Innovation and the Operational Performance of Newly Established Small and Medium Enterprises in Taiwan

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ABSTRACT. New Enterprises have been sprouted out prosperously in Taiwan. According to business income tax data, 143 thousand new enterprises were established between 1996–1998, which accounts for about 25% of total number of enterprises, and 98.68% of these new enterprises are SMEs.

In this research, a randomly sampled 1,047 new enterprises which established after 1996 were surveyed through telephone. The survey discovered that three-quarters of these new enterprises adopted at least one out of nine types of innovative activities which were listed in the questionnaire.

The logistic regression results of this study show that three main areas of innovation which were grouped from the nine activities by principal component analysis all had a positive relationship with operational performance of new enterprises. Innovative action had the biggest impact on sales growth, whilst the cultivation of an innovative atmosphere and the ability to innovate within the organization had the biggest impact on profits. In short, entrepreneurs in Taiwan are actively innovating, and this innovation is reflected in the performance of their enterprises.

1. Introduction

The number of Taiwanese business enterprises has increased steadily year by year. By 1995 there were in excess of one million enterprises in Taiwan, and in recent years, about 80,000 new enterprises added to the total each year. Taiwan is currently going through a period of economic transformation wherein many enterprises in the traditional industries are now finding that the pressure from the rapid changes in the external environment are forcing them to reduce their scales of operation, move their production processes overseas, or, in a worst case scenario, shut down their operations completely. Since 2000 in particular, widespread concern has arisen from frequent news reports of large enterprises either closing factories or going out of business completely. However, in sharing the concerns over these closures, we should not overlook the turnover effect from the establishment of new enterprises in Taiwan on a constant basis.

The constant establishment of these new enterprises provides an infusion of new blood and also acts as a stimulus for economic activity in general. This is of course very important for the continuing growth and strengthening of the economy. We are not yet in a position to know whether the number of new enterprises established in 2001 so far is greater than the number of enterprises which have closed down; however, up until 2000 it was clear that the number of new enterprises being established in Taiwan was consistently greater than the number of enterprises going out of business, although the difference between them has getting smaller in the last three years.

Whenever new enterprises are established, regardless of whether they are large or small, the entrepreneurs responsible for their inception invariably believe that they have found a niche in which they can survive. It may be that an existing market has not yet reached saturation point, or that new demand may have been created, or emerged. They may have created a new management model, or possess an innovative new production or marketing technology, enabling them to offer new products or services. Of course, we often see a situation in which innovation attracts a host of imitators, and once these have gobbled up the

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profits that the innovator brings, large numbers of companies then have to withdraw from the market, demonstrating that copying others invariably leads to failure in the end. Only by undertaking ongoing innovation can a company maintain its performance and continue to survive.

To summarize, most new enterprises are established because an opportunity for innovation has been spotted. New enterprises are not burdened with tradition; it is easier for them to adopt innovative new models for the organization and management of the enterprise right from the start. We can therefore assume that a new enterprise will have greater willingness to innovate, and the ability to accept innovation is much more readily accepted than an established enterprise, thus innovation will have more impact on the performance of a new enterprise.

Based on this view, this study explores the relationship between innovation and the performance of new enterprises. New enterprises established in Taiwan over the period 1996 to 1998 form the core of our research, with logistic regression being used for empirical analysis. The source of the data was a telephone questionnaire survey performed by the authors for a previous study; the effective sample is 1,047 enterprises.

In the next section we discuss the theory and review the literature on entrepreneurship and the importance of innovation. It is followed by the empirical research on the relationship between innovation and the performance of new enterprises. The final section provides the conclusions to this study.

2. Theoretical discussion and review of literature

In previous studies on the growth and entrepreneurial success of new enterprise, the main factors noted generally fall into three categories: (i) those factors relating to the personal characteristics of the entrepreneur, such as educational background, work experience and previous entrepreneurial experience, interpersonal relationships and family background, desire for authority, leadership ability and other psychological characteristics; (ii) factors relating to enterprise organization and resource management, such as financial management, marketing management, management team, internal management, and so on; and (iii) external factors, such as economic growth, industrial development, government policy and the social, cultural and historical background. Studies of these factors include Reynolds (1977), Hofer and Sandberg (1987), Merrifield (1987), Chang (1991), Huang (1994), Storey (1994), Ota (1996), Bruederl and Preisendoerfer (1998), Chiu (1998) and Yeh (2000).

However, whilst it is certainly true that these factors can affect the ability and probability of success and growth of a new enterprise, on the basis of the theories of Say and Schumpeter (1911), along with the development of the entrepreneurial economy in the U.S. in the late 20th century, Drucker (1985) put forward the view that innovation and entrepreneurship were the key factors affecting an enterprise's success and ongoing growth.

Say (a French economist active around 1800) defined the term "entrepreneur" as someone who "shifts economic resources out of an area of lower productivity and into an area of higher productivity and greater yield". In his Theory of Economic Dynamics (1911), Schumpeter claimed that the key issue for ensuring a sound economy and for economic theory and practice was the dynamic disequilibrium created by innovative entrepreneurs, rather than balance and optimization. Drucker went beyond this to suggest that "entrepreneurship" is in fact innovation; that is to say, changing the output of resources (Say's definition), or to use a supply-side phrase, changing the value and satisfaction which resources give to consumers.

Drucker points out that innovation is a special tool for developing entrepreneurship. Innovation gives resources a new capability, allowing them to create wealth and benefits. At the same time, innovation is both an economic and a social term, the use of which is not restricted to technology, and furthermore, entrepreneurship is not limited solely to newly established enterprises and economic organizations. The important thing is that innovation is something that can be taught, learned and put into practice; it is not a personality trait.

