



The relationship between international diversification, innovation performance and firm performance: An empirical analysis among hardware companies

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ARTICLE INFO	ABSTRACT
<p><i>Received: 26 Sep, 2016</i> <i>Revised: 15 Nov, 2016</i> <i>Accepted: 1 Oct, 2018</i></p> <p>Available online</p> <p>JEL classification: F23, L25, O30</p> <p>Keywords International business; Innovation performance; Three-stage theory of international business; Firm performance.</p>	<p>The fierce competition among hardware companies is increasingly becoming a global competition. With a fast-paced innovative environment, international business is becoming a strategic plan that all hardware management teams have to follow. However, with unique characteristics of high-tech industry, the international business of hardware firm potentially has specific issues, which make this research worth to proceed. This study examines the relationship between international business and performance of hardware companies from 2008 to 2014. To evaluate this potentially significant relationship, different degrees of internationalization are accounted to examine whether each stage may influence dissimilarly to the performance. In order to study a greater scale of this relationship, innovative performance, as a key competitive factor of high-tech companies, is also measured as another indicator to evaluate the internationalization's effects. A profound analysis is also provided to explain the findings based on unique characteristics of the hardware industry. The study finds out that companies who invest to diversify their markets likely achieve a higher profit during the internationalization process than their competitors.</p>

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1. Introduction

Nowadays, organizations are diversifying their geographic scope of their business activities in the pursuit of competitive advantage (Porter, 1990). Normally, international strategies come with a set of attendant costs and benefits that can lead to different consequences about the net performance benefits if these strategies incompletely conceptualize (Hitt et al., 1997). Interestingly, prior researches suggested conflicting empirical findings about this multinationality-performance relationship. Although both international management and strategic researchers realized the importance impact of international business on firm performance, this special relationship in hardware sector with its unique characteristics has received little attention. However, with the significant role of hardware companies to the development of social economy of many countries, especially emerging countries, for attracting foreign direct investment (FDI) and other kinds of investments, researches about hardware companies' international trend are very important for both academic literature and practical implication. Therefore, this paper aims to investigate and complement the knowledge of international impacts among hardware companies and contribute the potentially valuable findings to the international management and strategic literature. On the other hand, in terms of the relationship between geographic scope and firm performance, researchers mostly have measured financial performance of the firms and ignored the potential impact of other performance aspects, especially innovation performance. As a high-technological business, hardware companies have aimed to develop both their financial performance and innovation achievement. Therefore, in this study, firm performance is calculated by both financial performance and innovation performance. Furthermore, realizing the mixed results among prior studies, the international path would be divided into three phrases, which may imply the different impact of geographic scope on the performance of the firms. To sum up, this article tries to explain (1) the relationship between international diversification and firm performance of hardware companies and (2) the impact of innovation on performance of the firm.

2. Literature review

2.1. Definition

Capar and Kotabe (2003) referred to internationalization as a firm's expansion outside the borders of its home country across different countries and regions. According to Hitt et al. (2007), international business is a strategy through which a firm expands the sales of its goods or services across the borders of countries into different geographic locations or markets. In previous studies, all terms such as international diversification, internationalization, international expansion, globalization, and multinationality are defined as the same strategic management constructs and this article also adopts this

definition. Firm performance, on the other hand, refers to the measurement of operation results, in both financial and non-financial indicators. Firm performance sometimes relates to effectiveness of conducted company. Innovation performance introduces research and development (R&D) capacities of a business. Researchers mention innovation patent as a popular measure of this indicator. In addition, R&D intensity is also understood as another way to point out innovation level of firm.

2.2. International business and firm performance

In terms of relationship between degree of international business and firm performance, many researchers pointed out the significant effects of diversification strategies on firm's performance (Lu & Beamish, 2004; Doukas & Lang, 2003; Kotabe et al., 2002; Geringer et al., 2000; Contractor et al., 2003). However, the results are still controversial.

On the one hand, studies have shown that higher levels of international business lead to better firm performance (Delios & Beamish, 1999). The reasons for this positive relationship can be found in the internationalization theory and transaction cost theory. First and foremost, the initial impetus to a firm's internationalization is from the opportunity to exploit market imperfections based on its intangible assets in international markets (Caves, 1971; Buckley, 1988). Most previous researchers suggested that multinationality provides benefits through firm exploration and exploitation activities (Lu & Beamish, 2004). Greater business scope helps improve cost efficiencies and exploit economies of scale (Pangarkar, 2008; Caves, 1996; Hout et al., 1982). Multinational corporations can also involve a greater value creation activities in specific locations, such as labor intensive activities in low-wage countries like China, Bangladesh or Vietnam or hardware development in India and Israel to minimize their costs (Luo & Tung, 2007; Ghoshal, 1987). Appropriate transfer prices activities among subsidiaries could also help reduce taxes while the possibility of arbitrage may bring additional flexibility for firms (Allen & Pantzalis, 1996). In addition, higher level of international business could bring more learning opportunities, help satisfying diverse customer needs and raise competitiveness in foreign markets (Kostova & Roth, 2002; Zahra et al., 2000).

On the other hand, researchers gave an opposite argument in terms of costs of internationalization (Lu & Beamish, 2004; Denis et al., 2002; Geringer et al., 2000; Tallman & Li, 1996). Following this line, researchers explained that making foreign investments would risk firms installing new operations, staffing or building new management systems and business networks. These risks then could place firms in less competitive position (Lu & Beamish, 2004; Barkema et al., 1996). Based on the transaction cost theory, scholars also argued negative impacts because of coordination difficulties, information asymmetry and incentive misalignment among divisional managers (Denis et al., 2002; Lu & Beamish, 2004; Harris et al., 1982). Moreover, operating larger scales in disparate countries could increase costs of hierarchical governance because of requirements to increase information processing demands on administrative systems in uncertain environments (Bergh & Lawless, 1998; Jones & Hill, 1988; Hitt et al., 1997).

These conflicting results indicate that the multinationality-performance relationship might be more complex than prior theorized. Following this line, scholars tried to explain the lack of consistent findings by applying more complicated methodological and theoretical causes and expanded research's scopes, including the moderator impacts of product diversification, the pace and rhythm of expansion, the level of environment complexity or the different stages in international process of firms (Capar & Kotabe, 2003; Doukas & Lang, 2003; Vermeulen & Barkema, 2002; Guisinger, 2001). Implicit in the conflicting results from prior studies, this multinationality-performance relationship might be not monotonous (Contractor et al., 2003; Contractor, 2007; Lu & Beamish, 2004).

The relationship between degree of international business and performance might have an U-shaped figure (Ruigrok & Wagner, 2003), an initially negative effect of international expansion, followed by positive returns; or an inverse U-shape (Chen & Hsu, 2010), meaning an international expansion positively affects firm performance up until an optimal level, beyond which it becomes detrimental to performance. Curvilinears or S-shape are also proved as the potential frameworks explaining this complex relationship which will be discussed next (Contractor, 2007; Contractor et al., 2003; Lu & Beamish, 2004). The following section will discuss three stages of internationalization based on previous studies.

2.3. Three stages of international business

International strategic researchers suggested that the relationship between international intensity with the performance of multinational corporations (MNCs) is different in different stages of multinationality (Contractor et al., 2003). Contractor et al. (2003) developed the three-stage theory of international expansion that explained the different impacts of internationalization on the performance of MNCs at different levels of multinationality.

