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The Relationship of Corporate Financial Performance and Innovation among Manufacturing Industries

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Abstract: Innovation is becoming a critical determinant in the survival and advancement of firms. Despite this realization, little literature tackles this subject matter and its specific role on a corporate setting remains vague. Using corporate data on East and Southeast Asian manufacturing firms from 2008 to 2013, this study aims to identify the impact of corporate financial performance on R&D expenditure as a measure for innovation. To make it more specific, the researchers' utilized random effects (REM) and fixed effects (FEM) models to determine the relationship between R&D and corporate performance, then the researchers identified the determinants that affect R&D based on firm size: SMEs and large firms. The researchers found out that sales, profitability and cash flow have positive relationships with R&D. Moreover, when considering firm size, the researchers discovered that the determinants for large manufacturing firms were different from those of SMEs -- total liabilities and debt, and profitability deemed significant for large firms while number of employees and sales for SMEs.

Key Words: R&D; innovation; firm innovation; corporate performance; manufacturing industry

1. INTRODUCTION

As the world shifts to a more globalized economy, competition only intensifies. Now, more than ever, innovation is proving to be a subject of importance and plays a pivotal role in fueling growth and increasing competitive advantage (Crescenzi, n.d.). The discovery and cultivation of new knowledge can potentially become a key input in society and instigate economic growth. Apart from its utilization, the dissemination of newly acquired information is just as imperative. On a micro-economic level, firms have begun to re-examine their market strategies, product placements and corporate practice in order to sustain competitiveness in a knowledge-driven economy (Mobbs, 2010). Because of these, it is imperative that researchers are able to suggest courses of action firms can take. Thus, the need to know how firms can strengthen their innovative activities through their corporate performance arises.

Innovation is mainly about changes and improvements. Generally, it is the concept of creating

something new that is still unknown to the public or the idea of improving on an existing idea. Numerous economists over the years have argued that innovation can be a main driving force for economic efficiency and competitiveness (Schumpeter, 1934; Henry Hazlitt, 1979; Friedrich Hayek, 1960). In 1934, Joseph Schumpeter came up with the term "creative destruction" wherein he states that a free market economy evolves due to innovation because old inventories, ideas, technologies, skills, and equipment are changed into new and better ones.

He described innovation as the cause of continuous progress and improvement in standards of living of people but, at the same time, it also disrupts the status quo, leaving others better off or worse off in the process; wherein one cannot go forward from a new idea without sweeping away previous ideas that has been established. To prove this, Bessler and Bittelmeyer (2008) found similar effects of the Schumpeterian theory of creative destruction within their study. They reported that within firms, innovations only promote temporary advantage in the short-run and appear to be slowly diminishing in the long run because of knowledge diffusion across markets. Therefore, so as not to suffer a loss or be forced to exit the market, a firm should consistently engage in innovation to develop even better products or services.

This study aims to determine the effects of financial performance on research and development expenditure, compare the financial performance of sample firms to their level of innovative activity based on their firm size and suggest possible courses of action emanating from the policy implications of the results of the study.

The scope of this study included firms from the sub-sectors under the manufacturing industry category. The researchers decided on this sector because manufacturing industries tends to usually engage in innovation in order to better their products and to survive the highly competitive nature of the market as opposed to other sectors.

2. METHODOLOGY

The researchers will be using a panel dataset for different manufacturing sub-sectors within East and Southeast Asia firms covering the years 2008-2013. The sample of 593 firms are from 8 countries within East Asia and Southeast Asia (Refer to Table 2). This primary data will come from Osiris, which includes annual financial data of firms including the main variables for this study. Financial performance is measured in the income statement accounts such as: profits before tax, sales, cash flow, number of employees, total liabilities and debt, measured in thousands (current USD); whereas innovation is proxied by R&D expenditures.

Table 1: List of Sample East Asian and Southeast Asian Countries

Countries	*Number of Firms*
East Asia	
China	11
Hong Kong	6
Japan	515
Republic of Korea	27
Taiwan	25
South East Asia	
Indonesia	1
Philippines	2
India	5

To know the relationship of corporate performance and innovation, the researchers used a random effects panel data model mainly because it accounts for individual differences and that there are greater chances that the intercepts draws from a much bigger population since the data is pooled. The grand regression model is:

$$RND_{it} = \beta_1 + \beta_2 lagPROFIT_{it} + \beta_3 lagCASHFLOW_{it} + \beta_4 lagSALES_{it} + u_{it} \quad \text{(Eq. 1)}$$

where:
$lagPROFIT_{it}$ =last year's profit of firm i for time t
$lagCASHFLOW_{it}$= last year's cash flow of firm i for time t
$lagSALESit$= last year's sales of firm i for time t

The independent variables are lagged for one year because the previous year's profit, cash flow and sales are expected to fund the current year's R&D expense. It will not make sense for the variables to be at the current year because both are reported at the end of a year, whereas R&D expense is allocated at the beginning of a year.