What Ducker is saying is that not every small business represents entrepreneurial activity or entrepreneurship. Some enterprises are just

repeating past experience; although they take risks, they do not create new consumer demand or increase the output of resources. Although the people who establish such enterprises may have created a new business, they are not entrepreneurs. Regardless of whether they are a new enterprise or an existing enterprise, those companies lacking entrepreneurship and not engaging in innovation will be unable to survive in the rapidly changing era of innovation in which we now live. Drucker therefore advocates "entrepreneurial management" in order to create entrepreneurship. He suggests that entrepreneurial management requires that policy be formulated and implemented with respect to four specific areas: (i) the organization must be made receptive to innovation, and policies and practices are needed to create the entrepreneurial climate; (ii) the organization must undertake systematic measurement of the company's performance with respect to innovation, and must systematically cultivate a learning ability to improve performance; (iii) the enterprise must formulate a clear organizational structure, with regard to staffing and managing, and to compensation, incentives and rewards; and (iv) the things that an enterprise should not do in terms of entrepreneurial management, include combining the management and innovation departments, moving out of one's original field to achieve innovation through diversification, or trying to achieve innovation through acquisition (unless the subsidiary can be provided with a set of management systems within a short period of time).

In their recent study, Rajan and Zingales (2000) noted that the traditional vertically- integrated pyramid-type company organization is no longer suited to today's rapidly changing environment. The reason for this is that in the knowledge economy of today, specialized human capital and the mobility of such specialized human capital is more important than in the past. The traditional form of company organization derives its authority from the company's ownership of capital, but human capital is not an asset that can be owned, so the traditional method of using authority to manage a company is no longer valid. An organization can now only provide incentives to make the objectives of specialized human capital conform to those of the company, so as to encourage employees to work hard and to innovate. At the same time, democratic methods of sharing authority must be used if the company is to raise its efficiency and survive in today's environment of fierce competition.

As far as incentive schemes are concerned, in the past it was apparent that in American companies only senior managers had stock options. In the last few years, however, stock options have been made available to a far wider range of employees. Taiwanese hi-tech companies shared their profits by providing company stocks to all their employees, and the incentive effect that has been achieved from this measure is widely known. Owing to the increased importance of human capital, Rajan and Zingales felt that the most important task for a newly established company was to provide its key employees with attractive future compensation; whilst compensation for shareholders was of secondary importance.

As Lin (2000) notes

> "innovation is an attitude, a way of thinking, a kind of imagination and reform, whereby an enterprise can move past the present and glimpse the future. It is a capability built up through the long-term accumulation of knowledge, experience and wisdom, encompassing leadership, novelty and distinctiveness. It can provide an enterprise with vitality, new competitiveness, growth and profits, and can also stimulate new needs amongst customers and consumers. However, innovation is very expensive to implement, very uncertain and very difficult to manage; it is also subject to attack and imitation".

To summarize this discussion of the literature, and to respond to the development of the new economy in which innovation is the dominant element, special emphasis is placed on the importance of innovation for new enterprises within this study. We undertake empirical research examining the impact of innovation on the performance of newly established enterprises, which is something rarely seen in the literature.[1] We suggest that whilst innovation will not definitely produce good performance in any given enterprise, overall, those enterprises that pursue innovation will on average display better performance.

On the basis of the above discussion, we believe that innovation within an enterprise can be divided into four aspects: (i) the creation of an atmosphere of innovation; (ii) the cultivation of the capability to innovate; (iii) innovation in the management system; and (iv) innovative action. All of these different forms of innovation, which

are discussed separately below, will affect an enterprise's performance.

The first element, the creation of an atmosphere of innovation, is based on the first points of Drucker's entrepreneurial management. Enterprises use these systems and activities to cultivate and stimulate the potential for innovation within an enterprise. They represent long-term, fundamental tasks for innovative enterprises and whilst their effects may not be felt in the enterprise's performance in the short term, over time they are bound to produce the desired results. Concrete tasks in this area would include, for example, making innovation part of the enterprise's vision, full delegation of authority and the establishment of a democratic leadership system.

The second element is to cultivate the capability to innovate. Enterprises use internal resources to nurture the capability of employees as an individual or in a team to innovate. Concrete tasks would include personnel education and training and a system whereby employees are encouraged to make suggestions.

The third element is innovation in the management system. This refers to the adoption of innovative management systems in response to changes in the external environment so that the enterprise can raise efficiency and speed up innovation. This can be thought of as relating to Drucker's third key point for entrepreneurial management. In concrete terms, it includes, for example, the provision of stock options for employees and attaching importance to employees' career planning. Both of these two measures can satisfy an employee's personal objectives and those of the company.

The fourth element is innovative action. This refers to the actual steps taken by the enterprise to innovate, such as R&D activity, the use of new marketing channels, the adoption of new production process technology and moving into new business areas, etc.

In the empirical research for this study, nine innovative systems or activities have been selected representing those issues that have been the focus of considerable discussion in the literature on the innovation of business management over recent years. The enterprises interviewed were asked whether or not they had adopted these systems or activities, and a principal component analysis was used to group these nine systems or activities. These nine systems and activities are: (i) clear enterprise vision (Lin, 2000); (ii) full delegation of authority and a democratic leadership system (Rajan and Zingales, 2000); (iii) a system for encouraging employee suggestions; (iv) the implementation of education and training; (v) the implementation of employee stock options (vi) an R&D system and the undertaking of R&D activity; (vii) attaching due importance to employee career planning; (viii) internal management through an intranet system (Gates, 1999); and (ix) on-line marketing.

