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Impact of Intangible Assets on Profitability of Hong Kong Listed Information Technology Companies

Hanran Li

Dept. of Information Systems, City University of Hong Kong

Tat Chee Avenue, Kowloon, Hong Kong SAR

Tel: 86-136-3124-5527 E-mail: hanranli3-c@my.cityu.edu.hk

Wenshu Wang

The Hong Kong and Shanghai Banking Corporation, Securities Department (HSS Department)

Taikoo Hui Building 2, No. 383 Tianhe Road, Tianhe District, Guangzhou, China

Tel: 86-136-3124-0808 E-mail: wangwenshuemma@163.com

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Abstract

The objective of our study is to find out the relationship between intangible assets and financial performance of the listed technology firms in Hong Kong exchange market. Through reviewing the listed firms' annual reports for a five year period (from 2008 to 2012), we have collected data of three kinds of intangible assets, which are research and development cost, employee benefit expense, and sales training. Meanwhile, we have used total assets and net profit as control variables in analyzing the relationship between intangible assets and financial performance, represented by return on assets (ROA) of firms. Using lagged R&D expenditure as instrumental variable; our results suggested that research and development investment and sales training are beneficial to firms' financial performance while employee benefit expense is not.

Keywords: Intangible Assets, Research and Development, Sales Training, Return on Assets, Net Profit, Total Assets

1. Introduction

As the ultimate goal of firms is to maximize its wealth of its shareholders, it is important to identify the factors that affect the firms' financial performances. When evaluating firms' financial performances, the prevailing approach is to use accounting variables to calculate firms' earnings and the costs incurred from various activities. However, under the General Accepted Accounting Principles (GAAP), most of the assets recorded in the firms' financial statements are tangible assets, or physical assets. The contributions of intangible assets have been overlooked. With the absence of recognition of intangible assets, some important factors to firms' potential return are neglected while tangible assets' effects are over-emphasized. The intangible assets of firms have high value to the firms' future return, especially for knowledge-based firms like information technology companies. For example, R&D expenditure, employees' training，employees' given benefits, patent, and staffs' education level are all intangible assets that may have potential effects on firms' future financial performances.

With information technology firms' dependence on knowledge and innovation, it is vital to take intangible assets into consideration when assessing these companies' financial performance. Thus, in our research, we focus on investigating the relationship between R&D expenditure, advertising expenditure, employee benefit and sales training and the financial performances of a firm. More specifically, we have selected them as the innovative factors of a firm to examine how these variables affect the firm's financial performances. In this paper, Hong Kong is chosen to examine the relation between return on asset (ROA) of latest information technology companies and intangible assets. Currently, The Hong Kong exchange operates two markets: the main board and growth enterprise market. Until 31 January, 2014, 1,657 enterprises including 810 mainland companies are listed in HKSE. In 2013, the volume of transactions exceeded 15 trillion Hong Kong dollars. This market is chosen for a couple reasons. 1. Hong Kong is the internationally recognized financial center which attracts enormous mainland enterprises and multinational cooperation to raise capital. 2. There is no control of foreign exchange in Hong Kong and the tax rate in Hong Kong is relatively low which are good for mainland companies to build up international horizon. 3. Based on the common law of United Kingdom, the sound legal system in Hong Kong and strong regulatory body (securities and futures commission) ensure the companies will raise funds properly and enhance the market confidence. Comparing to stock market in mainland china, companies listed in Hong Kong stock market are required to disclose more information about its financial position, corporate governance and other information the public should be aware of.

Our research focuses on: 1) Investigating the relationship between the intangibles assets and financial performance of the listed information technology companies in Hong Kong. Typically, only intangible assets with data available to the public and can be related to innovative factors are included. 2) Constructing an integrated model of how different intangible assets affect return on asset (ROA) with detail explanation of causal relationship of the model. 3) Demonstrating a new way of assessing a firm's future financial performance to investors by showing them the implications behind these quantifiable, approachable-to-public intangible assets.

Since R&D expenditure is endogenous in nature, we use lagged values of R&D as instrumental variables. We found that R&D has significant positive effect on ROA. However, increasing employee benefit does not improve ROA as documented in the existing literature.

2. Literature Review

2.1 Research and Development

Though R&D expense in IT companies has been increasing in the past few decades, the influence of R&D expenditure on firm's financial outcome remains controversial. Some believe that R&D expense can enhance firm's future financial outcome while others do not. For example, Kothari, Laguerre, and Leone (2002) observed that, as R&D expense increases, the fluctuation of future earnings also increases. They documented an uncertain relationship between R&D expense and future earnings. However, their result may be biased as they focus on a sole factor in determining the factor's relationship with the firm's returns in the future. Other researchers have documented that a firm's R&D investment is positively related to a firm's future earnings.

