

IMPACT OF GREEN PRODUCT INNOVATION PROJECTS ON FINANCIAL PERFORMANCE OF SAUDI CHEMICAL INDUSTRIAL FIRMS

Hussain Zaid H Alsharif

Business School, Hunan University, Changsha, P.R. China

Ministry of Education, Kindom of Saudi Arabia

alsharifhz@hotmail.com

Shu Tong

Business School, Hunan University, Changsha, P.R. China 

Abstract

The annual budget of Saudi Arabia has earmarked expenditure for environment related issues such as water supply, sewage and urban sanitation, pollution control and similar other environmental concerns relevant to the country. This study will also be a model study to prove that project management in a chemical industry is as indispensable as in any manufacturing organization. The study will highlight such strategic issues that are required for a project's success in chemical industries It intends to set a framework for both capital project management as well as enhance ecological and environmental balances. The academic significance of this study will lie in it being a mixed method research with multi-scale and multi-functional factors (variables) used in this study such as environmental sustainability, ecological balance, reduced CO2 emissions and industrial waste, use of non-toxic and non-pollutant material and so on. Theoretically, this study will be a useful contribution to the learning domain as it will be using the theories of micro-economics as well as risk management theory.

Keywords: Green product Innovation Project, Financial Performance, Environmental Issues, Chemical Industrial Firms

INTRODUCTION

The annual budget of Saudi Arabia has earmarked expenditure for environment related issues such as water supply, sewage and urban sanitation, pollution control and similar other environmental concerns relevant to the country (Saudi Arabia Sustainable Energy, 2015). This budgetary provision is in response to the global concern for environment which requires every nation to develop its own green growth strategy. Being the largest country in the Gulf Cooperation Council (GCC) region, both in terms of economy and demography, Saudi Arabia has faced serious environmental issues but primarily the issue of pollution due to industrial development. There are constant media reports on the excessive use of oil and heavy fuel by the Saudi industries. hence, there is an urgent for green economy transition for which green product innovation projects are recognized as one of the key tools to achieve both environmental and financial success.

Moreover, the Saudi Vision 2030 document has also stressed upon environmental sustainability that could be achieved through adoption of green product innovation projects in key industries. This must become a strategic priority of companies in all sectors. The study will therefore male an overview of statements which relate to green product innovation projects emphasized upon in Vision 2030. The Saudi Vision 2030 requires chemical firms to apply innovative ideas in design, manufacturing, and marketing of only green innovative products. Such products take into account recyclability and disposal of materials that are less polluting, non-polluting, or non-toxic. Moreover, the emergence of green product innovation products has brought a revolutionary shift in markets. There are new societal expectations for companies to integrate environmental sustainability issues with their products.

The academic significance of this study will lie in it being a mixed method research with multi-scale and multi-functional factors (variables) used in this study such as environmental sustainability, ecological balance, reduced CO₂ emissions and industrial waste, use of non-toxic and non-pollutant material and so on. Theoretically, this study will be a useful contribution to the learning domain as it will be using the theories of micro-economics as well as risk management theory. This piece of research will also be useful for green product innovation project management practitioners in the chemical industry who usually encounter issues such as of cost and schedule overrun, inadequate and incompatible equipment and resources, lack of policies and strategies on environmental sustainability and like. Therefore, recommendations of this research will act as a roadmap for all current and future green innovation projects conceived by chemical project management teams in Saudi Arabia.

This study will also be a model study to prove that project management in a chemical industry is as indispensable as in any manufacturing organization. The study will highlight such

strategic issues that are required for a project's success in chemical industries. It intends to set a framework for both capital project management as well as enhance ecological and environmental balances. The findings of the study will also enhance the success of managing and controlling the chemical pollutants and thus contribute to the Vision 2030 objectives and also set global benchmarks.

LITERATURE REVIEW

A good amount of literature is available on project management, financial and economic risks and various mathematical models and methods employed to study financial performance of industrial firms. In order to have a complete overview of project management, chemical industries in Saudi Arabia and understanding of risk in projects, a literature review shall be carried out in order to first identify research and literature gaps and then investigate the stated objectives and research questions of this study.

