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The culture of European high-tech start-ups

an empirical exploration of its influence on strategic cooperation and partner selection

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An Empirical Exploration of Its Influence on Strategic Cooperation and Partner Selection

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Abstract

This report describes an empirical exploration of the influence of national, professional and sector culture on the cooperation propensity of European high-tech start-ups. Based on nine hypotheses a survey approach is used to test several relationships. The results of the survey are used to evaluate the hypotheses, discuss the findings and draw conclusions on the study's validity, reliability and practical applicability.

Executive summary

High-tech start-ups (HTSUs) play an important role in Europe's economic development. HTSUs are defined as companies less than six years old, aiming to produce and/or trade in technologically innovative products, processes and/or services. HTSUs generate a high turnover per employee and spillover effects to their surroundings, and furthermore play a dynamic role in job creation. Therefore, they are believed to contribute to the creation of wealth in the EU to make up for the increasing gap between labour force and welfare costs.

Many HTSUs operate independently and do not see the need for acquiring resources externally. Fear for loss of specific knowledge is often the reason for this. HTSUs are, however, in great need of external resources, i.e. they are initially resource dependent. This study goes beyond these resource dependency arguments and takes a look at nurtured individual characteristics of the people involved in a HTSU to determine cues for external partnering. In doing so it is argued that culture, the collective programming of the mind that distinguishes the members of one group or category of people from another, plays a role in this on several levels, namely on the national, professional and sector levels of culture (NC, PC, SC).

HTSUs may choose to cooperate externally and, if they do so, will they cooperate with those that have equal values, or with those that have totally different values? In relation to these arguments the following research question is used:

What is the influence of National Culture, Professional Culture and Sector Culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?

The latter terms in this question are the dependent variables and they are defined as follows:

Acceptance of cooperative strategies (COO): the degree to which a HTSU from one of Europe's countries is willing to accept cooperative strategic strategies that cross company borders.

Acceptance of partner dissimilarity (APD): the degree to which a HTSU from one of Europe's countries is willing to accept dissimilarities in its strategic partner's cultural background and values.

As it is believed that NC, PC and SC influence these variables, they are conceptualised as independent variables as follows:

National culture (NC): Hofstede's (2001) dimensions of individualism, uncertainty avoidance and masculinity were used.

Professional culture (PC): the degrees of cross-functional experience members of the HTSU have in their company.

Sector culture (SC): manufacturing or services.

Hypotheses are drawn about the relationships between the independent and dependent variables and they are validated in a cross-sectional digital survey across a large number of European countries (the resulting validated model is shown in Figure E1). From the data of the 109 HTSUs that responded evidence was found in support of five out of nine hypotheses. More specifically, two dimensions of national culture, one hypothesis for professional culture, and the two hypotheses for sector culture are

supported. As the items in the survey were found to reflect sufficient convergent and discriminant validity, the results are believed to be valid for HTSUs.

For further research a more fine-grained approach is necessary. This study's results are not applicable on a practical basis until they are further refined and weighted. The constructs have to be enriched and adapted to practice in such a way that they incorporate the benefits of cross-cultural cooperation more explicitly. Methodologically, a multiple case study approach would be a good way to start refining the variables and settings.
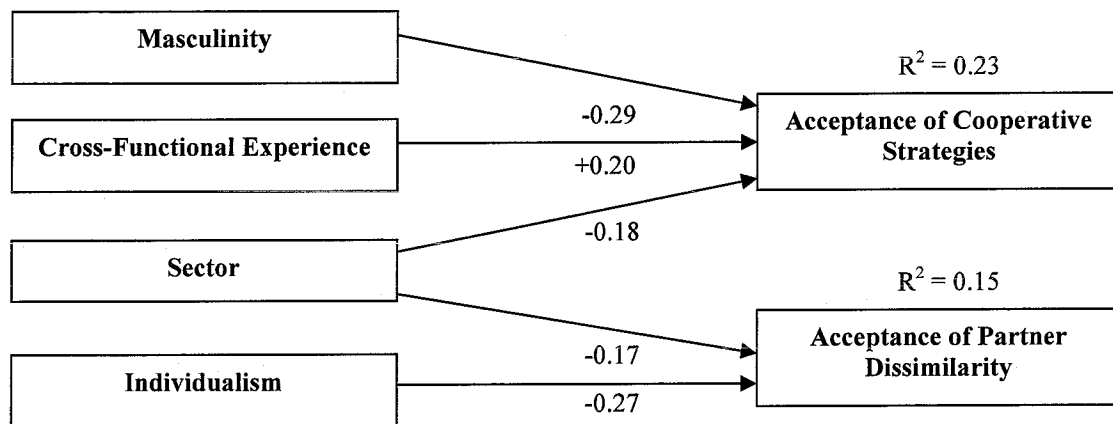

Figure E1 – The validated model with β-coefficients and R^2-values

Preface

This report presents a Master's Degree Thesis for the Organisation Science and Marketing Group of the Department of Industrial Engineering and Management Science, Faculty of Technology Management, at Eindhoven University of Technology, the Netherlands. It describes a research project that deals with culture's role in high-tech start-up cooperation. It was carried out jointly with the Entrepreneurship, Innovation and Small Business Network (EISB) at the European Foundation for Management Development (EFMD) in Brussels, Belgium.

It was my intention to experience the elements of doing a true research during my Master's degree project and that is surely what I have done. The past eight months have been quite a journey so to say, all the way through Brussels and Montpellier, through surveys and factor structures, through much more literature than I could have ever quoted in this study, through discussions with many different people from science and from practice; I could go on and on! Altogether, it has been a great learning experience.

The project ended up with some basic structure describing the influence of selected culture levels on cooperative strategies by European high-tech start-ups. The project was started as a pilot for the SURVIE task force (Start-Up Research and Valorisation/Validation of Intra- and Entrepreneurship in Europe), of which I had the pleasure to attend the first conference in March 2005 in Montpellier. At the same time I had the great pleasure of working for the European Foundation for Management Development and its Entrepreneurship, Innovation and Small Business Network in Brussels.

I would like to express my gratitude to some people involved in this project in particular. I would like to thank Liliana Petrella and Florence Gregoire for providing me with the encouragement, opportunities, support, information, contacts and facilities at EFMD in Brussels. Also, although they were not involved in the actual project, I thank Robin Hartley, Claude Loux, and all others at EFMD and EISB for their kindness and enthusiasm during my internship. Hamid Bouchikhi has been a great pleasure to work with and learn from; thanks for your focus, inspiration and interest. Furthermore, I would especially like to thank my first supervisor, Jan Ulijn, for his unlimited enthusiasm, dedication, support, ideas, and his respect; it has been a great pleasure to cooperate. Also, I would like to thank Bert Sadowski for his involvement in my project. Thanks to Kate Brown (University of Otago), Dominique Drillon (CEROM), Calin Gurau (CEROM), Beate van der Heijden (MSM), Ad de Jong (TU/e), Frank Lasch (CEROM) and Maria Clara Torrens (Universitat Politècnica de Catalunya) for support regarding methodological issues; to Tonny Bosman (Suprapolix), Bart de Jong (TU Innovation Lab) and Jelto Smits (Philips Incubator) for their practical view. Lastly, many thanks to Hanns Menzel for the valuable discussions we have had regarding both of our projects.

Finally, I would like to express my appreciation to all other people that, despite the fact that I am sometimes hard to deal with, supported me during this project: to Jessica, my family and friends; thanks very much for the support and encouragement.

Hans T.W. Frankort / Eindhoven, June 2005

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List of abbreviations

A	Anglo Culture Cluster
APD	Acceptance of Partner Dissimilarity
BS	Balto-Slavic Culture Cluster
CEROM	Centre d'Etudes et de Recherche sur les Organisations et le Management
CFE	Cross-Functional Experience
COO	Acceptance of Cooperative Strategies
DG	Directorate-General
EC	European Commission
ECIS	Eindhoven Centre for Innovation Studies
EFMD	European Foundation for Management Development
EISB	Entrepreneurship, Innovation and Small Business Network
EU	European Union
G	Germanic Culture Cluster
GL	Greco-Latin Culture Cluster
ID	Industry Dynamism
IDV	Individualism/Collectivism Index
LTO	Long-term Orientation Index
MAS	Masculinity/Femininity Index
MSM	Maastricht School of Management
N	Nordic Culture Cluster
NPD	New Product Development
PDI	Power Distance Index
SME	Small and/or Medium-Sized Enterprise
SURVIE	Start-Up Research and Valorisation/Validation of Intra- and Entrepreneurship in Europe
TU/e	Eindhoven University of Technology
UAI	Uncertainty Avoidance Index

1. Some background assessing relevance and rationale

Introduction

The meeting of the European Council at the Lisbon Summit in 2000 put enterprises at the heart of the European Union's strategy (European Commission, 2003a). The potential economic power of the EU was believed to be enormous: "[the goal of the EU is to become]…the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion [before 2010]" (European Union, 2005). Actually, the Lisbon Summit can be viewed as the continuation of a range of activities that over the past few decades have focused on the EU's competitiveness and social cohesion through fostering enterprise birth, development and success.

The recent report by the High Level Group chaired by Wim Kok pointed to a serious delay in the progress towards the 2010-goal and thus the European Union is going through a critical era in its development (High Level Group, 2004). Both the recent and upcoming enlargements as well as the disappointing economic performance call for redrawing the EU's structural sketch to utilize and join resources in a more constructive way. The rise in welfare costs and the concurrent sluggish decrease in labour force also cue this (Swann, 2000). Furthermore, high-cost locations in general are losing jobs because of globalisation forces and the information revolution. The resulting perceived policy trade-off entails the illusionary interplay between wages and employment. Higher wages would be linked to fewer jobs, whereas lower wages would be linked to more jobs. In reality, however, policies should focus on Europe's comparative advantage in knowledge-based economic activities, which are harder to transfer to low-cost locations and create more value per capita, thus maintaining wage levels (Murray, 2003; Audretsch, 1998)[1].

Economic solidity and regional integration will greatly benefit the EU's goals of creating more jobs and economic growth. This entails expanding the EU and creating increasing interdependencies between members, and between the Union and other "regional clubs" (Leonard, 2005). Creating these interdependencies does not only rest in policy design but also and primarily in the people's willingness to interact with others from different countries and cultures. Although all these people have different values that are often believed to cause troubles in their interaction, Europe's cultural diversity hides a great potential at the core of its economic power (Ulijn & Fayolle, 2004; Simons, 2002). This is one of the reasons to adopt several programs related to enterprise growth and support at a EU-level, mainly targeting small and medium-sized enterprises (SMEs). Most measures to improve the SME environment are a national responsibility. The EU's task is thus to help Member States improve their performance (European Commission, 2003b).

The High Level Group report emphasizes five focal points as determinants of future economic and social success in the EU, of which two deserve special attention. The *knowledge society* needs to be stimulated by boosting R&D spending, the development of new technologies, and increasing the value of human capital, among

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[1] However, a recent analysis in BusinessWeek argued that even R&D activities are being "farmed out" (Engardio & Einhorn, 2005). This challenges the long-term validity of theories that focus on Europe's advantage in knowledge-based activities.

others. The *business climate* needs to be stimulated by creating an environment conducive to entrepreneurship and innovation, and reducing the time and costs related to starting and doing business, among others. The following section deals with entrepreneurship and innovation of these two points in more detail and makes the case for fostering the growth and development of high-tech start-ups (HTSUs).

1.1 Entrepreneurship, innovation and HTSUs

Why do the recommendations of the High Level Group specifically focus on entrepreneurship, innovation, new technologies and new business start-up? To answer this question, some elaboration is useful.

The entrepreneurship concept has received a diffuse range of definitions and interpretations. However, even today a widely accepted definition and conceptual framework do not exist. As Shane and Venkataraman (2000) note, this seems to be the reason for the conceptual misunderstandings in entrepreneurship research. For the purpose of this project the following definition gives a fair view of the concept, entailing the concept of innovation already:

> "Entrepreneurship is the manifest ability and willingness of individuals, on their own, in teams, within and outside existing organizations, to:
> - perceive and create new economic opportunities (new products, new production methods, new organizational schemes and new product-market combinations) and to
> - introduce their ideas in the market, in the face of uncertainty and other obstacles, by making decisions on location, form and the use of resources and institutions" [Wennekers & Thurik, 1999: 46-47].

The concept of innovation is reflected in the first bullet point, where the creation of new products, methods, and so on is mentioned. Johnson (2001: 140) concludes that only if a company is "proactively moving away from what is to what could be", it can be described as innovating. From the definition above it becomes clear that there are many ways in which to be entrepreneurial and innovating. By creating new opportunities and introduce them in the market, economic growth is fostered as things come to life that did not exist before. Furthermore, jobs are created since new competencies are required to generate new ideas and to produce the products and processes.

The current study focuses specifically on one way of being entrepreneurial and innovative, namely the creation of new high-technology ventures. They will be labeled high-tech start-ups (HTSUs) in this study and are defined as follows:

> HTSUs are companies less than six years old, aiming to produce and/or trade in technologically innovative products, processes and/or services.

It should be stressed again that HTSUs are by no means the only way to be entrepreneurial and innovative. However, new venture creation is often used as a convenient measure for operationalising the entrepreneurship and innovation concepts in research (Audretsch, 1995).

Do HTSUs contribute significantly to economic growth and employment growth? Research confirms that knowledge-based start-ups are more successful than other start-ups in growth in turnover, mainly because of the creation of technologically valuable products, processes and services (Snijders & Van Elk, 1998; Shane, 1995).

