getting things done by following formal processes and procedures.
15.	We strongly emphasize holding to tried and true management principles and industry norms.	1 2 3 4 5 6	We strongly emphasize adapting freely to changing circumstances without much concern for past practices.
16.	Managers operating styles are allowed to range freely from very formal to very informal.	1 2 3 4 5 6	There is a strong insistence on a uniform management style throughout the firm.
17.	There is a strong emphasis on getting line and staff personnel to adhere closely to their formal job descriptions.	1 2 3 4 5 6	There is a strong tendency to let the requirements of the situation and the personality of the individual defines proper job behaviour.
		Reward Philosophy	
18.	Our employees are evaluated and compensated based on their responsibilities.	1 2 3 4 5 6	Our employees are evaluated and compensated based on the value they add to the firm.
19.	Our employees are usually rewarded by promotion and annual raises.	1 2 3 4 5 6	We try to compensate our employees by devising ways so they can benefit.
20.	An employee's standing is based on the value s/he adds.	1 2 3 4 5 6	An employee's standing is based on the amount of responsibility s/he has.
21.	An employee's performance is evaluated by short-term profit targets.	1 2 3 4 5 6	An employee's performance is evaluated by longer-term value creation for the firm.
22.	Rewarding in our firm is based on the employee's individual performance.	1 2 3 4 5 6	Rewarding teams for a good team performance is a common practice in our firm.
23.	We reward our employees by giving them more job flexibility and access to resources they might need to develop new ideas.	1 2 3 4 5 6	Increased responsibility levels are a common method of rewarding employees.
		Growth Orientation	
24.	It is generally known throughout the firm that growth is our top objective.	1 2 3 4 5 6	Growth is not necessarily our top objective. Long term survival may be at least as important.
25.	It is generally known throughout the firm that steady and sure growth is the best way to expand.	1 2 3 4 5 6	It is generally known throughout the firm that our intention is to grow as big and as fast as possible.
		Entrepreneurial Culture	
26.	We have many more promising ideas than we have time and the resources to pursue.	1 2 3 4 5 6	We find it difficult to find a sufficient number of promising ideas to utilize all of our resources.
27.	Changes in the society-at-large seldom lead to commercially promising ideas for our firm.	1 2 3 4 5 6	Changes in the society-at-large often give us ideas for new products and services.
28.	We never experience a lack of ideas that we can convert into profitable products/ services.	1 2 3 4 5 6	It is difficult for our firm to find ideas that can be converted into profitable products/ services.