

RESPONSIVE BUILT ENVIRONMENT

THE PROCEEDINGS OF ENVIRONMENTAL DESIGN
AND MANAGEMENT INTERNATIONAL CONFERENCE

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A MEASURE OF INNOVATIVENESS AND PERFORMANCE OF INFRASTRUCTURE INVESTMENTS IN UK

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ABSTRACT

The financing and provision of infrastructure is a global issue and most governments around the world are increasingly seeking innovative financing tools via the unlisted and listed infrastructure funds in bridging their looming infrastructure financing deficits. However, there is a knowledge gap regarding the measure of innovativeness and performance of these financing vehicles in meeting the capital requirement for financing infrastructure provision at a global level. This study adopts both financial and non-financial variables in determining the investment performance and innovativeness across ten listed infrastructure funds, highlighting the dominant innovative factors across these infrastructure financing vehicles. Findings indicate that best performing funds have a mix of regulated utilities infrastructure in their portfolio at the regional and global levels markedly investing in areas with a relatively more economic and political stability and regulatory environments. The study reveals a significant investment in research and development (R&D) confirming the relevance of (R&D) as a considerable innovative input factor enhancing the creation of innovations for cost-effective operations. The study also identifies 'strategy' as the most dominant innovative variable as all listed funds have a form of strategy and significantly includes investment, growth and management strategies.

Keywords: listed infrastructure, infrastructure funds, innovativeness and performance, strategies

INTRODUCTION

Literature indicates that the financing and provision of infrastructure is a global issue (RREEF 2006; Newell and Peng 2008; Newell et al 2009; and Chan et al 2009) and most governments around the world are increasingly seeking innovative financing tools such as the public private partnerships (PPP) and the private investment in infrastructure via the unlisted and listed infrastructure funds in bridging their looming infrastructure financing deficits. There are several outlets of opportunities for both individual and institutional investors to invest in infrastructure business. Standard & Poor's (2008) broadly classify these opportunities into unlisted and listed infrastructure funds. There key differences are in areas of the nature of investments, expenses, liquidity, access to funds and level of diversification.

Wozniak and Armstrong (2009) highlight three innovative methods of gaining exposure to infrastructure assets as: Direct It typically requires significant amounts of capital for a single purchase; Private Equity Funds/Partnerships These invest directly in infrastructure assets on behalf of their shareholders or partners and Listed Infrastructure Vehicles. These are collections of publicly traded stocks whose business is directly related to infrastructure assets. Innovative financing is therefore highly sought after in bridging the looming infrastructure gap, Hauser et al (2005) conclude that innovation is one of the most significant drivers of investment and sustainability, and contributes significantly in enhancing the standard of living by raising quality and lowering the prices of products and services deliverable through various sectors of the infrastructure assets; transport, energy, communication and social infrastructure.

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Innovation is therefore positioned as a driver of economic growth, providing a sustainable competitive advantage for investors (Vincent et al, 2004). Hence, innovation has a valuable impact on both the public and private sectors of the economy, enhancing a balanced national growth and corporate performance.

LITERATURE REVIEW

Innovation and Financial Performance Measurement

The Economist Intelligence Unit (2007) defined innovation as the application of new ideas and knowledge in a novel way, largely for economic benefit, creating added value either directly for the business or indirectly for its consumers (Business Council of Australia, 1993).

Innovation therefore has two commanding views a social view and an economic view. The social view looks at how innovation is adopted and adapted while five forms of innovation originate from the economic view- new products, new processes, new markets, new resources, and new organizations (Holbrook, 2005).

Product innovations reflect significant modifications in the capabilities of goods or services, including both entirely new goods and services and considerable improvement to existing products, focusing on existing market and differentiating through qualities and features that are currently not available, such as improvement in product design and excellence. Process innovations involve significant changes in production and delivery methods, maximizing speed, service, quality, simplicity and waste reduction. Waste consumes resources without creating any value. Waste of untapped human potential, waste of time, energy and material can be reduced or eliminated through process innovation (Tyagi, 2008). Organizational innovations represent the implementation of changes in business practices and workplace establishment or in relation to the enterprise' external affairs, while marketing innovations involve the implementation of new marketing strategies. These can include changes in product design and packaging, in product promotion and placement, and in methods for pricing goods and services (Oslo Manual, 2005). These forms of innovation essentially describe innovation in terms of 'change'. Tidd et al (2005) describe the other dimension of innovation as 'the scope of the change'. The scope dimension of what is changed is described as incremental change, radical change or transformational change. Incremental innovation can be seen as an update or a slight change of a physical product with possibilities to be developed expressing small improvements between generations of the product thereby enhancing performance (Tingström, 2005). Radical innovations take the innovation to a higher level than incremental in order to create new industries, products, and markets (Meyer et al, 1990).