R&D is a type of intellectual market-based intangible assets that contribute to a firms' knowledge in product development and market environment (Srivastava et al., 1998).As an intangible asset, Research and development (R&D) yields high importance to firms in terms of technology changes that are related to potential manufacturing cost reduction and product innovation. R&D intensity may be the most direct indicator to the degree of a firm's innovation. According to Mairesse and Mohnen(2005), R&D can be related to innovation by certain kind of knowledge production function and R&D is positively relate to all approaches of output of innovation such as patent holdings and patent application. Love and Roper (1999) suggested that in large firms, to implement R&D is necessary for innovation. Empirical studies have found R&D to be one of the determinants of the success of a new product (Henard& Szymanski, 2001; Troy, Hirunyawipada, & Paswan, 2008). Most of IT companies earn the competitive advantage through continuously updating their products and services since IT industry is an industry with rapid growth. Therefore, the successful performance of newly invented products serves as one of the dominant factors related to future financial performance.

However, it takes time for a firm's R&D investment to reveal its contribution on a firm's financial outcome; lots of previous researches have demonstrated that there is no short run relationship between a firm's R&D expense and the firm's financial performance. Specifically, Chiao (2001), who studied the short run and long run connection between a firm's R&D investment and the firm's financial outcome, pointed out that the long run correlation between a firm's R&D investment and financial performance was positive while the short run relationship is bi-directional. Mairesse and Siu (1984) also carried on a study that revealed no short run connection between a firm's R&D expense and financial performance. Thus, in our study, we will examine the relationship between a firm's previous year's R&D expenditure as an instrumental variable and the firm's current year financial performance by using the 1-year lagged value of R&D expense to examine the long term effect of research and development activities on a firm's financial performance.

2.2 Employee Benefit

An organization cannot be innovative just by depending on few core employees in R&D department. All employees, despite different positions, should contribute to the firm which makes it an innovative organization. When the company is committed to innovation, rewarding and compensating the staff is a necessary approach to motivate them to embark on innovation activity (Malaviya & Wadhwa, 2005). According to Chen et al. (2012), financially rewarding employees' outstanding performances can benefit the firm's technological innovations. Laursen (2003) stated that reward and bonus to a grass-root employee for minor progress can boost such incremental innovation activity regardless of the particular company in which the incentive system is implemented. In addition, extrinsic incentives, for example, monetary compensation can motivate employees to participate on innovation activity (Winston & Baker, 1985). Moreover, employee's behaviors are changeable so extrinsic factors can result in expected performance and behavior.

High level of creativity can be resulted for rewarding employee's divergent thinking (Winston & Baker, 1985; Edwards, 1989). In addition, lots of experimental researches indicated that large economic compensation positively relates to employees' incremental innovative activity. (Eisenberger & Cameron, 1996; Eisenberger & Armeli, 1997).

Since the IT companies are the sources of technological innovation, the more innovative activities, the more creative products and services will be invented. Moreover, the employees in IT companies always have high educational background. In order to retain these talents, the firm will provide an attractive employee benefit package to them. These high quality employees will positively influence the firm's financial performance.

2.3 Sales Training

Previous research has found that the higher the sales force competencies, the higher sales return a firm can obtain (Honeycutt et al., 2001). Sales force competency is based on salespersons' performances on a specific given task (Ennis, 1998). Moreover, with the increasing completion among firms and changing technologies, more and more firms are seeking training on sales force to increase their sales volume. Sales people today have to equip themselves with broad level of knowledge to satisfy customers' various needs and to retain customer loyalty (Galvin, 2001). Organizations' main expectation of investing in sales training is to let this training expenditure to aid the firm in reaching its objectives, or namely, increasing its sale return (Moore & Seidner, 1998).

However, researchers have encountered difficulties when evaluating whether using sales training can benefit the firm in achieving firms' financial objectives (Lupton, Weiss, & Peterson, 1999). There are simply too many different financial metrics for firms to measure their financial performances. Thus the lack of empirical work in sales training area is the main reason for the missing of a concrete solution about how sales training will affect future sales return (Warr, Allan, & Birdi, 1999).

Previous studies have demonstrated that the effect of sales training on return of asset from different angles. Doyle and Cook (1984) have conducted an experiment in UK retailing stores

to look into the effect of sales training. Through comparing the stores' weekly sales before and after sales training, they have found that stores receiving sales training had significantly higher sales revenue. They have also found that, with sales training, salespeople could accomplish multiple tasks at high quality. Recent studies have reported that strategic sales training can increase firms' profitability and customers' loyalty (Johnson, 2004). Similarly, Pfizer has also proposed that, with sales training, the salesperson turnover rate can be reduced and productivity can be boosted up.

