Title	Determinants of the Innovation Rent		
Submission ID:	158		
Track:			

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Abstract:

This study investigates the relationship between key organizational elements (inputs, knowledge management, innovation strategy, portfolio management, project management, and commercialization), business planning and the innovation rent. In order to deepen the understanding of innovation management in small and medium-sized enterprises (SMEs), a strategic comprehensive perspective on innovation is adopted in examining both high and low-tech enterprises from various industries. This study provides new evidence and insights for researchers and practitioners. The empirical results from 522 SMEs show that knowledge management, innovation strategy, business planning, portfolio management, project management and commercialization, have a positive, significant relationship with RENT. Conversely, inputs or resource endowment is not perceived a barrier to innovation and the development of a competitive advantage.

INTRODUCTION

Innovation is a key driver of economic growth and social development (Bessant 2003; European Commission 2009), and innovation processes are examined at multiple levels of analysis including national, regional and organizational perspectives (OECD 2007; Adams, Bessant and Phelps 2006). Given the dominance of small firms in most economies, innovation in small firms is of significant interest for practitioners, academics and policy makers. However, many SMEs face the same problems in commercializing innovation because of their limited resources and ability to cope with the investment risk (Mazzarol and Reboud 2009). Urban and Hauser (1993) revealed that only one-third of the new products were successfully commercialized. This fact strengthens the need for studying the strategic management of innovation. In addition, there have been inconsistencies in the ways of evaluating the potential outcomes of innovation investment. Much of the literature relating to

innovation either focuses on the hottest new start-up or the sleeping giant who suddenly awakened. Rarely do stories of established SMEs in traditional industries make headlines with their managerial activities (Blumentritt 2004).

In order to contribute to a deeper understanding of innovation in SMEs, this study takes a broad approach by including enterprises from various industries. We adopted a strategic perspective and consider that the primary goal of innovation is the establishment of sustainable, distinctive competitive advantage which, in turn, is a pre-condition for the appropriation of rents extracted from the intellectual property associated with the invention (McGrath et al. 1996). According to Santi et al. (2003), the potential rent of an innovation is the function of three elements: i) the volume (potential annual sales); ii) the rate of profit margin (average rate of profit), and iii) the length of the innovation (duration of the life cycle of the innovation). The objective of this paper is to study the strategic innovation management of SMEs in seeking the innovation rent. Drawing on a sample of 522 SMEs from 11 OECD countries, this study examines the determinants of innovation rent based on Adams, Bessant and Phelps' (2006) framework.

THEORETICAL BACKGROUND

The Organizational View

According to Adams et al (2006), the seven elements of the organization that need to be considered in innovation management include inputs, knowledge management, innovation strategy, organization culture, portfolio management, project management and commercialization. The organizational view explores the specific interactions of these elements and their role in the management of innovation at the firm-level. The first element of the framework, inputs, refers to the scarce and valuable resources that firms need to develop innovations, including sources such as finance, human and physical resources (Adams et al. 2006). The emphasis on inputs draws on the resource-based view of Barney (1986) and Wenerfelt (1984). The resource-based view suggests that firms should assemble

and deploy appropriate resources that provide opportunities for sustainable competitive advantage in the chosen market. The second element, knowledge management, relates to the idea generation, knowledge repository or the information flows within the organization. (Adams et al 2006).

The next important factor in determining the management of innovations is the innovation strategy of the firm. This strategy involves the main focuses that firms target in developing innovations such as their strategic orientation and strategic leadership. Organization culture means the internal culture and structure of the firm. Portfolio management is associated with the risk assessment and rating of the investment, for example, the measurement of the risk/return balance and the optimization tool. Project management refers to the evaluation of the efficiency of the project, tools used, communications and collaboration within the team members. The final and most critical issue is commercialization as it is directly concerned with the outcome of the innovation outputs. This element relates to issues such as market research, market testing, marketing and sales) (Adams et al. 2006).

The Formality of Business Planning

Several scholars (e.g. Burt 1978; Wood 1979; Bracker and Pearson 1986) have shown that formal strategic planning has a positive effect on performance. Thune and House (1970) concluded that formal planners outperformed informal planners in terms of financial performance. Burt's research on Australian retailing organizations (1978) found the significant positive correlation between high quality planning and the level of performance indicated by the improvement in profits, rate of return on invested capital, rate of return on total funds employed and the absolute rate of return on invested capital. Bracker and Pearson (1986) confirmed previous findings, indicating that firms which have a structural strategic planning were better at anticipating and coping with future change. According to Unni (1981) the significant contribution of the strategic formal planning calls for the need of developing

strategic plans in small businesses which are often known as lack of resources and capacities in preparing for long-range and formal plans.

The Rent Estimation Model

In the context of innovation management, rent is often known as "*the anticipated financial return which might be derived from a particular future investment in an innovation"* (Reboud and Mazzarol 2003 p. 32). The estimation of the rent indicates the firm's capacity in assessing the investment risks and its returns from the innovation. Many SMEs have difficulty in estimating the potential captured rent due to their limited resources as well as the engagement in the uncertainty of the investment.

