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Incentives to innovate

testing antecendents of innovation in small and medium-sized service firms

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Abstract

This empirical study investigates the factors that influence firms' incentives to innovate. We study the variables stimulating, enabling and conditioning the idea generation process in small and medium-sized service firms. The employees and their context determine the richness of the early stages of the innovation process, and thus the firms' incentives to innovate. Of the final set of explanatory variables, the most significant 'manageable' variable is the formulation of *clear innovation objectives* in the corporate strategy. Furthermore, fostering *freedom to experiment* and applying *multifunctional teams* have positive effects on the incentives to innovate. Besides, two factors (*quality competition* and *high uncertainty of market demand*) are market related. Finally, in contradiction to our expectations, having *well-educated employees* has a negative effect on the incentives to innovate.

Keywords: incentives to innovate, service firms.

1. Introduction and overview

The growing share of service industries in the national economies in most modern countries has been a familiar phenomenon in the past fifteen years. Service industries have become more important in terms of employment, and increasingly also in total output. It is well known that in the advanced economies of the OECD, services account for roughly two-thirds of value added and employment, a share that is still growing, whereas that of manufacturing is in decline (OECD, 2000).

Currently, for many small companies innovation is an important topic, and service firms are no exception to this. However, there is not much knowledge about innovation in service firms yet. Despite their economic importance, services have received relatively little attention in innovation research. The subject has long been discarded in favour of technological innovation, which is particularly relevant for manufacturing industries (Meyer and DeTore, 1999; Johnson et al., 1999).

Innovation is unmistakably a critical determinant of the competitiveness of the modern service firm. Small service firms are often credited with mid-term competitive advantage when economic times turn turbulent. In these first years of the century, it is increasingly understood that employees are as important to innovation as 'wizzy' inventors or visionary entrepreneurs (De Brentani, 2001). Smaller firms and their employees may be our window to the future. Times characterized by emerging and shifting business and industries foster businesses of smaller scale as the generators of new ideas, superior in operationalising ideas and bringing them quickly to the market (cf. Schumpeter, 1934). Smallness may make us more agile, responsive, and therefore fit for the future, especially when the latter is full of innovation. (e.g. Christensen and Bower, 1996; Audretsch and Thurik, 2000).

Summarising, more knowledge about innovation in services is needed. This empirical study investigates the factors that influence a service firm's incentives to innovate. We follow Brown and Eisenhardt (1995) in their assumption that employees are at the heart of the innovation process. Employees arrive at ideas, concepts, and actual specifications, confident to turn these building blocks into successful innovations. If incentives to innovate are missing, the number of innovative ideas will decrease, which may well limit the strategic opportunities of the firm. Strong incentives to innovate are a necessary condition to be successful at innovation (cf. Miles et al., 2000).

The incentives to innovate alone are not sufficient or equal to innovative performance. We are interested in the antecedents and determinants of a service firms' incentives to innovate. We test an empirical model that includes 35 potential determinants of a firm's incentives to innovate. The determinants are derived from both the economics and management literature on innovation. In section 2, we discuss the range of variables and the literature that led us to include the variables that we do. Section 3 elaborates on the research methodology. Section 4 presents the results of an empirical analysis. We test which of the determinants actually matter most in relation to observed differences in the incentives to innovate in a sample of Dutch service firms. Section 5 presents our conclusions and suggestions for further research.

2. Literature and variables

Brown and Eisenhardt (1995) discuss two complementary traditions in innovation research. The research splits into two broad areas of inquiry. These areas are the economics-oriented and the business-oriented tradition (Adler, 1989).

The first research tradition is economics-oriented. It examines differences in the patterns of innovation across countries and industrial sectors, the evolution of particular technologies over time, and intra-sector differences in the propensity of companies to innovate. The level of analysis is at the macro- or meso-level. Typically, the innovation infrastructure, market characteristics and rather straightforward firm factors (size and sector) are used to explain variables such as patenting and R&D expenditures. However, in this research tradition the actual innovation process remains a black box.

The second research tradition, which is business-oriented, opens up that black box. It examines how specific new services and products are developed, and indicates the organizational structures, roles and processes that are related to enhanced service development. The entrepreneurs and the innovations are placed in the heart of the analysis. This second tradition, in the terminology of the economics-based research tradition, discusses in essence the efficiency of the innovation trajectory; to what degree are innovative inputs transformed into innovative outputs?

In this study, we apply and test insights from both traditions, allowing a full range of factors to influence a company's incentives to innovate. Some factors are within managerial control, others are well beyond it. Some factors are directly aimed at fostering innovativeness, others are firstly aimed at other goals, but still possibly very relevant to the actual incentives to innovate.

First, we should define 'innovation' and our main topic, the 'incentives to innovate'. Innovation concerns new products, new services, new markets, new technologies, new processes or new organisations (Schumpeter, 1934). Innovation may be defined as "*the development and implementation of a new or improved product, service, technology, work process or market condition, in the intention to gain competitive advantages*" (Schumpeter, 1934). To successfully introduce innovations, service firms must foster their motivation and ability to look for and find new 'things'. The innovative attitudes of the employees are crucial here. They are assumed to codetermine a service firm's incentives to innovate: *the internal capacity to generate ideas and to work with these ideas to develop new or improved products, services, technologies, work processes or markets.* The willingness (or reluctance) of employees to try out new 'things' and actually take risks is at the heart of service firm's incentives to innovate (De Brentani, 2001).

As mentioned, we follow Brown and Eisenhardt (1995) and De Brentani (2001) in their assumption that employees are at the heart of the innovation process. Innovations are rooted in the knowledge, the motivation and the skills of the employees involved in the innovation process. If the incentives to innovate are missing, the desired behaviour of the employees will be lacking.