To know how firm size affects innovation, the researchers separated the sample by the number of employees of each firm – firms having 300 and less falls under small-medium enterprises (SMEs) while having more than 300 employees are considered large firms. After separating the sample, the researchers ran two different panel regressions, a random effect model for SMEs and a fixed effect model for large firms. To know which model to use (random or fixed) the researchers followed the result given by the Hausman test. The general model for SMEs is given in Eq. 2 while the model for large firms is given in Eq.3.

$$RND_{it} = \beta_1 + \beta_2 lagSALES_{it} + \beta_3 SIZE_{it} + u_{it} \quad \text{(Eq. 2)}$$

where:
$lagSALESit$=last year's sales of firm i for time t
$SIZE_{it}$ =number of employees of firm i for time t

$$RNDit = \beta 1 + \beta 2 lagPROFITit + \beta 3 LIABANDDEBTit + uit \quad \text{(Eq. 3)}$$

where:
$lagPROFIT_{it}$ =last year's profit of firm i for time t
$LIABANDDEBT_{it}$ =liabilities and debt of firm i for time t

3. RESULTS AND DISCUSSION

The first objective is to determine the effects of corporate financial performance on innovation (R&D expenditures). All three of the explanatory variables in the grand regression namely sales, cash flow and profitability deemed significant and were consistent with the a priori expectations of the researchers.

Based from the regression results in Table 2, it can be said that for every $1000 increase in profitability, R&D expenditure will increase by $78.8712. Quite the same as cash flow, profitability is considered as a critical determinant of a firm's financial performance because it sums up the overall performance of the firm in a given year into a certain value. This study's estimation reveals a positive relationship between R&D expense and sales. For every $1000 increase in previous year's sales, R&D expenditure will increase by $99.683. This effect is expected because previously gathered literature have shown the same results. Ejermo and Bergman (2013) studied Swedish manufacturing firms and found that sales stimulate R&D. Moreover, Baum, Caglayan and Talavera (2013) found that firms in United Kingdom invest more in R&D to develop new products, with sales diversifying across different parts of the world, UK firms tend to spend more on R&D to maintain a competitive advantage. Whereas when cash flow increases by $1000, R&D would increase by $138.2338 (in current USD). Cash flow is considered to be important indicator in the performance of a company because it is defined as the movement of cash into or out of a business. A positive value from the income statement of cash flow indicates that the company is having an inflow of cash while a negative value indicates that the company is having an outflow of cash. Therefore, explaining that when a company receives cash inflows, they prefer to invest in and source funds to R&D. Cash flow can also be used as gauge for the willingness and ability of companies to engage in innovative activity (Rafferty & Fund, 2008). Their empirical results revealed that an increase in cash flow can actually stimulate R&D expenditures so as to help companies stay competitive and reap more profits in the future.

Table 2: *Results of Grand Regression Model*

Independent Variables	Coefficients	Standard Error	*p*-value P > | z |
Sales	.0099683	.0037768	0.008***
Cash Flow	.1382338	.0320846	0.000***
Profitability	.0788712	.0267826	0.003***
Constant	19813.24	8547.514	0.020*

* significant at $\alpha = 0.05$
** significant at $\alpha = 0.01$
*** significant at $\alpha = 0.005$

The second objective is to compare the financial performance of SMEs and large firms to their level of innovative activity. From the regression results, the researchers discovered that the determinants for R&D expenditures for SMEs and large firms are different from each other. Lagged sales and number of employees deemed significant

for small and medium sized firms, while lagged profitability and, total liabilities and debt held to be significant for large firms. The difference in the determinants of R&D expense between SMEs and large firms are due to the differences in their operation. As suggested by the Static Trade-off theory and Pecking Order theory, large firms are more flexible in their R&D expense because they make use of external and internal financing, whereas SMEs heavily rely on internal funds. SMEs have financial constraints because they have limited resources compared to large companies, which is why it is expected they avoid financing on debt. An empirical study by Coleman (2002) on R&D expense of small firms conclude that while small firms desire for external funds, they are less likely to apply for loans and get approval; whereas large firms have the ability to finance on debt because they arguably have more funds and credibility to apply for loans. Another factor that contributes to firm size differential is that large firms are more capable to commence several projects of R&D at once than SMEs. Large firms then are more diversified and have less risk of one project from failing (Edmiston, 2007).

If SMEs have $1000 increase in sales the year before, the firm will increase its R&D spending by $3.3513. Similarly, when SMEs have a unit increase in the number of employees, this will result to $10,873.42 increase in R&D expenditures. Splash Corporation, a Filipino-owned beauty and wellness SME is continuously investing in R&D so as to stay competitive in an industry presently dominated by multinational firms. The company allocates around 10% of capital expenditures for the investment of their R&D, which is Splash Research Institute (SRI). The departments within SRI works interdependently with one another in creating innovative products that address the underlying needs of consumers. It adopted the "open innovation" concept, wherein the company personally collaborates with the suppliers to come up with new and better products in the most cost effective manner.