According to Reboud and Mazzarol (2003), the limited capability of SMEs in estimating the rent could be explained due to the following three reasons. First of all, the innovators often focus on more the anticipated absolute value while neglecting the erosion of the rent, the bargaining of customers and suppliers and the competition effects. Secondly, many small firms do not have a systematical assessment which leads to inappropriate or insufficient analysis of the captured rent. Thirdly, the complexity of the innovation imposes more challenge for small firms to verify the feedback over progress.

The risk assessment framework proposed by Santi et al (2003) was designed to help SMEs to assess the risk and return of the future investment, in terms of the anticipated value of the innovation, the erosion effects from the market and the competition analysis. According to Reboud and Mazzarol (2003) the assessment framework of risk and return includes four main steps. The first step relates to the analysis of the anticipated rent, related to the kind of innovation and the number and size of the potential using markets. The next step refers to the analysis of the characteristic of the environment of the potential using market, and the related erosion effects. The third step is the analysis of the competitive strengths that the innovation will have to face, leaving only a residual rent. The final step is the analysis of

the competitive situation of the SME, its ability to launch the innovation and able to catch an appropriable rent from the innovation (Reboud and Mazzarol 2003).

We adopted a strategic perspective and considered that the primary goal of innovation lies in the establishment of a sustainable, distinctive competitive advantage which, in turn, is a precondition for rent appropriation (McGrath et al. 1996). According to Santi et al (2003) the potential rent of an innovation results from the volume (potential annual sales), the rate of margin (average rate of profit), and the length of the innovation (duration of the life cycle of the innovation). This creates the formula *Rent = Volume x Rate x Length.*

As the objective of the paper is to investigate the relationship between elements of the organization framework and the innovation rent, the following questions are targeted:

1. How do the inputs influence the innovation rent outcome?
2. How does knowledge management influence the innovation rent outcome?
3. What effect does innovation strategy have on the innovation rent outcome?
4. What effect does business planning have on the innovation rent outcome?
5. How does portfolio management influence the innovation rent outcome?
6. How does project management influence the innovation rent outcome?
7. How does commercialization influence the innovation rent outcome?

Hypotheses Development

The hypotheses were developed from the framework of organization innovation measurement as suggested in Adams et al (2006), the formality of business planning (Thune and House 1970; Burt 1978) and the model of rent estimation (Santi et al 2003; Miles et al 2003; Mazzarol and Reboud 2003). Factors that are proposed to determine the innovation rent include inputs, knowledge management, innovation strategy, business planning, portfolio management, project management and commercialization.

Inputs: Inputs management is concerned with resourcing of innovation activities and includes factors ranging from finance to human and physical resources to generate ideas (Adams et al 2006). Resource-based studies by Penrose (1959), Wernerfelt (1984), Rummelt (1984), Teece (1984) revealed that a firm's resources are an important factor that contributes towards securing a sustainable competitive advantage. According to Barney (1991 p. 101), *"firm resources include all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness"*. The presence of different organizational resources and capabilities positively affects the outcome of the innovation process.

Even though R&D intensity has been used in some studies as an indication of the SME's capacity or propensity to innovate (Baldwin and Hanel 2003; Adams et al. 2006), there have been controversies in different studies about the relationship between R&D intensity and the innovation performance. For example, Parthasarthy and Hammond (2002) found the high degree of functional integration and the high R&D intensity is associated with greater innovation frequency. On the other hand, other authors argue that R&D is not regarded as an indicator or measure of innovation due to their very low correlation and weak relationship (Brouwer and Kleinknecht 1996; Hall and Bagchi-Sen 2002; Roper and Love 2002). In addition, this proxy is also not considered a useful measure for SMEs which do not typically have formal R&D activities, or have a low level of R&D intensity (Hipp and Grupp 2005).

According to the resource-oriented approaches, the performance of firms strongly depends on factors, like resources or capabilities, located within the organization (Sundbo and Fuglsang 2002). Therefore, it is important to focus on the combination and deployment of a firm's resources in order to achieve a competitive advantage (Corner 1991). From these findings, it is anticipated that a higher level of inputs will helps to generate higher innovation

rent. In other words, firms which have large scale of resources would have higher capacity to adapt large potential market to exploit the innovation for long time.

Hypothesis 1: *The more the inputs of the firm, the higher the innovation rent.*

Knowledge Management: According to the resource-based view, organization knowledge is one of the most important intangible resources that can help to build sustainable competitive advantage (Barney 1991). Additionally, Thornhill (2006 p. 692) mentioned that *"knowledge can possess the properties of value, rarity, inimitability and organizational engagement"*, which are *"central to enabling superior firm performance".* According to Argote and Ingram (2001 p. 151) knowledge transfer is known as *"the process through which one unit (for example, group, department or division) is affected by the experience of another"* and is regarded as a competitive advantage for firms. Knowledge management relates to a firm's ability in obtaining and communicating ideas and information both explicitly and implicitly (Adams et al. 2006). Hoopes and Postrel (1999) suggested that shared knowledge is an important resource underlying new product success. In addition, Whittington, Pettigrew, Peck, Fenton and Conyon (1999) confirmed that firms with increased knowledge intensity often have high level of systemic change and innovation.