Our literature review has revealed 35 factors that are possibly influencing a service firms' incentives to innovate. We study the variables conditioning, enabling/interacting and motivating the idea generation process in small and medium-sized service firms. We distinguish factors on various intermediate levels (see figure 1): *conditioning factors* (market level), *enabling and interacting factors* (firm level) and *motivating factors* (personal level).

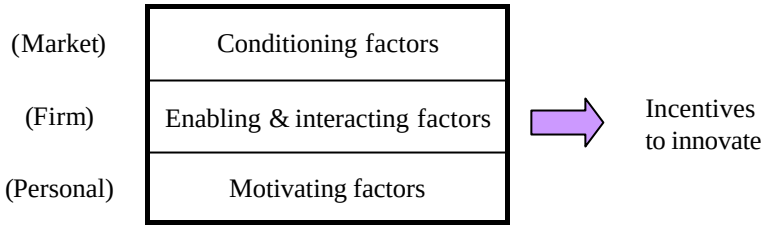

figure 1 Analytical framework

In concreto, the entrepreneur, the employees and their context determine the early stages of the innovation process, and thus the overall incentives to innovation at the micro-level. We assume that the incentives to innovate are a function of the *ability* and the *motivation* of the people in the firm (Vroom, 1964; Angle, 1989; Amabile, 1988, Amabile, 1998). Next to this, factors in the competitive and organizational context further condition the incentives to innovate (Drew, 1995).

Motivating factors (personal level)

The ability and motivation of employees are critical and necessary for success in the early stages of the innovation process. Organisations differ from one another in the inducements (rewards) they offer for the contributions by their employees (Simon and March, 1958; Angle, 1989). Motivation of employees can be both intrinsic and extrinsic. Incentives and rewards offered based on contingencies (e.g. by performance) are extrinsic, incentives and rewards that are received by participation (not directly related to performance) are intrinsic (Amabile, 1988; Angle, 1989; Amabile, 1998).

We distinguish nine motivating factors, affecting employees' incentives to innovate on a personal level.

Firstly, the *reward structure* can play a significant role in stimulating the employees' incentives to innovate. Rewarding (team) performance, rewarding idea generation and rewarding innovative performance can motivate employees in service firms to behave innovatively and pick up the incentives to innovate (Johne and Storey, 1998; Scheuing and Johnson, 1989; Debackere et. al., 1998).

Secondly, the *autonomy of employees*, that is the degree to which they do their work freely and independently, may determine the employees' incentives to innovate (Prakken, 1994). Autonomous, 'empowered' employees will generate and propose more ideas, and, they will feel free to act on them (Oden, 1997).

Amabile (1998) stresses *challenging tasks* as a determinant of the employees' incentives to innovate. MacMillan and McCaffery (1984) suggest encouraging internal entrepreneurs as a means of pursuing effective service innovation. Assigning appropriate and challenging tasks to employees may be of importance. These may directly improve their incentives to innovate. The decisive factor is the challenge presented by the work. The challenge should not be too small (such that people get bored), nor should it be too great (such that they lose control or feel threatened).

Sanders en Neuijen (1992) discuss the subject of *professionalism* as a dimension of a firm's culture. We hypothesize that professionalism is an incentive for innovation. In a professional environment, employees are focused on their jobs, open to information and interested in innovation. Therefore, professionalism can motivate employees to incentives to innovate.

The *result orientation* of the firm entails the degree to which results are emphasised in the work process (Amabile, 1998). A result-oriented firm may have few rules and procedures for carrying out the work and solving problems, but clear definition of what should be achieved. It is the results that 'count'. A result orientation may contribute to the firm's incentives to innovate by clarifying that employees may be innovative in their approaches to reach their targets.

The *people orientation* (Sanders and Neuijen, 1992) in a service firm entails the degree to which allowance is made for personal attention. Companies are collections of individuals. A people-oriented company takes explicit responsibility for the well being of its individual employees. In this regard, Zien and Buckler (1997) state that when the employee is central in the definition of tasks and results, the incentives to innovate will flourish.

Tushman and O'Reilly (1997) stress that *clear innovation objectives* play a significant role in increasing the incentives to innovate. Johne and Storey (1998) stress the importance of clear goals that must be set for new service development. Clear innovation objectives motivate employees to be innovative, they make it clear to employees that innovation has priority, and, they trigger the employees to really strive for innovation.

Statement of *innovation in the mission* plays a significant role in influencing and encouraging employees within service firms (Drew,1995; Ennew and Wright, 1990; Hodgson, 1986; Thwaites, 1992). The incentives to innovate may grow and become more explicit when the mission statement includes reference to innovation as part of the long term corporate strategy.

Finally in this set of motivating factors, the *commitment of the entrepreneur* (to innovation) may be important. An entrepreneur (or manager), who constantly encourages creative behaviour, stimulates the employees' incentives to innovate. So, the entrepreneur should show a high degree of confidence in his employees (De Brentani, 2001; Johne and Storey, 1998; Debackere et.al., 1998; Atuahene-Gima, 1996).

Summarising, we have formulated nine hypotheses on motivating factors which are presented in table 1.

table 1 Hypotheses on motivating factors

M1	Companies with a *reward structure* stimulating creativity have more incentives to innovate
M2	Companies with more *autonomy for their employees* have more incentives to innovate.
M3	Companies with *challenging tasks* for their employees have more incentives to innovate.
M4	Companies with a *professional culture* have more incentives to innovate.
M5	Companies with a more explicit *result orientation* have larger incentives to innovate.
M6	Companies with a more explicit *people orientation* have larger incentives to innovate.
M7	Companies with *innovation objectives* in their strategy have larger incentives to innovate
M8	Companies with *innovation in the mission* statement have larger incentives to innovate.
M9	Companies with *commitment of the entrepreneur* to innovation have more incentives to innovate.

Enabling factors (firm level 1)

A number of factors are critical in enabling employees to be innovative. These factors create the right environment and they can be managed in order to improve the incentives to innovate within companies. We distinguish ten such firm-level variables that directly enable the employees' incentives to innovate.