Furthermore, empirical evidence shows a large role for new small firms in the job-creation process (Audretsch, 2002; Bangma & Verhoeven, 2000; Carree & Klomp, 1996; Davis *et al.*, 1996; Konings, 1995; Birley, 1986). Specific evidence for the job-creation potential of HTSUs is, however, rare. It could even be argued that it is the large companies that create the most jobs per unit of time, but this argument rests mainly on US evidence (Bouchikhi, 2004). Therefore:

> The major contribution of HTSUs to Europe's economic growth goes beyond direct contributions to value added and employment. Significant spillover effects to the rest of the economy and social returns are primarily believed to exist (European Commission, 2002).

Because of the aforementioned evidence it is worthwhile looking at the development of HTSUs from a EU-perspective. Section 1.2 deals with a selection of problems and hurdles in HTSU development. Section 1.3 assesses a HTSU's need for cooperation, and provides a taxonomy of parties that can be used to cooperate with. Furthermore, it elaborates briefly on modes of cooperation. Lastly, Section 1.4 defines the dependent variables for this study and describes the report's structure.

1.2 What are the problems in HTSU development?
The development of a HTSU is believed to be highly iterative and problematic in several ways. Some examples:

1. The creation of knowledge is an iterative process and involves many tacit dimensions that cannot be managed in a unified way (Cavusgil *et al.*, 2003; Nonaka & Takeuchi, 1995). The dynamics of this process are strongly dependent on the type of product, process or service, on the environment of the organization, and on the organizational arrangement of the people that create the knowledge (Olson, 1987).
2. The HTSU changes during its development with regard to governance requirements (Sull, 2004; Alpander *et al.*, 1990; Olson, 1987). The kind of management required during the initial start-up is believed to be different from the management required during the growth of the venture. This does not only entail people but also structures (Treen, 2001; Shuster, 1999).
3. HTSUs operate in highly specialized, competitive and dynamic competence fields. The link between the technological inventions and the market is believed to be unclear in many cases, but is very important (Ulijn & Fayolle, 2004; Gartner, 1985).
4. The formation of a single internal European market in many ways forces companies to interact with people that have different cultural backgrounds. Because of the initial smallness of HTSUs they have to interact even more, especially if they would like to enter foreign markets.

1.3 HTSU cooperation
The problems and hurdles above only marginally describe the full picture of issues involved in starting up and developing a HTSU. The notion that cooperation between HTSUs and external parties helps fight these problems and hurdles has been fairly well established over the years. In the current study HTSU cooperation is defined as follows (adapted from Barnard, 1938):

> HTSU cooperation is a functional system of activities between the HTSU and one or more different parties, aimed at improving the HTSU's performance.

This definition implies that cooperation does not necessarily need to result in mutual benefits. Though mutual benefits often are at stake, they are not included in the definition, as they are not required to explain cooperation from the perspective and performance intentions of the HTSU itself. From literature a crude taxonomy of issues that influence a HTSU's incentives to cooperate is shown in Table 1.1.

Table 1.1 – Non-exhausting list of grouped reasons for HTSU cooperation[a]

1	Complementarity
	Partner in different sector
	Fulfil client needs more closely
2	Unique competencies of partner
	Ability of partner to acquire skills
	Technical capabilities of partner
	Quality of partner
3	Market access
	Market knowledge of partner
	Location of partner's premises
4	Cost of alternatives
	Finance
5	Sharing expertise
	Joint problem solving

[a] Sources: Johnson (2004), Wu and Young (2002), Chung *et al.* (2000), Hitt *et al.* (2000), Shuster (1999), Dennis (1998), Dyer and Singh (1998), Birley (1996) and Alpander *et al.* (1990).

Group 1 basically describes the reasons that originate explicitly from the complementarity between the HTSU and its partner. The partner may be operating in a different sector and a combination of that sector's practices with the ones from the HTSU may be improving the HTSU's performance. Group 2 specifically contains reasons that have the do with the quality, competencies, and uniqueness of the partner that, in cooperation, may increase the HTSU's performance by being allowed to benefit from these. Group 3 deals with reasons that aim at expanding the HTSUs market. Especially HTSUs in smaller countries are more likely to have reasons like these (European Commission, 2003a). Group 4 contains financial cues for cooperation, whereas group 5 emphasizes the sharing of knowledge and expertise. Most HTSUs will have a mix of the reasons above as cues for external cooperation. Note that these reasons are in this case not coupled to the HTSU *needs*. However, a HTSU is likely to have needs with regard to finance and market expansion (Section 1.2). Furthermore, the reasons for cooperation are believed to shift during the HTSU's development (European Commission, 2003a).

For cooperation the HTSU basically has two choices:
- *(Social) networks*: these are the networks of personal contacts the members of the HTSU have or the networks the HTSU is operating in. Research suggests a large role for these (social) networks in the formative years of a HTSU (see, among others, Cottica & Ponti, 2004; Labory, 2004; Nicolaou & Birley, 2003; Schutjens & Stam, 2003; McEvily & Zaheer, 1999; Coviello & Munro, 1995; Birley, 1985).
- *Strategic partnerships*: these are more formal agreements between the HTSU and other parties that can take the form of joint ventures, buyer-supplier alliances, technology alliances, and so on (Caloghirou *et al.*, 2003; Harrison *et al.*, 2001; Sarkar *et al.*, 2001).

The parties that a HTSU has at its availability to cooperate with could be summarized as in Table 1.2.

Table 1.2 – Contacts that a HTSU has at its availability for cooperation[a]

Formal contacts	Informal contacts		Cold contacts
	Business contacts	*Other contacts*	
(Local) government	Different HTSU	Family	Newspaper
Accountant	Different company	Personal friends	Mail advertisements
Advisor/mentor			Internet
Bank			Other
Chamber of commerce			
Incubator			
Lawyer			
Realtor			
Small business administration			
University			

[a] Sources: Nicolaou and Birley (2003), Schutjens and Stam (2003), Rodgers *et al.* (2002), Ostgaard and Birley (1996) and Birley (1985).

As becomes clear from the table above, some contacts provide professional assistance and others may both serve as members of the HTSU's social network as well as of its strategic partnerships, especially other HTSUs and companies. Cold contacts are mainly believed to be important as intermediaries for seeking personnel (Birley, 1985), but also for e-commerce, among others. What is very clear is that the HTSU is facing many choices in selecting the partners for its development.

> The major issue, however, is not the selection of the partners in the first place, but rather the decision to start cooperating itself! The European Commission (2003a) has shown that the one main reason for not cooperating is the fear for loss of independence and loss of firm-specific knowledge! (See also OECD, 1998)

1.4 Defining the dependent variables and the research question

The last remark in the previous Section provides serious challenges to policy makers. In an enlarging Europe with a growing cultural diversity, the markets may be becoming larger, but the integration may be becoming even more sluggish than before because of fears for people that have different cultural backgrounds. The current study will provide some starting points for further exploration by investigating the cultural effects on a HTSUs willingness to cooperate. Would the willingness to cooperate be related to culture? The first dependent variable that is defined in this context is thus the following:

> **Acceptance of cooperative strategies (COO)**: the degree to which a HTSU from one of Europe's countries is willing to accept cooperative strategies that cross company borders.

Related to both this notion of cooperation as well as Europe's cultural diversity is the notion of commonality or dissimilarity of one's strategic partner. Various studies investigated the effects of mixing cultural values in cooperation situations (Chen *et al.*, 1998; Nakata & Sivakumar, 1996). The latter, by Nakata and Sivakumar, argues that companies that are involved in new product development (NPD) can really benefit from cultural diversity (on a national culture level). They argue that in an

NPD-project the phases of NPD initiation and NPD implementation require different cultural backgrounds in the way depicted in Table 1.3.

Table 1.3 – Ideal cultural backgrounds for NPD initiation and NPD implementation, following Hofstede (2001) (adapted from Nakata & Sivakumar, 1996)[a]

NC dimensions	NPD initiation	NPD implementation
IDV[b]	High	Low
MAS	Low	High
UAI	Low	High
PDI	Low	High

[a] The long-term orientation dimension has been omitted to avoid confusion.
[b] IDV=individualism, MAS=masculinity, UAI=uncertainty avoidance, PDI=power distance

The four culture dimensions are described later and are drawn from Hofstede (2001). The table shows that the authors believe that the ideal cultural backgrounds of people in NPD initiation are the opposite of the ideal ones in NPD implementation. This suggests that cultural diversity might be a big asset for HTSUs, not only for market extension, but also for its NPD process. However, how do European HTSUs think about this cultural diversity in relation to their own cooperation? In high-tech industries the nature of value creation is usually different from other industries. It is believed to be relying heavily on intellectual capital and tacit knowledge (Rogers, 2001). Developing this knowledge and cooperating externally to do so requires trust between parties (Sydow, 1998). Namely, tacit knowledge content and development is hard to check and pin down. The second dependent variable that is thus defined in this context is the following:

> **Acceptance of partner dissimilarity (APD):** the degree to which a HTSU from one of Europe's countries is willing to accept dissimilarities in its strategic partner's cultural background and values.

The main research question that this study deals with is the following:

> *What is the influence of culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?*

Chapter 2 theoretically disentangles the concept of culture and rephrases the research question in a more specific way. Furthermore, hypotheses for the empirical part of this study are presented. Chapter 3 describes the research methods employed and Chapter 4 presents the empirical results. Chapter 5 then discusses the findings and deals with their implications. Chapter 6 states the overall conclusions of this study.

2. Culture and cooperation

Introduction
The previous chapter developed the issues that influence a HTSU's need for cooperation. As has been shown, these issues are the result of a need to establish and develop the venture in an environment where many concurrent developments are quick to change. This chapter takes a closer theoretical look at the role culture plays in a HTSU's willingness to cooperate. It thus elaborates on the following research question:

> *What is the influence of culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?*
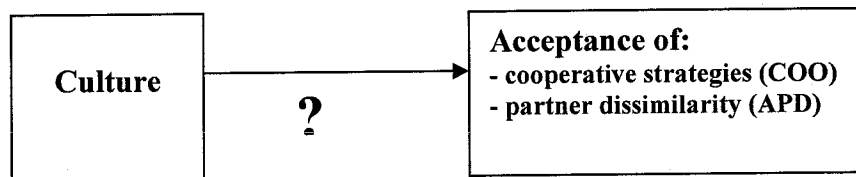
Figure 2.1 – The research construct

Namely, the theoretical universality of cooperation determinants is believed to be highly doubtful (Steensma *et al.*, 2000b; d'Iribarne, 1989). Furthermore, in this project HTSUs are considered to be independent entities for which cooperation is not "self-enforcing" by nature (Bartlett & Ghoshal, 1989: 93-94). Their cultural background will shape their view of the world, and they are autonomous and free to choose cooperation mechanisms (Chen *et al.*, 1998). Exploring culture as a determinant of a HTSU's cooperation propensity stems from the idea that cooperation may be embedded in culture and on various levels (ibid.). Work by Ali (2005) even shows that in a study of Islamic work ethic and values "cooperation" is the second most highly rated work value: "Cooperation is a virtue at work" (ibid., p. 59).

This chapter starts with some definitions of culture and its components. The culture concept is then further disentangled to the point where it is believed that useful relationships exist with the dependent variables, i.e. "acceptance of cooperative strategies" (referred to as COO) and "acceptance of partner dissimilarity" (referred to as APD). Hypotheses, which are the basis for the empirical research (Chapters 3 and 4), are then derived about these relationships.

2.1 Defining culture
Before using the culture concept in subsequent sections some elaboration is useful. Although the range of culture definitions is extensive, the visualizations of the concept are fairly similar across various sources. A widely accepted definition of culture is the one proposed by Hofstede (2001: 9):

> "[Culture can be treated as] the collective programming of the mind that distinguishes the members of one group or category of people from another."

Culture is thus seen as a collective rather than an individual feature. In this context Hofstede purposely distinguishes between groups and categories. "Groups" refers to a number of people that are in contact with each other, e.g. organization members,

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members of a sports team, and so on. "Categories" refers to a number of people that have something in common, without necessarily being in contact with each other, e.g. all people that are born in 1980, all people living in the UK, and so on. Obviously, categorical cultures cut across group cultures. They all create social order and provide a means of sense making (Schein, 1993; Trice & Beyer, 1993; Louis, 1980). Hence, an individual's way of making sense is influenced by the cultures that he or she is part of (Sirmon & Lane, 2004; Salk & Shenkar, 2001).