Oden (1997) indicated that the spreading of the available information within an organization is associated with the innovation success. Furthermore, the large diversity of information in the firm could facilitate the idea generating ability of a company, which plays a key role in the search phase of the innovation process. From pervious findings, knowledge management could be assumed to play an important role in improving the rent of the innovation.

Hypothesis 2: *The better the firm's knowledge management, the higher the innovation rent.*

Innovation Strategy: The research into innovation strategy and its performance effects occupies a central position in the management literature. Tushman and O'Reilly (1997)

suggested that innovation objectives play a significant role in increasing the innovative ability. Furthermore, innovation strategy is *"a major directional and motivating instrument for developing innovative decisiveness"* (De Jong and Brouwner 1999 p. 30). Studies measuring the relationship between new innovation strategy and the firm performance by Cooper (1984), Zahra and Das (1993), Markham (1998) found the positive correlation between these actors.

Zahra and Das (1993) in a empirical study of 149 manufacturing companies, confirmed the hypothesis that innovation strategy is an important determinant of corporate financial performance. Similarly, Markham (1998) concluded that innovation strategy positively related to a firm's success. Basing on the related findings about innovation strategy, it could be assumed that innovation strategy may have an influence on the innovation rent, which is the outcome of the innovation commercialization.

Hypothesis 3*: The better the firm's innovation strategy, the higher the innovation rent.*

Business Planning: Empirical studies about the relationship between the strategic formal planning and the corporate performance in the literature such as Hewlett (1999 p. 26) indicated that "*a strategic plan and the strategic planning process itself offers a competitive edge and enables a company to measure achievements against expectations*". O'Regan and Ghobadian (2002, p. 670) study of 1000 manufacturing SMEs in the United Kingdom concluded that *"formal planning firms experience the barriers to deployment to a lesser extent compared with non-formal planning firms"*. In other words, SMEs which have a formal strategic planning will likely to encounter fewer barriers than informal planning firms in implementation. Kraus, Harms and Schwarz (2008) undertook a study of 248 small Austrian firms and found that the degree of formalization of business planning has a positive and significant effects on corporate performance. As the investment on innovation involves a

high level of uncertainty and risks, a formal planning for innovation could be proposed to have an impact on the rent.

Hypothesis 4*: The more formal business plan has a positive effect on the innovation rent.*

Portfolio Management: Portfolio management is the phase where new projects are evaluated, selected and prioritized. The management helps firms to allocate resources for investment efficiently and diversify the risks. Portfolio management deals with issues such as maximizing the value of the portfolio, or the return on R&D spending and a portfolio investment strategy that is aligned with the company's overall business strategy (Adams et al 2006). According to Cooper, Edgett and Kleinschmidt (2001) most senior managers found that the common reasons of portfolio management are related to objectives such as their financial goals or the maximization of profitability, the maintenance of the competitive position of the business, efficient allocation of scarce resources, linking project selection with business strategies.

Mikkola (2001 p. 423) described the portfolio management of innovation as "*powerful tools*" that allow *"products and R&D projects to be analyzed in a systematic manner, providing the opportunity for the optimization of a long term company's growth and profitability"*. The process of selecting innovation projects requires evaluation and resource allocation under uncertain conditions. Therefore, a systematic process guided by clear selection criteria could help optimize the use of limited resources and enhance an organization's competitive position (Adams et al 2006). Similarly, Szakonyi (1994) viewed project evaluation and selection as *"an organizational capability and attempt to determine a level of proficiency"* (Adams et al 2006 p. 35). The portfolio management, therefore, could be proposed to play a role in determining the success of the innovation.

Hypothesis 5: *The better the firm's portfolio management, the higher the innovation rent.*

Project Management: According to Naughton and Kavanagh (2009 p. 4) project management is *"a set of techniques to effectively manage change and change is a synonym of innovation"*. Adams et al (2006 p. 36) describes project management as *"the process which turn the inputs into a marketable innovation"*. In addition, an efficient process that helps to manage the ambiguity of the innovation has been proved to be critical to innovation. Booz-Allen and Hamilton (1982) found that approximately 46 percent of total new product expenditures go to unsuccessful projects, which emphasizes the role of project management in innovation. Hence, the appropriate project management could be considered to play an important role in contributing to the innovation success.