Firstly, the recruitment of *well-educated employees* may enable a firm to enhance its capacity to generate and absorb new ideas. A lack of high quality and experienced development staff is a major barrier to many innovations (Drew, 1995; Johne and Harborne, 1985). Fischer et al. (1993) mention the importance of high expertise along co-workers as a success factor for new services. Contrarily, low-educated employees may cause many hurdles and bumps that have to be taken in order to get new ideas accepted. This will eventually smother the incentives to generate new ideas.

The presence of *financial resources* may also be an enabling factor for the incentives to innovate (Elfring, 1997; Preisl, 1998). Most service firms are small enterprises, and if innovation projects fail this implies high risks of financial losses that the firm can not bear. A lack of financial resources may be devastating for employees' willingness to behave innovatively. Dougherty and Hardy (1996) recommend the introduction of 'pockets of seed money' in a company for innovative initiatives.

Education and training programmes can advance the capacity for innovation by enlarging the body of knowledge and skills. This increases the creative and problem-solving capacities of employees (Tidd et al., 2000; Drew, 1995).

The influence of *company size* on the generation of ideas may be ambiguous. For service firms, the propensity to innovate is expected to increase with firm size. This is due to the simple fact that larger firms have more lines of activity and therefore more areas in which to innovate (Hipp et al., 2000). Larger companies have more possibilities of interdisciplinary activities and their existential risks related to innovation seem smaller (Vossen and Nooteboom, 1996). Yet, smaller companies tend to be

more flexible, encouraging the generation of ideas (Scherer, 1988). We hypothesize the first effect dominates in relation to the incentives to innovate.

Nagel (1993) suggests *technical knowledge* as a determinant. Technology (defined as the company's specific knowledge, skills and work processes) may trigger innovative efforts. According to Cooper and Kleinschmidt (1995) the technology present in a company is often a prerequisite for being able to innovate. This seems particularly true for manufacturing firms. In a company with more technical knowledge, there may be more incentives to innovate. We hypothesize that technical knowledge is an enabler of innovation in service firms as well.

Sanders and Neuijen (1992) discuss management by *loose control* as a dimension of a firms' business culture. This may be an incentive to innovate in service firms. Innovative companies generally have many non-standardized activities. Loose control will enhance the incentives to innovate. We believe tight control would result in a slowdown of creativity due to rule following.

An *open culture* may contribute to an organisation's incentives to innovate. Open cultures provide better support for an exchange of ideas. Having an open and highly innovative new product culture within the firm is generally considered a primary route to success. Developing highly innovative services that involve new technologies and completely different ways of dealing with problems, require a corporate environment that encourages and supports creativeness and 'stepping out' beyond the norm (De Brentani, 2001; Vermeulen, 2001; Johne and Storey, 1998).

Oden (1997) mentions that the *spread of information* within an organisation is relevant for the incentives to innovate. The availability of a large diversity of information for the employees affects the idea-generating power. Good internal communications facilitate the dissemination of ideas within a company, contributing to a culture in which ideas are more likely to be translated into action. Van der Aa (2000) states that the diffusion of knowledge, experience and 'best practices' is a necessary condition for effective innovation in services. Problems of communication between various functional specialist can slow down and decrease the success of innovative activities (Vermeulen and Dankbaar, 2002).

Companies with *freedom to experiment* give their employees the time to try out their ideas. Zien and Buckler (1997) argue that being able to experiment is important in each job. Many ideas for improvement are discovered accidentally. Giving the employees the time to try out ideas and treating the results of such experiments seriously fosters incentives to innovation.

Finally, *creativity techniques* contribute directly to the capacity of employees to generate ideas and solutions. There are many techniques designed to advance human creativity in a direct manner. Buijs (1987) mentions no less than 50. They enlarge the capacity to abandon programmed ways of thinking, freeing the way for creative ideas. The most widely used creativity technique is brainstorming, triggering and channelling incentives to innovation.

Summarising, we have formulated ten hypotheses on enabling factors which are presented in table 2.

table 2 Hypotheses on enabling factors

E1	Companies with *well-educated employees* have more incentives to innovate.
E2	Companies with *financial resources* for innovative efforts have more incentives to innovate.
E3	Companies with better possibilities for *education and training* have more incentives to innovate.
E4	Companies with a larger *company size* have more incentives to innovate.
E5	Companies with *technical knowledge* have more incentives to innovate.
E6	Companies with *loose control* have more incentives to innovate.
E7	Companies with an *open culture* have more incentives to innovate.
E8	Companies with a better *spread of information* have more incentives to innovate.
E9	Companies with *freedom to experiment* have more incentives to innovate.
E10	Companies that use *creativity techniques* have more incentives to innovate.

Interacting factors (firm level 2)

Within the firm, in addition to the abovementioned directly enabling factors, there are also factors that impact the firm's incentives to innovate indirectly. These factors relate to other functions within the firm, however, they may determine the incentives to innovation. We labeled these indirect enablers as 'interacting factors'. Below, we will discuss nine of these factors.

De-standardisation is the degree to which an organisation's work processes are established with relatively few rules and procedures. This has both positive and negative effects on the overall results of innovative activities. Bodewes (2000) concludes that the amount of de-standardisation should be high in the first stage of the innovation process, but lower in the development stage. During the first stages a firm derives no benefit from a multitude of rules and procedures. Few rules and procedures permit openness, which encourages new ideas and innovative behaviour of employees (Edvardsson et al., 1995). Although a high degree of de-standardisation seems desirable for the incentives to innovate, one should realise that in the development stage of the innovation process, de-standardisation negatively contributes to the execution speed of the company's service design processes (Fröhle et al., 2000).

Vertical integration means that the number of management layers is limited, leaving short lines of communication between employees and the entrepreneur. Vertically integrated manufacturing firms produce more ideas than companies with many management layers (Oden, 1997). We hypothesize this applies to service firms as well.