Figure 2.2 visualizes the "manifestations of culture at different levels of depth" in an onion metaphor (Hofstede, 2001; Schein, 1993)[2]. The figure shows that culture is a constellation of implicit and more explicit elements. Implicit elements at the cultural core are invisible (sometimes hidden), while the explicit elements are more visible.
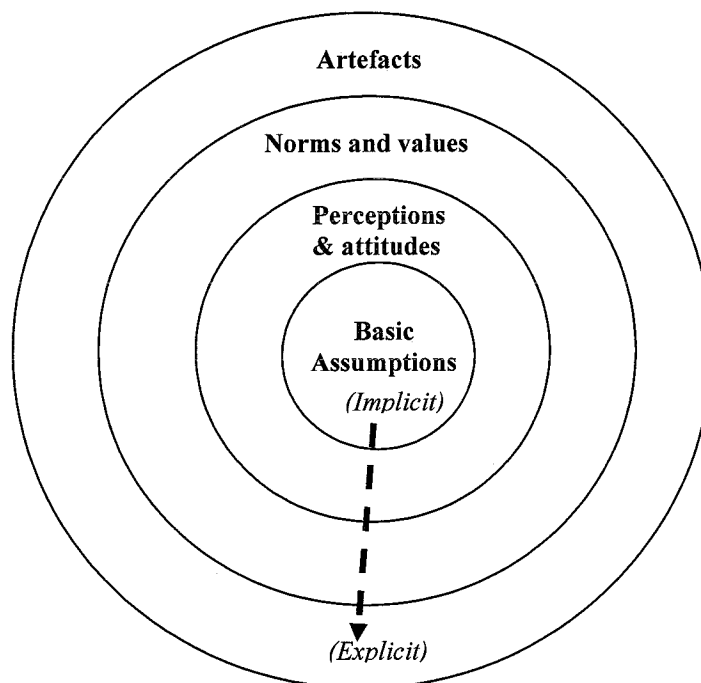
Figure 2.2: Culture as an onion (adapted from Ulijn & Fayolle, 2004 and Ulijn & Gould, 2002)

Basic assumptions are at the core of culture. These assumptions are often unquestioned and taken for granted and, in Schein's perspective, invisible and outside ordinary awareness. The basic assumptions influence the *perceptions*, thought, *attitudes* and feelings of members of a culture. The inner layers interact with the *norms* and *values* of a culture. Norms are unwritten rules that shape expectations in a wide range of situations. Values are the social principles, goals, and standards held within a culture to have intrinsic worth (Hatch, 1997). Outcomes that are valued are sanctioned (positively or negatively) by norms. At the surface of culture are the *artefacts*, i.e. physical, behavioural and verbal manifestations of the culture. These include the dress and appearance of people, the rituals and ceremonies, and the myths, history and heroes of a culture. Everyone can observe these manifestations. It should be noted that the reflection of core elements in explicit outings is not straightforward.

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[2] Substantial overlap exists between this model and others. Kilmann *et al.*'s (1985) cultural iceberg is often used as well.

Especially the interpretation of artefacts with regard to their core origin is often biased because they are furthest away from the cultural core.

As a note of caution it is important to mention the sluggishness of cultural change. A culture cannot just be created, shaped, changed or imposed on a social setting (Morgan, 1997; Schein, 1993). This is of special relevance for people that have an interest in changing a culture. Figure 2.2 shows that cultural change ultimately involves changing the invisible basic assumptions of culture's members. This change is the result of a complex group process, an accumulation of shared learning, on which individuals have only limited influence (Schein, 1993). Business leaders might be able to cue a change e.g. by transforming (financial) incentives. That, however, does not make the change easier, faster, or more convenient for employees. For example, BusinessWeek (Brady, 2005) had the story of General Electric's "Cultural Revolution": Jeffrey Immelt, its chairman and CEO, struggles to transform GE from a process-oriented company into "one steeped in creativity and wired for growth" (ibid., p. 52). Its employees are obviously not used to be judged on the basis of creativity but rather on bottom-line results. This thus imposes limits on the capacity to change.

The definition and model above apply to an infinite number of categorical and group cultures. However, the relevance of all these is limited by the degree of accuracy that is needed to describe the relationships in Figure 2.1. To achieve focus in the current study, the trade-off between relevance and accuracy is settled in Section 2.2. Sections 2.3 through 2.5 then provide the theoretical basis and the nine hypotheses.

2.2 Levels of culture

In order to state hypotheses about the relationships in Figure 2.1 it is necessary to define more precisely what kinds of culture have to be researched. This is approached in the current Section from a methodological point of view. Namely, the level of analysis in the empirical part of this study (Chapters 3 and 4) dictates the refinement that can be achieved. Since the HTSU, personified in a member of the team that started up the company, is the unit of analysis, it has to be made sure that the questions posed during data-collection are meaningful at the level of this individual. By doing so, the fallacy of the wrong level is avoided (Boone & De Brabander, 1997). Now, what levels of culture have to be researched? Figure 2.3 summarizes the ideas (inspired by Poortinga *et al.*, 1990).
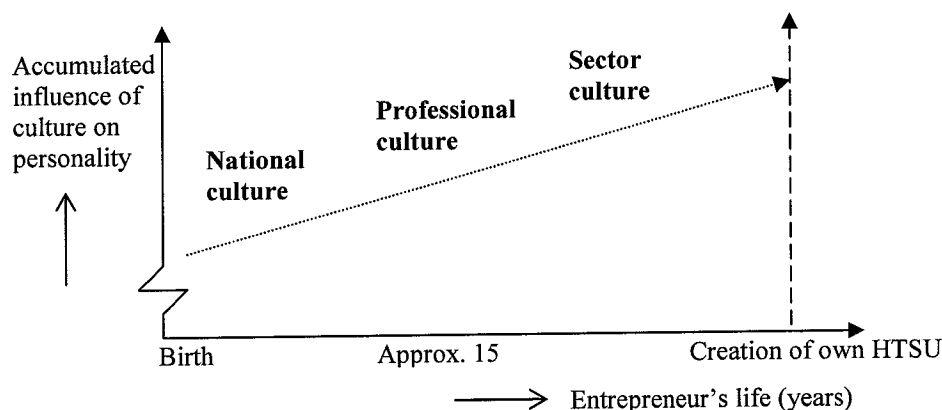

Figure 2.3 – A model of culture's influences on an entrepreneur's personality during his/her lifetime until the start of his/her own business (arbitrary axis values)

The y-axis presents an accumulation of genetic (natural) and learned (nurtured) phenomena. As genetic phenomena are determined in a prenatal stage, these are left out of consideration. The x-axis presents the entrepreneur's lifetime in years, until the point in his/her life where he/she (co-) starts a HTSU. The figure shows the belief that one's national culture (referred to as NC) is the earliest influence of culture on one's personality in life. Being born in a certain country implies that one is early on in life confronted with the country's "collective programming of the mind" (Hofstede, 2001: 9). After approximately fifteen years a person tends to develop thoughts on the kind of work he/she likes to do in the future and, consequently, what kind of tertiary education would be suitable to achieve this. This is when the influence of a certain professional culture (referred to as PC) starts influencing one's personality. Lastly, when one starts working the nature of the sector that one works in is likely to add an additional dimension to the programming of the individual's mind. In the current study this is referred to as sector culture (SC).

Thus, it is the elementary notion in this study that NC, PC and SC are embedded in one's personality by the time he/she starts a HTSU and that they influence the decisions one makes regarding the business (Tyler & Steensma, 1998; Kets de Vries & Miller, 1984; Miller *et* al., 1982). Because of this, NC, PC and SC have to a certain degree become part of the person's basic assumptions. These assumptions are reflected in the perceptions of the respondents (see Chapter 3) when they answer the questions regarding COO and APD. Or, put differently, the survey answers will reflect the respondent's perceptions, which are based on assumptions that stem partially from NC, PC and SC (Weber & Menipaz, 2003; Ulijn & St. Amant, 2000).

The research question can now be specified more precisely as follows:

> *What is the influence of National Culture, Professional Culture and Sector Culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?*

2.3 National Culture

The most widely studied level of culture is National Culture (NC). Research on NC rests on the belief that differences exist between nations as far as their basic assumptions are concerned. National borders also define the social, legal and political environments in which people operate. It is a general belief that the more similar these environments are, the higher the probability that countries' NCs are of a similar nature (Gupta *et al.*, 2002; Ronen & Shenkar, 1985). Research on NC seriously challenges the universality assumptions that underlie many management theories (Thomas & Mueller, 2000). Adler (1983) referred to the latter as "parochial" theories, in which culture is "implicitly considered to be a constant" (ibid., p. 33). In an increasingly global market, the limited applicability of these "parochial theories" pose a serious challenge to businesses: what worked before no longer does!

NC is, among others, believed to influence modes of employment (Hofstede *et al.*, 2004; Blanchflower *et al.*, 2001), entrepreneurial potential (Mueller & Thomas, 2000), innovation championing strategies (Shane *et al.*, 1995), international alliance formation, dissolution and success (Sirmon & Lane, 2004; Steensma *et al.*, 2000a&b; Barkema & Vermeulen, 1997; Park & Ungson, 1997; Cartwright & Cooper, 1993), relationships in teams (Salk & Brannen, 2000), knowledge sharing (Möller & Svahn, 2004), and perceptions of others (Ulijn *et al.*, 2003). As NC is already "programmed"

into individuals' minds early in life, behaviour tends to be, on average, more or less consistent with this NC (Wennekers *et al.*, 2002: 41; Hofstede, 2001). Moreover, research indicates that even in companies that are known for their strong corporate culture, NC remains of paramount importance in explaining its employees' business-related behaviour (Hofstede, 1994; Hofstede *et al.*, 1990). The current study relies on Hofstede's (2001) dimensions of NC. These dimensions are mutually independent and result from extensive research in 72 countries, including both developing as well as developed ones. The concepts of individualism, uncertainty avoidance and masculinity in particular are believed to be relevant in this study. These dimensions have been used before in entrepreneurship research (Steensma *et al.*, 2000a&b; Shane *et al.*, 1995).

The concept long-term orientation is not included in this study as the variance in long-term orientation values across European countries (that are relevant in this study) is very low. Power distance is not included for two reasons. Firstly, power distance, the extent to which members of a culture expect power to be distributed equally (Hofstede, 2001: 98), is believed to be irrelevant in this study approach. The concept does not imply relationships with the dependent variables. Secondly, in Hofstede's (2001) study power distance loaded on the same factor as individualism. His findings suggested that cultures that depend on in-groups (collectivists) also depend more on authoritarian personalities. Interestingly enough, the landmark study by Everett Hagen (1964) already reflected these findings. He argued that an individual in a traditional society (a society of in-groups) shapes his world according to the orders of authoritarian superiors and feels constrained to resist and fears to use his own initiative (ibid., pp. 97-98). His counterpart shapes the world by opening up to experiences and relying on his own (often unconscious) creative imagination to perceive opportunities. Hagen notes that such a personality is somewhat detached from his society (ibid., pp. 88-95), i.e. more individualistic and less dependent on authoritarians.

2.3.1 Individualism

Societies differ with regard to their emphasis on individual versus collectivist values. Hofstede (2001) defines these as follows:

> "Individualism stands for a society in which the ties between individuals are loose: everyone is expected to look after him/herself and her/his immediate family only. Collectivism stands for a society in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty" [p. 225].

The scale for individualism/collectivism is the Individualism Index (IDV): the higher a country's score, the higher the level of its individualism. Tiessen (1997: 370) argues that a high IDV score "does not preclude relationships with others". In his view, the IDV rather determines the importance of the pursuit of individual vs. collective benefits in relationships. In a high-IDV society cooperation thus does not necessarily occur less frequently than in low-IDV societies. However, Steensma *et al.* (2000a) found that high individualism was significantly negatively correlated to the acceptance of cooperative strategies in general. Collectivists' propensity to cooperate appears to be higher than that of individualists (Cox *et al.*, 1991). Hofstede (2001: 226) also mentions the belief in high-IDV societies that individual decisions are better than group decisions. This may be due to the mediating effect of cooperation

mechanisms like trust and other incentives (Chen *et al.*, 1998). The following is thus hypothesized:

> **Hypothesis 1**: *The higher a country's IDV, the lower its HTSUs' acceptance of cooperative strategies.*

Möller and Svahn (2004: 222) argue that members of collectivist cultures, although they tend to cooperate more, have a tendency to communicate primarily with others within their in-group, whereas individualists will communicate more easily with anybody, even across organizational boundaries. However, Steensma *et al.* (2000a) did not find evidence in favour of this argument. They found that in high-IDV societies an increased importance of contractual safeguards did not co-evolve with a decreased importance of the strategic partner's commonality. It may thus be believed that HTSUs in high-IDV societies will not accept partner dissimilarity because they do not like to cooperate in the first place. If they cooperate, the partner would better be as similar as possible. The following is thus hypothesized:

> **Hypothesis 2**: *The higher a country's IDV, the lower its HTSUs' acceptance of partner dissimilarity.*

2.3.2 Uncertainty avoidance

Hofstede (2001) defines uncertainty avoidance as:

> "The extent to which the members of a culture feel threatened by uncertain or unknown situations" [p. 161].

The scale for uncertainty avoidance is the Uncertainty Avoidance Index (UAI): the higher a country's score, the higher the level of uncertainty avoidance. Societies show different levels of uncertainty avoidance, as their members feel more or less comfortable in uncertain or unknown situations. People tend to value structure and formal rules more in uncertainty avoiding cultures, whereas in cultures with a low level of uncertainty avoidance people cope better with ongoing change. Hofstede (2001: 160) also indicates that in uncertainty avoiding cultures there tends to be an "ideological preference for group decisions". The amount of uncertainty avoidance is thus believed to increase the acceptance of cooperative strategies.

> **Hypothesis 3**: *The higher a country's UAI, the higher its HTSUs' acceptance of cooperative strategies.*

Uncertainty avoiding societies show a higher general anxiety level and a suspicion of foreigners and others. Furthermore, they show a higher resistance to change (Hofstede, 2001). Steensma *et al.* (2000a) found that uncertainty avoiding cultures place significantly more importance on partner commonality in cooperation. Hence, higher uncertainty avoidance will decrease the acceptance of partner dissimilarity.

> **Hypothesis 4**: *The higher a country's UAI, the lower its HTSUs' acceptance of partner dissimilarity.*

2.3.3 Masculinity

Societies differ with regard to their emphasis on masculine versus feminine values. Hofstede (2001) defines these as follows:

"Masculinity stands for a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focussed on material success; women are supposed to be more modest, tender, and concerned with the quality of life. Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life" [p. 297].