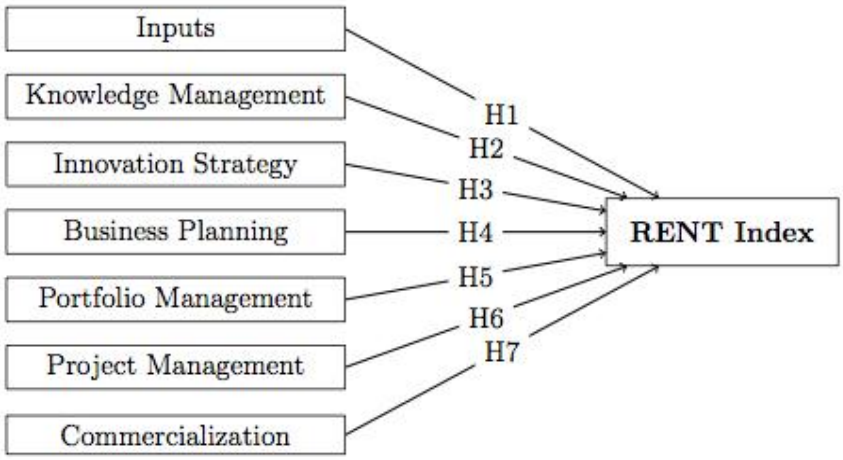
Hypothesis 6*: The better the firm's project management, the higher the innovation rent.*

Commercialization: Commercialization refers to *"the attempt to profit from innovation through the sale or use of new products, processes, and services... More than invention or innovation, commercialization is driven by firms' expectations that they can gain a competitive advantage in the market-place for a particular product, process, or service"* (Herdman 1995 p. 2). The role of commercialization is confirmed in Adams et al (2006 p. 37-38) as it is associated with the *"implementation phase"* or launching the innovation into the market to achieve *"commercially viable outcome for the firm"*. Hence, the successful introduction of new products or services into market is important for the survival and growth of the organization (Adams et al 2006). From this point of view, the commercialization of innovation could be assumed to have a positive relationship with the innovation rent.

Hypothesis 7*: The better the firm's commercialization process, the higher the innovation rent.*

We derived the model in Figure 1 from the hypotheses previously stated.

Figure 1 Determinants of innovation rent



METHODOLOGY

This study draws on a sample of 522 SMEs from 11 OECD countries. Data collection was part of an international project on innovation management in SMEs conducted from 2006 until 2008. All 522 firms have fewer than 250 employees and the turnover of less than EUR 50 million. The sample also includes missing values of the turnover to maximize the measurement of innovation management of SMEs, due to the fact that some managers hesitate to reveal their turnover but willing to participate in the innovation measurement parts of the survey. The questionnaires targeted owned-managers or executives of SMEs who make critical decisions for the innovation management of the firm. The variables used in the study were built from a series of items on 5-point Likert-scales. The items used for measuring variables are based on Mazzarol and Reboud (2006)'s study in which the rent configuration and the innovation diagnostic diamond framework were constructed. All variables had a Cronbach's alpha superior to 0.5 (see appendix for measurement constructs). The potential relationships will be investigated through the multivariate linear regression. Significance is at the level of either 0.01 or 0.05.

The selected data sample includes 522 SMEs in 11 OECD countries as follows: Australia (78 firms), Austria (77 firms), Belgium (51 firms), Canada (47 firms), France (67 firms), Germany (4 firms), Italy (12 firms), New Zealand (92 firms), Spain (9 firms), Switzerland (60 firms) and United States (25 firms). The size of firms are categorized into 3 levels including micro (fewer than 9 employees), small (from 10 to 49 employees) and medium (from 50 to 249 employees), accounting for 35.4 percent, 31.4 percent, and 33.1 percent respectively of the total number of firms in the sample. These firms are from cross sectors, among which the manufacturing accounts for approximately 34 percent of the total. The average age of these firms is 22.3 years and the average level of investment on innovation is 23.25 percent.

Dependent Variable

The dependent variable to be analyzed is the *rent index*, which is calculated by the mean value of the *volume*, mean value of the *rate* and the mean of the *length*, as follows:

Rent index= mean volume x mean rate x mean length.

The measures for the volume, the length and the rate of the innovation were constructed basing on the indications proposed in Santi et al (2003). The volume is calculated on the basis of the potential annual sales on the whole market possibly interested by the innovation. Indicators of the volume are the potential of sector diffusion, potential of geographic diffusion, size of user markets, limits to exploitation. The indicator sector diffusion estimates the spectrum of potential applications in different market segment. The indicator geographic diffusion refers to the spatial area in which the innovation will be commercialized. The size of user markets measures the average annual sales which are generated in all market segments and accessible geographic areas. The limits to exploitation indicate not accessible geographic markets or market segments due to patents already in place or other criteria (Santi et al, 2003).