Stage 1. Negative slope: Costs and barriers to initial international expansion

In this initial stage of international business, firms expand to new, unfamiliar markets to acquire the benefits of the international expansion. In this stage, it is likely that firms will challenge higher levels of uncertainty as a result of the unfamiliarity with international market conditions (Anderson & Gatignon, 1986). In addition, firms spend much more costs like agency costs, learning costs, local adaptation costs, communication costs, isomorphism and other operating costs for establishing their positions in foreign markets (Hennart, 2001; Roth & O'Donnell, 1996). Furthermore, Doz et al. (2001) presented that to be successful in the very first stage of doing business abroad, firms' managers need to have the ability to learn and assimilate local knowledge, culture, social structures and institutions to efficiently apply their own businesses in host countries. The management skills are considered as the key for companies to succeed in foreign operation. These costs and skills also appear in other stages of internationalization, but in terms of financial performance, the high upfront costs mostly spread over their initial return rate (Contractor, 2007). Lastly, at this stage, most firms hardly operate efficiently to earn higher profit from foreign sales. Therefore, this stage could

explain partly why some researchers found a negative relationship between degree of international business and firm performance.

Stage 2. Positive slope: Benefits of international expansion are now realized

In the middle stage, firms begin receiving benefits from international expansion. Organizations possibly acquire profits through price discrimination or arbitrage opportunities (Contractor et al., 2003). Benefits from economies of global scales and scopes as well as exploitation opportunities are now hypothesized to be greater than the incremental costs (Caves, 1996). In this stage of expansion, the companies are also suggested to access low-cost inputs and to engage know-how (Daniels & Bracker, 1989). In addition, firms are assumed to have more abilities to scan quickly and accurately market opportunities because of their international market experiences. Local culture and social institutions learnt from the initial stage also benefit firms now. Because of these reasons, multinationality is supposed to have positive impacts on the performance of MNCs.

Stage 3. Negative slope: International expansion beyond an optimal threshold

Many researchers pointed out the inverted U-shape of multinationality-performance relationship that brought idea about negative effect in later stage. Scholars showed that the incremental costs of further expansion now outweigh the incremental benefits and thus internationalization could affect negatively on performance. In particular, multinational companies are now considering expanding into other foreign markets with lower potential profit or an higher uncertainty environment. And, because of the complexity of globally operating firms, the incremental costs for expanding might exceed the benefits of higher levels of multinationality (Contractor et al., 2003). Gomes and Ramaswamy (1999) suggested that different cultures in different foreign countries could increase transaction and governance costs. Furthermore, expanding to more countries requires higher levels of management skills. The issue of managing inefficiency in international markets mentioned in the initial stage comes back again in this final stage of the global expansion. Therefore, in stage 3, a negative slope is hypothesized for the multinationality-performance relationship. Figure 1 below summarizes the three-stage theory discussed above.

Hypothesis 1: The relationship between internationalization and hardware firm's performance is nonlinear, with the slope negative at low levels of international business, positive at medium levels, and back to negative slope at high levels of international business.

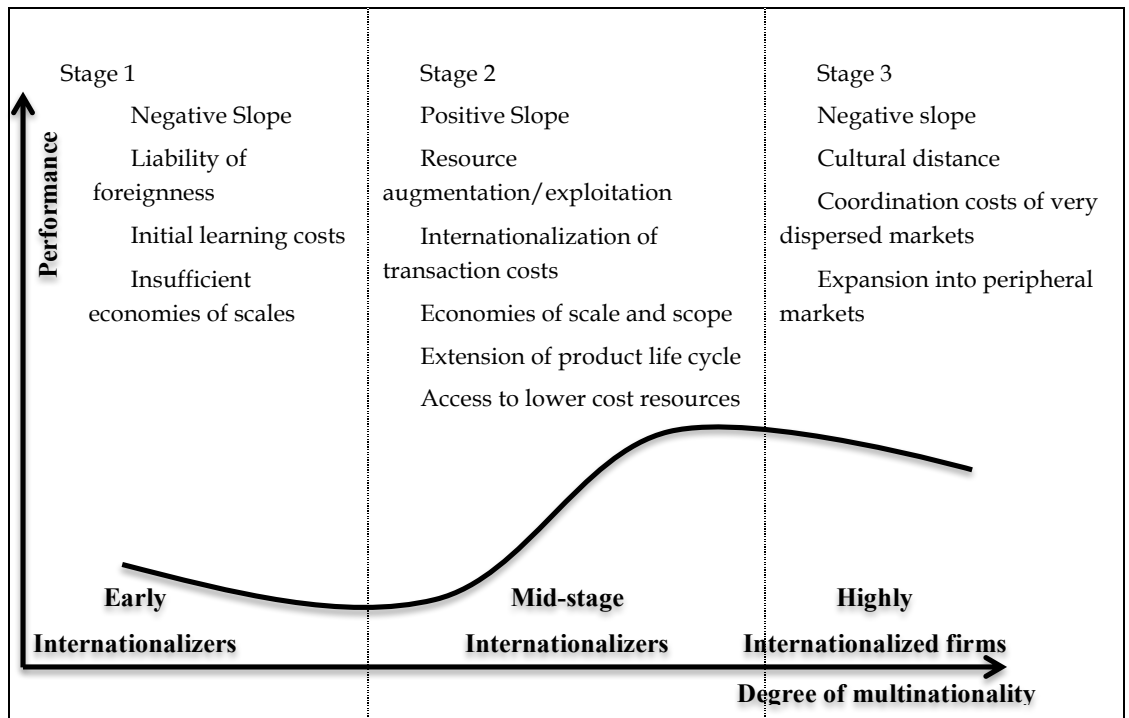


Figure 1. A three-stage theory of international business

Source: Contractor et al. (2003)

2.4. International business and innovative performance

Hitt and Ireland (1994) hypothesized the positive relationship between degree of international business and innovation performance. They suggested that international expansion helped firms acquire better innovative achievements and reduce potential failures. High level of international business may support hardware firms to generate more resources needed to operate their R&D activities sustainably (Kafouros et al., 2008). If the firms only operate in domestic markets, they will take risks from obsolete technologies. Moreover, hardware MNCs could improve their innovative performance by accessing new and diverse inputs from a variety of market and cultural aspects in the global arena (Kafouros et al., 2008). It is also more convenient for these organizations to borrow and exploit new ideas, to follow other firms' development strategies, to intergrate new research findings into their own products and services and thus increase their innovative capacity. Therefore, international business activities can improve the process of knowledge accumulation and increase the innovation performance (Hitt et al., 2006).

In terms of costs, Kotabe et al. (2002) argued that internationalization could reduce R&D costs since hardware MNCs could access materials and R&D inputs from the cheapest available international sources as well as operate their innovative activities in the most optimal places (Kafouros et al., 2008). Hardware MNCs could also have more opportunities to hire better technologists and high-skilled technical workers all around the world (Cheng

& Bolon, 1993). Additionally, researchers also pointed out that international business helps firms spread their advantages to other countries and innovation helps the firms overcome local disadvantages to compete their competitors in host countries (Hitt and Ireland, 1994).

Hypothesis 2: Higher degree of international business has positive impact on innovation performance of hardware MNCs

3. Research Methodology

3.1. Sample

Data of 177 companies have been collected from Standard & Poor's COMPUSTAT database for a 7-year period from 2008 to 2014. The COMPUSTAT database includes both financial and accounting data for more than 6,000 publicly traded firms. Companies have to qualify for these criteria: (1) Global Industry Classification Standard (GICS) industry code is 4520 as technology hardware and equipment companies, (2) annual sales must greater than US\$1,000 million and (3) data are available. In addition, data from Espacenet and Lexis-Nexis² were also collected to access the number of patents that chosen firms successfully achieved during this period. The number of new products as well as new upgraded version of existing products will also be utilized as a back-up plan. Furthermore, companies' financial statements were also gathered from DataStream and Bloomberg³ were also gathered to acquire data when needed. The decision to collect a seven-year timeframe was based on the rationale of having a sufficient duration to ensure the research's quality as well as to minimize the probability of missing data. This seven-year period would reflect the most current operation and also represent a stable situation of firms. There is also an empirical diversification research about this period. In addition, a seven-year period is desirable to achieve accurate evaluation and to avoid anomalies in the data. Last but not least, after the 2008-financial crisis, companies could probably have strategic plans to overcome the potential negative effects. Therefore, this chosen time span could potentially bring significant outcomes to international business studies.

