

ANALYZING INTERNATIONALIZATION, TECHNOLOGICAL DEVELOPMENT AND SUSTAINABLE FIRM GROWTH

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ABSTRACT

Firms use internationalization to access external resources to exploit technological knowledge or explore new market. However they face the paradox whether to build strong resources commitment to new foreign markets or continue resources allocations in other domains in existing markets. In this paper, we examine how newly listed firms overcome the paradox and initiate international activities and technology development in order to obtain valuable growth opportunities. Our findings reveal that firm growth is affected by early internationalization, and this relationship is moderated by the technology development.

Keywords: Internationalization, Technology development, Firm Growth, Sustainability and Linear regression

INTRODUCTION

The dynamic environment and the fast obsolescence of products or limited domestic demand urge many entrepreneur firms to have an international focus from inception. These firms do not follow a systematic and sequential internationalization process suggested by the traditional international studies as an incremental expansion model of Multinational Corporations (MNCs). One type of entrepreneur firms includes those who issued the initial public offering (IPO), which has been considered as an important stage in the life cycle of firms. According to Filatotchev and Piess [7], IPO represents the point of entry, which gives firms expansion options through access to equity capital.

Some firms already entered into an international market before issuing IPO to explore less related international business knowledge to add to the existing firm capabilities, thus these firms are defined as pre-IPO internationalized firms. Since initial internationalization before high expansion and growth stage, those firms might choose to go to similar foreign markets to leverage and exploit existing knowledge for growth or they might continue experimenting with less related international markets [13]. Therefore during the process of growth, they are confronted with a paradox between exploiting existing competencies and exploring new sources through international operations [17].

In this study, we conceptualize IPO firms' capabilities as embedded in activities and routines of organizations for addressing complex, practical and repeated problems including both technology development and international expansion. According to the international new ventures research, entrepreneur firms are likely to possess the "learning advantages of newness" [19]. Given the fact that entrepreneur firms lack existing organizational routines, they face less inertia to learn knowledge from external sources including foreign markets [2]. We believe that successful new ventures achieve punctuated equilibrium or temporal evolution between accumulative growths in the long run and short bursts of aggressive expansion. New ventures may use sequential adjustments to shift between these two processes. More specifically, once a new venture initiates new market entries, the repeated use of existing knowledge can make managers become more aware of current local knowledge and lead them to have a deeper understanding of the opportunities available in the foreign market.

Furthermore, we argue that IPO firms can develop balance and equilibrium capabilities incorporating both exploitative and explorative capabilities to benefit from early internationalization. Therefore, we propose that pre-IPO internationalization is associated with firms' growth through capabilities development process at post-IPO stage. We propose that the ability to internationalize during a young age and simultaneously commit to exploitation technology activities is associated with firms' growth. Figure 1 gives the conceptual framework tested in this study.

LITERATURE REVIEW

A major theme in internationalization literature is that MNCs tend to choose incremental growth model. Those works acknowledge that large MNCs build capability to create, disseminate and leverage knowledge, which was created in the past in a global context through both headquarters and its subsidiaries [9]. However, two divergent views exist in terms of how experience guide international new market entries. Johanson and Vahlne's [10] model implies four stages of gradually increasing foreign involvement in which firms follow their way to become internationalized. Based on this view, the more experiences a firm gains, the more likely they choose an area closed to that knowledge. Another view is based on a path-breaking change, and firms may choose move from their existing knowledge domain. Kogut and Zander [12] emphasize firms' capabilities to combine knowledge and acquire more knowledge. Given this view, the more experience a firm has, the more opportunities are available for them to recombine the knowledge elements, the more likely they will go through an incremental model for international expansion.