The scale for masculinity is the Masculinity Index (MAS): the higher a country's score, the higher the level of its masculinity. In general, feminine cultures are believed to prefer cooperation and group decision-making, whereas masculine cultures tend to prefer individual initiatives and decisions. Feminine cultures will place greater value on relationships and helping others, while masculine cultures will place greater value on careers and money, i.e. the more "ego goals" (ibid., p. 279). It can thus be concluded that femininity relates more to cooperation while masculinity relates more to competition.

> *Hypothesis 5*: *The higher a country's MAS, the lower its HTSUs' acceptance of cooperative strategies.*

2.4 Professional culture

National culture is a powerful concept for explaining differences between people from various countries. If we were only interested in cross-national differences in HTSU cooperation propensities, we could consider the preceding discussion to be sufficient. For this study's purposes it is clearly not. As Morgan (1997: 122) indicates, "many of the major cultural similarities and differences in the world today are occupational rather than national".

PC is related to one's education and, in a company context, to the competition over resources and power (Trice & Beyer, 1993). Namely, in a company people from different professional cultures have to work together. PC is an accumulation of education and practical experiences that lead to an understanding of how the profession has to be performed (Sirmon & Lane, 2004; Brown & Duguid, 1991). Especially in a HTSU context, where formal job descriptions and manuals are rare phenomena, PC is believed to shape the work practices and routines to achieve innovations (Brown & Duguid, 1991), not only within but also between organizations. An illustration that is often provided in this case is the distinction between the PCs of engineers and scientists as shown in Table 2.1. Nightingale (1998) argues that scientific knowledge cannot directly be applied in producing technology/engineering because scientists answer the wrong question. Whereas engineers often start with certain demands and desired end results from the market, scientists tend to value the unknown and surprising results that originate in known starting conditions more highly. In other words, scientists tend to act more out of curiosity than out of necessity (Sirmon & Lane, 2004: 314). As the market imposes strict demands on companies, the engineers will try to find ways to gather the required information quickly and in time to meet market demands. Consequently, engineers will rank the utility of the information and findings higher than scientists. Every HTSU, however, has to deal with market demands. It is the perception of the effects and necessity of cooperation that ultimately determines a HTSU's COO and APD. Because of possible data-collection problems, the differences between engineers, scientists, marketers, and so on will be left for further studies.

Table 2.1 – Engineering vs. scientific professional culture in relation to the innovation process (adapted from Sirmon & Lane, 2004: 313)

Professional cultures	Innovation process characteristics
Engineering	Problem driven
	Strict timelines
	Market criteria
Scientific	Curiosity driven
	Lax timelines
	Curiosity criteria

Sirmon & Lane (2004: 316) provide an additional feature of PCs, namely the degree of cross-functional experience of the members in the organization that is ultimately believed to *reflect* the dominant profession in a unit or company. It is highly likely that the degree of cross-functional experience (CFE) will relate to COO. Namely, the more CFE unit members have, the more likely they will be to accept a cooperative strategy because of an experience effect (Tyler & Steensma, 1998). Especially in HTSUs, with often only a few employees, the experiences across functions are likely to positively relate to COO, which is external of nature. The following is thus hypothesized:

> **Hypothesis 6**: *The higher the cross-functional experience of HTSU employees, the higher the HTSUs' acceptance of cooperative strategies.*

Furthermore, it is believed that CFE leads to a more diverse input and better results in innovation processes. Moreover, it is believed that value differences between team- and network members are beneficial to innovation performance (Möller & Svahn, 2004; Nakata & Sivakumar, 1996). The recognition of these benefits is likely to be related to the CFE within a company. The following is thus hypothesized:

> **Hypothesis 7**: *The higher the cross-functional experience of HTSU employees, the higher the HTSUs' acceptance of partner dissimilarity.*

2.5 Sector culture
The last cultural influence from Figure 2.3 is the SC. Apart from one's nationality and professional background, the sector that one is working in is believed to be of influence on decisions to cooperate. SC is thus used as a term that indicates the shared way of doing things on a sector level. Various sources find that the technology intensity of a sector is likely to influence modes of external partnering (Hagedoorn, 2002; Hagedoorn & Duysters, 2002; Hagedoorn & Narula, 1996). More specifically, the lower the technology level in the sector, the higher the preference for mergers and acquisitions above strategic alliances. As the current study focuses on high-tech sectors only, this distinction is not useful but nevertheless illustrating sector influences.

What would be a useful distinction between sectors that possibly reveals influences on COO and APD, given the likely limited response? A division into main operating sectors was the first idea, but deriving a useful taxonomy without excluding sectors appeared to be too ambitious in the current study. During the presentation of this

study's approach at the first SURVIE-workshop[3] I was warned not to be too specific in asking for a HTSU's main operating sector, but rather to distinguish between manufacturing and services sectors. Brouthers *et al.* (2002) found interesting results on this level of aggregation.

Literature suggests various differences between firms in manufacturing and services sectors. Firstly, manufacturing firms tend to have higher resource requirements than services firms (Erramilli & Rao, 1993), and will thus be more dependent on external resources early in their existence (Eisenhardt & Schoonhoven, 1996; Pfeffer & Salancik, 1978). Secondly, because of a higher share of people relative to capital in services firms, they are inherently more flexible than manufacturing firms (Erramilli & Rao, 1993). Thirdly, the competence core of manufacturing firms differs from services firms as the latter rely more heavily on tacit knowledge and their social capital (although in high-tech sectors these differentials may be less dramatic than in lower-tech sectors) (Brouthers *et al.*, 2002). From this the following can be hypothesized:

> **Hypothesis 8**: *HTSUs in manufacturing industries will show a higher acceptance of cooperative strategies than HTSUs in services industries.*

As services firms are more flexible because of less capital-intensive operations, they are more in control of the fit to market demands by means of e.g. relocating. Put differently, because they tend to have lower resource commitments they have less exposure to international risks of competition (Erramilli & Rao, 1993). Manufacturing firms will depend more on external parties that have alternative knowledge about markets and strategies across borders. Schutjens and Stam (2003) found that manufacturing firms made significantly more use of relationships than services firms did, probably due to diversification and competence complementarity reasons. The following is hypothesized:

> **Hypothesis 9**: *HTSUs in manufacturing industries will show a higher acceptance of partner dissimilarity than HTSUs in services industries.*

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[3] Start-Up Research and Valorisation/Validation of Intra- and Entrepreneurship in Europe (SURVIE); the first workshop was held in Montpellier, March 3-4, 2005.

3. Research methods

Introduction
This chapter deals with all the methodological aspects of the research. Firstly, the research model is summarized, including the research question and hypotheses. Secondly, the sampling frame, research design and response assessment are presented. Lastly, the data analysis procedure is discussed.

3.1 Research model
In previous chapter the hypotheses have been formulated about the nature of HTSU contacts and partnerships related to culture. The research question that was formulated is the following (see also Figure 3.1):

> *What is the influence of National Culture, Professional Culture and Sector Culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?*
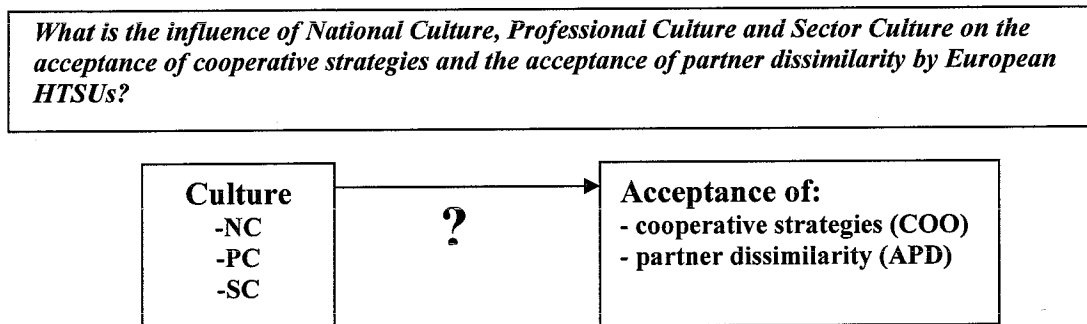
Figure 3.1 – The research construct

In order to answer this question various hypotheses have been formulated that can be visualized in the conceptual model as follows (see Sections 2.3 through 2.5):
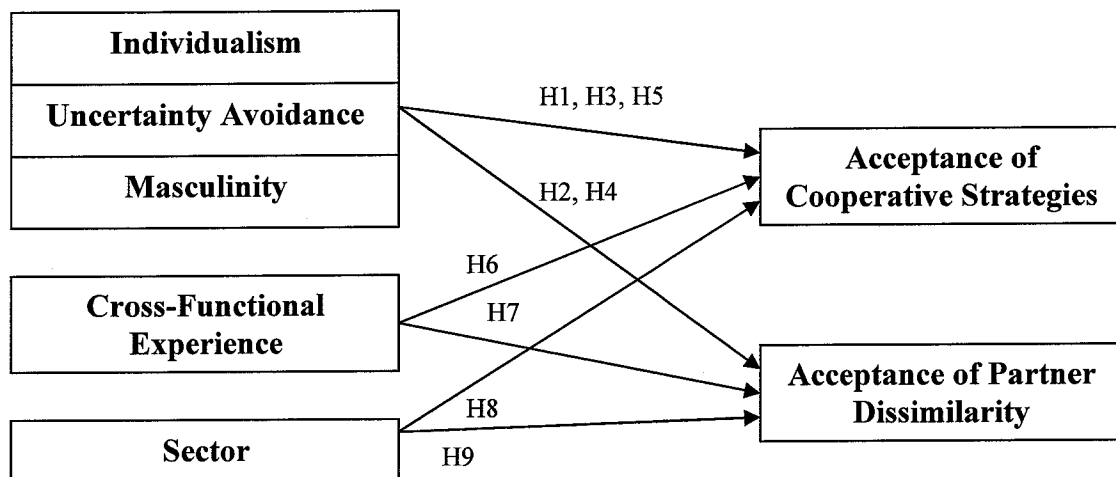
Figure 3.2 – The conceptual model

3.2 Research design
The present research employs a questionnaire approach. The data are collected with a digital questionnaire in English language, using an online survey design and administration tool.[4] Using a digital questionnaire avoids interviewer bias, allows for fast replication and sample extension, and is cheap compared to face-to-face

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[4] http://free-online-surveys.co.uk/

interviews as well as paper questionnaires. Furthermore, the output is provided in Microsoft Office Excel, which makes the transfer to SPSS 12.0.1 (the statistical package) convenient. After the creation of the survey its URL was sent to the target group by email, accompanied by an appropriate cover letter (Appendix 1). The cover letter specifically addressed higher-level employees and members of the team that started up the company. This is sometimes referred to as a key informant design (Steensma *et al.*, 2000b) and has been shown to be sufficiently valid, even in case of a single respondent per company (Menon *et al.*, 1999). The respondents were asked to click the URL, fill in the questionnaire and submit it. The settings were changed in such a way that every respondent was only allowed to participate once and, in order to be able to transmit the survey, all questions had to be filled in. Two reminders were sent and, in total, the data collection period spanned 36 days, slightly more than one month (see Appendix 2 for the response distribution).

3.3 Sampling frame
The companies in the sample were selected online by using websites of business directories, incubators, and so on. Also, personal contacts in a number of countries were used to target the HTSUs indirectly (France, Germany, Sweden, Switzerland and the UK). The following criteria were used for sample selection:

- *Firm origin*: the company should be established in a European country;
- *Firm age*: the company should be established in January 2000 or later;
- *Technology level*: the company should have a high technology level (i.e. be a high-tech company);
- *Firm operating mode*: the company should be independently operating (i.e. not operating as a subsidiary of a larger firm);
- *Digital firm access*: the company should be accessible through the email addresses of either its higher-level employees or its information address (this criterion did not necessarily hold for the indirect approach through personal contacts).

Note that the firm's previous experience with cooperation is not included as a criterion because this study gathers data on a firm's willingness to cooperate. This is not believed to be exclusively a function of previous experience. Hence, excluding inexperienced companies would seriously bias the results. Table 3.1 lists the range of countries included in the sample, divided into country clusters adapted from Hofstede (2001). It shows that the sample represents sufficient variance in cultural values.

Table 3.1 - Sample countries in culture clusters

Anglo (A)	Balto-Slavic (BS)	Germanic (G)	(Greco-)Latin (GL)	Nordic (N)
Ireland	Estonia	Austria	Belgium	Denmark
UK	Lithuania	Germany	Cyprus	Finland
	Poland	Luxemburg	France	Netherlands
	Slovenia		Greece	Norway
			Italy	Sweden
			Portugal	
			Spain	

3.4 Response assessment
Because the full sample resulted from a mix of both a direct as well as an indirect approach of the HTSUs the real sample sizes are unknown. Although the gross sample initially met the criteria above, in some cases digital firm access appeared to be

problematic for other reasons, resulting in a net sample slightly smaller than the gross one. Table 3.2 summarizes these results and furthermore provides response numbers. The total response percentage is 13%, which is rather low. Especially the low response from Germany is striking, but this is probably due to the survey language. The response is, in general, skewed towards the Greco-Latin and Nordic culture clusters. This is mainly due to troublesome data collection in the other clusters. Emails were sent randomly to non-respondents. Reasons for not answering were, among others, a busy schedule, an abundance of requests for filling in surveys, and irrelevance of the research for the company.