3.2. Dependent variables

Firm performance (financial performance) and innovation performance are two dependent variables conducted in this paper. Their operationalization will be discussed as follows.

² Espacenet (<https://worldwide.espacenet.com/>)

Lexis-Lexis (<https://www.lexisnexis.com/en-us/gateway.page>)

³ Datastream (<https://www.refinitiv.com/en/products/datastream-macroeconomic-analysis>)

Bloomberg (<https://www.bloomberg.com/professional/solution/data-and-content/>)

Firm performance

Most of performance measured variable prior studies used to test the hypotheses were corporate performance, including accounting-based and market-based financial performance measures (Lu & Beamish, 2004). Earlier diversification studies used simple indicators to measure firm performance, such as sales or profit to asset ratios (Tallman & Li, 1996). The indicators, however, were argued not to cover all effects of internationalization strategies to the performance of firms. The reason why researchers encouraged to used different measures when evaluating performance of firms is the differences in assets requirements and valuations when firms operate in international markets with different products. In addition, using multi dimensions for computing the performance of firms will help strengthen the measure and reduce the risk of limitation occurs in evaluating firm outcome compared to using one single dimension.

Accounting-based measures of performance such as ROS, ROA and ROI are usually used in strategic management and international business (Grant, 1987) because of their availability and also their useful information (Barney, 1997). Many papers have used only this accounting-based performance measure such as ROA and ROI, which are now encouraged to be used, because of their potential contribution to research outcomes.

However, there are some criticisms about using accounting-based performance measures only are that they have serious limitations in measuring corporate performance because of the differences about accounting policies cross firms and countries. Prior studies that relied only on accounting-based performance measures, ROA or ROS had recognized some limitations for their outcomes (Geringer et al., 1989; Tallman & Li, 1996; Contractor et al., 2003). These limitations then could imply wrongly to managerial lessons or evaluate incorrectly the strategic role of intangible resources and capabilities (Barney, 1997). Moreover, accounting measures do not consider business risks associated with individual firms in evaluating firms' performance. More importantly, accounting-based performance only describes a historical record of the firm's past financial situation without taking a consideration to the expectation of future performance.

Researchers suggested to used market-based performance measure when examine the multinationality-performance relationship of diversified firms. Sales growth is widely used to offset the limitations of accounting-based performance measures (Geringer et al., 1989). Use of growth measure tests the potential increase of market share over short-term profitability of diversified firms. In addition, scholars showed that using sales-based measures in international studies could avoid the effects of differential measures of asset valuation (Geringer et al., 1989). Another market-based index was encouraged to use is market-to-book value (Sledge, 2000). This ratio is considered as the best choice since it combines accounting information with market information, especially the future expectation of investors. Therefore, the market-to-book value is highly encouraged to be used to evaluate the performance of MNCs .

Tobin's Q which is defined as the market value of assets divided by the replacement value of assets, is another market-based financial performance measure (Contractor et al., 2003; Lu & Beamish, 2004; Qiu et al., 2014; Luo & Bhattacharya, 2006; Chang & Wang, 2007). This indicator has been widely used as a market value measure for diversified firms, such as marketing, finance and international business. However, there is some criticism of using Tobin's Q which mostly focused on the issue of measurement error and consequently biased estimation of the coefficient (Whited, 2001). Although there are some efforts to minimize potential measurement error by using an intricate routine to calculate the replacement value of assets rather than using book value as a convenient proxy, the difficulties to access this information make this ratio be not popular to be used among researchers. Scholars pointed out some other serious limitations in using this index. First, Tobin's Q does not count intangible assets thus overestimate the relative performance of firms with large investment in intangible (Chang & Wang, 2007). For example, the performance of ICT companies could be potentially computed wrongly if authors use this index. Second, scholars have argued the biased estimation of the investment opportunity of firms because of the potential measurement error. Last but not least, Tobin's Q may fluctuate through the years because firm's market value varies depends on the general economy (Chang & Wang, 2007).

Goerzen and Beamish (2003), on the other hand, also developed a formula, called economic performance, to evaluate the performance of multinational enterprises (MNEs) while investigating the effect of geographic scope to firm performance. This indicator was hoped to offset limitations of accounting-based performance measures, especially when they were looking to analyze the "forward looking" performance of firms. This economic performance was defined by three well-known market-based measures, including Jensen's alpha, Sharpe's measure and the market-to-book ratio (Jensen, 1968; Sharpe, 1966; Goerzen & Beamish, 2003). However, because of the complicated as well as potential error of measurement, this indicator was not very popular among recent studies when conducting the effects of degree of international business to firm performance. In this paper, three financial indexes which are agreed among researchers to conduct the relationship between the performance of firm and multinationality are utilized to evaluate performance of the firm.

ROA (return on assets) has been widely used in many prior studies on the impacts of degree of international business on the performance of firms (Contractor et al., 2003; Daniels & Bracker, 1989; Gomes & Ramaswamy, 1999; Lu & Beamish, 2004). ROA is an indicator of how profitable a company is relative to its total assets and is displayed as a percentage. This accounting-base profitability indicator is chosen because of the data availability and also of the fact that many previous researches have used this measure (Capar & Kotabe, 2003). Furthermore, hardware companies tend to have significant portions of intangible assets, which possess at different degrees depending on different sub-sectors. Thus assets-based performance measures are less likely to take this difference into consideration.

ROI (return on total investment capital) is used as a matter of fact that this accounting – based profitability measure is availability as well as is well known among prior studies

(Delios & Beamish, 2001; Kotabe et al., 2002; Tallman & Li, 1996; Lu & Beamish, 2004; Capar & Kotabe, 2003). In addition, this indicator is also encouraged to be used since it helps avoid the effects of different assets valuations due to the different timing of investment or depreciation (Geringer, Beamish, & da Costa, 1989).

Sales growth is widely used to offset the limitations of accounting-based performance measures (Geringer et al., 1989). Use of growth measure tests the potential increase of market share over short-term profitability of diversified firms. In addition, scholars showed that using sales-based measures in international studies could avoid the effects of differential measures of asset valuation (Geringer et al., 1989).

Innovation performance

Innovation performance is often measured as the number of new products introduced to market (Katila & Ahuja, 2002; Zahra & Nielsen, 2002), during the surveyed time. However, companies in hardware industry always upgrade their existing product lines and release new versions, which could be considered as the core activities to innovate their products. Therefore, in this article, any versions that differ from their existing products are all counted as a new innovation performance. This study will utilize three measures to capture innovation performance: (1) The number of new products introduced to market, (2) the number of new versions released for existing products, and (3) a summed total of the venture's product innovation activities.

On the other hand, researchers could also use patents as innovation output to measure the performance of firm's innovation. This variable is measured by the patenting frequency of firms, that is the number of successful patent applications by a firm in a given year. Patents have both significant strengths and weaknesses as measures of innovation output (Ahuja & Katila, 2001). First, patents are directly related to inventiveness: they are granted only for nonobvious improvements or solutions with discernible utility (Walker, 1995). Second, they represent an externally validated measure of technological novelty (Griliches, 1990). Third, they confer property rights upon the assignee and therefore have economic significance (Kamien & Schwartz, 1982; Scherer & Ross, 1990). In this article, the second measure, the number of patent to compute the innovation output would be used. Patent will be labeled as INO.

3.3. Independent variables

Degree of international business and control variables are the independent variables that will be investigated. Their operationalizations are detailed below.