The factors affecting the performance of a new enterprise include more than the innovation that we have just discussed. In order to ensure that the study was as comprehensive as possible, personal attributes of the entrepreneur, enterprise organization, resource management and the external environment also had to be included in the regression model for our empirical research on new enterprise performance. The structure of this research is thus as shown in Figure 1.

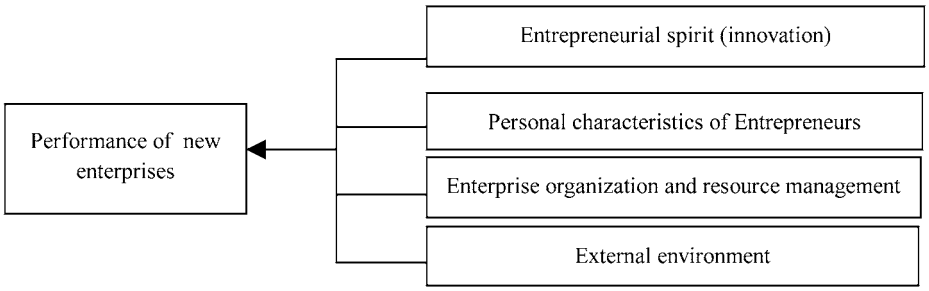

Figure 1. Factors affecting the performance of new enterprises.

3. Empirical research

The empirical analysis of this study uses the data collected from the questionnaire survey of newly established enterprises undertaken by Hsueh et al. (2000). In this section, at first, the sample characteristics is described; followed by the establishing of empirical model; and then the discussion of estimation results from the empirical model.

3.1. *Sample characteristics*

The population for the survey consisted of companies newly registering with the Commerce Department of Taiwan over the period 1996 to 1998. For sampling purposes the population was stratified by region (North, Central, South and East) and by year of establishment (1996, 1997 or 1998) with a telephone survey method being adopted. In the end, 1,047 companies were successfully interviewed, giving an effective interview rate of 59%. The distribution by region and by date of establishment is shown in Table I.[2] A χ^2 test, with 95% confidence level, shows there was no significant difference between the sample and the population, whether in terms of regional distribution or date of establishment.

Table II provides the sample distribution by industry sector[3] and by scale of operation. In every sector, SMEs accounted for at least 95% of the total. Small enterprises accounted for a particularly high percentage of new enterprises in the commercial sector. Amongst newly established enterprises in the industrial sector, although small enterprises were still the largest single group, medium-sized enterprises accounted for a higher proportion than in any other industry category.

Amongst all new small enterprises, the commercial sector was the largest industry category, accounting for 44.4% of the total, whilst for medium-sized enterprises the industrial sector was the largest industry category, accounting for 44.5% of the total. For large enterprises the commercial and service sectors have the larger shares, whilst the industrial sector accounts for the smallest share. (Table II inserted here)

3.2. *Establishment of the empirical model*

In an earlier section we concluded that the four main factors affecting the operational performance of a new enterprise were: (i) entrepreneurial spirit (innovation); (ii) the personal characteristics of the entrepreneur; (iii) the enterprise's organization and resource management; and (iv) the external environment. On the basis of these four factors, we established an empirical model for this study, which is exhibited in Figure 2.

As shown in Figure 2, the first group of explanatory variables relates to innovation. A prin-

TABLE I
Distribution of the effective sample

Date of establishment	Northern region	Central region	Southern region	Eastern region	Sub-total	%
1996	191	72	68	4	335	32.0
1997	217	79	681	3	367	35.1
1998	192	87	61	5	345	32.9
Sub-total	600	238	197	12	1,047	100.0
%	57.3	22.7	18.8	1.2	100.0	

Notes:

1. The number of companies established in the Southern Region in 1997 for which interviews were successfully completed was one less than originally anticipated.
2. H_0 = No difference between the regional distribution of the effective sample and that of the population. H_1 = Regional distribution of the effective sample is different from that of the population. df = 3, $\chi^2 = 3.383$, p-value = 0.336, thus H_0 can be accepted.
3. H_0 = No difference between the distribution of the effective sample in terms of date of establishment and that of the population. H_1 = Distribution of the effective sample in terms of date of establishment is different from that of the population. df = 2, $\chi^2 = 0.627$, p-value = 0.731, thus H_0 can be accepted.

Source: Hsueh et al. (2000).

TABLE II
Newly established enterprises, by industry sector and scale of operations

	Industry	%	Commerce	%	Services	%	Refused to answer	Total	%
Small enterprises (1–9 employees)	245	66.6	338	79.7	169	69.3	9	761	72.7
%	32.2		44.4		22.2			100.0	
Medium-sized enterprises (10–49 employees)	113	30.7	75	17.7	64	26.2	2	254	24.3
%	44.5		29.5		25.2			100.0	
Large enterprises (50 or more employees)	7	1.9	11	2.6	10	4.1	0	28	2.7
%	25.0		39.3		35.7			100.0	
Refused to answer	3		0		1		0	4	0.4
Total	368	100.0	424	100.0	244	100.0	11	1,047	100.0
%	35.1		40.5		23.3		1.1	100.0	

Source: See Table I.

cipal component analysis was undertaken with respect to nine enterprise innovation policies and activities. The result is shown in Table III. The three factors sorted out by the principal component analysis can largely match with the four aspects of innovation discussed in the earlier section with the first and the second aspects combined. The three factors were denoted as INN1, INN2, and INN3. The INN1 represents the cultivation of an innovative atmosphere and the ability to innovate; the INN2 represents the innovation in the management system; and INN3 represents the adoption of innovative actions. The standardized scoring coefficient for Z3, Z5 and Z7 of factor 3 is much higher than that for other activities, shows that Z3 (on-line marketing) in nature is closer to Z7 (R&D activity) and Z5 (using intranet for management) and not have too much common features with other activities. This is probably because enterprises that can adopt on-line marketing and intranet for management are highly technically oriented, hence R&D activities are also important for them.