Table 3.2 - Sample demographics and response rates divided by cultural cluster[a]

Cluster	Country	Gross # of firms targeted	Net # of firms targeted[b]	Response #	As % of total response	Country Response %
		a	b	c	d (=(c/109)*100%)	e (=(c/b)*100%)
A	Ireland	24	23	3	3	13
	UK	125	118	9	8	8
G	Germany	79	74	2	2	3
GL	Belgium	82	78	8	7	10
	France	91	85	11	10	13
	Italy	58	55	8	7	15
	Spain	87	87	10	9	11
N	Denmark	28	26	3	3	12
	Netherlands	204	187	37	34	20
	Others[c]	92	79	18	17	23
	Total	*870*	*812*	*109*	*100*	*13*
Gender	Female			7	6	
	Male			102	94	
Support[d]	No			58	53	
	Yes			51	47	

[a] The Balto-Slavic respondents are included in the "Others" category.
[b] This column (b) equals column a minus the addresses that could not be reached by email. Reasons for this included: over-sized mailboxes, nonexistent addresses and recipient server errors.
[c] These are: Austria, Cyprus, Estonia, Finland, Greece, Lithuania, Luxemburg, Norway, Portugal, Slovenia and Sweden.
[d] Respondents indicated whether their HTSU received major support from an incubator, Development Company or any other support centre.

To test non-response bias the respondents were divided in early and late respondents, as recommended by Armstrong and Overton (1977). After a check for variance equality across the two groups a one-way analysis of variance was performed. Table 3.3 displays the results. There are no significant differences between the two waves of respondents because the F-statistic is significant for neither COO nor APD.

Table 3.3 - Test of variance homogeneity and one-way ANOVA comparing early (n=55) and late (n=54) respondents' mean scores on COO and APD

Scale	Test of Homogeneity of Variances		One-way ANOVA		
	Levene Statistic	Sig.	Sum of Squares	F	Sig.
COO	0.06	0.82	0.26	0.37	0.54
APD	0.00	0.99	0.11	0.13	0.72

3.5 The questionnaire[5]

All hypotheses are tested using cross-sectional data. Time-dependent variables are not included as the goal of this research is to measure current attitudes and time availability is limited. Although processes over time are excluded, replicating the present or a comparable study at a set time interval might capture them. The questionnaire and all its scales are available in Appendix 4.

3.5.1 Dependent variables

Acceptance of cooperative strategies (COO). This scale uses six items on a six-point Likert-type scale and was adapted from Steensma *et al.* (2000a). The scale emphasises the belief that small firms are not self-sufficient early in their existence. In order to generalize the items the term "strategic alliances" was replaced by "strategic partnerships". The latter were described as "partnerships of various types, like joint ventures, buyer-supplier alliances, marketing alliances, technology alliances for either product or process R&D, informal bilateral agreements, and so on". All these are believed to be cooperative strategies. Steensma *et al.* validated this scale for a sample of entrepreneurial ventures. The resulting scale reliability in their study was 0.81 (Cronbach's α). In order to avoid sample pollution the pre-test was bypassed in this study, relying on the previous validation results.

Acceptance of partner dissimilarity (APD). This scale uses five items on a six-point Likert-type scale. It essentially measures the acceptance of value differences between partners in a strategic partnership. The scale was self-constructed and the items were adapted from excerpts of Hofstede (1994), Nakata and Sivakumar (1996) and Tiessen (1997). The scale validity was assessed by inspecting the items (face validity). Scale reliability estimates were derived early in the data-collection process, calculating the Cronbach's α for the first 24 responses. The resulting α was 0.638, passing the (conservative) 0.60 cut-off (Easterby-Smith *et al.*, 1991: 122).

3.5.2 Independent variables

National culture (NC). This study uses Hofstede's (2001) dimensions of individualism (IDV), uncertainty avoidance (UAI) and masculinity (MAS). Many studies have applied these constructs and have shown the usefulness of them (see, for example, Li *et al.*, 2004; Brown, 2003; Shane *et al.*, 1995). From a theoretical point of view they have received wide attention as well (Chen *et al.*, 1998; Tiessen, 1997; Nakata & Sivakumar, 1996). Table 3.4 shows the respective indices for each country from which companies have responded. Scores for Slovenia appeared to be similar to the scores for Yugoslavia, as IBM Ljubljana was part of IBM Yugoslavia at the time of Hofstede's study.

Professional culture (PC). Literature points to various aspects of PCs that seem to be influential in cooperation considerations. These are, among others, education, profession and the degree of cross-functional experience (see previous chapter). Because of the limited sample size and the divergent set of educational backgrounds and professions these two were excluded in the analysis. The degree of cross-functional experience (CFE) was included and was rated on a six-point Likert-type scale.

Sector. Sector effects were measured through the manufacturing/services distinction by directly asking for the company's main operating mode (0=manufacturing, 1=delivering services).

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[5] Considerable time was spent on developing a different questionnaire, see Appendix 3.

Table 3.4 - Hofstede's cultural measures for the participating countries[a] in clusters (see Table 3.1)

Culture cluster	Country	Individualism	Uncertainty Avoidance	Masculinity
A	Ireland	70	35	68
	UK	89	35	66
BS	Slovenia	27	88	21
G	Germany	67	65	66
GL	Belgium	75	94	54
	France	71	86	43
	Greece	35	112	57
	Italy	76	75	70
	Spain	51	86	42
N	Denmark	74	23	16
	Finland	63	59	26
	Netherlands	80	53	14
	Sweden	71	29	5

[a] Scores for Cyprus and Lithuania are not available in Hofstede (2001). Scores for Estonia and Poland are available through other sources (see the sources Hofstede (2001: 502) refers to), but these were not included in next chapter's analyses.

3.5.3 Control variables

Individual level. At the individual level gender was controlled for by introducing a categorical variable for gender having the values 0 for female and 1 for male.

Firm level. At the firm level the numbers of previous strategic partnerships were controlled for, as these are believed to influence a company's acceptance of cooperative strategies. Firm age has not been included as this variable appeared to be significantly correlated to the number of strategic partnerships that a company has engaged in already. Furthermore, the number of employees appeared to be significantly correlated to the degree of cross-functional experience (see Appendix 5 for all evidence).

Industry level. At the industry level the respondents were asked to rate four items that dealt with the dynamics in the company's environment on a six-point Likert-type scale. The items were adapted from Steensma et al. (2000b), who drew on Covin and Slevin (1989). Although the eventual scale reliability for this industry dynamism scale (ID) is slightly below the 0.60 cut-off, the scale will be used in the analysis because the α-measure states the lower bound of scale reliability and the items represent various important aspects of the construct (i.e. rates of change in products/services and technology, and R&D intensity).

Table 3.5 below assesses the predetermined item scaling for COO, APD and ID. The factor loadings are the result of an exploratory principal components factor analysis using Varimax rotation with Kaizer normalization. The results show that the items that do not fall within their original scale load highest on separate scales and not on other predetermined scales. This suggests that the items that do actually load on the COO, APD and ID scales represent separate constructs. In order to test the scale composition more powerfully a second similar factor analysis was run, excluding the items that did not load strongly on their original scale. Table 3.6 displays the results plus the resulting scale reliability measures for the reduced scales. The factor loadings show that sufficient convergent scale validity is ensured, as they are all equal to or above 0.60.

Table 3.5 - Factor loadings in the exploratory factor analysis[ab] (n=109)

	Factors					
	1	**2**	**3**	**4**	**5**	**6**
Scale	**COO**	**APD**		**ID**		
Acceptance of cooperative strategies (COO)						
COO1	**0.72**					
COO2	**0.79**					
COO3	**0.63**					
COO4	**0.71**					
COO5			0.83			
COO6			0.89			
Acceptance of partner dissimilarity (APD)						
APD1					0.79	
APD2		**0.82**				
APD3		**0.78**				
APD4					0.74	
APD5		**0.83**				
Industry dynamism (ID)						
ID1				**0.77**		
ID2				**0.72**		
ID3				**0.64**		
ID4						0.95
Eigenvalue	3.20	2.02	1.64	1.38	1.23	1.01
% of variance explained	15.54	14.13	12.10	11.02	9.58	7.44
Cumulative % of variance explained	15.54	29.67	41.77	52.79	62.37	69.82

[a] Factor loadings equal to or smaller than 0.40 are suppressed in the table.
[b] Full text scale items are shown in Appendix 4.2.

Table 3.6 - Reliability and factor loadings of (items in) the reduced scales[ab] (n=109)

	Scale reliability	Factors		
		1	**2**	**3**
Scale	**Cronbach's α**	**COO**	**APD**	**ID**
Acceptance of cooperative strategies (COO)	0.74			
COO1		0.77		
COO2		0.73		
COO3		0.66		
COO4		0.81		
Acceptance of partner dissimilarity (APD)	0.76			
APD2			0.82	
APD3			0.76	
APD5			0.84	
Industry dynamism (ID)	0.54			
ID1				0.78
ID2				0.75
ID3				0.60
Eigenvalue		2.69	1.85	1.52
% of variance explained		23.60	20.46	16.47
Cumulative % of variance explained		23.60	44.06	60.53

[a] Factor loadings equal to or smaller than 0.40 are suppressed in the table.
[b] Full text scale items are shown in Appendix 4.2.

By inspecting the excluded items in the second factor analysis (see Appendix 4.2 for the full-text items), some meaning can be given to the reasons for their distinctness. In the case of the COO-scale, items COO5 and COO6 load strongly on a separate factor. This is probably due to the fact that they explicitly describe a negative situation for small companies only, instead of involving large companies as well, like in items COO1 through COO4. The APD-scale outliers probably describe dissimilarities in too much detail to be suitable enough for the APD-scale. The outlier from the ID-scale is the only one of the initial four that explicitly deals with customers instead of processes, R&D, and so on.

3.6 Data analysis procedures
In the next chapter the relationship among study variables is explored using the inter-item correlation matrix and a hierarchical regression procedure. The significance of the β's in the resulting regression models indicates the strength and direction of the relationships between the various independent and dependent variables. By using a hierarchical procedure, the effect of introducing the main effects in the control-variable model can be clearly observed. The inter-item correlation matrix is used to provide some additional evidence for the discriminant validity of the constructs.

4. Results

Introduction
This chapter presents the results of the survey. Firstly, brief evidence for the discriminant validity of the survey scales is provided. Secondly, the results of the regression analyses are provided. These results are then used to test the hypotheses and draw a validated model.

4.1 Construct validity
In the previous chapter the factor loadings already indicated that the scales in the questionnaire possess sufficient convergent validity. One other aspect of the construct validity is the discriminant validity. Discriminant validity is sufficiently ensured if the variance extracted for each construct is higher than the squared correlation between the constructs or, similarly, if the average standard deviation extracted exceeds the intercorrelations of the construct with other constructs (Fornell & Larcker, 1981). Table 4.1 displays the construct intercorrelations. From this table it is evident that all constructs meet this criterion.

Table 4.1 – Intercorrelation matrix for dependent, independent and control variables*

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. COO**	4.65	0.84	-								
2. APD	3.86	0.95	0.18^a	-							
3. IDV	72.62	13.12	-0.23^b	-0.21^b	-						
4. UAI	63.11	21.26	0.10	0.05	-0.58^c	-					
5. MAS	35.49	22.07	-0.24^b	0.03	-0.02	0.31^c	-				
6. CFE	4.16	1.42	0.25^b	0.14	0.06	-0.09	-0.13	-			
7. Sector	0.69	0.47	-0.13	-0.17^a	-0.15	0.21^b	0.04	-0.01	-		
8. RGender	0.94	0.25	-0.12	0.05	0.21^b	-0.25^b	-0.23^b	0.00	-0.18^a	-	
9. NoSP	4.42	3.20	0.10	0.11	-0.07	0.01	-0.23^b	0.15	-0.05	-0.06	-
10. ID	4.08	0.86	0.08	0.16^a	-0.19^a	0.24^b	0.07	0.03	0.12	-0.11	-0.02

* All significances result from a two-tailed Pearson correlation test.
** The descriptives for COO, APD and ID are based on the average score on the items included.
^{a} p<0.10 ^{b} p<0.05 ^{c} p<0.01

4.2 Some preliminary observations
Table 4.1 provides some descriptives of the variables. It can be clearly seen that the respondents rate the acceptance of cooperative strategies higher than the acceptance of partner dissimilarity. From this it can be concluded that HTSUs have a fair willingness to cooperate, but that the degree to which a partner is allowed to differ in values is more limited. The previous chapter already mentioned the low response of females. The sector distribution is slightly more equal: 69% of the firms deliver services vs. 31% that are in manufacturing. Furthermore, significant correlations exist between various dependent and independent variables. The relationships are investigated in more detail in the next section, applying a hierarchical regression procedure.

The categorical variable that indicated whether a HTSU has received major support from an incubator, Development Company or any other support institution (0=no, 1=yes) has been analyzed because it is believed that the HTSUs in these kinds of institutes differ in behaviours from others. After a check for variance equality across the two groups a one-way analysis of variance was performed. Table 4.2 displays the

results. There are no significant differences between the two categories of respondents because the F-statistic is significant for neither COO nor APD.