Degree of international business

For the measure of the degree of international business, scholars used different indices. Scholars argued that measures of internationalization should mention the relative size and strategic importance of both local and foreign business units (Geringer et al., 1989; Grant, 1987).

A popular measure to compute the degree of international business of firms is the ratio of foreign sales to total sale (FSTS) (Chang & Wang, 2007; Delios & Beamish, 2001; Geringer et al., 1989; Lu & Beamish, 2004; Tallman & Li, 1996). Other scholars also proposed a multidimensional measure including five items for this independent variable (Hitt et al., 1997; Gomes & Ramaswamy, 1999). Contractor et al (2007) argued that in any internationalization cases, FSTS is still an appropriate index of the degree of multinationality whether firms based on pure exports, exports and FDI activities or expanded through FDI only. They also showed that FSTS might measure more legitimate than others used in prior studies such as a number of foreign offices or number of international countries that firms operated. Jeong (2003) supported using the ratio FTST since he argued that measures of the degree of international business should reflect the relative size and strategic importance of foreign operations to the firms (Geringer et al., 2000). However, researchers also criticized that this measure might have serious limitations because of the content validity, criterion validity and reliability (Gomes & Ramaswamy, 1999). In addition, it was argued that since this index includes resale of intermediate goods, they are not absolute measure of the degree of international business of firms. Overall, this indicator seems to be a relatively good measure and has been widely used (Geringer et al., 1989; Chang & Wang, 2007; Geringer et al., 2000).

Besides the FSTS measure, scholars also suggested to use other measures including the number of international countries in which firms operate its business and the ratios of foreign assets to total assets (Gomes & Ramaswamy, 1999; Tallman & Li, 1996). Tallman and Li (1996) used two measures of international diversity, consisting of multinationality and country scope. Multinationality was defined similarly with the index FSTS while country scope refers to a proxy for the geographical scope of international operations. Country scope was measured as the number of international countries that MNEs operates its business. Scholars showed that since MNEs operate differently depends on tax policies, economic environment or political arbitrage, a country count seems to evaluate better and less arbitrarily than a subsidiary count (Tallman & Li, 1996).

Furthermore, scholars also suggested using export intensity as a measure to calculate the degree of internationalization at early stage when firms mostly expand its business through exporting their products (Geringer et al., 2000). The authors also computed the ratio of sales by foreign business units to total international sales as another item to measure the level of international business. However, due to the nature of internationalization strategy in which export is just a very simple method for international business activities among firms, scholars showed that using export intensity as a measure of internationalization might be not appropriate for large MNEs or at the later stages of internationalization (Chang & Wang, 2007). Wiersema and Bowen (2008) also developed a formula to calculate the degree of internationalization of firms. This calculation, however, is argued not to be appropriate for studies about multinationality-performance relationship since it includes too many irrelevant variables such as trade barriers or industrial characteristics. Developing a new operationalized diversification measure, Qian et al. (2010) adopted both sales-based and

subsidiary-based measures to examine the relationship between the degree of international business and the performance of MNEs. To be more specific, the authors included both sales and subsidiary diversification measures. This approach, however, seems similarly to prior studies when consisting sales performance and geographic scope that firms operate (Geringer et al., 2000; Hitt et al., 1997). Developing new three-stage international theory, Contractor et al. (2003) proposed three items to measure the degree on internationalization, including the ratio of foreign sales to total sales, the ratio of number of foreign employees to number of total employees, and the ratio of number of foreign offices to number of total offices. However, these dimensions were admitted to be strong correlated (Contractor et al., 2007). Lu and Beamish (2004) developed two measures of firm's internationalization. The first was a number of firm's overseas subsidiaries in each year, irrespective of entry mode and the second was a number of countries in which a firm had overseas subsidiaries in a given year. The authors later integrated these two measures to change them from counts to ratios.

Another well-known approach is the asset dispersion entropy score developed in previous studies on international business (Goerzen & Beamish, 2003). This index was defined as:

$$ID = \sum_i E_c \times \ln(1/E_t)$$

where E_c is the number of employees in a particular country c and $\ln(1/E_t)$ is the weight given to each country c or the natural logarithm of the inverse of the MNE's total employment (Hitt et al., 1997). However, this formula focuses mostly on the number of national markets that firms operate abroad as well as the potential effects of natural markets to the performance of firms. In addition, this entropy mostly relates to the number of employees working for international business units. Therefore, this calculation is not appropriate for studies focus more about the interrelationship between multinationality and firm performance.

Similarly, Chang and Wang (2007) adopted a new entropy measure of the degree of international business, which is defined as

$$\sum [P_i \times \ln(1/P_i)]$$

where P_i is the percentage of sales at a given country i and $\ln(1/P_i)$ is the weight of each geographic segment. Chang and Wang (2007) argued that this measure could include both the number of countries that firms operate and the level of contribution to total sales of each geographic segment and thus it is a more appropriate measure of the degree of internationalization (Hitt et al., 1997). Because of data availability constraints and also for comparison purposes, the FSTS ratio has been applied in this article. This variable will be labeled (ID).

3.4. Control variable

Prior researches have used different control variables including in conducted models such as tangible assets, firm age, sector effect or firm-leverage (Buckley & Casson, 1976; Grant, 1987; Contractor et al., 2003; Gomes & Ramaswamy, 1999; Kotabe et al., 2002; Tallman & Li, 1996). These variables showed significant effects on the models and thus applied in this article's model.

The first variable is tangible assets that were found to have different effects on firms because of different amount of resources under managerial control (Chang & Wang, 2007; Geringer et al., 2000; Hitt et al., 1997; Tallman & Li, 1996). For instance, small firms with lower level of tangible assets are more source-constrained and vulnerable to market competition while higher level of tangible assets allows firms to utilize the economies of scale in coordination and planning and thus increase profitability (Doukas & Lang, 2003; Chang & Wang, 2007; Sledge, 2000). Furthermore, because of their lower level of tangible assets when entering international markets, firms tend to acquire fewer benefit from international business. In contrast, large firms with higher level of tangible assets may have greater coordination costs which help reduce the synergy of internationalization. Therefore, the effect of tangible assets on the multinationality-performance relationship may be significant (Chang & Wang, 2007). This variable is measured by the ratio of companies' capital and the number of employee. This measurement is a result of Jorgenson (Capital theory and investment behavior, 1963) when he argued that businesses should not be calculated by input capital but by invested capital during that period. In this article, this variable is labeled as K. Labor being measured by the number of employees at companies, Labor was also mentioned in prior studies and found its significant effects on firm performance (Chang & Wang, 2007; Contractor et al., 2003). It is essential to remind that this conducted model is developed based on Cobb-Douglas producing formula and since the number of employee is also counted whenever calculating firm performance and intangible assets, coefficient of Labor will not represent its influences on firm financial performance. Labor will be labeled as L in this article. To sum up, in this article, the authors would like to use two control variables, tangible assets and labor, which are hypothesized to affect firm performance. Tangible assets, a common variable suggested to be relevant to firm performance, is measured by the ratio of companies' capital and the number of employee and used to control economies and diseconomies of scale at the corporate level (Contractor et al., 2003). Labor is measured by the number of employee at companies (Contractor et al., 2003).