3. Data and Methodology

When it comes to measuring a firm's financial performance, several indicators are commonly used: return on equity (ROE), return on investment (ROI), return on sales (ROS), return on assets (ROA), and earnings per share (EPS). Among them, we choose ROA to be our dependent variable to measure our selected firms' financial performance based on the following considerations. ROA is the value of the firm's annual net income divided by the firm's total assets in book value. There are two reasons: 1. Based on our observations on the firms' annual reports and announced financial indexes, we found that ROE, ROI, ROA are highly correlated over time. Namely, a high ROA is usually accompanied by a high ROE in a given time period. However, among these variables, ROA remains most stable over time; other financial performance indicators seem to have large fluctuation with little change in our independent variables. Thus, using ROA as an indicator of financial performance is most representative. 2. ROA indicates a firm's ability to generate revenue that exceeds actual spending. ROA represents the accounting income for shareholders (Carter et al, 2003). The ultimate purpose of our research is to better serve shareholders' interests, using ROA thus matches the purpose of our research. 3. in our study, the technology firms included usually require more assets for production. Not only can ROA explain firm's financial performance, it also indicates a firm's assets utilization (Balakrishnan et al., 1996).

3.1 Estimation Model

Our key estimation equation is:

$$ROA_{i,t} = C_i + \beta_0 + \beta_1 \log(R\&D_{i,t-1}) + \beta_2 log(employeebenefit_{i,t}) + \beta_3 training_{i,t} + \beta_4 \log(totalasset_{i,t}) + \beta_5 netprofit_{i,t-1} + \beta_6 ROA_{i,t-1} + \mu_{i,t} \quad (1)$$

Where $\mathrm{ROA_{i,t}}$: Return on asset of company i at time t

$\log(\mathrm{R\&D_{i,t-1}})$: Logarithm of research and development expenditure of company i at time t-1

$\log(\mathrm{employee\ benefit_{i,t}})$: Logarithm of employee benefit of company i at time t

$\text{Training}_{i,t}$: Dummy variable, training program of company i at time t

$\log(\text{total asset}_{i,t})$: Logarithm of total asset of company i at time t

$\text{Net Profit}_{i,t-1}$: Net profit of net profit of company i at time t-1

$\text{ROA}_{i,t-1}$: Return on asset of company i at time t-1

Other than using a firm's total assets ($\log(\text{total asset}_{i,t})$)as one of the control variable to shield the firm size influence on assets return, we adopted net profit as another control variable to isolate the effect that strategic management and environmental factors on a firm's financial performance. Generally speaking, net profit reveals a firm's financial situation in a post-tax basis.

3.2 Measurement of Variables

3.2.1 Measurement of R&D Activity

R&D was measured by different proxies in different literatures. Dividing R&D expense by sales or the number of patent is the most common measure. Other measurements include dividing R&D cost by profit, number of current research project, or dividing R&D employee by total staff and number of staff with undergraduate degree or above.

Most of the annual report merely announce R&D expenditure and staff number without detailed educational background. Therefore, due to the lack of information, we choose companies' R&D expenditure to represent R&D activity. In this paper, we use lagged value of R&D. As demonstrated by Fung and Lau (2013), only past values of R&D affect current profit growth. Also, using current R&D would cause endogenity issue rendering the estimate biased.

Hypothesis 1: Other things being equal, the R&D expenditure and the firm's ROA has a positive correlation.

3.2.2 Measurement of Employee Benefits

Most of the literatures measure the employee benefit by surveying the employees using questionnaire or percentage of top manager's incentive compensation and those allocated to other employees (Arbaugh, Cox, & Camp, 2004). Therefore, we use the company's employee benefit expenditure in the model.

Hypothesis 2: Other things being equal, the employee incentive can have a positive effect on a firm's ROA.

3.2.3 Measurement of Sales Training

To isolate the interventions (seasonality, market conditions, and marketing efforts) on training's effect, researchers point out the necessity of using a control group and an experiment

group. Namely, the study should be conducted with one group of firms offer training for employees while the other group does not. Thus, in practice, we used dummy variables to indicate the relationship between sales training expenditure and ROA. Namely, we denoted firms provided sales training to employees with 1 and labeled firms without sales training to employees with the number 0. We search the whole annual report about anything regard to sales training to determine this variable of each company. We then conducted a regression analysis between sales training and the firm's ROA to examine their relationship.

Hypothesis 3: Other things being equal, the sales training can have a positive effect on a firm's ROA.

The sources of IT technological companies listed in Hong Kong financial information are annual reports from 2008 to 2012 from the Hong Kong Stock Exchange. The companies that do not reveal R&D expenditure will be excluded. There are three categories of companies - Electronic Product and Component, Internet Information Provider/ Multimedia, and Application and Software Supplier[1].

We modified the Sun and Huang (2013) model to suit our purpose. We collect the data from the annual reports during 2008-2012. The source of these annual reports is the official website of Hong Kong Exchange News named HKExnews. After selecting the companies related to information technology industry, we have 92 companies in our sample. All of the data from the annual report are expressed in million Hong Kong dollars.

The t-test will be used to test the hypothesis mentioned above.