Table 3: *Results of SMEs*

Independent Variables	Coefficients	Standard Error	*p*-value P > | z |
Sales	.0033513	.0015667	0.032**
Employee	10.87342	4.484807	0.015**
Constant	-93.3335	890.2661	0.917

* significant at $\alpha = 0.05$
** significant at $\alpha = 0.01$
*** significant at $\alpha = 0.005$

Meanwhile if large firms have $1000 increase in profitability the year before, it will increase its R&D spending by $67.3042 while $1000 increase in the large firm's liability and debt, it will also increase its R&D spending by $22.08. The significant constant in the large firm regression explains the fixed R&D expenditures made by large firms when all other variables (liabilities and debt, and lagged profit,) are 0. Based from the regression, large manufacturing firms spend around $49,421,120 for R&D expenditure every year even when they experience zero profitability and zero liabilities and debt.

Table 4: *Results of Large Firms*

Independent Variables	Coefficients	Standard Error	*p*-value P > | z |
Profitability	.0673042	.0245451	0.006***
Liabilities and Debt	.022086	.0121224	0.069***
Constant	49421.12	16361.47	0.003*

* significant at $\alpha = 0.05$
** significant at $\alpha = 0.01$
*** significant at $\alpha = 0.005$

4. CONCLUSIONS

The economic growth of a country can be associated with the amount of investment the country is willing to allocate for its research and development. As such, more countries are focusing on how to compete for global R&D through economic

policies. Hence, government institutions need to continually revise policies in order to stay relevant and attractive to other investors of R&D. The trend of R&D is shifting at an increasing pace across Asian countries and keeping up to date with key R&D policies can help give a country the boost it needs in terms of economic growth and competitiveness in a rapidly changing atmosphere (Parsons, 2013). Having said these, the researchers believe that it is necessary to recommend policies that will help improve R&D activities. One of which is through R&D tax incentives, these tax incentives are vital components in helping companies establish and promote the sustainability of R&D activities. These incentives can encourage R&D efforts and in return lead to increase business growth for innovating companies. Thus, countries with R&D tax incentives are usually the preferred location for further expanding of global R&D activities; in the process, companies can effectively leverage their global R&D infrastructure, which can lead to the development of valuable intellectual properties (Deloitte, 2014). Another policy is through further strengthening the current intellectual property rights by making the patents long lasting. This is to ensure that firms will enjoy the economic benefits of their new discoveries such as increases in sales and profitability.

While large companies have no problem with the financial means needed to support R&D expenditure year after year, small and medium sized firms which are drivers of economic growth, employment and innovation in the Philippines have to find other alternative solutions because unlike large firms, they have limited funds to support R&D. Hence one practical solution and recommendation is to have R&D collaboration through innovation networks among companies. This practice can be a key factor for success for companies particularly SMES which cannot finance major R&D projects. Innovation networks not only benefit the economy as a whole but also single organizations alike. One advantage of collaborating for R&D is that it acts like an investment for the firms. Based on the study's findings, SMEs that have more sales continually invest in R&D, which implies that the SMEs believe that R&D helps the company to grow and prosper in the long run. Furthermore, according to Hansen & Morten (2009), collaboration leads to better innovations, better sales, and better operations. Moreover, Camarinha-Matos (2004) argues that the benefit of collaborating only leads to an increase in efficiency—that is, the costs will reduce. Finally, and the most significant of all, the work of Audretsch & Vivarelli (1996) shows how collaboration of SMEs can out-perform even the big companies by having a higher R&D productivity.

Wiens and Jackson (2015) suggest problems faced in finding the golden approach to creating policies that will incentivize and utilize innovative activity more efficiently: (1) high patent litigations for firms who are not aware of the patents that are currently being implemented suffer from costly penalties; (2) these penalties mainly stem from ambiguous policies; and (3) current patents held by firms are most-often-than-not used passively and are there in case of policy infringements instead. This implies that some patents are wasted and one such remedy to this problem would be to increase maintenance fees for patent holders. This way, firms will make more productive use of their patents. Apart from patents and intellectual property rights, there are many other policies that can be utilized in order to promote research and development. Some of the better policies are unique to different countries.

In the end, the right policies that will successfully encourage and fuel innovation must root from a thorough analysis of the issues a country is facing first. Furthermore, acquiring a great deal of understanding of the weaknesses and strengths (characteristics) of a country proves to be beneficial for policy making. Other Asian countries should apply the method by which Japan and India handles its research and development regulations; the two countries have created policies that are specific to the needs and qualities of their constituents. Learning which economic issue can be addressed by innovation-related efforts first before implementing policies will prove to be beneficial. This way, Asian nations can avoid creating ambiguous policies that are rather irrelevant to firms operating in their respective countries and pursue better and more efficient policies that fuel innovation.

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