3.5. Models

Dubofsky and Varadarajan (1987) found the value of reaffirming empirical results by repeating their previous studies. Hitt et al. (1997) also described the role of the replication studies which was considered an integral part of the development of scientific methodologies. When investigating the relationship between multinationality and performance, previous studies adapted some different techniques (Capar & Kotabe, 2003; Contractor, 2007; Contractor et al., 2003; Delios & Beamish, 2001; Delios et al., 2008). Among

them, the multiple regression models are highly recommended because of its suitability to study the relationship among variables (Greene, 2010). Additionally, the method is also suitable as both the independent variables and dependent variables are metric (Sharma, 1996). Therefore, the present study will adapt this method to investigate and analyze the relationship between these two variables. This is the baseline model that authors applied for this article (Contractor, Kumar, & Kundu, 2007):

Model 1 (Linear Model):

$$PERF_{it} = \beta_0 + \beta_1 K_{it} + \beta_2 L_{it} + \beta_3 ID_{it} + \varepsilon_{it}$$

Model 2 (U-shaped):

$$PERF_{it} = \beta_0 + \beta_1 K_{it} + \beta_2 L_{it} + \beta_3 ID_{it} + \beta_4 ID_{it}^2 + \varepsilon_{it}$$

Model 3 (S-shaped):

$$PERF_{it} = \beta_0 + \beta_1 K_{it} + \beta_2 L_{it} + \beta_3 ID_{it} + \beta_4 ID_{it}^2 + \beta_5 ID_{it}^3 + \varepsilon_{it}$$

where i represents the companies in the study (cross-sectional component), t corresponds to the different periods (time series component, 2008–2014), $PERF$ is a performance variable, K is a proxy for tangible assets of company, L is a measure of labor of company. ID is the degree of internationalization, ID^2 is a squared item to test the parabolic form of the relationship and ID^3 is a cubic terms to test the three-stage relationship.

4. Findings

4.1. Multiple regression result

Table 1 presents the mean, standard deviations and intercorrelations among the variables. According to Pindyck and Rubinfeld (1991), there are multicollinearity among variables if the correlations have absolute values greater than 0.560. In conducted models, tangible assets seem only to have relationship to firm performance.

Next, the authors applied the stepwise methods to test the order in which predictors entered into the model are based on a purely mathematical criterion, aiming to find a statistical model fit (Field, 2009). However, the models derived by computer often take advantage of random sampling variation and decisions about which variables should be included will be based upon the slight differences in their semi-partial correlation, the stepwise models are advised to avoid. In this article, the stepwise results contrasted dramatically with the theoretical importance of a predictor to the model, the result was not applied (Field, 2009). Instead, the value of R-square, adjusted R-square and F-value are considered to determine if the model fits (Greene, 2010).

The final part discussed results of multiple regressions to examine the developed hypotheses and to build the conclusion about the relationship of these two variables in hardware industry. The hypothesis will be accepted if the null hypothesis can be rejected.

According to Field (2009), the null hypothesis will be rejected if the regression coefficients β differ from 0 with significant at 0.05 level (the higher the better).

Regarding to financial performance, models 2, 6 and 10 are confirmed as fitting models, in which ROA, ROI and sales growth are dependent variables respectively, based on an analysis of adjusted R-squared, R-squared and the statistics F-value. Following these models, internationalization affects financial performance of companies through a U-shaped pattern, negatively as the early stage and positively at the later stage. Therefore, hypothesis 1 is partially supported.

In terms of innovation performance, model 14 is confirmed as fitting model based on an analysis of adjusted R-squared, R-squared and the statistics F-value. Following this model, internationalization affects innovation achievement of companies through a U-shaped pattern, negatively as the early stage and positively at the later stage. Therefore, hypothesis 2 is rejected since the relationship between innovation performance and internationalization is nonlinear.

Table 1.

Pearson correlation result

Variables	Mean	S.d.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. ROA	-5.00	2.47	1						
2. ROI	-10.27	4.54	0.00	1					
3. Innovation performance	1248.63	39.93	0.10	0.15	1				
4. Tangible Assets	24440	18440	-0.55	-0.53	-0.03	1			
5. Labor	9347	16526	-0.41	-0.43	0.14	-0.03	1		
6. Sales Growth (%)	1.06	0.17	0.00	0.00	0.19	0.36	-0.07	1	
7. Degree of international business	0.44	0.24	0.08	0.27	0.01	0.39	0.07	0.12	1

Table 2.

The multiple regression results with ROA (first 6 models) and ROI (last 6 models) as dependent variables

Independent variables	ROA					ROI		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
1. Tangible Assets	0.016** (2.38)	0.016** (2.25)	0.015** (2.24)	0.021** (2.42)	0.020** (2.36)	0.021** (2.21)	0.019** (2.05)	0.021** (2.47)
2. Labor	-0.024** (-3.08)	-0.022** (-3.20)	-0.017** (-3.14)	-0.019** (-3.32)	-0.020** (-3.16)	-0.018** (-3.01)	-0.016** (-3.00)	-0.021** (-4.07)

Independent variables	ROA					ROI		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
3. ID	-0.10* (-2.20)	-0.61* (-2.38)	-1.43* (-2.39)	-1.44* (-2.37)	-0.03* (-2.39)	-0.38* (-2.46)	-0.62 (-1.01)	-0.62 (-1.00)
4. ID squared		0.54* (2.10)	2.72 (1.86)	2.72 (1.84)		0.36* (2.41)	1.01 (1.67)	0.99 (1.66)
5. ID cubed			-1.43 (-1.51)	-1.43 (-1.49)			-0.42 (-0.43)	-0.41 (-0.41)
6. ID x RD				-0.00 (-0.01)				0.02 (0.08)
R ²	0.14	0.14	0.13	0.12	0.15	0.15	0.14	0.12
Adjusted R ²	0.12	0.12	0.11	0.10	0.13	0.13	0.11	0.08
F-value	6.95***	7.04***	8.59***	7.69***	3.29**	3.83**	3.31**	2.93**

Note: t-statistics is in the parentheses. *, **, *** denotes the significance of 10, 5, and 1 percent respectively.

Table 3.

The multiple regression results with sales growth and innovation performance as dependent variables

Independent variables	Sales Growth				Innovation Performance			
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
1. Tangible Assets	0.014** (2.36)	0.014** (2.23)	0.013** (2.22)	0.019** (2.40)	0.018** (2.34)	0.019** (2.19)	0.017** (2.03)	0.019** (2.45)
2. Labor	-0.021** (-3.04)	-0.019** (-3.17)	-0.013** (-3.11)	-0.016** (-3.28)	-0.017** (-3.13)	-0.016** (-2.97)	-0.013** (-2.96)	-0.018** (-3.98)
3. ID	-0.02* (-2.23)	-0.03* (-2.12)	-0.68 (-1.08)	-0.71 (-1.13)	-0.14* (-2.84)	-0.47* (-2.06)	-0.60 (-1.14)	-0.20 (-0.67)
4. ID squared		0.05* (2.21)	1.77 (1.16)	1.87 (1.22)		0.64** (2.84)	-2.19 (-1.71)	-0.87 (-1.17)
5. ID cubed			-1.12 (-1.14)	-1.22 (-1.22)			1.86* (2.25)	0.66 (1.38)
6. ID x RD				0.19 (0.64)				2.32*** (16.28)
R ²	0.09	0.16	0.08	0.05	0.22	0.27	0.29	0.76
Adjusted R ²	0.07	0.15	0.05	0.03	0.21	0.25	0.27	0.76
F-value	5.72**	10.12***	4.14*	3.15*	19.43***	16.35***	13.90***	86.57***

Note: t-statistics is in the parentheses. *, **, *** denotes the significance of 10, 5, and 1 percent respectively.

4.2. Durbin-Watson results for measuring correlation

Table 4.

Durbin – Watson results

Model	R	R square	Adjusted R square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R square change	F change	df1	df2	Sig. F change	
2	0.374	0.14	0.12	1.51	0.14	7.04	4	172	0.000	1.885
6	0.346	0.15	0.13	2.41	0.12	3.83	4	172	0.000	1.906
10	0.387	0.16	0.15	4.01	0.15	10.12	4	172	0.000	2.140
14	0.520	0.27	0.25	40.63	0.27	16.35	4	172	0.000	2.200

In models 2 and 6, the number of independent variables (k) is 4 and of sample is 177 (conducted samples $n = 200$, according to Durbin-Watson table), significant value 0.01 (99%), value of dU and dL for 2 models are 1,715 and 1,633 respectively. As the value of d in these two models is from dU to 2, it is concluded that there is no autocorrelation. In models 10 and 14, the number of independent variables (k) is 4 and sample is 177 (conducted samples $n = 200$, according to Durbin-Watson table), significant value 0.01 (99%), value of dU and dL for 2 models are 1,715 and 1,633 in respectively. Because a value of d in these two models are 2.14 and 2.20, are between 2 and 4 – dU (2.285), therefore, it is concluded that there is no autocorrelation.