The second group of variables is regarding to the entrepreneur's personal characteristics, besides educational background, particular emphasis is placed upon their working and entrepreneurial experience. Previous entrepreneurial and relevant work experience of founders would have a positive impact on the performance of new enterprises.

The third group of variables is concerned with enterprise organization and resource management. The most important resources for a new enterprise are control over the sources of technology and access to start-up and working capital. If the new enterprise can provide these resources itself, it can make considerable savings on rights payments and interest, which should help to improve the enterprise's performance. In addition, the scale of operations of the enterprise will affect its management costs and economies of scale, and is thus also likely to affect the performance of enterprises.

The last but not the least group of variables is about external environment of an enterprise. The performance of new enterprises is likely to be affected differently by domestic and international economic environment due to the different nature of industrial sectors and locations. Government assistance to the enterprises, in the form of loans or technical assistance may also have effect on the performance.

The dependent variables are the rate of growth in sales and operating profit which are regarded as enterprise performance.

In this study, we also explore the factors affecting the disparity between anticipated profits at the time of establishment and actual profits. The anticipated profit ratio is one of the bases on which the enterprise is established. Whether or not this anticipated profit ratio can be achieved, or

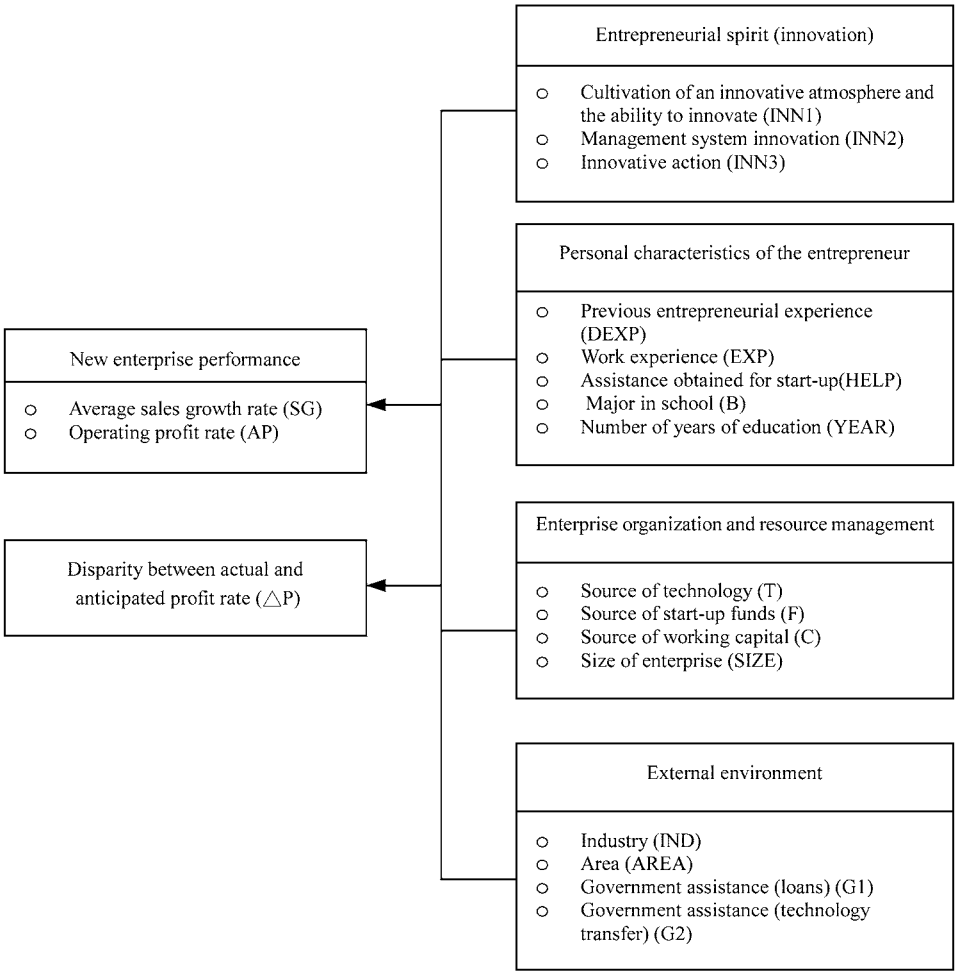

Figure 2. Empirical model of factors affecting new enterprise performance.

whether it turns out to be overestimated or underestimated, also depends on the background and experience of the entrepreneur, their innovative capabilities and the objective environment. If the anticipated profits turn out to be underestimated, this could indicate that the entrepreneur is steady and conservative; if the anticipated profits turn out to be overestimated, this could indicate that the entrepreneur had insufficient information or experience in making right judgement, or was excessively optimistic. The definition of each of the variables is provided in Table IV, and the anticipated signs of all explanatory variables on these three dependent variables are also given in the table. Means and standard deviations of these variables are exhibited in Table V.