	Employee Benefit	Net Profit	R&D Expenditure	ROA	Total Assets	Sales Training
Mean	313.4203	157.0106	2300.449	-187.8314	3049.313	0.149254
Median	125.6732	25.845	14.59167	2.44	992.66	0
Maximum	9504.368	12731.87	839514	269.27	75255.81	1
Minimum	0.3	-3033.49	0.05	-74291.39	0.72	0
Std. Dev.	723.803	1014.063	41878.02	3705.463	6879.686	0.356782
Skewness	7.385239	8.655229	19.95013	-19.97024	5.721404	1.968613
Kurtosis	78.27655	94.39367	399.3354	399.8745	46.49954	4.875439

Figure 1. Descriptive Statistics of Research Variables (Measured in Million HKD)

Figure 1 shows the basic descriptive statistic information about our sample. They are expressed in millions Hong Kong dollar expect sales training because it is a dummy variable. The standard deviation of sales training is small since this variable in each company remains unchanged according to our data. On average, 15 per cent of firms offer sales training in the sample period.

4. Empirical Results

4.1 Model Building Process

[1]Detailed description can be found in the appendix.

Firstly, we run the Pooled Ordinary Least Square (POLS) method to estimate the impact of intangibles on ROA. Since our data are different from that of the literature, an improvement of the regression model is necessary. The existing literature use data in 2009 while our data are ranging from 2008-2012. When dealing with the panel data, it is important to choose between the fixed effect and random effect model. The selection criterion is the Hausman test. If the result rejects the null hypothesis that random effect model is not efficient and consistent, we will use fixed effect.

The most significant difference between fixed and random effect in panel data estimation is the assumption that fixed effect require the individual effect and any explanatory variable are correlated while random effect require no correlation between them. The fixed effect estimation uses the time-demeaned data $(\ddot{x}_{i,t} = x_{i,t} - \bar{x}_i)$In our model, the variable of sales training of each company in 5 years is a constant without any variation (constant 1 or 0 in 5 years). Since there is no change of sales training in 5 years, we can merely use random effect in our model [2](Wooldridge, 2009).

According to the result of Durbin-Watson statistic, ROA has a moderate autocorrelation. To eliminate this problem, we add $\mathrm{ROA}_{i,t-1}$to model autocorrelation. The model estimation requires that all explanatory variables are exogenous variables. However, according to Wooldridge (2009), research and development in the future is influenced by other factors such as current profitability and ROA which makes R&D a suspect endogenous variable. Moreover, unobserved effects such as management level of the company may also influence ROA of a company. Therefore, an introduction of instrumental variable is necessary. The requirements of instrumental variable are that this variable should be highly correlated to R&D and no correlation to the random error. Among the available data we have,$\mathrm{R\&}D_{i,t-2}$and $\mathrm{R\&}D_{i,t-3}$can satisfy these two requirements: R&D expenditure may has no relationship to management level (variables influence the management level may include managers' education level or working experience). There is a significant relationship between R&D expenditure a year ago $(\mathrm{R\&}D_{i,t-1})$ and that of two or three years ago $(\mathrm{R\&}D_{i,t-2}\,\mathrm{and}\,\mathrm{R\&}D_{i,t-3})$. Meanwhile, we calculate the robust standard error using a method similar to Fung *et al.* (2014a) and Fung *et al.* (2014b) to control for cross-sectional and temporal dependence.

Independent Variable	Pooled OLS	Random Effect	Random Effect (with Instrumental Variables)
Constant	-13.45503	-13.45503	19.78878
P-VALUE	(0.1666)	(0.5624)	(0.1064)
Log(employee benefit)	5.24015	5.24015	-0.871109
P-VALUE	(0.0306**)	(0.1099)	(0.7863)
R&D(t-1) (log)	-1.226274	-1.226274	4.533482
P-VALUE	(0.3198)	(0.5825)	(0.0195**)

[2]See Wooldridge (2009) for the detail.

Training	5.283002	5.283002	3.132906
P-VALUE	(0.3852)	(0.0009***)	(0.0026***)
ROA(t-1)	NA	NA	-0.502366
P-VALUE	NA	NA	(0.0088)
log(total asset)	0.086286	0.086286	-3.910451
P-VALUE	(0.3597)	(0.5128)	(0.1716)
Net profit(t-1)	0.002671	0.002671	0.004147
P-VALUE	(0.3141)	(0.0001)	(0.0036)
R^2	0.038165	0.038165	0.28867
Adj-R^2	0.023183	0.023183	0.261658
Joint Significance	2.547381	2.547381	18.73336
P-VALUE	(0.027995)	(0.027995)	(0)

Figure 2. Output of Regression

* = 90% significant

** = 95% significant

*** = 99% significant

4.2 Pooled OLS

Our first model is the ordinary least square model without random effect. According to Table.2 (column 1), the coefficient of employee benefit is 5.24015 which means an increase of 1 million in employee benefit will result in 0.0524015% increase in ROA. The coefficient of research and development expenditure one year ago is -1.226274, which means an increase of 1 million in research development expenditure will result in decrease 0.01226274% in ROA. The coefficient of sales training is 5.283002, which means the sales training program to employee will increase0.05283002% in ROA.