4.3. Test for the presence of multicollinearity

In order to examine data collinearity, the variance inflation factor (VIF) is applied as an indicator for the presence of this phenomenon.

- If $VIF < 10$ then there is no multicollinearity
- If $VIF > 10$ then there is multicollinearity among variables

Table 5.

Multicollinearity among variables

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Beta	Beta			Tolerance	VIF
2 (Constants)	0.385					
Tangible assets	0.016	0.020	2.25	0.002	0.984	1.016
Labor	-0.020	-0.032	-3.20	0.002	0.990	1.011
ID	-0.61	-0.740	-2.38	0.006	0.256	3.899

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Beta	Beta			Tolerance	VIF
ID Squared	0.54	0.615	2.10	0.005	0.258	3.873
6 (Constants)	0.382					
Tangible assets	0.021	0.040	2.21	0.002	0.984	1.016
Labor	-0.018	-0.022	-3.01	0.003	0.990	1.011
ID	-0.38	-0.420	-2.26	0.006	0.256	3.899
ID Squared	0.36	0.371	2.41	0.005	0.258	3.873
10 (Constants)	0.405					
Tangible assets	0.014	0.023	2.23	0.002	0.984	1.016
Labor	-0.019	-0.032	-3.17	0.002	0.990	1.011
ID	-0.03	-0.041	-2.21	0.005	0.256	3.899
ID Squared	0.05	0.053	2.21	0.005	0.258	3.873
14 (Constants)	0.407					
Tangible assets	0.019	0.028	2.19	0.002	0.984	1.016
Labor	-0.016	-0.022	-2.97	0.003	0.990	1.011
ID	-0.47	-0.56	-2.06	0.006	0.256	3.899
ID Squared	0.64	0.87	2.84	0.005	0.258	3.873

Based on the test result for the present of multicollinearity, there is no multicollinearity among variables since the values of VIF are all below 10.

4.4. Heteroskedasticity Test

Table 6.

Results for Heteroskedasticity Test

Model	R	R squared	Adjusted R squared	Change Statistics				
				R squared change	F change	df1	df2	Sig. F change
2	0.374	0.14	0.12	0.095	7.04	9	167	0.000
6	0.346	0.15	0.13	0.111	3.83	9	167	0.002
10	0.387	0.16	0.15	0.154	10.12	9	167	0.000
14	0.520	0.27	0.25	0.161	16.35	9	167	0.000

In model 2, $R^2 = 0.14 \rightarrow nR^2 = 177 \times 0.14 = 24.78$

In model 6, $R^2 = 0.15 \rightarrow nR^2 = 177 \times 0.15 = 26.55$

In model 10, $R^2 = 0.16 \rightarrow nR^2 = 177 \times 0.16 = 28.32$

In model 14, $R^2 = 0.27 \rightarrow nR^2 = 177 \times 0.27 = 47.79$

In these models, the variables $k-1$ equal to the freedom of level $df1$ equal to 9 for all minor regression models, the significant level 1% (99%) in the Chi-square table. The limited value of Chi-square is 21.67. Since $nR^2 >$ the limited value of Chi-square, there is constant variable.

5. Conclusion

5.1. Degree of International Business and Firm Performance

The three measurements of hardware companies' performance, which are ROA, ROI and sales growth, are computed as the ratios of return or profit to the asset (ROA), capital investment (ROI) or the ratio of the revenue of the current year to the revenue of the previous year, respectively. The two indicators, therefore, will measure the profit and income earning from business activities. The negative sign of internationalization at the first stage means hardware companies will suffer loss at their first stage of the internationalization strategies. This loss could partly be initial capitals that hardware companies invest to expand abroad, for example to establish hardware infrastructures and systems or to research markets. The disadvantages at the beginning stage could also be explained using Luo and Tung's arguments about hardware industry (Luo & Tung, 2007). They argued that the hardware firms would not often earn sufficient revenues to cover the expenditures (Luo & Tung, 2007), which then make the return rate have negative values. Among the expenditures, the costs of geographic diversification on the first stage are main liabilities. When making a foreign investment, hardware companies need to deal with new and foreign challenges related to a new operation, such as purchasing and installing facilities, staffing and establishing internal management. Hardware companies also need to comply with some specific requirements such as skilled workers, unique distributional system, external business networks for exploiting and improving their high technological competitive advantages (Hymer, 1976; Lu & Beamish, 2004; Contractor et al., 2007). These challenges can put a new hardware subsidiary in a disadvantage position compared to an established firm in foreign markets. However, these liabilities tend to decrease as the subsidiary builds and improves reputations gradually (Lu & Beamish, 2004; Barkema et al., 1996), which possibly explain for the positive slope in the next stage of the internationalization.

Lu and Beamish (International diversification and firm performance: The S-curve hypothesis, 2004) argued that at the later stage of the strategy, firms with more international's knowledge and experience begin receiving positive return rate. Furthermore, their initial investments at foreign markets such as offices, hardware training programs for new employees, advertising campaigns or market research bring them now more advantages compared to their competitors (Luo & Tung, 2007). Given the internationalization theory, Buckley and Casson (1976) also pointed out that the greater level of market commitment of a firm in international market is, the more advantages from the

exploitation of tangible and intangible assets that firms could have. For example, at this stage, since hardware companies create stronger external business network, they will have more chances to exploit intangible assets from their partners which are technological institutes, universities and other research institutes (Contractor et al., 2007). One more interesting feature is that the exchanging point from negative to positive slope among hardware companies is expected to be lower than that of other traditional companies since the learning curve among these companies are often shorter and faster (Carr, 2003). It is also a reason why it is easier for hardware companies to expand abroad than others.

To sum up, it is believed that international business activities has significant effect on firm performance, that international business has U-shaped relationship with firm's performance. Therefore, Hypothesis 1 is partially supported.

Degree of international business with innovation performance

Although prior studies suggested a positive relationship between the internationalization strategies and the innovation achievement, this paper does not support this conclusion. The regression results point out that the relationship between innovation performance, which is measured by the number of patents, and the degree of international business is not linear. This conclusion could be explained by the nature of the hardware industry as well as the relationship between these two strategies. Since creativity and innovation are important activities of such companies, they have always to invest much more resources and capital to develop their core innovated competences (Shields, 2014). At the first stage of internationalization, since firms have to spend much more money on expanding geographically, their capital for innovation is not as much. This is a plausible reason for the negative effect at the early stage. Unlike other manufacturing or service companies, the internationalization strategies play a vital role among hardware companies in terms of looking for new markets, new customers or new assembling factories at low-wage countries rather than of improving the innovation assets (Allen & Pantzalis, 1996; Ahuja & Katila, 2001). Moreover, one of the main reasons hardware multinational corporations expand abroad is to increase labor productivity growth or customer's need rather than to develop the innovative performance (Bakhshi & Larsen, 2005; Jalava & Pohjola, 2002). Therefore, such companies are mostly looking for target markets with advantages of low-cost labor or large market's demand (Bakhshi & Larsen, 2005). Last but not least, engaging in the learning process help hardware firms follow the right direction and improve their innovation performance. Hence, such firms have to keep investing and developing their R&D activities at the early stage of the establishment instead of waiting for opportunities in different market (UNCTAD, 2012). Even during the international business where such firms have to look for opportunities in their high-tech fields, this goal is confirmed not their priority (Suarez et al., 2012).