*Multifunctional team*s and the overall number of tasks performed in them may interact with the incentives to innovate within the firm. Multifunctional teams are groups of persons with different backgrounds (work, education, experience, etc.) carrying out particular jobs. The employment of multifunctional teams for new service development directly contributes to the overall effectiveness of developing new services (Fröhle et al., 2000; Atuahene-Gima, 1996; Vermeulen and Dankbaar, 2002). It is stimulating because of an increase in creativity and breadth of ideas that are associated with

diversity. This increases the problem-solving ability during the development stage of the innovation process as well.

Job rotation is a management tool for a range of purposes. Most importantly in our context job rotation broadens the employees' points of view. It makes employees in an organisation familiar with each others' work (Prakken, 1994). The employees will find it easier to place problems in a wider context, and therefore they experience stronger incentives to innovate. Maira and Thomas (1999) find that when employees come into contact with other job areas through job rotation, they often gain new ideas and insights.

The *external orientation* of firms, according to Cooper and Kleinschmidt (1995), is a critical determinant of the incentives to innovate. By external orientation we mean the extent to which a company is knowledgeable of and interacts with its environment. Heydebreck (1997) discusses a number of such external parties that can help a SME to enhance the incentives to innovate, for instance suppliers, customers, competitors and advisors. In service firms, due to the ease of copying, competitors have been identified as an even more important source of ideas for new products than customers (e.g. Easingwood, 1986; Hooley and Mann, 1988; Scheuing and Johnson, 1989).

Customer orientation aids the incentives to innovate. Kline and Rosenberg (1986) mention the significance of interaction with clients as a success factor for innovation in services. Service firms that maintain intensive contacts with their customers will pick up information about customers' experience with their services, using this to improve themselves. A critical success factor is the ability to understand and respond to the specialized and long-term needs of customers (De Brentani, 2001).

Cooperation with parties from the external environment is also a relevant determinant of the incentives to innovation, as Gosselink (1996) argues. Each participant brings in his own knowledge and skills to the cooperation, and by using the mutual knowledge and skills causes an increase in the variety of the information. Each of the external participants may look at problems from different perspectives. The incentives to innovate may benefit from this (Hulshoff and Snel, 1998).

A *wide range of business activities* refers to the degree and pattern of diversification of a company. Usually the variety of information and possibilities of synergy activities increase with the range of activities. For manufacturing firms it is hypothesized to trigger more incentives to innovate (see Lunn, 1987; Felder et al., 1996). For service firms, a wide range of activities could have a positive impact on the success of new services as well (Atuahene-Gima, 1996). New services in related activities are more likely to be successful. Innovative ideas in one market can be transferred to a related market. Synergy with current services leads to benefits such as lower development costs, reduced error, and increased development speed. In this study we hypothesize a positive impact of the range of business activities on the incentives to innovate.

Finally, by *acquiring (technical) knowledge* from external parties in exchange for money a firm can increase its incentives to innovate. In the study of Brouwer (1997), it appears that in manufacturing firms, the expenditures on innovation increase when a company acquires more external knowledge. We hypothesize that acquiring technical knowledge from external parties aids the incentives to innovate in service firms as well, because new knowledge acquisition could increase the cross-fertilisation of ideas.

Summarising, our hypotheses on interacting factors are shown in table 3.

table 3 Hypotheses on interacting factors

I1	Companies with more de-standardisation have more incentives to innovate.
I2	Companies that are more vertically integrated have more incentives to innovate.
I3	Companies that organise their work in multi-functional teams have more incentives to innovate.
I4	Companies that frequently rotate tasks among employees have more incentives to innovate.
I5	Companies with a stronger external orientation have more incentives to innovate.
I6	Companies with a stronger customer orientation have more incentives to innovate.
I7	Companies that cooperate more, have more incentives to innovate.
I8	Companies with a wider range of business activities have more incentives to innovate.
I9	Companies that acquire (technical) knowledge have more incentives to innovate.

Conditioning factors (market level)

The last set of variables that we include in our analysis can be labelled conditioning factors. They concern features in the competitive realm, relating to the 'market level', potentially codetermining the ability and motivation and therefore the incentives to innovate within the firm. The conditioning factors may be the result of choices by the entrepreneur (CEO) in the past, but the entrepreneur him-/herself cannot manage them directly. They can be certainly of relevance to the incentives to innovate, though.

Firstly, a *complex service design* may be a viable way to protect a company's knowledge. If service design is highly complex, it is more difficult for competitors to copy the product. As a result, the firm can gain more benefits from an idea. This could benefit the incentives to innovate, since the company may anticipate receiving sufficient returns to innovation. On the other hand, a high degree of complexity could cause a slow-down of adoption by customers, if not total rejection (Shostack, 1984). So on beforehand the effect of a complex service design is not clear. In this study a positive effect is hypothesized.

Fast growing demand has a positive influence on the probability that a company innovates. For service firms, market attractiveness (size, growth) is important (Edgett, 1994; Storey and Easingwood, 1995; De Brentani and Ragot, 1996). When demand growth is high, competition is typically not as intense, which may work in two directions for the incentives to innovate. It could benefit the incentives to innovate since the company may anticipate receiving sufficient returns to innovation, on the other hand firms might get 'lazy'. When demand is low, innovative service firms often feel they are slowed down in their activities by the reluctance of clients to accept new services (Preisl, 1998).

Quality competition (in stead of price competition) may give rise to more incentives to innovate. Drew (1995) identifies economic conditions as one of the main barriers to innovation success in service firms. Companies competing with each other on design, product features, advertisement etc. will need ideas to move forward. Therefore, in these market environments, companies continuously try to differentiate their products from their competitors. As long as the customers are actually able to see these differences and actually value them, companies will experience the incentives to innovate.

Arvantitis and Hollenstein (1994) have investigated this for manufacturing firms. We hypothesize the same effect for service firms.