However, according to the p-value of each coefficient, only employee benefit has a significant effect in ROA in 95% confidence level (p-value=0.0306). The p-value of research and development expenditure and sales training are 0.3198 and 0.3852, respectively, which shows that they have no significant effect in ROA. In addition, both R square and adjusted R square are very small. It demonstrates that the model can only explain about 3.8165% of variation of ROA. Lastly, according to the F-statistic (2.547381), these variables are jointly significant in 95% significant level.

Since OLS method without random effect is not widely used in panel data analysis, the random effect model estimation will be conducted.

4.3 Random Effect Model

As mentioned above, we adopt random effect since sales training is time invariant. Table 2 (column 2) shows that the coefficient of employee benefit is 5.24015, which means an increase of 1 million in employee benefit will result in 0.0524015% increase in ROA. The coefficient of research and development expenditure one year ago is -1.226274 which means an increase of 1 million in research development expenditure will result in decrease

0.01226274% in ROA. The coefficient of sales training is 5.283002 which means the sales training program to employee will increase 0.05283002% in ROA.

However, according to the p-value of each coefficient, sales training has a significant effect in ROA with 99% confidence level (p-value=0.0009). The p-value of research and development expenditure and employee expenditure are 0.5825 and 0.1099, respectively, which shows that they have no significant effect in ROA. In addition, both R square and adjusted R square are very small. It demonstrates that the model only explain about 3.8165% of variation of ROA. Lastly, according to the F-statistic (2.547381), these variables are jointly significant in 95% significant level.

4.4 Random Effect Model (With Instrumental Variable)

Our final model adds two instrumental variable ($R\&D_{i,t-2}, R\&D_{i,t-3}$, research and development expenditure two years and three years ago) to render the estimated coefficient of R&D unbiased and $ROA_{i,t-1}$ to control for the autocorrelation. Table.2 (column 3) shows that the coefficient of employee benefit is -0.871109 which means an increase of 1 million in employee benefit will result in 0.00871109%decrease in ROA. The coefficient of research and development expenditure one year ago is 4.533482 which mean an increase of 1 million in research development expenditure will result in increase0.04533482% in ROA. The coefficient of sales training is 3.132906 which means the sales training program to employee will increase 0.03132906% in ROA.

According to the p-value of each coefficient, both R&D expenditure and training program are significant in influencing ROA. The p-value of research and development expenditure and sales training are 0.0195 and 0.0026, demonstrating that R&D expenditure is 95% significant while training program is 99% significant.

The R square and adjusted R square are also much higher (0.28867 and 0.261658). Therefore, the model explains more than 25% of the variation of ROA. Lastly, according to the F-statistic (18.73336), these variables are jointly significant in 99% significant level.

5. Discussion

5.1 Reasons of Insignificance of Employee Benefit

Although many previous studies proved that the employee benefit and financial performance has a positive relationship, our study fail to prove it. The main reason is that in our sample, the listed IT companies in Hong Kong, majority of companies are manufacturer or assembler of the IT product and infrastructure. Most of the employees are the worker in the assembly line with small amount of salary and remuneration. Therefore, even the employee benefit increase significantly, the amount of every worker actually received is small. Their motivation to conduct innovation activity or produce more products will not change significantly. Moreover, the employee benefit in the annual report may include the benefit to the management level which is at the top of the pyramid. The actual amount of benefit

distributed to employee may smaller than the number stated in annual reports. Therefore, the effect of employee benefit is not significant in our case.

5.2 Limitations

There are three limitations of this study. First, the Sample size used in our research is relatively small considering the total number of listed information technology companies in Hong Kong. Second, due to the limited access to data, we have excluded a few independent variables in our study, such as the number of patents, the education level of employees and sales training time. These variables are also the important indicators of a firm's intangible asset regarding to R&D, employee benefit and sales training, respectively. Thus our research may not be comprehensive enough. Third, according to our research method, sales training is a dummy variable where '1' represents the firm provide sales or promotion training to the salesman and '0' shows the company does not provide. We search the key word "sales training" in company's annual report to determine this variable in every company. However, only few companies explicitly stated there is training program of sales provide to the employee while the majority of them merely said the company has employee training program but does not specify what these training program are. Therefore, it may difficult to identify whether the sales training program is offered in the company only depend on the information in annual report.

6. Conclusion

This paper examine the effect of research and development expenditure, employee benefit and sales training to return on asset in information technology companies listed in Hong Kong. The result of our regression model demonstrates both R&D expenditure and sales training have a positive relationship to ROA in statistics. The previous studies about intangible asset and financial performance are mainly biological and medical companies in Europe and North America. The related studies and researches conducted in Asia and information technology industry are very few. Therefore, this paper partially fills this missing gap.