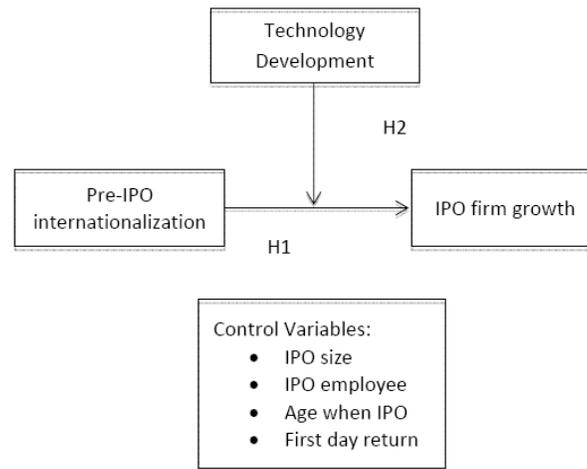


Figure 1

The impact of internationalization and technology development on IPO firm growth

Cohen and Levinthal [5] demonstrate how the capability base of firms determines their absorptive capacity, and therefore the extent to which they can further expand their capabilities. Given firm's absorptive capacity, knowledge creation and exploitation should be seen as points along continuum. However, works on less developed capabilities often pay less attention to the importance of pre-existing firms' knowledge. This learning process may not be applied to international entrepreneurs, defined as those pursue internationalization to exploit opportunities at an early growing stage [14].

Recently, internationalization scholars have acknowledged that entrepreneur firms internationalize at their early stages and follow a more radical and large-scale approach [11]. The internationalization process for small and medium-sized enterprises (SMEs) has been defined as "the process by which firms both increase their awareness of the direct and indirect influence of international transactions on their future and establish and conduct transactions with other countries". This idea assumes that, the broader the international market scope of a new venture would be, the more learning sources a new venture would have in the further growth process [18], and the learning benefit of early international expansion depend upon the firm's capabilities to exploit and explore knowledge learned from foreign knowledge sources [15]. The international entrepreneurship literature provides some explanations on how international expansion of a new venture can lead to its technological learning. However, neither traditional MNCs knowledge-based view nor international entrepreneur literature has specifically considered an integrated model to understand the relationship between an international growth path of high-growth oriented firms.

Facing globalization and technology development, new ventures, sometimes referred to as "international entrepreneurs", "global born firms" or "international new ventures", might decide to enter into an international

market to explore a less related knowledge to the existing firm capabilities. Furthermore, they might also choose to introduce a related domestic market to leverage and exploiting existing knowledge for growth or to continue experiments with less related international markets. Therefore, the paradox faced by international entrepreneurs during international expansion is based on decision for exploiting existing capabilities or explore new capabilities.

In summary, the existing literature provides less explanation on how international growth path impacts post-internationalization performance. In fact, there is little research bridges internationalization and IPO firms' growth. Thus a long-term growth process of international new ventures is not well explained, especially from a time equilibrium perspective. International new ventures provide a nice context for understanding how these firms can develop competencies that exploit their core knowledge and explore new market opportunities for further growth.

RESEARCH METHODOLOGY

This research focuses on the newly listed firms (IPO firms). Those firms provide a unique research angle for a bridge between mature and publicly listed firms and entrepreneurial firms. Although they survived the early stage, they still suffer from the liability of newness, lack of reputation and social capital and relatively narrow resources base.

Both the exploitation and augmentation of knowledge are critical to the international strategy and technology development of international firms. Exploitation has been defined as using the former process with existing knowledge [3]. Exploitation involves improvements in existing components and builds on existing technological trajectory. For instance, in emerging markets, the recognition and exploitation of new technologies are critical to firms to find and gain competitive advantage in the industry such as logistics and distribution where GIS and GPS technologies are considered factors that could significantly contribute to the successfulness of firm growth [20]. Since the scope of exploited knowledge is more likely to reside in the routines that constitute the firm existing knowledge base [8], the knowledge similarity with internal resources can facilitate its internal knowledge transfer.

An exploration strategy is likely to create more knowledge then positively impact firm learning. Exploitation and Exploration have to be recombined to create value [16]. IPO firms need a higher level of dynamic capabilities based on a match in the relative magnitude of exploratory and exploitative activities while an imbalance between exploration and exploitation poses threats to firm performance. According to Cao et al. [5], firms are more likely to be subject to the risk of obsolescence when their magnitude of exploitation exceeds that exploration. IPO firms may rely on early internationalization to achieve exploration in a high competitive global market. And there is not only one dimension of a balance between exploitation and exploration. For instance, a new venture needs to achieve a certain level of knowledge stock before making new changes on international exploration trajectory, and further the international growth is also based on the continuous exploitation of certain knowledge following a burst of the exploration.