3.3. *Analysis of the model estimation results*

Regression analysis was conducted on the basis of the empirical model just described. As the dependent variables are in ranks, the PROC Logistic procedure included in SAS software can be readily used. The results are shown in Table VI. In Table VI, we can find that chi-square values for proportional odds test are very large, which means the assumption of proportional odds may be violated. ”However, Peterson and Harrell (1990) showed that this test is very anti-conservative. They recommend using this test only to conclude that the proportional odds assumption is valid.”[4]

TABLE III
Principal component analysis for enterprise innovation activities

	Factor 1 Cultivating an innovative atmosphere and the ability to innovate	Factor 2 Management system innovation	Factor 3 Innovative action
Rotated Factor Pattern			
Z1 (implementation of an employee stock option plan)	9	82*	–11
Z2 (implementation of education and training)	56*	36	12
Z3 (on-line marketing)	–2	12	86*
Z4 (cultivation of a second specialty)	35	41*	27
Z5 (using intranet for management)	6	60*	41*
Z6 (system for encouraging employee proposals)	69*	12	3
Z7 (R&D activity)	44*	–3	53*
Z8 (delegation of authority or democratic leadership)	70*	0	0
Z9 (clear corporate vision)	45*	13	30
Standardized Scoring Coefficients			
Z1 (implementation of an employee stock option plan)	–0.10090	0.72297	–0.26945
Z2 (implementation of education and training)	0.27791	0.17048	–0.07820
Z3 (on-line marketing)	–0.21812	–0.05267	0.73085
Z4 (cultivation of a second specialty)	0.09386	0.22671	0.08649
Z5 (using intranet for management)	–0.17691	0.43770	0.22880
Z6 (system for encouraging employee proposals)	0.44233	–0.05623	–0.13531
Z7 (R&D activity)	0.20321	–0.22786	0.37269
Z8 (delegation of authority or democratic leadership)	0.48399	–0.16112	–0.14250
Z9 (clear corporate vision)	0.21851	–0.04076	0.14469

Note: Figures appear in Rotated Factor Pattern section are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 have been flagged by an asterisk '*'.
Source: The present study.

1. *Entrepreneurial spirit (innovation)* (INN1, INN2, INN3):

(1) The adoption of systems aimed at cultivating an innovative atmosphere and the ability to innovate (INN1) had a significant positive impact on the enterprise's average sales growth, average profits and the disparity between anticipated and actual profits. Those entrepreneurs adopting such innovative systems actually tended to underestimate the positive impact could have on the enterprise's performance, and as a result their anticipated profits also tended to be underestimated.

(2) Adopting innovative management systems (INN2) has a significant positive impact on the enterprise's average sales growth; however, the impact on profits was not significant. The adoption of an innovative management system also has a significant positive impact on the difference between anticipated and actual profits, which shows again entrepreneurs adopting such a system tended to underestimate the impact that the system would have on their profits.

(3) Adopting innovative actions (INN3) has a significant positive impact only on the enterprise's average sales growth; it does not have a significant impact on the enterprise's average profits or the difference between anticipated and actual profits. This indicates that those new enterprises which aggressively undertook R&D activity and on-line marketing could provide new products and services rapidly, and exploit new marketing channels, thereby effectively increasing their sales; however, in the short term this increase in sales is not reflected in increased profits.

The results from the above three variables show that innovation does indeed have a significant positive impact on a new enterprise's performance. This is in conformity with our theoretical conclusions reached earlier, and supports Drucker's view that entrepreneurial spirit (innovation) affects the operational performance of newly established enterprises. By comparing the size of coefficients, the adoption of innovative action (INN3) is found to be most effective in increasing a new enterprise's average rate of sales growth, followed by the cultivation of an innovative atmosphere and the ability to innovate (INN1), and management system innovation being the least effective (INN2). However, from the point of view of increasing profits, only the INN1 has significant effect. The above analysis indicates that the cultivation of an innovative atmosphere and the ability to innovate (INN1) are what a new enterprise needs most to maintain innovation over the long term; it can help the enterprise to achieve long-term, steady growth and profits.

2. *Personal characteristics of entrepreneurs*

(1) Whether or not the entrepreneur has previous entrepreneurial experience has no significant impact on the new enterprise's average sales growth rate, average profit rate or the difference between anticipated and actual profit rates. This shows that previous entrepreneurial experience is not a key factor influencing the success or failure of a new enterprise.
(2) If the entrepreneur has previous work experience (EXP1–EXP3), this helps to increase the new enterprise's average growth in sales and profits; however, there is no significant effect on the difference between anticipated and actual profits. Having previous work experience in the same field as the new business (EXP1) is more effective in increasing average growth in sales and profits than having experience in a peripheral or totally unrelated area (EXP2 and EXP3). This was as we had anticipated.
(3) The entrepreneur's academic major (B1 and B2) has a significant positive impact only on the new enterprise's rate of sales growth; it does not have a significant impact on average profits or the difference between actual and anticipated profits. The size of the estimated coefficients for the B1 and B2 show that entrepreneurs with a background in science or engineering have higher rates of sales growth than those with a background in humanities, law, business or business administration, whilst those with a background in agriculture, medicine or some other major have the lowest rates of sales growth.
(4) The entrepreneur's number of years of education (EDYEAR) has a significant positive impact on sales growth within the new enterprise – the higher the level of education, the greater the entrepreneur's ability to make use of various types of resources and information to stimulate sales growth. The entrepreneur's level of education had no significant impact on average profits, but it did have a significant positive impact on the difference between actual and anticipated profits – the higher the entrepreneur's level of education, the more conservative and more accurate their estimated profit ratio will be; they are less likely to rush blindly into starting up a business on the basis of excessive optimism as less highly-educated entrepreneurs are likely to do.