S*hort product life cycles* may stimulate companies to be more creative. For some markets the lifetime of the products is short and products are continuously replace older products. In this context, Kox (2002) states that technological change can affect the production and distribution of services as well as the demand for services from client industries. We will test the hypothesis that shorter life cycles mean more incentives to innovate.

A *Low price elasticity* could stimulate product innovations because the costs of product innovations can be financed by an increased price without causing an enormous fall in the demand. Consequently when the price elasticity of a product is low, employees are stimulated to renew the product and so the incentives to innovate and to generate new ideas is high. Le Bas and Cabagnols (1999) have investigated this for manufacturing firms. In this study the hypothesis is tested that low price elasticity mean more incentives to innovate.

Heterogeneous demand can be expected to encourage the company's incentives to innovate. When customers demand many (slightly) different products, it pays off to generate new ideas in order to differentiate the product better and link up with the customer needs. Again, Le Bas and Cabagnols (1999) have investigated this for manufacturing firms. They find that a heterogeneous demand directed toward small series indeed enhances the number of product innovations in SMEs. In this study we hypothesize that a heterogenous demand induces larger incentives to innovate.

Finally, companies facing *high uncertainty* about the characteristics of demand will indeed generate more ideas and have more incentives to innovate, according to Klepper (1996). When a company initiates activities to discover the characteristics of demand and the needs of their customers, new ideas are likely to emerge. Therefore, high uncertainty is likely to trigger incentives to innovate, as long as uncertainty also means (some) opportunities for high returns.

Summarising, table 4 presents our hypothesized effects of conditioning factors on incentives to innovate.

table 4 Hypotheses on conditioning factors

C1	Markets with *complex product designs* induce larger incentives to innovate.
C2	Markets with *fast growing demand* induce larger incentives to innovate.
C3	Markets with *quality competition* induce larger incentives to innovate.
C4	Markets with *short product life cycles* induce larger incentives to innovate.
C5	Markets with a *low price elasticity* induce larger incentives to innovate.
C6	Markets with a *heterogenous demand* induce larger incentives to innovate.
C7	Markets where there is *high uncertainty* induce larger incentives to innovate.

3. Research design and data collection

Research design

In this study, we focus on small and medium-sized companies in the Dutch service sector (10-100 employees). The companies in our sample were drawn from the SME policy panel of EIM. The panel consists of a stratified sample of about 1.700 SMEs. For this study, only companies in business sectors (business to business services, financial services and personal services) were included. A letter was sent to 477 service companies in these sectors, including information about the objectives of the study. Of these 477 companies, 101 responded that they were willing to participate. To these companies two different questionnaires were sent. The first questionnaire had to be completed by the entrepreneur (or CEO). The questions in this questionnaire focus on determinants related to the company as a whole and to the conditioning factors. The second questionnaire had to be completed by 10 to 20 randomly selected employees. The employee questionnaire focuses on the other variables. After six weeks a reminder was sent to companies that had not returned their questionnaire at that moment. In total, 65 entrepreneurs completed usable questionnaires, a response rate of 64%, whilst 725 employees from 72 companies completed the other questionnaire, a response rate of 71%.

Measurement

Most variables in our study are latent constructs that are not directly measurable. Therefore, we have used multi-item scales to measure the constructs. In each questionnaire the items were formulated as statements (propositions). The respondents were asked to rate the statements on five-point Likert-type scales. Most constructs consist of two or more items. Cronbach alphas were used in order to evaluate the reliability of the constructs. All constructs proved to be reliable measures with Cronbach alphas exceeding the corresponding critical values (0.59 and up). The values are presented on the diagonals of the correlation tables in the next section.

For example, eight items measure the existing 'incentives to innovate', our independent variable. Reliability is good (Cronbach alpha = 0.83). In table 5 the items behind this construct are shown[1].

table 5 Items behind our measure of the 'incentives to innovate'

I like to try things in a new way.
I think of innovative projects as a challenge.
The people in my company consider me as a strong advocate of renewal and change.
In my work, I often come up with ideas.
In my work, I often initiate changes.
In my work, I am always prepared to take a chance.
I feel at ease in risky situations.
You will never know unless you try.

Finally, for five factors we did not manage to find a reliable measurement scale: freedom to experiment (E9), use of creativity techniques (E10), multifunctional teams (I3), job rotation (I4), fast growing demand (C2). In these cases, we used a single indicator by selecting the statement that fitted the content

[1] The full survey (in Dutch language) is available upon request.

best in our opinion. Besides, company size (E4) was measured with a single indicator as well: the number of employees.

Data analysis

In our model, we identify four blocks of factors that influence the incentives to innovate. In order to select the most important factors, we follow a two-step approach. Given the sample size of this study it is not possible to do a regression that includes all independent variables. Ideally, we would like to estimate the effects of 35 independents to explain the incentives to innovate. However, we only have 65 observations at our disposal. Hair et al. (1995) recommend a ratio of 1:5 for reliable estimates of regression coefficients. So due to a lack of observations we did not compute a single regression equation with all 35 independents.

Instead, we started with a stepwise regression per block of variables as identified in the literature review. In the second step, we combine the significant variables of each block and perform another stepwise regression. By following this procedure, we end up with the most important variables that explain the incentives to innovate.

As a test for robustness, we also present and discuss results based on a stepwise regression analysis starting with all 35 explanatory variables (explaining the variance of 65 observations of the incentives to innovate). In several respects the results of this procedure are in hindsight very appealing, but since the number of observations is too limited we will not discuss this results in much detail.

4. Empirical results

In this section we discuss the results of the regression analysis, firstly of the regressions per block. As said, the significant variables per block are used to derive the final stepwise regression results.

Motivating factors

In the literature review, we have identified nine motivating factors. In table 6, the correlations and Cronbach alphas are presented (on the diagonal, in brackets, in stead of the 1's).