Table 4.2 - Test of variance homogeneity and one-way ANOVA comparing mean scores on COO and APD for HTSUs that received support from an incubator, Development Company or any other support institution (n=51) and those that did not (n=58)

Scale	Test of Homogeneity of Variances		One-way ANOVA		
	Levene Statistic	Sig.	Sum of Squares	F	Sig.
COO	0.71	0.40	1.13	1.61	0.21
APD	1.25	0.27	0.15	0.16	0.69

4.3 Regression results and hypothesis tests

In order to test the nine hypotheses that relate to the second research question two hierarchical regressions were performed. Tables 4.3 and 4.4 display the resulting β-coefficients, significance levels and some model descriptives for COO and APD. Model 1 shows the control variable model and Model 2 the extended model where the independent variables are inserted into the equation. The models for both dependent variables are significant at the 0.01 and 0.05 levels respectively, given the F-statistics. Furthermore, the data show that the Models 2 both significantly improve the control variable models (Models 1). The percentage of variance explained (R^2) by the independent and control variables is 23% for COO, and 15% for APD. In both APD-models the industry dynamism appears to be positively correlated to the acceptance of partner dissimilarity, i.e. the more dynamic the industry, the more likely a HTSU would be to choose a partner that differs significantly in values.

What do these models imply about the hypotheses? Table 4.5 provides an overview of the hypotheses and the evidence from the regressions.

Table 4.3 – Hierarchical regression models for COO*

	Expected	Model 1	Model 2
Control variables			
RGender	?	-0.11	-0.15
NoSP	+	0.18[a]	0.04
ID	+	0.05	0.02
Direct effects			
IDV	-		-0.18
UAI	+		0.10
MAS	-		-0.29[c]
CFE	+		0.20[b]
Sector	-		-0.18[a]
R^2		0.05	0.23
ΔR^2			0.18
F			3.36[c]

*All significances are based on a two-tailed test.
[a] $p<0.10$ [b] $p<0.05$ [c] $p<0.01$

Table 4.4 – Hierarchical regression models for APD*

	Expected	Model 1	Model 2
Control variables			
RGender	?	0.00	0.01
NoSP	+	0.16	0.11
ID	+	0.19^a	0.18^a
Direct effects			
IDV	-		-0.27^b
UAI	-		-0.08
CFE	+		0.09
Sector	-		-0.17^a
R^2		0.06	0.15
ΔR^2			0.09
F			2.23^b

*All significances are based on a two-tailed test.
^{a} $p<0.10$ ^{b} $p<0.05$

Table 4.5 – Test of hypotheses

Culture level	Hypotheses	Constructs	Direction	β	Test
NC	H1	IDV - COO	-	-0.18	Rejected
	H2	IDV - APD	-	-0.27^b	Failed to reject
	H3	UAI - COO	+	0.10	Rejected
	H4	UAI - APD	-	-0.08	Rejected
	H5	MAS - COO	-	-0.29^c	Failed to reject
PC	H6	CFE - COO	+	0.20^b	Failed to reject
	H7	CFE - APD	+	0.09	Rejected
SC	H8	Sector - COO	-	-0.18^a	Failed to reject
	H9	Sector - APD	-	-0.17^a	Failed to reject

^{a} $p<0.10$ ^{b} $p<0.05$ ^{c} $p<0.01$

From the table it can be concluded that in total five out of nine hypotheses could not be rejected based on the regression results. All β-coefficients are in the hypothesized direction. On the NC-level Individualism appears to be significantly negatively related to the acceptance of partner dissimilarity (H2) and the same holds for Masculinity in relation to the acceptance of cooperative strategies (H5). HTSUs in countries that have high(er) levels of IDV and MAS are thus significantly less likely to engage in cooperative strategies and if they do so, they are less likely to accept partners that have largely differing cultural values. On the PC-level the degree of cross-functional experience of the organization members appears to be significantly positively related to the acceptance of cooperative strategies (H6). Thus, apparently the in-company cooperation is a good predictor of the external cooperation propensity. Finally, on the SC-level it appears that HTSUs in manufacturing sectors are significantly more accepting cooperative strategies and partner dissimilarity than HTSUs in service sectors do (H8 and H9). Hypotheses H1, H3, H4 and H7 cannot be supported with empirical evidence. Especially the insignificance of the Uncertainty avoidance dimension is remarkable. This will be discussed in more detail in the next chapter.

The results from the analyses provide the validated model of the aggregate influence of culture on the two dependent variables in Figure 4.1. β-Coefficients are included on the arrows and R^2-statistics for the dependent variables. Uncertainty avoidance is not included for reasons discussed before.
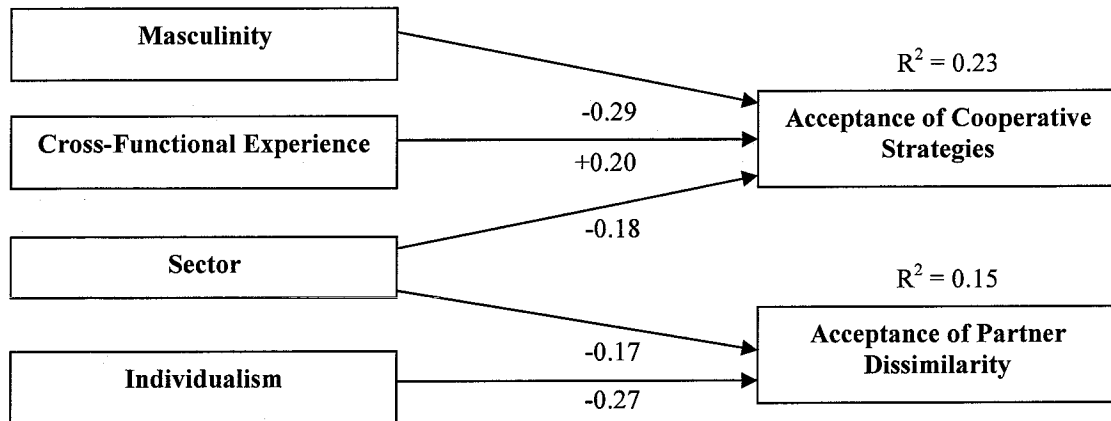

Figure 4.1 – The validated model with β-coefficients and R^2-values

5. Discussion and implications

Introduction
Firstly, this chapter deals with the study's limitations in general, through its validity. Secondly, it reflects on the results and takes a look at the implications for theory and practice. In doing so, it goes more deeply in the some validity issues. Lastly, it provides some ideas on how to proceed on the interesting issues in this research.

5.1 Validity of the research
This Section deals with validity issues concerning the current research. This entails the construct validity, and the internal and external validity (Ulijn, 2000; Judd & Kenny, 1981).

5.1.1 Construct validity
The construct validity deals with the operationalisation of the theoretical constructs in the conceptual model (Judd & Kenny, 1981). Chapters 3 and 4 have already shown that *statistically* the operationalisations could be viewed as satisfactory, because reasonable Cronbach's α's have been achieved, together with a valid factor structure (convergent validity) and discriminant validity. However, as Davidsson (2004: 105-108) notes, it might be useful to provide some evidence of the theoretical soundness of the operationalisations in the case of multi-item scales. More specifically, the degree to which they cover the theoretical concepts should be reviewed. How do the three multi-item scales in this research perform?

The items in the COO-scale are meant to assess a HTSUs acceptance of cooperative strategies in general (Appendix 4.2). The items that were eventually included in the scale address this issue sufficiently. However, all these items place both small as well as large companies on the same level. Namely, it is implied that for both categories cooperative strategies are advantageous. The items that were excluded explicitly dealt with smallness and COO. It can thus be concluded that the operationalisation is sufficient but incomplete. Section 3.5 dealt with some explanations of the factor structure of COO.

The items in the APD-scale (Appendix 4.2) represent fairly identical ideas, i.e. the items insufficiently vary across the scale. Though this increases the reliability of the scale, the construct validity could be increased by adding items to the scale that more fully describe the phenomenon of APD in the setting of this research (HTSUs in Europe). All in all, for an exploration of the phenomena, the scale presents a good starting point for a more extensive one.

The ID-scale (Appendix 4.2) is meant to measure the dynamics in the industry the HTSU is operating in. It includes the rates of change in both products/services and technologies, as well as the R&D intensity in the industry. Customer characteristics were excluded because of the scale's factor structure. This means the original theoretical construct is not fully covered. Furthermore, Davidsson (2004: 124) notes that Likert-type scale assessments of industry dynamics, hostility and heterogeneity only provide largely subjective assessments of the constructs, which often include pure misconceptions. In the current research this suffices as the ID is only meant to reflect perceptions of the factors involved.

5.1.2 Internal validity
The internal validity deals with the extent to which the detected effects on the dependent variables are due to the operationalised independent and control variables rather than to competing causes (Judd & Kenny, 1981). As has been shown in Chapter 1, it is believed that decisions to cooperate externally are cued by many "hard" issues, including market extension, R&D collaboration, and so on. Furthermore, the respondent's personality is of significant influence as well (Kets de Vries & Miller, 1986). This belief already gave rise to the notion that much of the variation in COO would be caused by variables other than cultural ones. Some of these issues were controlled for on the individual, firm and industry levels. The R^2-statistics in Chapter 4 reinforce that the operationalisations of the various culture levels only explain a limited amount of variation in both COO as well as APD.

5.1.3 External validity
The external validity deals with the extent to which the measured effects can be generalized to theoretical constructs other than those specified in the current study's hypotheses (Judd & Kenny, 1981). Sometimes this is viewed as the robustness of the findings across settings or, alternatively, the ecological validity of the research (Ulijn, 2000). For the sample countries and companies the findings seem to hold. What are the constraints in the current study?

Firstly, the study deals with HTSUs. Would the findings also hold in different companies, for example low- and medium-tech start-ups or companies? It is believed that this is highly unlikely. Namely, the necessity to cooperate is especially essential for companies in high-tech industries. Furthermore, it has been shown that companies in medium- and low-tech industries prefer different governance structures than companies in high-tech industries do (Hagedoorn & Duysters, 2002). Secondly, the study deals with start-up companies. The findings can probably be generalized to all high-tech companies, as cooperation rates are not believed to change significantly during the company's lifetime (European Commission, 2003a: 25-26). Thirdly, the study deals with European start-ups. Probably, the findings will be valid for HTSUs in other countries as well, although they might be slightly different reflecting different regulatory environments, for example. Also, in the case of Asian countries, their long-term orientation is believed to significantly contribute to COO and APD.

5.2 Reflections and implications
The following Sections go into the results more deeply and discuss their implications. The remarks from Section 5.1 are dealt with in more detail, especially the construct validity.

5.2.1 NC - individualism
IDV is significantly related to APD but not to COO. Thus, the more individualistic the person is, the lower his or her acceptance of partner dissimilarity. This implies that, in general, people from individualistic countries favour to cooperate with others that have moderately different values, whereas in more collectivistic countries the APD is significantly higher. It is surprising that IDV is not significantly related to COO. What could be explanations for this finding?

Firstly, like UAI, there just might not be a relationship between IDV and COO. This can be due to the fact that IDV is defined on a different level than COO. Namely, IDV

is in fact a country-level dimension, reflected in an individual, whereas COO is defined at the company level. Depending on the respondent's position within the HTSU, he or she might feel more or less personally connected to cooperation decisions. Secondly, the IDV-values may have converged over the years. Hofstede (2001) found that a country's IDV-score correlates to its GDP fairly closely. Countries that have undergone a serious economic development may have become more individualistic. This could have led to a decreasing variance in IDV across the sample.

5.2.2 NC - uncertainty avoidance

The results show that UAI is not significantly related to the two dependent variables. Which explanations could fit these results? Namely, different studies did find a relationship between UAI and comparable dependent variables, albeit a weak one in some cases (Steensma *et al.*, 2000a&b).

Firstly, it is possible that there just is no relationship, in a HTSU context, between UAI and COO or APD. UAI may be irrelevant in a high-tech starter's decision to cooperate or choose a potential partner. Secondly, the insignificance with regard to COO might be caused by a definition problem in the questionnaire. Namely, uncertainty-avoiding people might prefer to use their social network to reduce the uncertainty involved in starting and developing their venture, instead of using a formal strategic partnership. Since these social networks have not been included in the COO- or any other scale, this cannot be shown. Thirdly, the UAI may be converging in a sample of HTSUs from the initial Hofstede (2001) value to a value that is extremely moderated by the very fact that the respondents are entrepreneurs. Because of this they may display a level of uncertainty avoidance that is more universal than Hofstede suggests. In that way the sample in this study could be biased. Entrepreneurs might simply not wish to be too uncertainty avoiding, as this would limit the number of opportunities they perceive. For them the saying "Nothing beats a failure except a trier" might be the motivation. Work by Brown (2003) seems to reinforce this whole argument in a sample of New-Zealand entrepreneurs. She found that only 8% of the items (2 out of 25), which she adapted to fit four of the five Hofstede dimensions, loaded on a factor that could be labelled as UAI. Lastly and most elementary, it might be that the uncertainty-avoidance concept as defined by Hofstede does not capture the implicit elements of culture. If the items that Hofstede used to construct the UAI-dimension were only explicit (i.e. visible, audible, noticeable), he ignored the implicit elements that might characterize an additional feature of uncertainty avoidance as it applies in various practices, entrepreneurship in this particular case.

5.2.3 NC - masculinity

MAS turned out to be significantly negatively correlated to COO, meaning that HTSUs in high-MAS countries are less likely to accept cooperative strategies than HTSUs in low-MAS countries. Figure 5.1 shows a plot of IDV-values versus MAS-values for selected countries in the sample. The right side of the figure lists the countries per quartile. Although the figure neglects other independent variables and the division of quartiles is arbitrary, it is interesting to briefly elaborate on the implications of the results. HTSUs in countries in the upper-right quartile are, as the results show, least happy with cooperative strategies (because of a high MAS) and least happy with a partner that has different values (because of a high IDV). HTSUs in countries in the lower-right quartile are relatively less keen on accepting cooperative

strategies (because of a high MAS), but in case they do accept them the partner may have very different values (because of a lower IDV). The lower-left quartile contains countries in which HTSUs are very open to cooperation and partner dissimilarity. Lastly, the upper-left quartile contains countries in which HTSUs are relatively happy to cooperate but they favour partners that are only moderately different from their own.