To summarize, the empirical results show that the personal characteristics of the entrepreneur do affect new enterprise performance with work experience having the greatest impact.

3. *Enterprise organization and resource management*

(1) The main source of a new enterprise's technology (T1–T3) did not have a significant impact on growth in the enterprise's sales or on profits rate. (2) If the main source of start-up funding (F1–F2) was personal capital or funding through formal channels, it has a significant negative impact on the new enterprise's average rate of sales growth, but no significant impact on profits. Those entrepreneurs who used their own capital for start-up funding tended to be more conservative in financial matters; however, the very fact that they are more financially conservative tends to have a negative impact on sales growth. A significant positive effect was felt in the difference between actual and anticipated profits only if the entrepreneur used personal capital

TABLE IV
Definitions of variables in the empirical model

Variable	Anticipated sign			Definition
Dependent variable	SG	AP	ΔP	
SG				Average annual sales growth over the period 1996–1999, or since the company's establishment 1 = SG < –30%; 2 = –30% <= SG < –10%; 3 = –10% < SG < 0%; 4 = SG = 0%; 5 = 0 < SG < 5%; 6 = 5% < = SG < 10%; 7 = 10% < = SG < 15%; 8 = 15% < = SG < 20%; 9 = 20% < = SG < 30%; 10 = 30% < = SG < 100%; 11 = 100% < = SG
AP				Average annual operating profit rate over the period 1996 – 1999 or since the company's establishment. The grades are the same as for SG; however, in the results of this survey AP values were all below 100%, so there are only 10 grades for AP.
ΔP				Disparity between the actual current operating profit rate and the anticipated operating profit rate at the time of establishment. 1 = much lower, 2 = slightly lower, 3 = roughly the same, 4 = slightly higher, 5 = much higher
Entrepreneurial spirit (innovation)				
INN1	+	+	?	Cultivation of an innovative atmosphere and the ability to innovate; factor1 after principal component analysis.
INN2	+	+	?	Management system innovation; factor2 after principal component analysis.
INN3	+	+	?	Innovative action; factor3 after principal component analysis. (*Note:* For the INN1.INN2.INN3mix, see Table 18)
Entrepreneur's personal characteristics				
DEXP	–	–	–	1 = the company is the first which the entrepreneur has established; 0 = other
EXP1	+	+	+	1 = the entrepreneur was previously involved in a related line of business; 0 = other
EXP2	+	+	?	1 = the entrepreneur was previously involved in a business area peripheral to their current business area; 0 = other
EXP3	+	+	?	1 = the entrepreneur was previously involved in a totally different line of business; 0 = other (*Note:* Those entrepreneurs with no work experience were taken as the control group)
HELP	+	+	?	1 = received help in enterprise establishment; 0 = did not receive help in enterprise establishment
B1	?	?	?	1 = entrepreneur's educational background falls into the first category, including humanities, law, business, and business administration; 0 = other
B2	?	?	?	1 = entrepreneur's educational background falls into the second category, including the sciences and engineering; 0 = other (Note: those entrepreneurs who fell into the third category, with educational background in agriculture, medicine or art, or with no background in any specific major, were taken as the control group)
EDYEAR	+	+	+	Number of years of education received

TABLE IV *(Continued)*

Variable	Anticipated sign			Definition
Enterprise organization and resource management				
T1	+	+	?	1 = the enterprise's main source of key technology is the management team itself; 0 = other
T2	+	+	?	1 = the enterprise's main source of key technology is hired experts; 0 = other
T3	?	?	?	1 = the enterprise's main source of key technology is outside sources, including domestic and overseas alliance partners, purchase of technology either in Taiwan or overseas, and technology provided by suppliers, etc.; 0 = other
				(Note: those enterprises which obtained their technology from other sources were taken as the control group)
F1	?	?	?	1 = the enterprise's main source of start-up funding was own capital, including own savings and funds provided by affiliates; 0 = other
F2	+	+	+	1 = the enterprise's main source of start-up funding was thru formal channels, including bank loans or investment, government loans and venture capital funds; 0 = other
				(Note: the control group consisted of those enterprises whose main source of start-up funding was thru informal channels, including borrowings from shareholders, revolving credit associations, loans from relatives or friends, loans from other companies in the same industry, etc.)
C1	+	+	?	1 = the enterprise's main source of working capital is own capital or affiliates; 0 = other
C2	+	+	+	1 = the enterprise's main source of working capital is thru formal channels, including bank loans, government loans and venture capital funds; 0 = other
				(Note: the control group consisted of those enterprises whose main source of working capital is thru informal channels, including borrowings from shareholders, rotating credit associations, loans from relatives or friends, loans from other companies in the same industry, etc.)
SIZE1	?	?	–	1 = small enterprise with 10 employees or less; 0 = other
SIZE2	?	?	–	1 = medium-sized enterprise with 10–49 employees; 0 = other
				(Note: the control group consisted of large companies with 50 or more employees)
External environment				
IND1	?	?	?	1 = industrial sector; 0 = other
IND2	?	?	?	1 = commercial sector; 0 = other
				(Note: enterprises in the service sector were taken as the control group)
AREA1	?	?	?	1 = Northern Region; 0 = other
AREA2	?	?	?	1 = Central Region; 0 = other
AREA3	?	?	?	1 = Southern Region; 0 = other
				(Note: enterprises located in the Eastern Region were taken as the control group)
GOV1	+	+	?	1 = the enterprise had received government loans; 0 = the enterprise had never received government loans
GOV2	+	+	?	1 = the enterprise had received technology transfer from the government; 0 = the enterprise had never received technology transfer from the government