Some of the correlations between motivating factors are high. They do not block reliable regression analysis, however. The strong correlations between *result orientation*, clear *innovation objectives* and *the commitment to innovation by the entrepreneur* are most notable. Ex post, the clarity of the innovation objectives seems to lie behind the other two more personal motivations. The results orientation by the employees and the commitment to innovation by the entrepreneur confirm the clarity of the innovation objectives as such (and the fact that the service firm is serious with their innovation objectives).

table 6 Correlation matrix: Motivating factors[a]

	M1	M2	M3	M4	M5	M6	M7	M8	M9	Y
M1 reward structure	(.73)									
M2 autonomy of the employees	.14	(.75)								
M3 challenging tasks	-.24	.23	(.72)							
M4 professionalism	.55	.22	.15	(.69)						
M5 result orientation	.24	.45	-.04	.28	(.63)					
M6 people orientation	.22	.20	.29	.46	.39	(.79)				
M7 clear innovation objectives	.44	.40	.00	.42	.68	.46	(.58)			
M8 innovation in the mission	.41	.23	.08	.67	.27	.35	.28	(.61)		
M9 commitment of the entrepreneur	.35	.46	.20	.39	.55	.55	.72	.45	(.63)	
Y incentives to innovate	.37	.34	-.07	.46	.48	.18	.50	.54	.46	(.83)

[a] On the diagonal, the Cronbach alphas are presented.

In table 7 the results of the stepwise regression of the motivating factors are shown. Only the hypotheses M7 (*clear innovation objectives*) and M8 (*innovation in the mission*) are supported (cut-off is 5% significance). We conclude that clear innovation objectives and the statement of innovation in the mission of service firms have positive effects on the incentives to innovate, together explaining 42% of the total variance in our dependent variable.

In table 7 the partial correlations of the remaining factors, which are not included in the regression equation, are revealed as well. People orientation and result orientation appear to have relatively high partial correlations, but their contribution to the explanation of the incentives to innovate is not significant at 95% confidence.

table 7 Stepwise regression: Motivating factors explaining the incentives to innovate

Variable	beta	sign.	partial corr.
M7 Clear innovation objectives	.38	.00	.43
M8 Innovation in the mission	.43	.00	.48
R^2: 0.42			
Variables excluded:			
M1 Reward structure			.05
M2 Autonomy of the employees			.13
M3 Challenging tasks			-.14
M4 Professionalism			.02
M5 Result orientation			.20
M6 People orientation			-.21
M9 Commitment of the entrepreneur			-.02

Enabling factors

In the literature review, we identified ten (directly) enabling factors. Correlations and Cronbach alphas are presented in table 8. Once again, multicollinearity was no problem in the regression analysis. There is a notable inverse relation between loose managerial control and managerial attention to the easy spread of information. As shown below, neither one makes the cut in the stepwise regression analysis.

table 8 Correlation matrix: Enabling factors[a,b]

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	Y
E1 well-educated employees	(.60)										
E2 financial resources	.05	(.74)									
E3 education and training	.12	.47	(.79)								
E4 company size	-.27	-.23	-.07	(n.a.)							
E5 technical knowledge	.26	.32	.23	-.02	(.78)						
E6 loose control	-.16	-.18	-.22	.22	-.26	(.61)					
E7 open culture	.03	.48	.32	.04	.28	-.52	(.62)				
E8 spread of information	.21	.40	.45	-.28	.25	-.67	.41	(.67)			
E9 freedom to experiment	.24	.54	.35	-.19	.23	-.19	.09	.46	(n.a.)		
E10 use of creativity techniques	.17	.42	.26	-.02	.32	-.29	.19	.45	.51	(n.a.)	
Y incentives to innovate	-.17	.49	.01	.03	.03	.02	.23	.22	.50	.46	(.83)

[a] On the diagonal, the Cronbach alphas are presented.

[b] (n.a.) on the diagonal means that these are single item scales.

The results of the stepwise regression analysis are presented in table 9. Three factors significantly contribute to the explanation of incentives to innovate, explaining 41% of the total variance in our dependent variable. The *freedom to experiment* (E9) and the *use of creativity techniques* (E10) have positive effects on the incentives to innovate. Our results suggest a significant negative relationship between *well-educated employees* (E1) and the incentives to innovate. In the discussion we will elaborate on this interesting result.

Again, the partial correlations of the factors excluded from the regression equation are presented as well. *Financial resources* and *education and training* have relatively high partial correlations, but they are only significant at 90% confidence, so they are excluded from our further analysis.

table 9 Stepwise regression: Enabling factors explaining the incentives to innovate

Variable	beta	sign.	partial corr.
E1 Well-educated employees	-.33	.00	-.38
E9 Freedom to experiment	.43	.00	.43
E10 Creativity techniques	.29	.01	.31
R^2: 0.41			
Variables excluded			
E2 Financial resources			.24
E3 Education and training			-.24
E4 Company size			.04
E5 Technical knowledge			-.12
E6 Loose control			.18
E7 Open culture			.19
E8 Information spread			-.07

Interacting factors

In the literature review, we identified nine interacting factors. In table 10 we present the correlations and the Cronbach alphas. It appears that customer orientation and external orientation are strongly related. Ex post, this correlation appeared not to pose an obstacle to the stepwise regression results.

table 10 Correlation matrix: Interacting factors[a,b]

	I1	I2	I3	I4	I5	I6	I7	I8	I9	Y
I1 de-standardization	(.72)									
I2 vertical integration	-.01	(.67)								
I3 multifunctional teams	-.24	.10	(n.a.)							
I4 job rotation	-.37	.19	.19	(n.a.)						
I5 external orientation	-.12	.12	.38	-.05	(.60)					
I6 customer orientation	.16	.17	.20	-.26	.72	(.57)				
I7 cooperation	-.01	-.20	.15	-.04	.21	.20	(.66)			
I8 wide range of business activities	-.09	-.01	.38	.30	.20	.05	.13	(.67)		
I9 acquiring (technical) knowledge	-.01	.17	.36	.05	.09	.08	.34	.16	(.66)	
Y incentives to innovate	-.00	.22	.41	.33	.36	.29	.19	.23	.32	(.83)

[a] On the diagonal, the Cronbach alphas are presented.