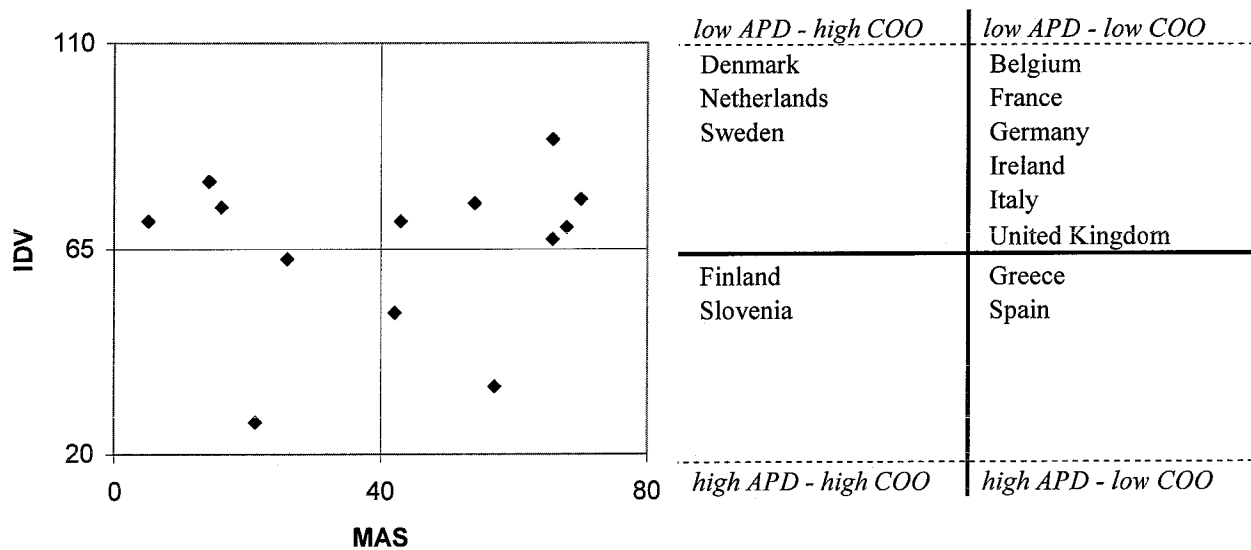| *low APD - high COO*	*low APD - low COO*
Denmark	Belgium
Netherlands	France
Sweden	Germany
	Ireland
	Italy
	United Kingdom
Finland	Greece
Slovenia	Spain
high APD - high COO	*high APD - low COO*

Figure 5.1 – IDV vs. MAS for selected sample countries (shifted IDV-axis)

What does this imply for cross-cultural cooperation in HTSUs? As Nakata and Sivakumar (1996) argue, the mix and complementarities of cultural values would be extremely helpful in fostering the success of new product development (NPD). They hypothesize that different stages in NPD require different strengths that result from one's national culture. They refer to these as "stage-dependent strengths" (ibid.: 68). A prerequisite for mixing these culturally divergent strengths is the acceptance of cultural divergence, conceptualised in the current study as APD. As shown before (Chapter 1), Nakata and Sivakumar propose the following link between IDV/MAS and the initiation/implementation stages of NPD respectively (Table 5.1):

Table 5.1 – Ideal IDV- and MAS-scores during NPD initiation and implementation (adapted from Nakata & Sivakumar, 1996)

NC dimensions	NPD initiation	NPD implementation
IDV	High	Low
MAS	Low	High

Concretely, this might imply that a HTSU in the Netherlands could cooperate with a HTSU in Spain, since these have opposing IDV-/MAS-values respectively. However, as shown in Figure 5.1, a Dutch HTSU is unlikely to accept the value differences between itself and a Spanish HTSU, whereas the Spanish HTSU will probably not even be in favour of cooperating in the first place.

5.2.4 PC - cross-functional experience

CFE turned out to be significantly related to COO, but not to APD. As mentioned before, apparently the functioning of an internal "network" in a HTSU has implications for the acceptance of an external network, including (networked)

alliances. Company age effects have been discussed already: the older the company in the sample, the lower its CFE. Thus, if CFE is significantly related to COO, older companies might consider improving their internal cross-functional activities. Why would CFE not be significantly correlated to APD?

Firstly, it may be possible that a high CFE indeed does not lead to an increased APD. Secondly, the mental picture of CFE that the respondents had while answering the question is likely to be influenced by their inherent attitude towards cooperation with others in the company. Engineers are known to have a different mental picture than scientists do (Sirmon & Lane, 2004; Nightingale, 1998). In other words, if someone dislikes cooperating with colleagues in different functions but has to do so, his or her answer might be biased towards his or her mental picture. In that case the answer does not match the real cross-functional experience of the respondent. Thirdly, the perception of CFE may very much depend on the nature of the group. For example, if someone does have a distinct function in the company, but at the same time has a similar educational background as his or her colleague, the CFE might errantly be perceived as minimal. Lastly, the insignificance may be due to the nature of the concepts of CFE versus APD. While CFE is a fairly general notion that reflects a particular spirit or mindset, APD is a concrete phenomenon on an action level. So, given that a partner's values are the way they are, would I like to cooperate with him or her?

5.2.5 SC
The sector appeared to be a significant predictor for both COO as well as APD. In both cases it turned out that HTSUs in a manufacturing sector are more willing to cooperate and, at the same time, more willing to accept a partner's value differences. This may be due to the fact that they have to. Namely, manufacturing companies are often physically in touch with up- and downstream companies, while service companies do not necessarily need to.

5.2.6 Support
The last point for discussion is the fact that the analysis in previous chapter did not show significant differences between support-receiving HTSUs and others with respect to the two dependent variables (Section 4.2). This finding, if valid, seriously challenges the usefulness of spending lots of money on incubators, Development Companies and other support institutions. Care has to be taken, since the goals of these institutions towards their clients are not exclusively to foster cooperation. It was, however, expected that HTSUs that did receive support would be willing to cooperate significantly more or less, depending on their experiences.

5.3 Directions for further research
The main conclusion that can be drawn from the current study is that a more fine-grained approach towards cultural determinants of cooperation is necessary. Although various aspects appear to be significantly correlated, a broad generalization is not possible yet. In order to improve the current research the following actions might be taken:

Firstly, the sample could be extended as far as number of respondents is concerned. A broader representation and better balance of HTSUs across countries and sectors certainly adds to the external validity of the results and their usefulness for practice. It

is advisable to focus more on a small group of countries and to approach the important issues on a lower unit of analysis. The approach in the current research is, namely, too holistic to be applicable for the design of practices and policies.

Secondly, the measures in the current research have to be extended or split in order to increase the construct validity and, at the same time, the external validity of the findings. What COO and APD exactly represent should be more specifically defined. Also, alternative governance structures like social networks and mergers and acquisitions should be included as alternatives to strategic partnering. APD should be divided into more narrowly defined concepts that are believed to influence alliance formation and partner selection. Sector effects should be refined as to gather more information on competition/cooperation tradeoffs (Quintana-García & Benavides-Velasco, 2004), sector patterns, and so on. Basically, these observations hold for all variables, and can be visualized as in Figure 5.1 (Mahoney, 2004).
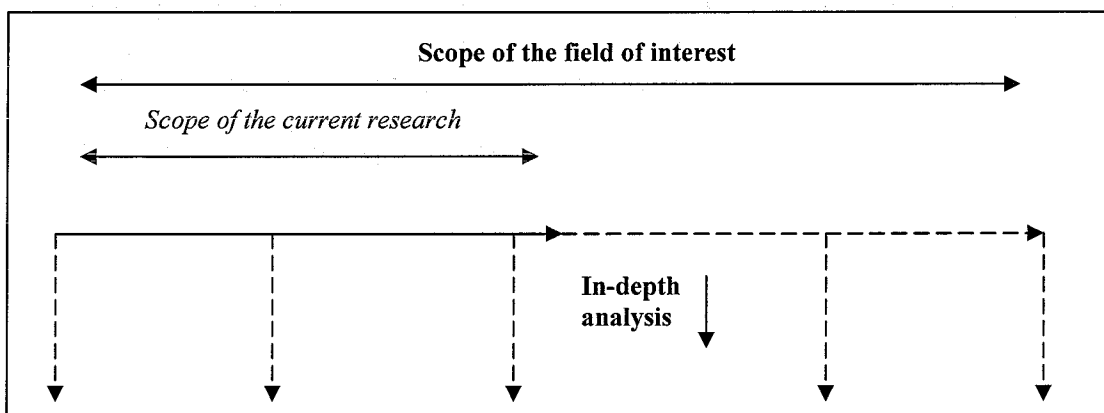
Figure 5.2 – Scope of the current study and scope and depth required to sufficiently describe the phenomena of interest

The figure shows that the current research has explored a certain part of the scope of relevant issues concerning the cooperation between HTSUs and their acceptance of value differences of potential partners. An in-depth analysis by means of, for example, a case study has not been done yet. In order to more fully describe and analyse the underlying patterns, a broader scope has to be set and operationalised to the level at which useful actions might be taken in practice. This also includes conducting the parameter measurement on a longitudinal basis as to be able to make claims about causality. Lastly, the practical application of the results would benefit greatly if the goals of the research are set even more precisely.

6. Conclusions

The present study explored the influence of selected cultural determinants on high-tech start-ups' acceptance of cooperative strategies and its acceptance of partner dissimilarity. In doing so, it aimed to answer the following research question:

What is the influence of culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?

Based on methodological considerations, the concept of culture was split into national culture, professional culture and sector culture, resulting in the final research question:

What is the influence of National Culture, Professional Culture and Sector Culture on the acceptance of cooperative strategies and the acceptance of partner dissimilarity by European HTSUs?

To investigate this question, several hypotheses were stated and consecutively tested by using a survey approach with a cross-sectional key-informant design. The hypotheses were the following:

National culture
Hypothesis 1: The higher a country's IDV, the lower its HTSUs' acceptance of cooperative strategies.
Hypothesis 2: The higher a country's IDV, the lower its HTSUs' acceptance of partner dissimilarity.
Hypothesis 3: The higher a country's UAI, the higher its HTSUs' acceptance of cooperative strategies.
Hypothesis 4: The higher a country's UAI, the lower its HTSUs' acceptance of partner dissimilarity.
Hypothesis 5: The higher a country's MAS, the lower its HTSUs' acceptance of cooperative strategies.

Professional culture
Hypothesis 6: The higher the cross-functional experience of HTSU employees, the higher the HTSUs' acceptance of cooperative strategies.
Hypothesis 7: The higher the cross-functional experience of HTSU employees, the higher the HTSUs' acceptance of partner dissimilarity.

Sector culture
Hypothesis 8: HTSUs in manufacturing industries will show a higher acceptance of cooperative strategies than HTSUs in services industries.
Hypothesis 9: HTSUs in manufacturing industries will show a higher acceptance of partner dissimilarity than HTSUs in services industries.

From the data of the 109 HTSUs that responded to the survey evidence was found in support of Hypotheses 2, 5, 6, 8 and 9. This means that two dimensions of national culture, one hypothesis for professional culture, and the two hypotheses for sector culture are supported. As the items in the survey were found to reflect sufficient convergent and discriminant validity, the results are believed to be valid for HTSUs. Figure 6.1 shows the final validated model.

For further research a more fine-grained approach is necessary. This study's results are not applicable on a practical basis until they are further refined and weighted. The constructs have to be enriched and adapted to practice in such a way that they incorporate the benefits of cross-cultural cooperation more explicitly. Methodologically, a multiple case study approach would be a good way to start refining the variables and settings.
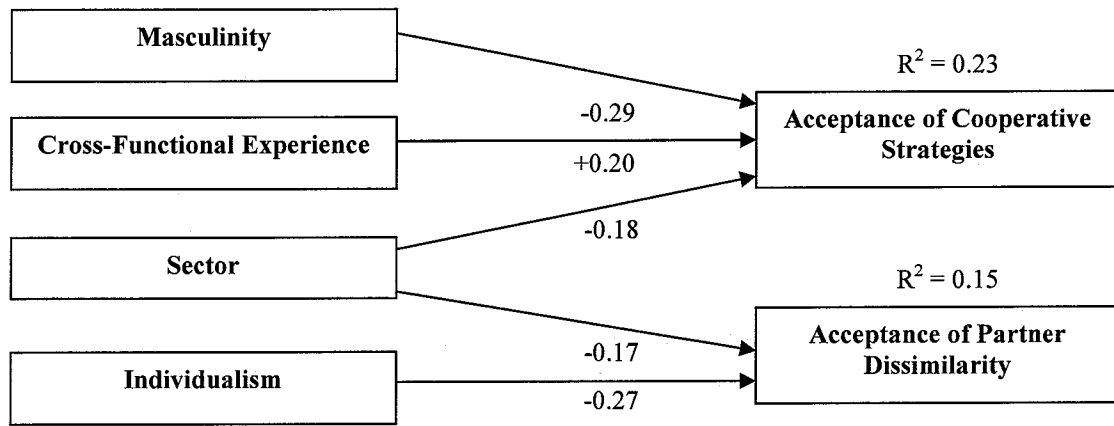
Figure 6.1 – The validated model with β-coefficients and R^2-values

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Appendix 1. Cover letter

Dear Madam, Dear Sir,

The emergence of innovative companies is at the heart of Europe's future. In this framework we are performing a pan-European project on cooperation among young high-tech companies. Information about the characteristics and development of such companies is essential for developing suitable support measures on a large scale.