The Measurement of Innovation

Following from the broad classification and scope of innovation and its adaptability across sectors and economy, the measurement and quantification of innovation are therefore likely to be difficult due to this expansive nature of innovation activities (Rogers, 1998 and Vincent et al, 2004). However, different measures have been used to assess the innovation performance of businesses across sectors. Rogers (1998) identified two forms of innovation measurement: output innovations and input innovation. The key output measure of innovation activity relates to the company performance revealed through profits, revenue growth, share performance, market capitalization and productivity, while research and development (R&D) constitutes the input measure of innovation activity in combination with acquisition of technological know-how, acquiring industrial engineering, industrial design, production start-up and marketing for new or improved products (Oslo Manual, 2005).

Generally, according to Oke (2007) measures of innovation have been based on financial and non-financial metrics. From the financial matrix point of view, Blundell *et al* (1999) assert that firms who innovate will grow and therefore have higher market shares (Blundell *et al*, 1999). Share price has long been a central theme of investment theory and finance research and firms' performance expectations are integrated into security prices (Elton *et al*, 1981). Several studies have appropriated the share price in their research investigations (Keane, 1995; Allen *et al*; 2004 and Ali *et al*, 2008).

There are various financial ratios that are designed to help investors who hold shares in a company to assess the returns on their investment and include dividend per share (DPS), dividend pay-out, dividend yield ratio, earning per share (EPS) and price earnings ratio. The dividend per share ratio relates the dividends paid out over an entire year (including interim dividends excluding special dividends- dividends which are only expected to be issued once) to the outstanding ordinary shares issued (Subramanyam and Wild, 2009) and thus provides an indication of the cash return that a shareholder receives from holding shares in a company (Atrill and McLaney, 2002). Dividends per share are usually easily found on quote pages as the dividend paid in the most recent quarter which is then used to calculate the dividend yield. The dividend yield ratio relates the cash return from a share to its current market value through which investors can assess the cash return on their investment.

From the non financial perspective, Goffin and Pfeiffer (1999) identify five key components necessary to achieve successful innovation measurement and the underlying relationship with company performance; selection and portfolio matrix, creativity and ideas management, innovation strategy, implementation management and human resource management. Fries *et al* (2003) highlight other distinct innovation characteristics to include geographical location and market size (by country), economic sector of operation, ownership structure and origin of the firm, and characteristics of the business leadership.

Blundell *et al* (1999) highlight that though R&D is not reported by many firms; it is an input rather than an output factor. However, R&D is a major source of long-term productivity growth, unfortunately there is a dearth of empirical investigation about the magnitude of the productivity gains from R&D (Parham, 2006). Frascati Manual produced by OECD (2003) defines R&D as: creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Although the above definition does not indicate a significant practical application, however, for commercial firms, R&D will be considered as facilitating the creation of innovations for profitable utilization (Rogers, 1998). Furthermore, Vincent *et al* (2004) highlight research and development (R&D) intensity as a significant variable of innovation. Research and development (R&D) has long been seen as an important component and indicator of innovation activity within firms, both internally and externally, through multinational firm cooperation (Rothwell, 1992). Infrastructure has emerged as a critical sector in the international competitive positioning of nations. Regrettably there has been a dearth of investigation on the measurement of innovation for infrastructure investments. However, in the investigation of project innovation as a function of procurement mode, Russell *et al* (2006) identify 22 drivers and inhibitors of innovation subdivided into five groups: project-specific factors, commercial and business characteristics, project requirements, project risks, and socioeconomic and political factors. However, the primary perspective of the study was on the public sector approach to assessing innovation as a function of procurement mode.

RESEARCH METHODS

The study investigates the performance of ten listed infrastructure funds over the period 2008-2009, the selection includes listed funds with at least an infrastructure asset based in the UK obtained from Preqin database. Two forms of variables were adopted for the study, the financial and non-financial/innovative variables. The financial variables include the share price and the investment financial ratios, earning per share (EPS), dividend per share (DPS), price earnings and the dividend yield obtained from Thomson Reuters database.

