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Explaining innovative efforts of SMEs. An exploratory survey among SMEs in the mechanical and electrical engineering sector in The Netherlands

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Abstract

Innovations are among the most important means through which small and medium sized enterprises contribute to increased employment, economic growth and economic dynamics. A lot of research has been carried out to determine which factors enhance innovative efforts of SMEs. This study uses a regression-based methodology to examine the importance of each factor, controlling for the other factors. The study is based on data collected through telephone interviews with managers of Dutch SMEs in the metal-electro-sector. In the analyses innovative efforts are used as the dependent variable. Out of 14 potentially independent variables, three appear to contribute significantly to innovative efforts: using innovation subsidies, having links with knowledge centres, and the percentage of turnover invested in R&D. This article suggests that innovativeness is the result of a deliberately chosen and pursued policy. If governmental and or sectoral institutions want to stimulate SMEs to become and remain innovative, they should encourage these companies to implement an innovation directed policy. Without such a policy, SMEs seem unable to digest successfully stimulating measures and subsidy schemes. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Innovation; SME; Mechanical engineering; Electrical engineering; Multiple and logistic regression analysis; Predictors of innovative efforts

1. Introduction

Small and medium sized enterprises (SMEs) have a reputation as boosters of employment, economic growth and economic dynamics. One of the most important means through which SMEs are able to make these contributions is their capability to realise innovations. Therefore, in both developed and developing countries and regions, many efforts have been made during the last few decades to stimulate SMEs to realise innovations. SMEs have been encouraged to make use of funding schemes and to utilise the services of knowledge centres. However, in spite of these efforts there still is a lack of knowledge about the nature and extent of SME support needs and the mechanisms for delivering it effectively. The result is that the policy environment is characterised by a wide range of experimentation (Bessant, 1999).

In recent years a lot of research has been done to find out which factors contribute to innovation efforts by SMEs, to build a more thorough theoretical foundation for the mechanisms behind innovations and to substantiate practical interventions. These studies revealed that activities directed to innovation correlate with a considerable number of variables. An important characteristic of these studies is that so far, little or no attention has been focused on uncovering possible interactions between variables. From a theoretical as well as from a managerial perspective, it seems to be relevant to know which variables contribute most to innovation efforts.

In this paper, the results of an exploratory survey among managers of SMEs are presented. The aim of the survey was to find a relatively small set of variables within a larger number that are reported to be important for innovation, which suffice to "explain" the differences between SMEs being involved in innovative efforts and others that are not.

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First, the conceptual background will be described. It includes a literature review of recent publications about variables contributing to innovation efforts of SMEs. Next the survey's design and methodological set-up are explained. After that, the results of the statistical analysis and the interpretation of the results are presented. Finally, we discuss the major findings.

2. Theoretical background

To find out which variables can be considered as possible predictors of innovation efforts, a number of recent publications were reviewed. Our conclusion was that the variables could be classified as *external variables* and *internal variables*. External variables refer to opportunities an SME can seize from its environment. Internal variables refer to characteristics and policies of an SME. The variables found in the review are summarised in Table 1.

For most of the variables summarised in Table 1, the suggestion is that they have a direct and positive relationship with innovative efforts of SMEs. In some cases, researchers have reported relationships that are more complex. We can think of different reasons for these confusing reports. One reason may be that in these cases both generic and context specific conditions play a role. A second cause may lie in the difference between "espoused theory" — what SME managers say they do — and "theories in use" — the way SME managers act in practice (cf. Argyris and Schön 1978, 1996). A third reason may be that the variables concerned interact with other variables.

Below we will mention some of the most remarkable "deviant outcomes". The results of our study will hopefully lead to a better understanding of the way in which such variables contribute to innovative performances.

Different views are found on the impact of links to *sources of knowledge*. Hoffman et al. (1998) point to some contradictions in literature about sectoral differences in the use of external knowledge sources. Some authors find that many SMEs, particularly in high-technology sectors, have diverse and intensive links with external sources of knowledge (public and private), while others have found evidence that counters many of the positive assumptions made about the value and extent of such links. Le Blanc et al. (1997) discovered geographical differences. Japanese

Table 1
Summary of literature review about variables influencing innovative efforts of SMEs

External variables	Internal conditions
Collaboration with other firms: • Collaboration with suppliers to overcome size constraints and to spread new technology costs and risks. Continued interactions with suppliers lead to low formalised relations that could be difficult to achieve over long distances (Lipparini and Sobrero, 1994). • Close working relationships with suppliers and customers in co-design and co-makership (Birchall et al., 1996; Meer et al., 1996; Dutch Ministry of Economic Affairs 1993, 1996; Docter and Stokman, 1988; Davenport and Bibby, 1999; Keeble et al., 1999) • Customers are the main source of improved technology for SMEs in the USA (Le Blanc et al., 1997) • Strategic alliances as an integral part of the firm's development plan (Forrest, 1990; Cooke and Wills, 1999) *Linkages with knowledge centres*: • Contributions by professional consultants, university researchers and technology centres (Le Blanc et al., 1997; Hoffman et al., 1998; Oerlemans et al., 1998) • Contributions by innovation centres and Chambers of Commerce (Oerlemans et al., 1998) *Utilising financial resources or support regulations:* • Availability of R&D funding (Le Blanc et al., 1997; Birchall et al., 1996; Hoffman et al., 1998) • Government financial aid (Dutch Ministry of Economic Affairs, 1993)	*Strategy:* • Explicit strategies to increase and stimulate internal creativity and risk taking behaviour (Birchall et al., 1996; Carrier, 1994) • Sound day-to-day and strategic business-management practices (Anonymous, 1999) • Strategies to implement state-of-the-art production technology and automation (Aronson, 1998; Abdul-Nour et al., 1999) *Structure:* • Application of project management structures (Larson et al., 1991; Meer et al., 1996) *Technology policy:* • Planning for the future (Docter and Stokman, 1988) • Number of technology policy instruments used by the firm (Oerlemans et al., 1998) *Level of education:* • Level of education of founder/manager and employees (Docter and Stokman, 1988) • Presence of qualified engineers (Le Blanc et al., 1997; Hoffman et al., 1998) *Investments in R&D:* • Percentage of sales volume invested in R&D (Birchall et al., 1996; *Geographical location:* • Rural or urban location (Hoffman et al., 1998)

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