Although a firm may specialize in only one geographic market, one market is rarely sufficient for success of the firm, and internationalization is critical for firm survival and growth [1], especially given globalization and technology development, which provide more business opportunities for entrepreneur firms. By extending and expanding geographically, a firm grows in size and volume, develops diverse and complementary capabilities and becomes more established entities. However, it's not clear how entrepreneur firm can develop their capabilities from different sources and use internationalization as growth approach over time. Pre-IPO firms can be argued to be at an earlier stage of their evolution with limited capabilities compared to large MNCs.

Autio et al. [1] argue that high potential new ventures should internationalize and leverage their learning advantages of newness and exploit foreign markets for further growth. Given this assumption, pre-launch experience has been identified as a key factor predicting international new ventures' performance. Thus these experiences developed before IPO can influence a firm's predisposition to take the risks associated with internationalization, and its capability to allocate resources in order to gain competitive advantages.

Pre-IPO internationalization can be considered that firms initiate international expansion before high growth stage as an experimental exploration process. The exploratory learning involves a shift to a different trajectory from the knowledge created at domestic country. As a search-oriented firm, IPO firm pursuing exploration activities may

seek opportunities in new countries in order to generate new products and technologies. Therefore, firms with a strong exploration orientation may compete on the speed of identifying business opportunities in other countries; and they tend to implement international operations at the early stage of their development.

Table 1 Descriptive Statistics

Variable	Mean	SD	Min	Max	Revenue Growth (ln Million)	IPO size (ln Million)	IPO employee (ln)	Age when IPO	First Day Return (ln)	Firm Pre-IPO Internationalization	Technology Development
Dependent Variables											
Revenue Growth (ln Million)	3.42	2.06	-5.01	8.7	1						
Control Variables											
IPO size (ln Million)	4.51	0.87	2.04	7.42	-0.11*	1					
IPO employee (ln)	-0.41	1.84	-6.91	5.29	0.59***	-0.18***	1				
Age when IPO	13.93	16.65	1	87	0.06	0.27***	-0.13**	1			
First Day Return (ln)	2.26	1.31	-1.61	4.42	-0.17***	0.28***	-0.12**	0.08	1		
Independent Variables											
Firm Pre-IPO Internationalization	0.46	0.5	0	1	0.09*	-0.13**	-0.01	-0.26**	0.21**	1	
Technology Development	0.03	0.15	-0.95	0.83	-0.14**	0.05	-0.14**	0.05	-0.1*	-0.09*	1

Two-tailed test: * $p < .10$, ** $p < .05$, *** $p < 0.005$, **** $p < 0.001$

In order to understand the effect of pre-IPO internationalization, technology and international business knowledge categories should be taken into consideration. During the subsequent process after IPO, firm exploitation is defined as using the former process with existing knowledge. It underlines the need for existing customers and markets to deepen the existing knowledge in a way that refines established technological and customer competences.

Given the context of pre-IPO stage, firm resources are scarce; therefore, when they pursue exploring and exploiting of resources, the relationship is more likely to be mutually exclusive. Therefore, within a single domain (technology type or market knowledge), exploration and exploitation will generally be on opposite ends of a continuous scale. However, if the firms explore in international operations, they can also explore in another loosely coupled domain. On one hand, for these IPO firms that conduct international exploration after their early internationalization, their competitive advantages come from the improvement of their existing technological knowledge. Therefore, it requires more investment, demonstrating their commitment to current knowledge development. Technological capabilities help these ventures develop a strong knowledge base for integrating external knowledge, thus neutralizing the threat to future growth from exploration.

Since the scope of exploited knowledge is more likely to reside in the routines that constitute the international organizations' existing knowledge base, the knowledge similarity with internal resources can facilitate its internal knowledge transfer to the new international units. Stronger technology capabilities will build stronger knowledge ownership. Therefore, those who have strong technological capabilities are more likely to benefit from early internationalization. The research hypotheses to be tested are as follows:

H₁: Pre-IPO internationalization exhibits a positive relationship to future growth of the firm.