7. Recommendation

Two parties may find this paper useful: the administration staff and individual investors. For the managers and decision makers in the company, this paper can help them to understand the effect of intangible assets such as R&D expenditure, employee benefit and sales training in firm's financial performance so that they can develop more comprehensive strategies, especially in information technology companies. They will be better in allocating resource to R&D expenditure, employee benefit and sales training.

For the individual investors, this paper provide a new angle to them to evaluate firm's performance and forecast the future development vision of an information technology company base on intangible asset. They can collect these numbers of a company and make a forecasting estimation to judge whether the company they choose has significant potential growth and profitability and make investment to these companies to gain more return.

Appendix

Categories of Chinese IT firms listed at Hong Kong Stock Exchange.

1. Electronic Product and Component

Most of these enterprises are the manufacturer of electronic hardware and component. Their products are the material basis of the whole IT industry. These companies have either a strong power and initiative of innovation or a large scale manufacturing equipment and skilled workers. There are 35 companies in this category in our sample.

2. Internet Information Provider/Multimedia Companies

These companies are providing channels to users so that they can access information on the internet, such as co-operations operating a portal site, telecommunication companies and internet service providers (ISP). Nowadays, these co- operations may extend its business to other areas easily since they have high level of vitality in creation and innovation with large amount of active user group or develop to a dominant power in one specific area. There are 24 companies in this category in our sample.

3. Application and Software Supplier

In addition to hardware companies, more than 30 software and application suppliers are listed in Hong Kong exchange. Besides traditional computer software companies, more and more companies focus on smart devices application development and game development appear in Hong Kong stock market which are mainly listed in GEM. There are 33 companies in this category in our sample.

References

Aaker, D., & Jacobson, R. (1994). The financial information content of perceived quality. *Journal of Marketing Research, 31*, 191-201. http://dx.doi.org/10.2307/3152193

Ailawadi, K. L., Lehmann, D. R., & Neslin, S. A. (2003).Revenue premium as an outcome measure of brand equity. *Journal of Marketing, 67*, 1-17. http://dx.doi.org/10.1509/jmkg.67.4.1.18688

Arbaugh, J. B., Cox, L. W., & Camp, S. M. (2004).Employee equity, incentive compensation, and growth in entrepreneurial firms. *New England Journal of Entrepreneurship, 7*(1), 15-25. Retrieved from http://search.proquest.com/docview/231213495?accountid=38789.

Arias-Aranda, D., Minguela-Rata, B., & Rodriguesz-Duarte, A. (2001). Innovation and firm size: An empirical study for spanish engineering consulting companies. *European Journal of Innovation Management, 4*(3), 133-14. Retrieved from http://search.proquest.com/docview/211855199?accountid=38789. http://dx.doi.org/10.1108/EUM0000000005671

Bebchuk, L., Reinier Kraakman & Georges Triantis (2000). Stock Pyramids, Cross-Ownership and Dual Class Equity: The Mechanisms and Agency Costs of Separating Control from Cash-flow Rights, Concentrated Corporate Ownership, R. Morck ed., National Bureau of

Economic Research (NBER), p.445-460.

Benhabib J, Spiegel MM (1994). The role of human capital in economic development: evidence from aggregate cross-country data. *J Monet Econ 70,* 143-173. http://dx.doi.org/10.1016/0304-3932(94)90047-7

Balakrishnan, R., T. Linsmeier, M. Venkatachalam. (1996). Financial benefits from JIT adoption: Effects of customer concentration and cost structure. *Accounting Review. 71*(2) 183-206.

Carter, D. A., Simkins, B. J., & Simpson, W. G. (2003). Corporate governance, board diversity, and firm value. *Financial Review, 38,* 33-53. http://dx.doi.org/10.1111/1540-6288.00034

Chan, L. K., Lakonishok, J., & Sougiannis, T. (2001). The stock market valuation of research and development expenditures. *Journal of Finance, 56*(6), 2431-2456. http://dx.doi.org/10.1111/0022-1082.00411

Chauvin, K. W., & Hirschey, M. (1993). Advertising, R&D expenditures and the market value of the firm. *Financial Management, 22,* 128-140. http://dx.doi.org/10.2307/3665583

Chen, M. Y., Lin, C. Y., Lin, H., & Mcdonough, E. F. (2012). Does transformational leadership facilitate technological innovation? the moderating roles of innovative culture and incentive compensation. *Asia Pacific Journal of Management, 29*(2), 239-264. http://dx.doi.org/10.1007/s10490-012-9285-9

Chiao, C. (2001) The relationship between R&D and physical investment of firms in science-based industries, *Applied Economics, 33,* 23-35. http://dx.doi.org/10.1080/00036840150203206

Damanpour, F., & Schneider, M. (2006). Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers. *British Journal of Management, 17*(3), 215-236. doi:10.1111/j.1467-8551.2006.00498.x.