5.2. Control variable effects

Tangible assets

Tangible asset is expected to have potential effect on the performance of multinationality because of the amount of resources under managerial control (Chang & Wang, 2007; Geringer et al., 2000; Hitt et al., 1997; Tallman & Li, 1996). The impact of tangible assets on performance is tested on the 16 models. The null hypothesis will be rejected if the regression coefficient β_1 is different from 0 and especially higher than 0 with significance at 0.05 level (Field, 2009). And the finding of this article rejects this null hypothesis since the regression coefficients β_1 in conducted models qualify the required statistical significance.

This result could be interpreted based on the relationship between the amount of resources under managerial control and firm performance. For instance, lower level of tangible assets tend to acquire fewer benefits from international business. On the other hand, large firms with higher level of tangible assets may have greater coordination costs which help reduce the synergy of internationalization. Moreover, these firms are expected to be more diversified in terms of both geographic scope and products since they usually operate their businesses in multiple locations and subsidiaries. Last but not least, it is worth mentioning that small firms with lower level of tangible assets are more source-constrained and vulnerable to market competition while larger firms are able to utilize the economies of scale in coordination and planning and thus increase profitability.

Labor

The impact of labor on firm performance is tested on the 16 models. The null hypothesis will be rejected if the regression coefficient β_2 is different from 0 and especially lower than 0 with significance at 0.05 level. And the finding of this article rejects this null hypothesis since the regression coefficients β_2 in these models qualify the required statistical significance. This result indicates that high-labor firms would expect to have unfavorable valuation because of labor-intensive demand for expanding business may lower the benefits of internationalization. On the other hand, corporations with low level of labor intensive demand would be expected to derive positively from diversification since they spend more funds to expand smartly and effectively through high-educated labor.

5.3. Limitations and Future Research

There are several limitations in this article. Firstly, authors investigate the overall (firm-level) performance implications of internationalization but do not consider the performance attained by individual subsidiaries in particular markets. Fortunately, this assumption may be less valid since all collected companies are large firms. Another limitation is that authors cannot control several firm characteristics such as the prior experience of top managers in internationalization or different favor policies that companies may have. In addition, since authors collect financial information of companies in different countries, they may have different accountant policies. Finally, data should be collected at longer span in order to identify the exchange point from negative to positive by applying robust test, which implies a research direction for future researchers. These limitations may reduce research scale and thus limit value of findings. The shortcomings, however, may propose many fruitful areas

of future research. First, this article implies that researchers should consider the effects of firm's nature as well as other external moderator effects while investigating the relationship between the degree of international business and performance. Researches should also classify corporations into developed and developing countries. This classification may help increase the accuracy of results since potentially different external factors will be eliminated. It would also help strengthen the results, and provide further validation for the findings, for example, by discovering the effects of different cultures on businesses. Secondly, future research might examine the associated effects of the characteristics of the markets as well as the strategic plan adopted, such as the development of market and cultures that firms penetrate, the sequence of countries chosen for expansion, the pace of expansion, and organizational structure or size and scale of the initial stage of internationalization. Last but not least, although this article does not confirm the effect of product diversification on firm performance, this strategy may help improve the international performance. Therefore, future research should drill down this relationship and put it into different scenarios to figure out what make diversifying product strategy perform better■

References

- Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal*, 22(3), 197–220.
- Allen, L., & Pantzalis, C. (1996). Valuation of the operating flexibility of multinational corporations. *Journal of International Business Studies*, 27(4), 633–653.
- Anderson, E., & Gatignon, H. (1986). Modes of foreign entry: A transaction cost analysis and propositions. *Journal of International Business Studies*, 17(3), 1–26.
- Bakhshi, H., & Larsen, J. (2005). ICT-specific technological progress in the United Kingdom. *Journal of Macroeconomics*, 27(4), 648–669.
- Barney, J. B. (1997). *Gaining and Sustaining Competitive Advantage*. Reading, MA: Addison-Wesley.
- Barkema, H. G., Bell, J. H., & Pennings, J. M. (1996). Foreign entry, cultural barriers, and learning. *Strategic Management Journal*, 17(2), 151–166.
- Bergh, D. D., & Lawless, M. W. (1998). Portfolio restructuring and limits to hierarchical governance: The effects of environmental uncertainty and diversification strategy. *Organization Science*, 9(1), 87–102.
- Buckley, P. J. (1988). The limits of explanation: Testing the internalization theory of the multinational enterprise. *Journal of International Business Studies*, 19(2), 181–193.
- Buckley, P. J., & Casson, M. (2016). *The Future of The Multinational Enterprise*. Springer.
- Capar, N., & Kotabe, M. (2003). The relationship between international diversification and performance in service firms. *Journal of International Business Studies*, 34(4), 345–355.
- Carr, N.G. (2003). IT doesn't matter. *Harvard Business Review*, 81(5), 41–49.
- Caves, R. E. (1971). International corporations: The industrial economics of foreign investment. *Economica*, 38(149), 1–27.
- Caves, R. E. (1996). *Multinational Enterprise and Economic Analysis*. (2nd ed). Cambridge: MA: Harvard University Press.
- Chang, S. C., & Wang, C. F. (2007). The effect of product diversification strategies on the relationship between international diversification and firm performance. *Journal of World Business*, 42(1), 61–79.

- Cheng, J. L., & Bolon, D. S. (1993). The management of multinational R&D: A neglected topic in international business research. *Journal of International Business Studies*, 24(1), 1–18.
- Chen, H., & Hsu, C. W. (2010). Internationalization, resource allocation and firm performance. *Industrial Marketing Management*, 39(7), 1103–1110.
- Cieřlik, A., & Kaniewska, M. (2004). Telecommunications infrastructure and regional economic development: The case of Poland. *Regional Studies*, 38(6), 713–725.
- Contractor, F. J. (2007). Is international business good for companies? The evolutionary or multi-stage theory of internationalization vs. the transaction cost perspective. *Management International Review*, 47(3), 453–475.
- Contractor, F. J., Kumar, V., & Kundu, S. K. (2007). Nature of the relationship between international expansion and performance: The case of emerging market firms. *Journal of World Business*, 42(4), 401–417.
- Contractor, F. J., Kundu, S. K., & Hsu, C. C. (2003). A three-stage theory of international expansion: The link between multinationality and performance in the service sector. *Journal of International Business Studies*, 34(1), 5–18.
- Daniels, J. D., & Bracker, J. (1989). Profit performance: Do foreign operations make a difference?. *Management International Review*, 29(1), 46–56.
- Delios, A., & Beamish, P. W. (1999). Geographic scope, product diversification, and the corporate performance of Japanese firms. *Strategic Management Journal*, 20(8), 711–727.
- Doz, Y., Santos, J. & Williamson, P.J. (2001). From global to metanational: How companies win in the knowledge economy. Cambridge, MA: Harvard Business School Press Books.
- Denis, D. J., Denis, D. K., & Yost, K. (2002). Global diversification, industrial diversification, and firm value. *The Journal of Finance*, 57(5), 1951–1979.
- Doukas, J. A., & Lang, L. H. (2003). Foreign direct investment, diversification and firm performance. *Journal of International Business Studies*, 34(2), 153–172.
- Dubofsky, P., & Varadarajan, P. R. (1987). Diversification and measures of performance: Additional empirical evidence. *Academy of Management Journal*, 30(3), 597–608.
- Field, A., 2009. *Discovering statistic using SPSS*. (3rd ed). Dubai, India: SAGE.
- Garner, Inc. (2014). *Garner*. Retrieved from <http://www.gartner.com/newsroom/id/2696317>
- Geringer, J. M., J., Beamish, P. W., & DaCosta, R. C. (1989). Diversification strategy and internationalization: Implications for MNE performance. *Strategic Management Journal*, 10(2), 109–119.
- Geringer, J. M., Tallman, S., & Olsen, D. M. (2000). Product and international diversification among Japanese multinational firms. *Strategic Management Journal*, 21(1), 51–80.
- Ghoshal, S. (1987). Global strategy: An organizing framework. *Strategic Management Journal*, 8(5), 425–440.
- Goerzen, A., & Beamish, P. W. (2003). Geographic scope and multinational enterprise performance. *Strategic Management Journal*, 24(13), 1289–1306.
- Gomes, L., & Ramaswamy, K. (1999). An empirical examination of the form of the relationship between multinationality and performance. *Journal of International Business studies*, 30(1), 173–187.
- Guisinger, S. (2001). From OLI to OLMA: Incorporating higher levels of environmental and structural complexity into the eclectic paradigm. *International Journal of the Economics of Business*, 8(2), 257–272.
- Grant, R. M. (1987). Multinationality and performance among British manufacturing companies. *Journal of International Business Studies*, 18(3), 79–89.
- Greene, W.H. (2010). *Econometric Analysis*. (6th ed). New York: Pearson Education.
- Griliches, Z. (1990). Patent Statistics as Economic Indicators: A Survey. *Journal of Economic Literature*, 28(4), 1661–1707.