[b] (n.a.) on the diagonal means that these are single item scales.

In table 11 the results of our stepwise regression are revealed. Of the nine interacting factors collected, three have a significant effect on the incentives to innovate in service firms. We found support for a positive relationship with the incentives to innovate for *multi-functional teams* (I3), *job rotation* (I4) and *customer orientation* (I6), explaining 33% of the total variance.

In table 11 the factors that were excluded from the regression equation are mentioned as well. Of the variables excluded, *acquisition of technical knowledge* has the highest partial correlation. However, its contribution is not significant at the 5% level.

table 11 Stepwise regression: Interacting factors explaining the incentives to innovate

Variable	beta	sign.	partial corr.
I3 Multifunctional teams	.28	.02	.31
I4 Job rotation	.37	.00	.39
I6 Customer orientation	.33	.00	.35
R^2: 0.33			
Variables excluded:			
I1 De-standardization			.20
I2 Vertical integration			.09
I5 External orientation			.06
I7 Cooperation			.13
I8 Wide range of business activities			.00
I9 Acquiring (technical) knowledge			.23

Conditioning factors

Finally, we identified 7 conditioning factors. In table 12 correlations and Cronbach alphas are presented.

table 12 Correlation matrix: Conditioning factors[a b]

	C1	C2	C3	C4	C5	C6	C7	Y
C1 complex product designs	(.67)							
C2 fast growing demand	.07	(n.a.)						
C3 quality competition	.18	.22	(.68)					
C4 short product life cycles	-.06	-.11	-.00	(.62)				
C5 low price elasticity	-.05	.06	.28	.17	(.62)			
C6 heterogenous demand	.12	-.18	.28	.22	.29	(.65)		
C7 high uncertainty	-.17	-.07	.28	.35	.19	.36	(.60)	
Y incentives to innovative	-.12	-.04	.44	.02	-.18	.22	.36	(.83)

[a] On the diagonal, the Cronbach alphas are presented.

[b] (n.a.) on the diagonal means that these are single item scales.

The regression results are revealed in table 13. Three conditioning factors appear to have a significant relationship with the incentives to innovate (explaining 38% of variance). We found support for the hypotheses that *quality competition* (C3) and *high uncertainty* (C7) trigger the employees' incentives to innovate.

Low price elasticity (C5) is also significantly related to the incentives to innovate, however with the opposite sign than hypothesized. The explanation may be that service firms which are faced with a low

price elasticity are getting 'lazy', since a price increase is not punished by many customers who walk away. With a high price elasticity, service firms should constantly be aware of new developments (new entrants, technologies, etc.) and this will foster the incentives to innovate.

table 13 Stepwise regression: Conditioning factors explaining incentives to innovate

Variable	beta	sign.	partial corr.
C3 Quality competition	.46	.00	.48
C5 Low price elasticity	-.37	.00	-.40
C7 High uncertainty	.30	.01	.34
R^2: 0.38			
Variables excluded:			
C1 Complex products			-.23
C2 Fast growing demand			-.12
C4 Short product life cycles			-.03
C6 Heterogenous demand			.12

Overall results

As discussed in our literature review, we argued that the incentives to innovate are based on four blocks of determining factors. Investigating the relationship between the variables within one block is not enough, because it is likely that the variables from various blocks correlate with each other. To find the determinants of incentives to innovate, we did a stepwise regression with the most important variables of each block as found in the previous analysis. By doing this, we can test which variables are most important in explaining the incentives to innovate.

In table 14 the results of our final stepwise regression are revealed. It appears that six factors have a significant relationship with the incentives to innovate, explaining 61% of variance. Of each block at least one variable survives. Having clear innovation objectives (M7), operating in a market with quality competition in stead of price competition (C3), giving employees much freedom to experiment (E9), organising the work in multifunctional teams (I3), an operating in a market with highly uncertain demand characteristics (C7) significantly contribute to explain the incentives to innovate. These significant factors have their hypothesized signs. This is not the case with the effect of well-educated employees (E1). Its negative sign might be related to the maturity and corresponding bureaucracy of some of the companies in our sample. In larger, rigid service firms the education of employees often is better organised.

table 14 Final stepwise regression results: Explaining the incentives to innovate

Variable	beta	sign.	partial corr.
M7 Clear innovation objectives	.35	.00	.44
C3 Quality competition	.18	.07	.24
E1 Well-educated employees	-.34	.00	-.47
E9 Freedom to experiment	.31	.00	.38
I3 Multifunctional teams	.19	.04	.28
C7 Uncertain market demand	.19	.04	.27
R^2: 0.61			
Variables (newly) excluded:			
C5 Low price elasticity			-.22
I4 Job rotation			.20
M8 Innovation in the mission			.18
I6 Customer orientation			,17
E10 Use of creativity techniques			-,05

Robustness

As mentioned above, to validate the results of the two-step procedure, we also performed a stepwise regression that included all explanatory variables. In table 15 the results of this 'validating' regression are presented.