The rate of margin is related to the value and size of the competitive advantage created by the innovation. Indicators are process of generation of the innovation, kinds of innovation, and kinds of prior protection. The first indicator indicates that if the process of generation is closely interacted with suppliers, research institutions and customers, it is assumed that a favorable effect on the rate of margin and the protection of intellectual properties will be potentially obtained. In addition, kinds of innovations such as incremental versus radical, isolated versus integrated innovations, are supposed to have an effect on the rate of profit. The indicator kinds of prior protection refer to the ability of firms to protect its intellectual properties. When the innovation is new and there is not prior intellectual property, firms have opportunities to capture a rent on it (Santi et al 2003).

The length or duration of the life cycle of the innovation is related to the durability and sustainability of the innovation in the using sectors. Indicators are the technological basis of the innovation, innovative intensity of the using sector, limitation of the innovation (legal and technical). The first indicator means the more complicated the technological basis of the innovation, the longer life cycle the innovation. In addition, the higher the intensity of the using sector, the more possibilities the innovation could be imitated or copied, which shortens the length of the innovation exploitation. The final indicator suggests the innovation which has patents and high involvement of technological complexity, will have longer life cycle (Santi et al 2003). The measures for variable length, therefore, includes the technical base of the innovation, the legal protection of the property rights, for example, patents and licenses, which are very important to determine how long the innovation exists.

Independent Variables

Inputs: Resources are defined as the firm's financial, physical, human, commercial, technological, and organizational assets that are used for developing, manufacturing and distributing products and services to customers (Barney 1991; Wernerfelt 1984). The resources for producing sustainable competitive advantage should be valuable, rare and

imperfectly imitable or replace by competitors (Barney 1991). This paper focuses on the resources-based view to identify measures for variable inputs including the technical, human, financial and physical resources for developing and commercializing innovations.

Technical resources such as engineering and production equipment, manufacturing facilities and information technology systems have been found to have a positively impact on innovation (Song and Parry 1997; Gatignon and Xuereb 1997; Mitchell and Zmund 1999). The next important indicator of inputs is the human resources committing to the innovation. Firms which have a pool of qualified human capital with advanced technical skills, know-how in R&D projects, and risk-taking propensity have a higher probability of implementing innovative activities (Hitt, Bierman, Shimizu and Kochlar 2001; Canto and Gonzales 1999; Kessler and Chakrabarti 1999).

Financial resources are perhaps the most important measure of inputs, which allow firms to allocate funds to innovation investments. Those firms which have available financial resources will have greater capacity to support its innovative activities (Lee et al 2001; Canto and Gonzales 1999). Facilities or physical resources such as the firm's plant and equipment, its geographic location and access to raw materials are also important resources influencing the implementation of the innovation (Adams et al 2006).

Knowledge Management: A study by Uhlaner, Stel, Meijaard and Folkeringa (2007 p. 5) study showed that tacit knowledge is *"the most effectively shared directly between individuals, either through conversation or direct observation"*". Damanpour (1991) mentioned that the internal communication has the positive effect on the innovative ability of firms. This idea was supported by Penrose (1995) who linked the ability of creating knowledge and the growth of the firm. Knowledge management is considered as a key resource for decision making, for example, to formulate strategies. Hence, it is important to combine innovation efforts and knowledge development so as to improve the firm's competitiveness. Organizations that are able to stimulate and to improve the knowledge of

their human capital are better to cope with changes (West 1992; Harari 1994; Nonaka 1994). Even though companies may acquire knowledge both internally and externally, evidence from the past researches on SMEs reveals that the greater part of knowledge that SMEs acquire comes from outside the firm. According to Zahra and George (2002), knowledge absorption or an organization ability to identify, acquire and utilize external knowledge can play a key role in a firm's success operation.

Innovation Strategy: Adams et al (2006) described innovation strategy as the two distinction components including the strategic planning or orientation and strategic vision or leadership. The measures for strategic orientation are, for example, the focus of the firm's strategy and its commitments to differentiate funding (Adams et al 2006). The strategic leadership relates to the measurement of the effectiveness of shaping and guiding innovation in the organization. De-Jong (1999) indicated innovation strategy as in an integrating part of the mission, objectives for innovation, programs for innovation and budgets.

Business Planning: The formality of business planning has been measured by "*the degree of planning of manual usage, the amount of emphasis on developing written plans and the existence of specific schedules for formulating plans"* (Lyles, Baird, Orris, Kuratko 1993 p. 38). Robinson and Pearce (1983) focused on the extent of written documentation in categorizing groups of small firms. According to (Baird et al 1993 p. 43), three levels of planning including " *(1) no written business plan covering at least three years into the future, (2) a written plan that includes objectives, strategies and resource requirements for at least three years into the future and (3) a written plan that includes objectives, strategies and resource requirements as well as control procedure and data regarding factors from outside the immediate firms environment for at least three years into the future".* Based on measures indicated in previous studies, the business planning factor in this paper is measured by the level of formality and written business plan for innovation.