TABLE V
Means and standard deviations of variables in the empirical model

Variable	Mean	Std Dev
SC	5.49	1.90
AP	5.56	1.55
ΔP	3.58	1.06
DEXP	0.54	0.50
EXP1	0.64	0.48
EXP2	0.22	0.41
EXP3	0.13	0.34
HELP	0.88	0.32
B1	0.27	0.44
B2	0.34	0.47
EDYEAR	13.56	2.51
T1	0.59	0.49
T2	0.20	0.40
T3	0.19	0.39
F1	0.60	0.49
F2	0.16	0.37
C1	0.63	0.48
C2	0.14	0.35
SIZE1	0.73	0.44
SIZE2	0.24	0.43
IND1	0.35	0.48
IND2	0.40	0.49
AREA1	0.57	0.49
AREA2	0.23	0.42
AREA3	0.01	0.11
GOV1	0.05	0.21
GOV2	0.01	0.11

as the main source of funding (F1); this also indicates that those entrepreneurs using personal capital to start up their business tend to be more cautious and conservative.

(3) Different sources of working capital (C1–C2) have no significant effect on average sales growth; however, if the source of working capital was enterprises' own money, the average profits tended to be higher. This may be simply because self-owned capital had no cost, thereby leading to higher profits.

(4) Whether the new enterprise was a small or a medium enterprise (SIZE1, SIZE2) had no significant impact on the enterprise's average rate of sales growth, nor did it have a significant impact on the difference between actual and anticipated profits; however, the profits for SMEs were significantly higher than those for large enterprises. This may be because SMEs have lower overhead costs, whilst also enjoying greater flexibility in terms of cost control measures.

To summarize, the results of the empirical analysis with respect to the impact of enterprise organization and resource management show that the source of start-up funds has the biggest impact on the average rate of sales growth, whilst the source of working capital affects profits, with the size of the enterprise also being related to profits.

4. *External environment*[5]

(1) Industry category (IND1 and IND2) does not have significant impact on the average rate of sales growth or the difference between actual and anticipated profits. Average profits tend to be higher only in the commercial sector (IND2). Statistics has shown that service sector grew very fast in recent years; however, after taking other factors into consideration, the rate of sales growth in the service sector does not significantly different from others. Hence, overall speaking, domestic and international economic situation did not affect different sectors differently.

(2) As regards the impact of the area in which the enterprise is located (AREA 1–3), the average rate of sales growth for new enterprises in Northern Taiwan was significantly higher than that in other regions. Average profits for new enterprises in the Northern and Central regions were also significantly higher than that in the Southern and Eastern regions. This reflects the fact that high-tech and other high growth enterprises are clustered in the northern part of Taiwan. There was no significant difference between regions with respect to the disparity between actual and anticipated profits.

(3) Receipt of government loans (G1) had no significant impact on the enterprise's average rate of sales growth, average profits or the difference between anticipated and actual profits. The 4.6% of companies in the sample which had received government loans all felt that the loans had been of some use to them; however, the results of the regression analysis show that receipt of government loans did not affect operational performance significantly.

(4) Receipt of technology transfer from the gov-

TABLE VI
Logistic regression results

	Average sales growth rate (SG)		Average operating profit (AP)		Difference between actual and anticipated profit rate (ΔP)	
	Estimated coefficient	$Pr > X^2$	Estimated coefficient	$Pr > X^2$	Estimated coefficient	$Pr > X^2$
INTERC1	–7.15	0.00***	–8.32	0.00***	–5.88	0.00***
INTERC2	–6.22	0.00***	–6.95	0.00***	–4.04	0.00***
INTERC3	–5.63	0.00***	–6.23	0.00***	–2.17	0.05**
INTERC4	–5.16	0.00***	–5.54	0.00***	–1.06	0.34
INTERC5	–4.60	0.00***	–4.48	0.00***		
INTERC6	–3.62	0.00***	–2.38	0.03***		
INTERC7	–1.77	0.14*	–1.01	0.37		
INTERC8	–0.61	0.61	–0.38	0.73		
INTERC9	–0.12	0.91	0.46	0.69		
INTERC10	0.93	0.44				
INN1	0.19	0.00***	0.21	0.00***	0.19	0.00***
INN2	0.12	0.06**	0.07	0.26	0.11	0.05**
INN3	0.26	0.00***	0.09	0.16	–0.01	0.83
DEXP	–0.02	0.87	0.09	0.45	0.04	0.72
EXP1	1.59	0.07**	2.02	0.01***	0.64	0.43
EXP2	1.45	0.11*	1.80	0.02***	0.58	0.47
EXP3	1.46	0.11*	1.69	0.04***	0.47	0.57
HELP	0.04	0.81	0.28	0.16	0.23	0.20
B1	0.29	0.10*	0.04	0.79	–0.23	0.17
B2	0.34	0.03***	0.05	0.74	–0.21	0.17
EDYEAR	0.07	0.01***	0.01	0.63	0.08	0.00***
T1	0.22	0.62	–0.01	0.96	0.43	0.30
T2	0.10	0.81	0.10	0.82	0.07	0.87
T3	0.42	0.37	0.30	0.52	0.54	0.21
F1	–0.26	0.08**	–0.00	0.99	0.23	0.10*
F2	–0.40	0.05**	–0.10	0.61	0.14	0.45
C1	0.19	0.21	0.29	0.05**	–0.03	0.83
C2	0.23	0.28	0.18	0.37	0.32	0.11*
SIZE1	–0.27	0.52	0.89	0.02***	–0.26	0.49
SIZE2	0.21	0.63	0.93	0.02***	–0.24	0.52
IND1	0.23	0.17	0.18	0.29	–0.11	0.47
IND2	0.13	0.42	0.27	0.10*	–0.10	0.48
AREA1	0.25	0.12*	0.44	0.00***	0.08	0.57
AREA2	0.13	0.48	0.49	0.00***	–0.02	0.88
AREA3	–0.53	0.32	–0.05	0.92	0.63	0.26
GOV1	–0.00	0.99	–0.13	0.62	0.14	0.60
GOV2	1.25	0.02***	1.47	0.00***	–0.37	0.49
Proportional Odds						
Chi–Square	654.77		1392.53		167.77	
P value	0.0001***		0.0001***		0.0001***	
Df	243		216		81	
–2 Log Likelihood						
Chi–Square	109.45		65.62		49.24	
P value	0.0001***		0.0001***		0.0056***	
Df	27		27		27	
Sample size	813		834		911	