Damanpour, F. (1992). Organizational Size and Innovation. *Organization Studies (Walter De GruyterGmbh & Co. KG.), 13*(3), 375-402. http://dx.doi.org/10.1177/017084069201300304

Di Vito, J., Claude Laurin and Yves Bozec (2010). R&D Activity in Canada: Does Corporate Ownership Structure Matter?,Canadian *Journal of Administrative Studies, forthcoming*. http://dx.doi.org/10.1002/cjas.152

Doyle, Peter, & David Cook (1984). An Evaluation of a Sales Training Programme in a Retailing Environment, *European Journal of Operational Research, 16*(3), 308-313. http://dx.doi.org/10.1016/0377-2217(84)90284-4

Dubinsky, Alan J. (1999). Salesperson Failure: Sales Management Is the Key, *Industrial Marketing Management, 28* (January), 7-18.

Dobni, C. B. (2008). The DNA of innovation. *The Journal of Business Strategy, 29*(2), 43-50. http://dx.doi.org/10.1108/02756660810858143

Edwards, M. R. (1989). Measuring creativity at work: developing a reward-for-creativity policy, *Journal of Creative Behavior, 23,* 26-37. http://dx.doi.org/10.1002/j.2162-6057.1989.tb00515.x

Ennis, Susan (1998). Assessing Employee Competencies, in Evaluating Corporate Training: Models and Issues, Stephen M. Brown and Constance J. Seidner, eds., Boston: Kluwer Academic, 183-208.

Fennell, M. L. (1984). Synergy, influence, and information in the adoption of administrative innovations. *Academy of Management Journal, 27*(1), 113. http://dx.doi.org/10.2307/255960

Fung, K. W. T., Lau, C. K. M., & Chan, K. H. (2014a). The Conditional CAPM, Cross-Section Returns and Stochastic Volatility. *Economic Modeling. 38*, 316-327

Fung, K. W. T., Demir, E., & Zhou L. (2014b). Capital Asset Pricing Model and Stochastic Volatility: A Case study of India. MPRA working paper no.56180.

Fung, K. W. T., & Lau, C. K. M. (2013). Financial Development, Economic Growth and R&D Cyclical Movements. *Journal of Applied Economics and Business Research, 3*(3)

Galvin, Tammy (2001). 2001 Industry Report, *Training, 38*(10), 40-75.

Galli é, E., & Legros, D. (2012). Firms' human capital, R&D and innovation: A study on french firms. *Empirical Economics, 43*(2), 581-596. http://dx.doi.org/10.1007/s00181-011-0506-8

Ha-Brookshire, J. (2009). Does the firm size matter on firm entrepreneurship and performance? *Journal of Small Business and Enterprise Development, 16*(1), 132-146. http://dx.doi.org/10.1108/14626000910932926

Henard, David H., & David M. Szymanski (2001). Why Some New Products Are More Successful Than Others, *Journal of Marketing Research, 38*(August), 362-75. http://dx.doi.org/10.1509/jmkr.38.3.362.18861

Hermalin, B. E., & Michael S. Weisbach (1991). The Effects of Board Composition and Direct Incentives on Firm Performance, *Financial Management, 20,* 101-112. http://dx.doi.org/10.2307/3665716

Hirschey, M. (1985). Market structure and market value. *Journal of Business, 58,* 89-98. http://dx.doi.org/10.1086/296284

Hirschey, M., & Spencer, S. (1992). Size effects in the market valuation of fundamental factors. *Financial Analyst Journal, 48,* 91-95. http://dx.doi.org/10.2469/faj.v48.n2.91

Hitt, M. A., R. E. Hoskisson & R. D. Ireland (1990). Mergers and Acquisitions and Managerial Commitment to Innovation in M-Form Firms, *Strategic Management Journal, 11*(S), 29-47.

Honeycutt,KiranKarande, Ashraf Attia, & Steven D. Maurer (2001), A Utility-Based Framework for Evaluating the Financial Impact of Sales Force Training Programs, *Journal of Personal Selling & Sales Management, 21,* 3(Summer), 229-238.

Jin, B. (2006). Performance implications of information technology implementation in an

apparel supply chain, *Supply Chain Management: An International Journal, 11*, 309-16. http://dx.doi.org/10.1108/13598540610671752

Johnson, Heather (2004). Field of Sales. Training, 41 (July), 36-37.

Laursen, K., & Foss, N. J. (2003). New human resource management practices, complementarities and the impact on innovation performance, *Cambridge Journal of Economics, 27*(2), 243-63. http://dx.doi.org/10.1093/cje/27.2.243

Kothari, S. P., T. E. Laguerre, & A. J. Leone. (2002). Capitalization versus Expensing: Evidence on the Uncertainty of Future Earnings from Capital Expenditure versus R&D Outlays. *Review of Accounting Studies, 7*, 355-382.