H₂: Firms' subsequent resources commitment in technology development positively moderates the relationship between pre-IPO internationalization and future growth.

Thompson Financial Security Data Corporation (SDC) Global New Issues database provides the base sample of IPO firms. The sample includes all U.S. IPOs issued in 2004 across all industries. We chose the period covering the years between 2005 and 2008 for 248 firms based on the following criteria: The ventures that were corporate subsidiaries or corporate spin-offs will be eliminated from the sample given the firms have to be independently founded and operated to meet the conceptual understanding of being truly young new ventures. Using a sample of publicly held firms is beneficial given the public access to key financial information, and internationalization data would be hard to obtain otherwise. Given the criteria above, the sample is condensed to international new ventures. The descriptive statistics for the variables is shown in Table 1.

RESULTS

A total of 215 IPO companies from the periods of 2005 to 2008 are included into the analysis. Since the dependent variable (revenue growth) is continuous variable, we employ a panel linear regression model. Tables 2 reports the results of the analysis. Results for each hypothesis test are reported below.

Table 2 Regression Analyses for Pre-Internationalization and Firms Growth

Variable	Model 1	Model 2	Model 3	Model 4
Intercept	3.055***	3.900***	3.803***	3.696***
IPO size (ln Million)	0.086**	0.015**	0.040**	0.053**
IPO employee (ln)	0.085***	0.871***	0.726***	0.728***
Age when IPO	0.020**	0.012**	0.002	0.003
First Day Return(ln)	-0.121	0.016	0.058	0.070
Independent Variables				
Firm Pre-IPO Internationalization		1.05**	0.996**	1.002**
Technology Development			-0.927	-0.400
Firm Pre-IPO Internationalization X Technology Development				1.619**
N	215	215	215	215
Adjust-R²	0.63	0.64	0.75	0.75
F-Value	104.73***	89.05***	111.48***	97.28***

Two-tailed test: * $p < .10$, ** $p < .05$, *** $p < 0.005$, **** $p < 0.001$

Results reported in Table 2, Model 2 is used to test H1: Pre-IPO internationalization exhibits a positive relationship to future growth of the firm. Hypothesis 1 is supported, as the coefficient with the new ventures in Model 2 is positive and the two-tailed test is significant at the $p < .005$ level. And higher Adjusted-R squared is also showing that early internationalization provide more explanatory power to the model.

Model 3-4 are used to test Hypothesis 2. The hypothesis is supported, as the interaction term in model 4 is positive and the two-tailed test is significant at the $p < .001$ level. We also found that the direct effect of technology development is insignificant (in model 3 and in model 4), which shows that exploiting technology is not positively related to IPO sales growth for internationalized firms. But the interaction of technology development and pre-IPO internationalization is positively related to further growth of IPO firms. This also supports the arguments that pre-IPO internationalized firms require further technology development as a complementary tool to support their growth.

CONCLUSIONS

The results of this study confirm that firm growth is affected by early internationalization, and this relationship is moderated by the technology development. And our result also supports the dynamic capability argument for international IPO firms that they are not able to simultaneously conduct both technology and international development. Firms need to take trade-off between short-term gain from exploitation and long-term objective of exploration. Therefore, international firms are less likely to explore both international business and technology search at the same time. Moreover, for new ventures, at different points in firm growth stage, either exploration or exploitation may dominate internationalization process.

There are some limitations in this study. First, it focuses on the intra-firm level knowledge characteristics. However, there is another group of knowledge which has attracted attention of current literature: Researchers have found that inter-organizational activities can enable both exploitative and exploration knowledge creation processes. To access external knowledge, firms need to establish structure from proximate environment or relational contexts to create a broad set of resources from those actors and normative and social cues. Second, we did not include industry level value into the framework to understand international entrepreneur learning capabilities. Therefore, future studies can use the model developed in this paper to find the relationships in larger context.

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