As a young high-tech company, your input for this project would be highly valuable due to your practical knowledge and experience. To this end we developed a short survey which addresses issues regarding some of your firm's characteristics and its surroundings. The survey can be filled out **fully anonymously**. You may, however, provide an email address (in the designated box) in case you would like to receive a summary of the project's results. They are expected to be published in the course of June 2005.

The survey would ideally be filled out by two people in your firm:

-   Preferably (one of) the founder(s) of your firm; and/or
-   People that have been working with the firm for a long time.

We very much hope that you would take about 5-10 minutes from your busy schedule to fill in the survey at the following link:

Link to Survey on High-Tech Ventures

Should this survey be also appropriate for one or more of your colleagues, we would very much appreciate if you could kindly forward it to them.

Hoping for your valuable input, we look forward to receiving your completed survey, preferably before *date*.

Thank you very much,

Sincerely yours,

<table>
<tr>
<td align="center">Hans Frankort
Eindhoven University of Technology
(the Netherlands)
European Foundation for Management
Development (Brussels)</td>
<td align="center">Prof. Jan Ulijn
Jean Monnet Chair in Innovation, Entrepreneurship
and Culture
Eindhoven University of Technology
(the Netherlands)</td>
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<td align="center">Prof. Hamid Bouchikhi
Chairman of the EFMD Entrepreneurship,
Innovation and Small Business Network
-
Chair in Strategy and Management
ESSEC Business School (Paris)</td>
<td align="center">Liliana Petrella
Director Development
European Foundation for Management
Development (Brussels)
-
Secretary General of the EFMD Entrepreneurship,
Innovation and Small Business Network</td>
</tr>
</table>

Information on parties involved in this research can be derived from:

-   *http://www.efmd.org*
-   *http://fp.tm.tue.nl/capaciteitsgroep/osm/ulijn/*

Appendix 2. Response distribution

Figure A2.1 below shows the response distribution over time, both per day as well as cumulative. The sudden response increases fairly well correspond to the dates on which cover letters were sent.
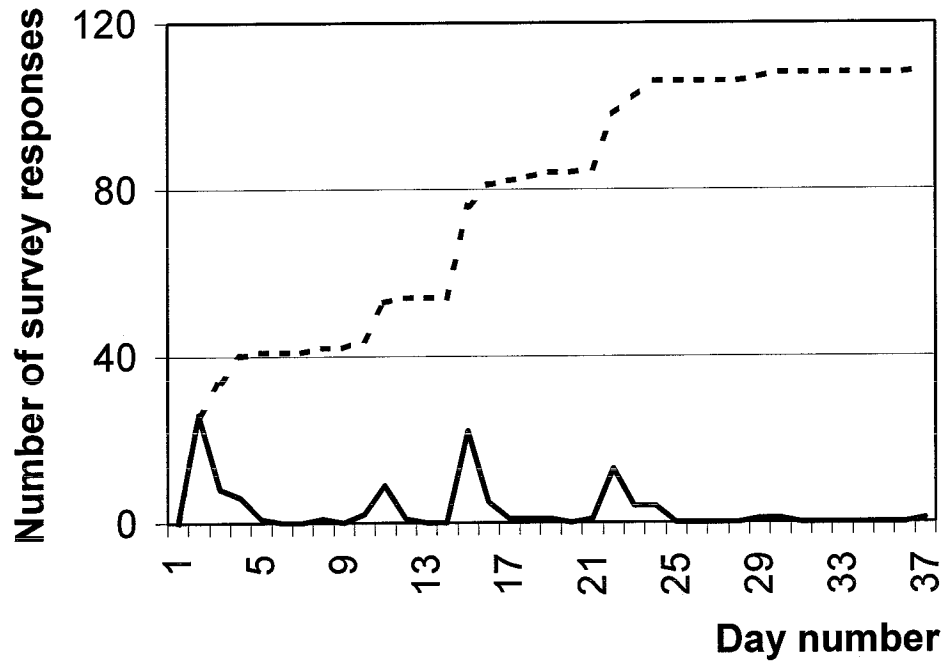

Figure A2.1 – Number of survey responses per day (solid line) and cumulative (dashed line)

Appendix 3. Alternative questionnaire

In this project considerable time was spent on developing a single tool that simultaneously measures a high-tech start-up's national culture, sector culture and professional culture in relation to cooperation. Though the tool proved unsatisfactory with regard to reliability and validity, this section will nevertheless describe its methodological development as an example for (however doubtful) further development. It should be explicitly noted that my conceptual understanding of the issues involved in questionnaire research were underdeveloped at the time of this questionnaire's pilot.

Capturing various levels of culture in a single tool is not new to literature. Ulijn and Weggeman (2001) describe the operationalisation of Hofstede's dimensions (Hofstede, 2001) in an innovation context on firm level. They validated all five Hofstede dimensions, and used a new Market Pull/Technology Push dimension that could not be validated. Since the dimensions of national culture could be validated for an organizational culture, it seemed to be possible to validate them for a mixture of national, sector and professional culture as well.

Firstly, this required contextualizing Hofstede's dimensions. Items were selected to fit the topic and the dimensions well and were drawn from various sources, including Hofstede (2001), Ulijn and Weggeman (2001), Brown (2003), and Li *et al.* (2004). Secondly, per dimension the items were divided into three cultural levels and one item was left as general item (see Table A3.1). The COO dimension in the table represents the dependent variable, namely the attitude towards cooperation. Coding of the items was done using Hofstede's abbreviations of dimensions (IDV was replaced with COL for collectivism, and COO) plus NCx, SCx, PCx and G, with x = 1, 2, 3. Namely, for NC, SC and PC three items were generated, plus a general one. So, every dimension consisted of 10 items, divided in NC (3 items), SC (3 items), PC (3 items), and 1 General item. The items were formulated in such a way that high item answer averages would confirm the hypotheses. Scale values (Likert-type) ranged from 1 (fully disagree) to 6 (fully agree) to avoid central tendency errors.

Table A3.1 – Numbers of items divided per culture dimension and culture level (within the dimension).

Culture level	Dimension						
	PDI[a]	UAI	COL	MAS	LTO	COO	Total
National	3	3	3	3	3	3	18
Sectoral	3	3	3	3	3	3	18
Professional	3	3	3	3	3	3	18
General	1	1	1	1	1	1	6
Total	10	10	10	10	10	10	60

[a] PDI=power distance index, UAI= uncertainty avoidance index, COL=collectivist index; MAS=masculinity index; LTO=long-term orientation index; COO=cooperation index

In the first draft version of the questionnaire every item included information on the cultural level I was looking for. The first pilot of the tool, conducted among PhD students in management at Maastricht School of Management, resulted in radical changes in its structure. Filling in the list took a lot of time and many items were ambiguous. It was decided to put all the items together per cultural level and introduce them with a narrative drawing the context, i.e. national, sectoral, professional and general. In this way the framework was provided without a) directing the reader's thoughts towards cultural elements and b) causing social desirability effects. The second pilot was conducted among several students in Industrial Engineering and was used to assess the correlations between the 60 items. These correlations did not present the desired patterns and, in a lot of cases, were negative or zero, while the coding was right. Furthermore, Cronbach's alphas were unacceptable (mostly below 0.4). A factor analysis was not performed because of a limited sample size (n=9).

After these iterations and various conversations with experts it was decided to redraw the conceptual model and start using existing measures. The tool is very well applicable for a single cultural level, but three seem to be too much and highly invalid and unreliable. More studies have stressed the problems with operationalising Hofstede's dimensions, even at one (national) level (see, for example, Rose *et al.*, 2001).

Appendix 4. The questionnaire and its scales

A4.1 The questionnaire
This survey addresses issues regarding some of your company's characteristics and its surroundings. The survey consists of 25 questions. The instructions for answering the questions are provided when necessary.

Filling in the survey will take about 5-10 minutes of your time.

1.   (Optional) What is the name of your company?

        ....

2.   In what country has the company originally been established?

        ....

3.   When was your company established? (month/year)

        ....

4.   Has your company been established with major help from an incubator,
        Development Company or any other support centre?
        □   No
        □   Yes

5.   How many employees does your company have (including yourself)?

        ....

6.   What is your year of birth?

        ....

7.   What is your gender?
        □   Female
        □   Male

8. What is your educational background?

        ....

9. What is your country of origin?

        ....

10.What was the size of the team that started up your company?

        ....

11.What is the country of origin of the founder(s)?

....

12. The start-up team consisted mainly of... (In case of one person, just state his/her background.)
    □ Engineer(s)
    □ IT specialist(s)
    □ Marketer(s)
    □ Scientist(s)
    □ Other, namely.......................................

13.Which types of employees are most numerous in your company as a whole?
    □ Engineers
    □ IT specialists
    □ Marketers
    □ Scientists
    □ Other, namely.......................................

14. According to you, to what extent do the employees in your company have experience in more than one function?

| Very little | | | | | Very much |
1	2	3	4	5	6

15. Please judge the **current** relative importance of the following nine activities for your company. Rate them from 1 to 9, using 1 for the most important activity and 9 for the least important one. Please note that the activities are put in alphabetical order.

.....Accumulating resources (raw materials, equipment, a location etc.)

.....Acquiring employees (building an organization)

.....Acquiring intellectual property rights

.....Creating and developing product and/or process knowledge

.....Internationalising

.....Locating and assessing opportunities

.....Marketing the product/process/service

.....Producing and selling the product/process/service

.....Seeking finance/funding

16. In which sector is your company active?
    □ Aerospace
    □ Agriculture
    □ Automotive
    □ Biotechnology
    □ Construction
    □ Food
    □ Information Technology

     □ Medical
     □ Pharmaceuticals
     □ Telecommunication
     □ Other, namely.......................................

17. My company focuses on...
     □ Manufacturing
     □ Providing services

18. How do you judge...:

	Very slow (1)	2	3	4	5	Very high (6)
the rate at which products/services become obsolete in the sector?						
the rate at which production/service technology changes in the sector?						

19. How do you judge...:

	Very low (1)	2	3	4	5	Very high (6)
the R&D intensity in your sector?						

20. How do you judge...:

	Very easy (1)	2	3	4	5	Very hard (6)
the predictability of demand and customer tastes in your sector?						

21. Please tick off the option that best describes your opinion concerning each statement (1 to 6, strongly disagree to strongly agree). In this question, "strategic partnerships" include partnerships of various types, like joint ventures, buyer-supplier alliances, marketing alliances, technology alliances for either product or process R&D, informal bilateral agreements, and so on.

	Strongly disagree (1)	2	3	4	5	Strongly agree (6)
Both large and small companies will have to increasingly "network", i.e. enter into strategic partnerships to achieve success.						
Creating strategic partnerships can be an alternative to being acquired.						
For businesses interested in growth, strategic partnerships offer excellent opportunities.						
In the future, both large and small companies will be required to enter into strategic partnerships to achieve success.						
It is not enough to be "small" and entrepreneurial in the future.						
Small organizations must recognize that they are not "self-sufficient".						

22. Please tick off the option that best describes your opinion concerning each statement (1 to 6, strongly disagree to strongly agree).

In a strategic partnership...:

	Strongly disagree (1)	2	3	4	5	Strongly agree (6)
common practices are more important than common values.						
cultural value differences benefit both parties.						
heterogeneity should be favoured above homogeneity.						
individualists produce breakthroughs that collectivists implement and improve.						
one should favour cultural dissimilarity.						

23. How many strategic partnerships has your company engaged in?

....

24. How many of these have proven successful?

....

25. In case you would like to receive a summary of the project's results, please write your email address:

....

A4.2 Scales

Table A4.2.1 – Items of the three multi-item scales (COO, APD and ID) including the full-text

Scale	Item coding	Full-text items
COO	COO1	Both large and small companies will have to increasingly "network", i.e. enter into strategic partnerships to achieve success.
	COO2	Creating strategic partnerships can be an alternative to being acquired.
	COO3	For businesses interested in growth, strategic partnerships offer excellent opportunities.
	COO4	In the future, both large and small companies will be required to enter into strategic partnerships to achieve success.
	COO5	It is not enough to be "small" and entrepreneurial in the future.
	COO6	Small organizations must recognize that they are not "self-sufficient".
APD		*In a strategic partnership:*
	APD1	common practices are more important than common values.
	APD2	cultural value differences benefit both parties.
	APD3	heterogeneity should be favoured above homogeneity.
	APD4	individualists produce breakthroughs that collectivists implement and improve.
	APD5	one should favour cultural dissimilarity.
ID		*How do you judge:*
	ID1	the rate at which products/services become obsolete in the sector?
	ID2	the rate at which production/service technology changes in the sector?
	ID3	the R&D intensity in your sector?
	ID4	the predictability of demand and customer tastes in your sector?

Appendix 5. Selected correlations

Table A5.1 – Intercorrelation matrix for company age (Cage) and number of strategic partnerships (NoSP)*

Variables	1	2
1. CAge	-	
2. NoSP	0.29[a]	-

* The significance is based on a two-tailed test.
[a] p<0.01

Table A5.2 – Intercorrelation matrix for the number of employees (NoEmpl) and cross-functional experience (CFE)*

Variables	1	2
1. NoEmpl	-	
2. CFE	-0.25[a]	-

* The significance is based on a two-tailed test.
[a] p<0.05