The first variables that prove to be significant confirm our earlier findings: it appears that having clear innovation objectives (M7), operating in a market with quality competition in stead of price competition (C3), giving employees much freedom to experiment (E9) and organising the work in multifunctional teams (I3) significantly contribute to explain the incentives to innovate. Besides, having well-educated employees (E1) once again contributes negatively in service firms.

table 15 Stepwise regression: All factors explaining incentives to innovat e

Variable	beta	sign.	partial corr.
M7 Clear innovative objectives	.26	.00	.38
C3 Quality competition	.25	.01	.38
E1 Well-educated employees	-.26	.00	-.43
E9 Freedom to experiment	.32	.00	.42
I3 Multifunctional teams	.23	.00	.38
M2 Autonomous employees	.27	.00	.41
E3 Education and training	-.17	.05	-.27
I4 Job rotation	.29	.00	.43
I6 Customer orientation	.18	.03	.30
M6 People orientation	-.19	.04	-.28

R^2: 0.74
Excluded: all other variables

A major difference is that operating in a market with highly uncertain demand characteristics (C7) no longer appears to be a conditioning factor for incentives to innovate. Instead, five other factors seem to make a valuable contribution. Allowing employees to do their job autonomously (M2) seems to be a significant motivating factor. The same applies to job rotation programmes (I4) and having a customer oriented business culture (I6), which could both be important indirect enablers for the incentives to innovate. Finally, people orientation (M6) and education and training (E3) could be of some influence, although the signs of these factors are in the negative direction.

This stepwise regression analysis shows that the stability of the results presented before is sufficient, since five out of six significant factors are reproduced in the same order as in our first stepwise regression. On the other hand it also shows that some variables may have dropped out only because of the order of stepwise deletion by analysis in blocks. Actually, the final results in table 15 seem to be more convincing (adjusted R^2 is considerably larger). However, due to a lack of observations the coefficient estimates in table 15 can not be considered reliable.

5. Conclusion and discussion

The creation of a constant stream of innovative ideas is critical in today's business environment. In the literature a wide range of variables are mentioned that might influence the flow of innovative ideas. The variables can be grouped into four blocks, motivating, enabling, interacting and conditioning factors. In this study, we identify several variables in each block that might influence the incentives to innovate. By block, we tested the importance of the variables in explaining the incentives to innovate. Based on these results we combined the significant variables of the four blocks in a new regression. From each block at least one variable is significant, also if we choose to include all variables at once and derive our model.

Implications for managers

This study has several implications for manager and entrepreneurs in service firms. First, the formulation of *clear innovation objectives* in the corporate strategy is among the most important determinants of the incentives to innovate. Clear innovation objectives motivate employees to be innovative, they make it clear to employees that innovation has priority, and they trigger the employees to really strive for innovation. We conclude that for service managers it is wise to put energy into the formulation of such objectives and communicate these objectives to co-workers in a strong and forceful way.

Secondly, fostering *freedom to experiment* has positive effects on the incentives to innovate. It is critical to provide co-workers with time and resources to try out their ideas. Giving them the time to try out ideas and treating the results of such experiments seriously fosters incentives to innovation. In service firms, we imagine this is particularly relevant for front-line employees. Because of the inseparable nature of services, front-line employees shape the quality of a customer relationship. Their close contact and potentially long-term relationships with customers make such employees an important source of ideas.

Thirdly, organising the work in *multifunctional teams* appears to have a positive effect on the incentives to innovate. Because of the multifunctional backgrounds of its members, creativity improves and problem-solving capabilities improve. Service managers should utilize their options for teamwork as much as possible. A collective, team-spirited culture is likely to stimulate the incentives to innovate.

Of the final set of explanatory variables, two factors (*quality competition* and *high uncertainty of market demand*) are determined at the market level. In these market environments, companies continuously try to differentiate their products from their competitors. Besides, activities will be employed to discover the characteristics of demand and the needs of customers. These largely exogenous features of the environment codetermine the incentives to innovate within service firms. The type of competition and the degree of uncertainty are among the strategic decisions that an entrepreneur

(or CEO) makes when choosing fields of operation. Once competing in such markets they are mostly beyond managerial control. We conclude that service managers will never be able to control the incentives to innovate in their firms for a hundred percent.

Finally, we found a negative relationship for *well-educated employees* and the incentives to innovate. This negative sign might be related to the maturity and corresponding bureaucracy of some of the service firms in our sample, yet probably in general as well. Education and training may be particularly well organised in rigid, bureaucratic firms, which would actually explain the negative sign. Besides, in the Dutch economy highly educated employees usually choose to work for the larger service firms which have more rigid climates (devastating for innovation). Finally, overeducated employees may show fewer incentives to innovate. If undereducated employees are sufficiently able and motivated to pick up the incentives to innovate, it will work. Overeducated employees may well gradually lose their 'entrepreneurial spirit', possibly even afraid to show that they do not know it all.

Suggestions for further research

We would like to round off by noting that this study has several limitations. Firstly, our stepwise regressions showed that some factors may have dropped out only because of the order of stepwise deletion by analysis in blocks. There was no perfect match between the significant factors in our two-step approach and the remaining factors are analysed in a stepwise regression at once. Our analytical framework, categorising potential determinants into four categories (conditioning, enabling, interacting and motivating factors) will need further refinement in future research. Explorative techniques should be used to find a more suitable model for categorising potential determinants of the incentives to innovate. Besides, a larger sample size is necessary in order to obtain reliable regression coefficients when all factors are analysed at once.

Second, the respondents in our study are companies in the Dutch services sectors. This implies that other sectors and countries may show different determinants of the incentives to innovate. The results cannot blindly be generalised. We expect that in other sectors, some other variables will prove to be more important than the significant variables here. Further research is needed to test the model in such other contexts.

Third, we did not examine the processes by which creative ideas are actually evaluated and implemented. Many if not all enterprises have limited resources for the full development of ideas and the implementation of innovations. The question is whether the most promising ideas actually survive. The selection process is the next step in the innovation process, and it will need more attention if one wants to link the incentives to innovate to project selection and performance. Further research is needed to examine the correlation between antecedents of the incentives to innovate and the final results of innovation like new products, new services, new profits and growth.

In our opinion, one can safely conclude from the analysis presented in this paper, that a number of variables in the motivating and enabling realm of management determine incentives to innovate in Dutch service firms. Entrepreneurs (and CEOs) that feel the need to improve their employees'

incentives to innovate may do so by applying the measures analysed. This may help to jumpstart the innovation process.

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