



## Assessment of proposals for new technology ventures in the UK: characteristics of university spin-off companies

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### Abstract

University “spin-off” companies are high technology ventures that originate from research work in a university, resulting in the generation of intellectual property and, usually, the subsequent involvement of key researchers. The analysis distinguishes between 14 new technology-based firms that are university “spin-off” companies and 14 community companies that had no connection with a university. The analysis described in this paper is based on a specially developed assessment methodology that comprises a structured decision-making model. This technology assessment methodology is based on the identification of key criteria for analysis. The study identified the most significant variable for university “spin-off” companies being that of protecting competitive advantage. This result can be attributed to the need for universities to protect their intellectual property, which is to be rewarded with an equity stake in the company. Two other significant variables were identified as the level of product innovation (compared to competitors) and market criteria (including the potential customer base). © 2003 Elsevier Ltd. All rights reserved.

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### 1. Introduction

New ventures have a high rate of births and failures. Estimates of failure rates for new ventures have improved with 91.4% of UK VAT-registered businesses in 2000 trading for a year, compared to 85.5% in 1993 (DTI, 2003). The same survey reported that the percentage of UK businesses surviving 3 years or more increased from 60 to 64%. The risks are greater for new technology ventures because they have more dimensions of novelty than other new ventures. The dimensions of novelty identified (Shepherd et al., 2000) are:

- Novelty to the market;
- Novelty in production;
- Novelty in management.

One of the challenges for bank managers and other investors is how to assess the various new technology ventures that approach them for funding. Expertise in financial matters does not provide the necessary

background to understand the proposed technology in sufficient depth, preventing an assessment of viability or market attractiveness. Technology risk added to normal commercial risk could lead to the avoidance of new funding in this sector and potentially profitable future business. The use of consultants specialising in ‘due diligence’ work at the initial appraisal stage would be expensive and passing these costs on to the new technology ventures would be decidedly unwelcome.

This paper develops a methodology for the assessment of new technology ventures based on the identification of key criteria for analysis. The methodology is then applied to a sample of new technology ventures. The samples chosen comprise a group of university “spin-off” companies and a group of companies arising from the community as a whole, later referred to simply as ‘community companies’ for convenience.

The university “spin-off” companies selected were high technology ventures that originated from research work in a university, resulting in the generation of intellectual property and, usually, the subsequent involvement of key researchers.

The categories used in the assessment method can readily be identified in the research literature and have frequently been used to assess business plans of high technology

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ventures. The analysis described in this paper is based on a specially developed assessment methodology that comprises a structured decision-making model.

## 2. Theoretical model and literature

### 2.1. *The approach to new technology venture assessment*

Assessment of new technology reported in the research literature includes assessment of new technology ventures and new technology projects for new product development. The research identifies two approaches to assessment. The process-based approach (Khurana and Rosenthal, 1998) employs established procedures, e.g. for assessing project proposals based on new product development. In contrast, a culturally based approach (Cooper and Kleinschmidt, 1997) is one where there is no formal methodology that all projects are assessed against—assessment is based on the assessor's experiences both individually and collectively.

The research literature relating to the assessment of new technology ventures identifies the different approaches taken by the main parties active in this area—business angels and venture capitalists. Business angels come from diverse backgrounds ranging from former entrepreneurs to finance specialists (Prowse, 1998). They are inclined to target the less risky proposals compared to those favoured by venture capitalists (Mason and Harrison, 2002) and their assessment focus reflects this. They focus less on assessment of market risk than venture capitalists (Fiet, 1995), and focus more on assessment of the entrepreneurs—their methods also vary in that they use more informal networks than venture capitalists.

Venture capitalists (VCs) use a culturally based approach to achieve a holistic appraisal during their involvement in the early stages of new technology ventures. In contrast, approaches based on decision models (e.g. by actuaries or universities) are essentially process-based to achieve a holistic appraisal in their assessment of new technology ventures.

The benefits for a VC of using a culturally based approach to their assessment of new technology ventures (rather than a formalised process or decision model) are that they are free to adapt to individual circumstances. This suits their mode of operation, as they are often in close contact with many of the different players in a given sector. This may be advantageous although potentially risky in a newly evolving market situation.

It is also a speedier approach to assessment with times of 12 min reported (Sandberg and Hofberg, 1987; Shepherd et al., 2000). Speed is an important criteria to venture capitalists who need to make a quick initial screening of the hundreds of proposals that they receive. From this they select those worthy of further scrutiny, typically less than 1% of the total. Previous studies have shown that decision

models can also be successfully used in the initial screening stage (Zacharakis and Meyer, 2000).

The disadvantage of a culturally based approach that has been reported (Zacharakis and Shepherd, 2001) is that of overconfidence. This research into venture capitalists' decision-making highlighted the fact that they make decisions without obtaining additional information to check areas of concern.

The use of decision models by venture capitalists is reported to be rare (Zacharakis and Meyer, 2000). However, the mode of operation of venture capitalists (which is based on their closeness to a given marketplace) can be improved by the use of decision models (Shepherd and Zacharakis, 2002).

### 2.2. *Assessment criteria in new technology venture assessment*

The assessment of new technology ventures in the UK presented in this paper is based on identifying key criteria for analysing high technology ventures presented to banks in the first instance. The order of the criteria given below is one considered appropriate to the nature of this task. VCs would be likely to choose and order that which achieves rapid elimination, e.g. considering CVs of the management team first.

#### 2.2.1. *Technological and commercial risk*

High technology ventures are inherently riskier than other business ventures as they are likely to involve technological and product developments. Research has shown that this risk is increased when innovation involves both technological innovations and market innovations, such that the product capabilities are new to the market (Veryzer, 1998). The promotion of products to the market is also affected by the complexity of a product (Ahearne et al., 2000; Kim and Wilemon, 2003).

Technological uncertainty is recognised in the research literature (McDermott and Connor, 2002) as one of the four dimensions of radical innovation (the others being technical inexperience, business inexperience and technology cost).

The product risk increases with the greater number of functions or technologies (Kim and Wilemon, 2003) so the level of complexity of the proposed product requires assessing. In the cases where there is no prototype to assess, there is a need to focus on whether a company can develop its area of competence by developing products with a high market distinction (Tatikonda and Rosenthal, 2000; Kim and Wilemon, 2003).

The technological and commercial risk in developing and promoting the proposed products or services is one of the criteria used in the assessment method as shown in Table 1.

#### 2.2.2. *Level of product innovation*

Many of the business plans that have been assessed are from entrepreneurs who are frequently overly optimistic about their business proposal and have a tendency to

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