For the innovative variables, the study adopts five key factors in order to achieve a balanced score card for the listed infrastructure funds. As there is no recognized single best measure of innovation (Tidd, 2001), the methodology involves document analysis and attempts to validate these factors through the investigation of the infrastructure funds' websites and reports. These innovation variables include:

- Portfolio matrix (transport, utilities and social infrastructures)
- Infrastructure stage (greenfield, brownfield, secondary)
- Geographical focus (local, regional or global)
- Strategy (growth, investment)
- Research and Development (R&D)

The study adopts the above factors in determining the relationship between performance and innovation. First, the portfolio of the individual infrastructure fund is examined for dominant infrastructure type and how this affects performance. The portfolio matrix adopts three major infrastructure types: Transport, Utilities and Social infrastructures.

How the geographical focus and strategy employed by the infrastructure funds affects performance is analysed considering whether those funds that have a wider geographical focus perform better or not. The concluding innovative factor is research and development (R&D), which is ubiquitous in the literature and has been identified as the catalyst for sustainability and innovation.

The study examines the performance of the listed funds and compares the relationship of the share price (dependent variable) with the investment financial ratios including earnings per share (EPS), dividend per share (DPS), price earnings ratio (P/E) and dividend yield (DY) as the independent variables.

ANALYSIS AND PRESENTATION

The adjusted R^2 (Table 1) given in the Model Summary table is .879 indicating that the above investment financial variables-EPS, DPS, P/E and DY collectively account for 87.9% of the annual share price variance. Dividend per share has the highest correlation of .948 (Table 2) with the share price and .904 for the earnings per share. The least correlated is price earnings ratio .573 while dividend yield has a correlation of .859.

Table 1: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
					R Square Change	F Change	df1	df2	
1	.966 ^a	.933	.879	16.54719	.933	17.276	4	5	.004

a. Predictors: (Constant), Dividend Yield, Price earnings ratio, Earnings per share, Dividend per share

b. Dependent Variable: Annual share price

Table 3: Coefficients^a

		Annual price index for 2009	Earnings per share	Dividend per share	Price earnings ratio	Dividend Yield
Pearson Correlation	Annual price index for 2009	1.000	.904	.948	.573	.859
	Earnings per share	.904	1.000	.938	.633	.722
	Dividend per share	.948	.938	1.000	.612	.797
	Price earnings ratio	.573	.633	.612	1.000	.497
	Dividend Yield	.859	.722	.797	.497	1.000
Sig. (1-tailed)	Annual price index for 2009	.	.000	.000	.042	.001
	Earnings per share	.000	.	.000	.025	.009
	Dividend per share	.000	.000	.	.030	.003
	Price earnings ratio	.042	.025	.030	.	.072
	Dividend Yield	.001	.009	.003	.072	.

Table 2: Correlations

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	53.072	26.264		2.021	.099
Earnings per share	3.228	5.547	.202	.582	.586
Dividend per share	9.361	6.738	.540	1.389	.223
Price earnings ratio	.064	.278	.034	.228	.829
Dividend Yield	1.840	1.191	.300	1.545	.183

The model equation given from the coefficient table (Table 3) is specified as:
 Estimated annual share price = $a + b_1 \text{EPS} + b_2 \text{DPS} + b_3 \text{PE} + b_4 \text{DY}$

a = constant

b_1 is coefficient of Earnings per share

b_2 is coefficient dividend per share

b_3 is coefficient price earnings ratio

b_4 is coefficient dividend Yield

Hence,

$$\text{Share price} = 53.072 + .202(\text{EPS}) + .540(\text{DPS}) + .034(\text{PE}) + .300(\text{DY})$$

The above model suggests that the dividend per share is relatively more important in predicting share price followed by dividend yield, earnings per share and price earnings respectively and gives indication of funds investment performance.

Findings from this study reveals that best performing infrastructure funds are seen to have a mix of utilities infrastructure in their portfolio investing across a range of regions such as Australia and the OECD regions with the expected financial objective of capturing a wider geographical market,

noticeably investing more at the regional than at the global levels particularly in areas with a relatively more economic and political stability and regulatory environments.

The level of research and development (R&D) of the listed funds suggest that R&D previously identified as a significant innovative output factor is unambiguously taken into consideration with 70% of the funds investing in research and development through various channels such as conferences, publications and the establishment of research centres, like that of the Ecofin Research Foundation a London based investment management firm established with a primary objective of addressing issues related to climate change and the global utility sector believed to be the largest single source of CO₂, also the 3i Knowledge and Research Centre and the Infrastructure Investment Committee (IIC) established by Challenger Infrastructure fund responsible for supporting the management on infrastructure related activities.