Notes:
1. *** indicates significance when $\alpha = 0.05$; ** indicates significance when $\alpha = 0.1$; * indicates significance when $\alpha = 0.15$.
2. Explained variables are ranked in decreasing order.

ernment (G2) had a significant positive impact on the enterprise's average sales growth and average profits, but did not have significant impact on the difference between actual and anticipated profits. These results are in conformity with the self-evaluation of new enterprises that had received technology transfer[6]; the survey shows that they all felt that the technology transfer had been of great help to them. Clearly, technology transfer is of more use than government loans.

To summarize, the empirical results show that neither the industry category nor the receipt of government loans had much impact on the enterprise's performance; however, the region in which the enterprise is located and the receipt of technology transfer from the government both had a significant impact on new enterprise performance.

Overall speaking, the empirical results are generally in line with the assumptions made earlier in the theoretical discussion. The four main areas of: (i) innovation; (ii) entrepreneur's personal characteristics; (iii) enterprise organization and resource management; and (iv) the external environment, are indeed closely related to the operational performance of new enterprises, by the fact that there are more than one significant in each category. The direction of the impact is also in general conform to that predicted in the theoretical discussion.

4. Conclusions

The establishment of a new enterprise does not necessarily imply that innovation or entrepreneurial spirit is involved; however, one would expect new enterprises to be most likely to make use of non-traditional management methods and innovative activities. Within this study, in our survey of new enterprises in Taiwan established in 1996–1998, we have discovered that three-quarters of these new enterprises adopted at least one out of nine type of innovative activities. In addition, the empirical results of this study show that there are three main areas of innovation which all had a positive relationship to the operational performance. Innovative action had the biggest impact on sales growth, whilst the cultivation of an innovative atmosphere and the ability to innovate within the organization had the biggest impact on profits.

Taiwan is currently going through a period of economic transformation within which the traditional manufacturing industry is facing a serious downturn. Not only the revival of existing industries is needed, but also the establishment of large numbers of new enterprises that can inject new blood into the economy, enabling Taiwan's economy to complete its transformation smoothly and rapidly. The empirical results of this study should offer us considerable encouragement. They demonstrate that the vast majority of new enterprises in Taiwan display the sort of entrepreneurial spirit described by Drucker. Entrepreneurs are not merely following in the footsteps of others; they are actively innovating, and this innovation is reflected in the performance of their enterprises.

Another point brought out by the results of this study is that although the number of enterprises receiving technology transfer from the government was limited, both the regression analysis and the self-evaluation by the enterprises concerned indicate that technology transfer is very helpful in terms of enterprise performance. The government should therefore further promote the use of government funds for new technology development and transfer.

Notes

[1] Much of the previous research has concentrated on technological innovation.

[2] The effective interview rate = the number of companies that were actually interviewed / number of companies that should have been interviewed = the number of companies that were actually interviewed / (number of companies that were actually interviewed + number of companies that refused to be interviewed + number of questionnaires not completed) = 1,047 / (1,047 + 287 + 432) = 59%.

[3] The Industrial Sector includes mining, manufacturing, electricity, gas & water and construction. The commercial sector includes wholesale, retail and foreign trade. The service sector includes transport, storage, communication, finance, insurance, real estate, business services, social and personal services.

[4] Quote from *Logistic Regression Examples Using the SAS System*, p.103. To accommodate this problem, we have tried several ways to regroup the classes in the dependant variables, but the resulting chi-square value for proportional odds are still very large. Because the dependent variables of this paper (sales growth rate, operating profit, and difference between actual and anticipated profit rate) are ordered in nature, it is not appropriate to change to multinomial logit or probit model

which gives different slopes for each class of dependant variables.

[5] Enterprises in the sample were established in three different years. The macro environment of these three years may also have effect on the performance of enterprises. To solve this problem, we have tried to put in establish year dummy variables, but the coefficients of dummies are not statistically significant, and they are not affecting the results of estimation of other coefficients. Therefore, they are not included in the model.

[6] Only a very small portion of new enterprises, 1.3% of the total sample, received technology transfer from the government.

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