Portfolio Management: The management of portfolio of innovation investment refers to the process of evaluating and selecting innovation projects and allocation of resources under uncertain conditions (Adams et al 2006). Financial methods including various profitability and return metrics, such as net present value (NPV), return on net assets (RONA), return on investment (ROI) or payback period, dominate portfolio management and project selection approaches (Cooper et al 2001). Empirical results from Cooper et al (2001) revealed that a total of 77.3 percent of businesses used a financial approach in portfolio management and project selection. This percentage confirmed the role of financial methods in calculating, rating and ranking the priority and selection of projects and diversified investments. Therefore, measures for variable *Portfolio Management* in this study are identified as financial and funding allocation related issues including the flow of investments, risk assessment, financial model and the financial sources.

Project Management: The efficiency of the project management can be measured by different tools of evaluation procedures and instruments (Adams et al 2006: Kerzner 2006, p. 5) defined a successful project management as *"having achieved the project's objectives within time, within cost, at the desired performance or technology level, utilizing the assigned resources effectively and efficiently and accepted by the customers*". Moreover, the role of team project management is a critical issue; i.e. the ability to collaborate, the quality and efficiency of team working should be emphasized (Frey 2003). To formulate measures for variable Project Management in this paper, factors such as the experience in leading the project, the cooperation between team members, supports from external experts and exploration of government programs to assist the commercialization of innovation are taken into consideration.

Commercialization: As the commercialization process relates to the introduction and launching of innovations into the market, this phase is closely associated with leading customers and suppliers to facilitate the new product development (Miller 2001). Tiger and

Calantone (1998) study of the US software industry found that thorough customer knowledge enhances the success of new product development. Similarly, Huang, Soutar and Brown (2002), Helfat and Raubiscek (2000) emphasized the role of market knowledge on the development and launching of new products. The marketing capabilities such as market investigation, market testing and promotion are critical issues in the *"implementation phase"* (Calantone and di Benedetto 1988; Globe, Levy and Schwartz 1973; Adams et al 2006). The aspects of commercialization should involve the market analysis, monitoring, planning and reaching customers (Verhaeghe and Kfir 2002; Adams et al 2006). Communication with the customers and suppliers can make significant contribution to the innovation process (Bessant 2003). According to Slatter and Morh (2006 p. 30) the *"key factor determining a firm's ability to successfully develop and commercialize technological innovation is how it comes to understand customer needs"*. The more complicated and highly legal protected innovations are supposed to have longer life than those which are easy to be copied or imitated in a short time.

RESULTS

The descriptive analysis of variables is shown in Table 1 where it can be seen that the mean value of these variables are above average. Of the total 522 SMEs of the sample, 492 firms have values in all examined variables. The mean value of variable knowledge and innovation strategy is very high, indicating that these SMEs have well-managed its knowledge and strategies for developing innovations. The rent index value ranges from 1 to 125, with the average of approximately 29. Those firms which have the value of rent index higher than 29 is categorized as firms having potential of capturing high rent. Nevertheless, the standard deviation for the rent index is rather high in comparison with other variables.

- Insert Table 1 here -

Before running a regression we want to see if there is extreme multicollinearity amongst our independent variables, defined as a Pearson's r correlation coefficient. To do

this, we constructed a correlation matrix amongst all variables. As detailed in Table 2, several independent variables correlate at low—albeit significant—level. This can possibly lead to spurious regression results. The results of the multivariate linear regression in Table 3 show that all independent variables have significant relationships with the innovation rent at a two tailed level. In other words, the rent is found to be determined by these above factors. The R square of the model is 30.6 percent and the adjusted square is 29.6 percent.

- Insert Table 3 here -

Except for inputs, all coefficients of other variables are positive. These results confirm the proposed hypotheses that knowledge, innovation strategy, planning, portfolio, project and commercialization have positive effects on the Rent Index. In particular, the coefficients of variable commercialization and knowledge are higher than that of other variables, indicating their strong influences on the rent.

However, the first hypothesis concerning variable inputs is rejected due to its negative impact on the rent index. This suggests that a large resources endowment can possibility have a negative effect on innovation rent for SMEs. These companies have often better results with the limited resources at hand and they have to "make do" with what they have. Despite their limited resources SMEs can pursue opportunities that high rent if they use resources efficiently, having the right strategies, using bricolage, or seeking external supports for developing and commercializing innovations.

DISCUSSION

In this paper, we examined the innovation management in SMEs from an organizational perspective. Accordingly, we looked at the way in which the firm configures its resources to undertaken the process of innovation management. The key units of analysis here were: inputs, knowledge management, innovation strategy, organization and culture, portfolio and project management, and the process of commercialization. Using this general conceptual framework we also employed the rent configuration —the combination of the

volume, rate of margin, and length of the innovation— to determine the potential an innovation.