- Harris, M., Kriebel, C. H., & Raviv, A. (1982). Asymmetric information, incentives and intrafirm resource allocation. *Management Science*, 28(6), 604–620.
- Hennart, J. F. (2001). Theories of the multinational enterprise. *The Oxford Handbook of International Business*, 127–149.
- Hitt, M. A., Bierman, L., Uhlenbruck, K., & Shimizu, K. (2006). The importance of resources in the internationalization of professional service firms: The good, the bad, and the ugly. *Academy of Management Journal*, 49(6), 1137–1157.
- Hitt, M. A., Hoskisson, R. E., & Kim, H. (1997). International diversification: Effects on innovation and firm performance in product-diversified firms. *Academy of Management Journal*, 40(4), 767–798.
- Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. (1994). A mid-range theory of the interactive effects of international and product diversification on innovation and performance. *Journal of Management*, 20(2), 297–326.
- Hitt, M.A., Ireland, R.D. & Hoskisson, R.E., (2007). *Strategic Management: Competitiveness and Globalization*. (7th ed). Cengage Learning.
- Hout, T. M., Porter, M. E., & Rudden, E. (1982). *How Global Companies Win Out* (pp. 98–108). Graduate School of Business Administration, Harvard University.
- Hymer, S.H. (1976). *A Study of Direct Foreign Investment*. Cambridge, MA: MIT Press.
- Jalava, J., & Pohjola, M. (2002). Economic growth in the new economy: Evidence from advanced economies. *Information Economics and Policy*, 14(2), 189–210.
- Jensen, M. C. (1968). The performance of mutual funds in the period 1945–1964. *The Journal of Finance*, 23(2), 389–416.
- Jeong, I. (2003). A cross-national study of the relationship between international diversification and new product performance. *International Marketing Review*, 20(4), 353–376.
- Jones, G. R., & Hill, C. W. (1988). Transaction cost analysis of strategy-structure choice. *Strategic Management Journal*, 9(2), 159–172.
- Jorgenson, D. W. (1963). Capital theory and investment behavior. *The American Economic Review*, 53(2), 247–259.
- Kafouros, M. I., Buckley, P. J., Sharp, J. A., & Wang, C. (2008). The role of internationalization in explaining innovation performance. *Technovation*, 28(1–2), 63–74.
- Kamien, M. I., & Schwartz, N. L. (1982). *Market Structure and Innovation*. Cambridge University Press.
- Kostova, T., & Roth, K. (2002). Adoption of an organizational practice by subsidiaries of multinational corporations: Institutional and relational effects. *Academy of Management Journal*, 45(1), 215–233.
- Kotabe, M., Srinivasan, S. S., & Aulakh, P. S. (2002). Multinationality and firm performance: The moderating role of R&D and marketing capabilities. *Journal of International Business studies*, 33(1), 79–97.
- Lu, J. W., & Beamish, P. W. (2004). International diversification and firm performance: The S-curve hypothesis. *Academy of Management Journal*, 47(4), 598–609.
- Luo, X., & Bhattacharya, C. B. (2006). Corporate social responsibility, customer satisfaction, and market value. *Journal of Marketing*, 70(4), 1–18.
- Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: A springboard perspective. *Journal of International Business Studies*, 38(4), 481–498.
- McKinsey & Company. (2011). *McKinsey & Company*. Retrieved from http://www.mckinsey.com/client_service/high_tech/expertise/consumer
- Pangarkar, N. (2008). Internationalization and performance of small-and medium-sized enterprises. *Journal of World Business*, 43(4), 475–485.

- Pindyck, R. & Rubinfeld, D. (1991). *Economic Models and Economic Forecasts*. New York: McGraw-Hill, Inc.
- Porter, M.E. (1990). *The Competitive Advantage of Nations*. New York: Free Press.
- Qian, G., Khoury, T. A., Peng, M. W., & Qian, Z. (2010). The performance implications of intra-and inter-regional geographic diversification. *Strategic Management Journal*, 31(9), 1018–1030.
- Qiu, Y., Shaukat, A., & Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *The British Accounting Review*, 48(1), 102–116.
- Roth, K., & O'donnell, S. (1996). Foreign subsidiary compensation strategy: An agency theory perspective. *Academy of management Journal*, 39(3), 678–703.
- Ruigrok, W., & Wagner, H. (2003). Internationalization and performance: An organizational learning perspective. *MIR: Management International Review*, 43(1), 63–83.
- Scherer, F. M., & Ross, D. (1990). *Economic Performance*. Boston: Houghton-Mifflin.
- Sharma, S., (1996). *Applied Multivariate Techniques*. New York: John Wiley and Sons, Inc.
- Sharpe, W. F. (1966). Mutual fund performance. *The Journal of Business*, 39(1), 119–138.
- Shields, A. (2014). Market Realist. Retrieved from <http://marketrealist.com/2014/07/must-know-overview-hardware-industry-2/>
- Sledge, S.A. (2000). *An Assessment of The Links Between International Business, Product Diversification, Performance and Risk within Service Corporations*. PhD Thesis. Old Dominion University.
- Suarez, F. F., Cusumano, M. A., & Kahl, S. J. (2013). Services and the business models of product firms: An empirical analysis of the software industry. *Management Science*, 59(2), 420–435.
- Tallman, S., & Li, J. (1996). Effects of international diversity and product diversity on the performance of multinational firms. *Academy of Management Journal*, 39(1), 179–196.
- UNCTAD. (2012). Information economy report 2012: The software industry and developing countries. Retrieved from http://unctad.org/en/PublicationsLibrary/ier2012_en.pdf.
- Vermeulen, F., & Barkema, H. (2002). Pace, rhythm, and scope: Process dependence in building a profitable multinational corporation. *Strategic Management Journal*, 23(7), 637–653.
- Walker, R. (1995). *Patents as Scientific and Technical Literature*. Scarecrow Press.
- Whited, T. M. (2001). Is it inefficient investment that causes the diversification discount?. *The Journal of Finance*, 56(5), 1667–1691.
- Williamson, O.E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York: Free Press.
- Wiersema, M. F., & Bowen, H. P. (2008). Corporate diversification: The impact of foreign competition, industry globalization, and product diversification. *Strategic Management Journal*, 29(2), 115–132.
- Zahra, S. A., Ireland, R. D., & Hitt, M. A. (2000). International expansion by new venture firms: International diversity, mode of market entry, technological learning, and performance. *Academy of Management Journal*, 43(5), 925–950.