Love, J. H., & Roper, S. (1999). The determinants of innovation: R & D, technology transfer and networking effects. *Review of Industrial Organization, 15*(1), 43-64. Retrieved from http://search.proquest.com/docview/209862097?accountid=38789

Lupton, Robert A., John E. Weiss, & Robin T. Peterson (1999). Sales Training Evaluation Model (STEM): A Conceptual Framework, *Industrial Marketing Management, 28*(January), 73-86.

Mairesse, J. and Siu, A. K. (1984) An extended accelerator model of R&D and physical investment, in R&D Patents and Productivity (Ed.) Z. Griliches, University Chicago Press, Chicago, pp. 271-98.

Malaviya, P., & Wadhwa, S. (2005). Innovation management in organizational context: An empirical study. *Global Journal of Flexible Systems Management, 6*(2), 1-14. Retrieved from http://search.proquest.com/docview/201693792?accountid=38789

Mintzberg, H., D. Raisinghani & A. Theoret (1976). The Structure of Unstructured Decision Processes, *Administrative Science Quarterly, 21*, 246-275. http://dx.doi.org/10.2307/2392045

Mizik, N., & Jacobson, R. (2003).Trading off between value creation and value appropriation: the financial implications of shifts in strategic emphasis. *Journal of Marketing, 67*, 63-76. http://dx.doi.org/10.1509/jmkg.67.1.63.18595

Moore, Carol Ann, & Constance J. Seidner (1998). OrganizationalStrategy and Training Evaluation, in Evaluating Corporate Training: Models and Issues, Stephen M. Brown and Constance J. Seidner, eds., Boston: Kluwer Academic, 19-40.

Mairesse, J., & Mohnen, P. (2004). The importance of R&D for innovation: A reassessment using french survey data. *Journal of Technology Transfer, 30*(1-2), 183. http://dx.doi.org/10.1007/s10961-004-4365-8

Nelson RR, Phelps E (1994) Investment in humans, technological diffusion, and economic growth. *Am Econ Rev 2*(3), 69-75.

Morck, R., David A. Strangeland & Bernard Yeung (2002). Inherited Wealth, Corporate Control and Economic Growth: The Canadian Disease? in R. K. Morck, (ed.) Concentrated Corporate Ownership (Chicago, Il: University of Chicago Press).

Ozgulbas, N., Ali, S. K., & Yilmaz, F. (2006). Identifying the effect of firm size on financial performance of SMEs.The Business Review, *Cambridge*, *6*(1), 162-167. Retrieved from http://search.proquest.com/docview/197297029?accountid=38789

Sasser, S. L. (2006). Creativity, innovation and integration in global advertising agency channel relationships: Creativity in the real world. (Order No. 3218294, Wayne State University). ProQuest Dissertations and Theses, 143-143 p. Retrieved from http://search.proquest.com/docview/304966567?accountid=38789

Shaheen, S., & Malik, Q. A. (2012). The impact of capital intensity, size of firm and profitability on debt financing in textile industry of pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, *3*(10), 1061-1066. Retrieved from http://search.proquest.com/docview/1013486912?accountid=38789

Srivastava, R., Shervani, T. A., & Fahey, L. (1998). Market-based assets and shareholder value: a framework for analysis. *Journal of Marketing*, *62*, 2-18.doi: http://dx.doi.org/10.2307/1251799

Troy, Lisa C., TanawatHirunyawipada, & Audhesh K. Paswan (2008). Cross-Functional Integration and New Product Success: An Empirical Investigation of the Findings, *Journal of Marketing*, *72*(November), 132-46. http://dx.doi.org/10.1509/jmkg.72.6.132

Weifeng Sun & Zuhui Huang. (2013), Advertising expenditure，R&D expenditure，and firm performance, *Science Research Management*, *34*(2), 44-51

Villalonga, B., & R. Amit. (2006). How Do Family Ownership, Control, and Management Affect Firm Value?, *Journal of Financial Economics*, *80*, 385-417.doi: http://dx.doi.org/10.1016/j.jfineco.2004.12.005

Warr, Catriona Allan, & Kamal Birdi (1999). Predicting Three Levels of Training Outcome, *Journal of Occupational and Organizational Psychology*, *72*(September), 351-375. http://dx.doi.org/10.1348/096317999166725

Winston, A. S., & Baker, J. E. (1985). Behavior analytic studies of creativity: a critical review, *The Behavior Analyst*, *8*, 191-205.

Wooldridge, J. M. (2009). Introductory to econometrics: a modern approach(4thed.).Cengage Learning, c2009.

YAFEH Y et YOSHA O; (2003), Large shareholders and banks: Who monitors and how? *The Economic Journal*, *13*, 128-146. http://dx.doi.org/10.1111/1468-0297.00087

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