Strategy however was the most dominant of the innovative variables with all investigated funds revealing various forms of strategy, significant strategies involves:

Investment strategy: This is a long-term investment in infrastructure assets with the aim of yielding steady returns seeking to maintain an appropriate stability between a regular cash yield and a projection for long-term capital growth to security-holders. A clearly defined strategy across funds involves investment in a portfolio of high-quality infrastructure assets spread across different stages of the asset life cycle within the sector with a geographical focus across the globe with a concentration on Europe and Australia/Asia.

Growth strategy: This maximizes on the acquisition opportunities of significant equity or equity like interests in infrastructure investments and the acquisition of appropriate large-scale projects with minimum competition in line with company objectives, pursued through deploying operations-oriented approach to enhance value, technical insight, evaluation and execution of acquisitions.

Management strategy: This is employed to actively manage infrastructure assets through the implementation of policies and actions that will facilitate the identification and mitigation of risks across the whole of the funds' operations with first-rate management so as to enhance investment capital structures over time.

CONCLUSION

The paper has discussed the emerging issues relating to innovation and the financing of infrastructure assets with emphasis on ten listed infrastructure funds investing across a range geographical location and various infrastructure stages. As a novel attempt in measuring innovation and financial performance of listed funds, the study adopted two major variables, the financial and the non-financial variables. The financial variables include the share price and investment financial ratios including earning per share, dividend per share, price earnings ratios and the dividend yield. While the non-financial innovative variables include the portfolio matrix, infrastructure stage, geographical focus, research and development (R&D) and strategy.

Findings indicate that best performing funds have a mix of regulated utilities infrastructure such as power generation, power transmission, electricity and gas distribution, water and communications networks in their portfolio at the regional and global levels markedly investing in areas with a relatively more economic and political stability and regulatory environments. The study also reveals a significant investment in research and development (R&D) confirming the relevance of (R&D) as a considerable innovative input factor enhancing the creation of innovations for cost-effective operations.

The study identifies strategy as the dominant innovative variable as all listed funds have a form of strategy and significantly include investment, growth and management strategies. However, for a more generalized conclusion on measurement of innovation and financial performance of infrastructure funds, there is a need to investigate a larger number of listed funds across a wider geographical regions including more financial ratios such as profitability, efficiency and gearing ratios. However, this study is the first to investigate the innovativeness and performance of listed infrastructure funds incorporating both financial and non-financial variables.

REFERENCES

- Acemoglu, D and Linn, J (2004), "Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry", *Quarterly Journal of Economics* 119:3, 1049-90.
- Ali Z., McGreal S., Adair A. and Webb J.R. (2008) "Corporate Real Estate Strategy and Share Price: Evidence From the UK and Malaysia". In: (Ed., Bany Ariffin Amin Nordin, Taufiq Hassan and Zaiton Ali), *Selected Readings in Finance*. UPM, Press. Pp. 112-123.
- Allen D., Lim L.K. and Winduss T. (2004) "The Present Value of Pacific Basin Stock Markets: A Domestic and External Factor Model", *Edith Cowan U. Accounting Finance and Economics Working Paper No. 2004.1*.
- Atrill and McLaney (2005) *Financial Accounting for Decision makers*, 4th Edition Prentice Hall FT. London
- Atrill P and McLaney E. (2002) *Financial Accounting for Non-specialists*, 3rd Ed. FT Prentice Hall
- Blundell, R, Griffith, R and Van Reenen, J (1999), "Market Share, Market Value and Innovation: Evidence from British Manufacturing Firms" *Review of Economic Studies* 66:3, 529-54
- CEC (2007) Adapting to climate change in Europe. Options for EU action Brussels, 29.6.2007
- Chan C., Forwood D., Roper H. and Sayers C. (2009) "Public Infrastructure Financing: An International Perspective", Staff Working Paper, Productivity Commission, Melbourne, 2009
- De Bruijn, P and Legendijk A. (2005) "Regional Innovation Systems in the Lisbon Strategy", *European Planning Studies*, Vol. 13, No. 8, 1153-1172 December 2005
- Elton E.J, Gruber J.M. and Gultekin M. (1981) "Expectations and Share Prices", *Management Science*, Volume 27, Issue 9 Sep., 1981, 975-987
- Foster G. (1986) *Financial Statement Analysis*, 2nd Edition Prentice-Hall London
- Frame W. S. and White L.J. (2002) "Evidence from British Manufacturing Firms" *Review of Economic Studies* 66:3, 529-54
- Fries, S., Lysenko T. and S. Polanee (2003), "The 2002 Business Environment and Enterprise Performance Survey: Results from a Survey of 6,100 firms", EBRD Working Paper No. 84 (www.ebrd.com/pubs/find/index.htm).
- Gibson C.H (1995) *Financial Statement Analysis: Using Financial Accounting Information*, 6th Edition, International Thomson Publishing USA
- Goffin, K., Pfeiffer, R. (1999) "Innovation Management in UK and German Manufacturing Companies", Anglo-German Foundation, London
- Griffin, A. (1997), "PDMA research on new product development practices: updating trends and benchmarking best practices", *Journal of Product Innovation Management*, Vol. 14 pp.429-58
- Hays F.H., De Lurgio S.A. and Gilbert A.H. (2009) "Efficiency Ratios and Community Bank Performance", *Journal of Finance and Accountancy* Vol. 1 August 2009
<http://www.cdc.org.in/UserFiles/File/SKL/Management%20Innovation->
<http://www.ibm.com/ibm/governmentalprograms/interimreport21wg.pdf>
- Keane S. M. (1995) "A Reappraisal of Share Price Maximization as a Corporate Financial Objective", *The European Journal of Finance*, Volume 1, Issue 1.
- Lesáková L. (2007) Uses and Limitations of Profitability Ratio Analysis in Managerial Practice 5th International Conference on Management, Enterprise and Benchmarking June 1-2, 2007 Budapest, Hungary