Our findings indicate that the inputs, knowledge management, innovation strategy, portfolio management, project management and commercialization play a key role for management innovation in SMEs. The results show that knowledge management has a positive effect on the innovation rent. This is consistent with previous studies by Hoopes and Postrel (1999) and Oden (1997) which suggested that knowledge management contributes to the success of new product development. The interaction between the internal and external flow of information can also improve the effectiveness of knowledge management. Firms which have both internal and external views supporting the pursuing of innovations seem to have higher potential to obtain high rent. Similarly, innovation strategy of SMEs is seen as the critical factor in determining the rent as it helps firms in formulating the right orientations and to pursue a competitive advantage built an innovation. Firms which have the strategic orientation and focus on innovation are potentially more successful in seeking high rent. A formal business plan is an important tool firms to well-prepare for the uncertainty due to the investment risks. Nevertheless, as variable planning is only measured by a single item, the measurement of the range of its formality is limited. Those SMEs which have a good performance of portfolio and project management are found to have a positive influence on the rent. The last factor, commercialization is strongly positively associated with the innovation rent. This finding confirms the importance of linking with customers and suppliers in promotion and marketing, improving market knowledge and emphasizing the implementation of legal protection of property rights to ensure the life of innovations.

The ability of many small firms to successfully engage in innovation and commercialization is often restricted by their lack of resources, weak or unsystematic marketing and management competencies, and inadequate use of appropriate third party advisors (Adams 1982; Vermeulen 2005). Yet our findings demonstrate that small firms can

be active innovators in spite of their limited scale and resources. The negative impact of the inputs or firms' resources on the rent proved the fact that firms with large scale resources do not always have a better advantage in capturing high rent in comparison with smaller firms. It means that the efficient allocation and strategic utilization of resources will be more important than the amount of resources. The implication is that despite the limited resources, small firms still have opportunities in achieving innovation successes. Hence, the question of how resources are sought and used could be a more concerning issue rather than how much resources the firms have.

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Appendix A – Measurement

Items used for measuring dependent and independent variables are based on Mazzarol and Reboud (2006)'s study.

A.1.1 Measures for Dependent Variables

Volume (5 point Likert-scale, unless otherwise specified) Cronbach's Alpha = 0.561

1. In your estimation what would be the potential geographic diffusion of this innovation? (Q17A)
2. In your estimation what would be the potential annual sales for your innovation on a worldwide basis? (1= < $5m to 5= > $20m) (Q17B)
3. In your estimation what would be the potential diffusion of this within your industry sector? (Q17C)

Rate (5 point Likert-scale, unless otherwise specified) Cronbach's Alpha = 0.627

1. In your estimation what could be the gross profitability of this innovation? As measured by gross profit margin (1 =< 20% to 5= > 80%) (Q18A)
2. In your estimation what could be the net profitability of this innovation? As mea- sured by net profit margin (1= < 10% to 5= > 40%) (Q18B)
3. In your estimation this innovation? (Q18C)

Length (5 point Likert-scale, unless otherwise specified) Cronbach's Alpha = 0.573

1. The technical base of this innovation? (Q19A)
2. From a technical point of view, would you describe this innovation? (Q19B)
3. From a legal point of view, would you describe this innovation? (Q19C)

Rent Index (5 point Likert-scale, unless otherwise specified)Cronbach's_'s Alpha = 0.621_

1. Mean value of the Volume
2. Mean value of the Rate
3. Mean value of the Length

A1.2 Measures of the Independent Variables

Inputs (5-point Likert-scale) Cronbach's Alpha = 0.694

1. Do you already have the technological resources to create a prototype? (Q22A)
2. Do you have the competencies to fully commercialize the innovation alone? (Q22B)
3. Are staffing resources adequate for the future development of the idea? (Q22E)
4. Are financial resources adequate for the future development of the idea? (Q22F)
5. Are physical resources adequate for the future development of the idea? (Q22G)

Knowledge Management (5-point Likert-scale) Cronbach's Alpha = 0.673

1. Other people within my firm consider pursuing this innovation to be? (Q24E)
2. Other people external to your firm who you turn for advice consider this innovation to be (Q24H)

3. Other people external to your firm who you turn for advice consider this innovation to be? (Q24J)

Innovation Strategy (5-point Likert-scale) Cronbach's Alpha = 0.613

1. Do you feel that the generation of new innovations is a major focus of your firm? (Q21B)
2. Have you fully researched the benefits as perceived by the customer for this innovation?(Q20A)
3. Have you fully explored how compatible it is with customers' existing technologies/ systems? (Q20F)
4. Have you researched if there is already a customer ready to adopt this innovation? (Q20J)

Business Planning (5-point Likert-scale)

1. Do you have a formal, written business plan for your innovation? (Q23A)

Portfolio Management (5-point Likert-scale) Cronbach's Alpha = 0.622

1. Have you identified sources of venture capital financing for the innovation? (Q22I)
2. What has been the level of investment in such innovation as a percentage of annual turnover? (Q10B) (1= 0−20%, 2= 21−40%, 3= 41−60%, 4= 61−80%, 5= 81 − 100%)
3. Have you fully assessed the threat of alternative technologies to yours? (Q23)
4. Have you fully assessed the reaction of competitors to your innovation? (Q23E)
5. Have you undertaken a risk assessment in the light of potential threats? (Q23I)
6. Have you completed a comprehensive financial model for the innovation? (Q23J)