- Meyer A., Brooks G., and Goes J., (1990) "Environmental jolts and industry revolution: Organizational responses to discontinuous changes", *Strategic Management Journal*, 11:93-110.
- Muradoglu G., Bakke M. and Kvernes G.L. (2005) "An investment strategy based on gearing ratio", *Applied Economics Letters*, 12: 13, 801-804
- National Innovation Initiative (2004) "Innovation- The New Reality for National Prosperity", *Draft Interim Report June 1, 2004 Version 1.63*
- Newell G., Chau K. W. and Wong S.K (2009) "The significance and performance of infrastructure in China", *Journal of Property Investment & Finance Vol. 27 No. 2,*
- Newell G. and Peng H.W (2008) European infrastructure Investment: A Valuable Addition to the Mixed-Asset Portfolio Findings in Built and Rural Environments, *June 2008 Research FiBRESERIES*
- OECD (2003), *Proposed Standard Practice for Surveys of Research and Development* (Frascati Manual), OECD, Paris.
- Oke A. (2007) "Innovation types and innovation management practices in service companies; *International Journal of Operations & Production Management Volume: 27 No.: 6*
- Oke, A. (2002), "Improving the innovative capability of a service company", *Journal of Change Management, Vol. 2 No.3, pp.272-81.*
- Parham D. (2006) Empirical analysis of the effects of R&D on productivity: Implications for productivity measurement? OECD Workshop on Productivity Measurement and Analysis Bern, Switzerland 16-20 October, 2006
- Rogers M. (1998) The Definition and Measurement of Innovation. Melbourne Institute Working Paper No. 10/98
- Rothwell R (1992) Successful industrial innovation: critical factors for the 1990s, *R&D Management* 22: 223-239.
- RREEF (2006) Opportunities in Private Infrastructure Investments in the US RREEF Research September, 2006.
- Subramanyam K.R. and Wild J.J. (2009) *Financial Statement Analysis*, 10th Edition, McGraw-Hill, New York
- Tidd J., Bessant J. and Pavitt K. (2005) *Managing Innovation: Integrating Technological Market and Organizational Change* 3rd Edition Hoboken NJ. John Wiley and Sons
- Tingström J. (2005) The Challenge of Environmental Improvement in Different Types of Innovation Projects; Bramley A., Brissaud D. Coutellier D. and McMahon C. (eds.), *Advances in Integrated Design and Manufacturing in Mechanical Engineering*, 33-44. 2005 Springer, Netherlands.
- Tyagi R.S. (2008) Management Innovation-Role of a Consultant; Accessed 14/04/2010
[Http://www.cdc.org.in/UserFiles/File/SKL/Management%20Innovation-](http://www.cdc.org.in/UserFiles/File/SKL/Management%20Innovation-)