Project Management (5-point Likert-scale) Cronbach's Alpha = 0.612

1. Do you have an experienced project management team to work on the idea? (Q22C)
2. Do you know how to find external expert assistance if required? (Q22D)
3. Do you have a management board to provide guidance and advice? (Q22J)
4. Have you fully explored government assistance programs designed to help small firms with commercialization? (Q22H)
5. Do you use confidentiality agreements before showing your ideas to others? (Q21G)
6. Do you actively involve customers in developing your new innovation? (Q21I)
7. Do you actively involve employees in developing new innovation? (Q21J)

Commercialization (5-point Likert-scale) Cronbach's Alpha = 0.610

1. Does your innovation have legally protectable patents in place or pending? (Q21F)
2. Have you previous experience of commercialization of your innovations? (Q21H)
3. Are you confident that the innovation has been independently tested or evaluated? (Q21D)
4. Have you fully explored with an intellectual property lawyer or patent attorney the IP management issues associated with the innovation (s)? (Q21E)
5. The innovations ability to meet the needs of the targeted customers? (Q12SUCB)

6. The protection of the intellectual property upon which the innovation was based? (Q12SUCG)
7. How much value (as measured in financial benefits) you consider the joint marketing/ promotion provides to your business from your lead customers (?Q9FCUST)
8. How much value (as measured in financial benefits) you consider the obtaining of technology externally provides to your business from your lead customers ?(Q9GCUST)
9. How much value (as measured in financial benefits) you consider the joint marketing/ promotion provides to your business from your lead suppliers? (Q9FSUPP)
10. How much value (as measured in financial benefits) you consider the obtaining of technology externally provides to your business from your lead suppliers? (Q9GSUPP)

A.2. Tables

Table 1: Descriptive Analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Inputs	514	1.40	5.00	3.7222	.74159
Knowledge	506	2.00	5.00	4.0800	.60853
InnoStrategy	514	1.33	5.00	4.0101	.72314
BusinessPlanning	513	1.00	5.00	3.3860	1.40144
Project	514	1.43	5.00	3.7645	.72017
Portfolio	521	1.00	5.00	2.9682	.75276
Commercialization	521	1.00	5.00	3.0993	.68132
RentIndex	503	1.00	125.00	29.1473	19.08645
Valid N (listwise)	492				

Table 2: Correlation Matrix

		RentIndex	Inputs	Knowledge	InnoStrategy	Business Planning	Project	Portfolio	Commercialization
RentIndex	Pearson Correlation	1	-.046	.325**	.309**	.339**	.381**	.375**	.378**
	Sig. (2-tailed)		.301	.000	.000	.000	.000	.000	.000
	N	503	501	493	502	500	501	503	502
Inputs	Pearson Correlation	-.046	1	.122**	.281**	.180**	.274**	.165**	.148**
	Sig. (2-tailed)	.301		.006	.000	.000	.000	.000	.001
	N	501	514	505	513	513	514	514	514
Knowledge	Pearson Correlation	.325**	.122**	1	.303**	.187**	.302**	.209**	.218**
	Sig. (2-tailed)	.000	.006		.000	.000	.000	.000	.000
	N	493	505	506	504	504	505	506	506
InnoStrategy	Pearson Correlation	.309**	.281**	.303**	1	.380**	.498**	.385**	.351**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000
	N	502	513	504	514	512	513	514	514
BusinessPlanning	Pearson Correlation	.339**	.180**	.187**	.380**	1	.511**	.546**	.312**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000
	N	500	513	504	512	513	513	513	513
Project	Pearson Correlation	.381**	.274**	.302**	.498**	.511**	1	.533**	.446**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000
	N	501	514	505	513	513	514	514	514
Portfolio	Pearson Correlation	.375**	.165**	.209**	.385**	.546**	.533**	1	.407**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000
	N	503	514	506	514	513	514	521	520
Commercialization	Pearson Correlation	.378**	.148**	.218**	.351**	.312**	.446**	.407**	1
	Sig. (2-tailed)	.000	.001	.000	.000	.000	.000	.000	
	N	502	514	506	514	513	514	520	521

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Multivariate Linear Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-32.157	6.440		-4.994	.000
	Inputs	-5.005	1.029	-.194	-4.864	.000
	Knowledge	6.111	1.279	.194	4.777	.000
	InnoStrategy	2.645	1.248	.099	2.119	.035
	BusinessPlanning	1.425	.650	.104	2.193	.029
	Project	3.110	1.375	.118	2.262	.024
	Portfolio	3.529	1.291	.134	2.734	.006
	Commercialization	5.600	1.269	.193	4.411	.000

a. Dependent Variable: RentIndex