A preliminary review of literature has revealed that there is not much attention given to the issue of integration of environmental sustainability and new product development in the Saudi chemical industry. The following is a glimpse of the review proposed to be made in this study: A project on green products innovation focuses on key environmental issues such as energy, materials/resources, and pollution/toxic waste (Roy et al., 1996). Ottman et al. (2006), state that "the term 'green product' or 'environmental product' are used commonly to describe those that strive to protect or enhance the natural environment by conserving energy and/or resources and reducing or eliminating use of toxic agents, pollution, and waste." There are studies on green product innovation (e.g., Chen, 2001; Chung and Tsai, 2007; Pujari et al., 2003, 2004; Pujari, 2006; Rehfeld et al., 2007) that have contributed to building awareness about environmental sustainability. Integrating environmental sustainability and greening issues as innovation processes is becoming a strategic opportunity for companies (Porter and Reinhardt, 2007; Aragon-Correa and Sharma, 2003; Dyllick and Hockerts, 2002; Sharma and Vredenburg, 1998). As a result, a number of companies have launched products that look "sustainable," "environmentally friendly," or "ecofriendly," with a view to not only to increase environmental value and social good but also make products more market-driven, environmentally innovative and financially viable (Bergeret al., 2007). Examples to be cited include Ford's soya-based seat cushions, SC Johnson's green list showing restricted ingredients and Lipton Tea's pledge to source their tea only from environmentally sustainable and certified tea estates.

Green product innovation projects not only explore innovative ideas resulting in new designs, better manufacturing processes and novel marketing strategies but also attempt to

outperform the conventional or competing products in greenness and newness (Soylu&Dumville, 2011). These green innovative products take into account a number of measures such as recyclability and disposal issues throughout the products' their life cycle; using materials that are recycled and less polluting, non-polluting, or non-toxic; energy conservation; human toxicity, ecological impact and sustainability issues (Chiou et al., 2011). Besides, such products also cause less burden on the environment in terms of energy and raw materials requirements, control the air emissions, monitor the waterborne effluents and solid waste throughout its product life cycle (Chuang & Yang, 2014).

All green projects must face internal and external risk prone environment necessitating frequent changes (Barccarini, 2005). The internal environment of a project constitutes corporate objectives, stakeholder's interests, and resource problems and people management. The external environment includes social, political, legal, economic, financial, and climatic factors. The success of a green product imitation project depends on taking initiatives in order to manage risks in both internal and external environments. A few of these initiatives include the use of efficient raw material, lowering costs, finding new ways of converting waste into saleable products, and looking for additional revenues (Hasan & Ali, 2015) increasing cash flow and competitive advantage (Chuang & Yang, 2014).

Previous Studies have studied various risk factors that would potentially lead to failure of a project. For instance, there are studios on financial risks factors such as exchange rate fluctuation and shortage of funds (Ahsan &Gunawan, 2010; Hartono et al.,2013, Hwang et al.,2013; Lam et al. ,2007); on operational costs causing Low labour productivity (Anderson, 2000; Eybpoosh et al.,2011; Ghosh and Jintanapakanont, 2004; Ke et al. 2010; Gupta and Sravat,1998) on inadequate resources and failure of equipment (Hartono et al., 2013, Hwang et al. 2013; Doloi et al.,2012; on competition and rivalry affecting profit margin (Ahsan and Gunawan,2010) on the increase in corruption (Hwang et al.,2013) and finally on political instability as a constantly recurring risk factor (Hartono et al.2013; Hwang et al.,2013; Jamil et al.2008; Ke et al..2010; Khattab et al. 2007; Lam et al., 2007; Shuying,2009). These studies have contributed to understanding and identifying various risks categories and factors as well as project management tools and techniques that could make a project success. Such factors equally apply to a green product innovation project and will be a subject of this study.

METHODOLOGY

The study will build a conceptual framework to study the green product innovation project and will include key environmental variables such as energy minimization, materials reduction, and pollution prevention right in the products; life cycle phases. The study will also measure firms'

motivation to develop green products as well as their readiness to accept environmental policies. All such dimensions shall perpetuate this study toward its objective of measuring the financial performance and profitability due to green product innovation projects

Several methods and models shall be used to carry out this study. Results from the study will then be synthesized and integrated in order to shed light on various aspects of green product innovation and provide solutions to challenges and risks that are faced by firms. Finally, implications for managers, academia and public policy makers will be discussed.

The reasons why Saudi chemical firms are chosen for this study are: first, to align it with the international perspective of greening the industrial scene; second, these firms would be easily accessible to the researcher as their being in the home country. The choice of companies will also be made on the basis of their commitment towards sustainability and environmental issues as would be evident from their policies, disclosures, environmentally-specific patents and projects undertaken. The unit of analysis in this study will therefore be green product innovation projects in four to five sampled organizations from the chemical industrial sector. This will allow the researcher to investigate issues related to innovativeness of green products that these firms might have developed or planning to develop. The study will also examine the motivations level of these firms to engage in green product innovation projects and how they address sustainability issues, risks and challenges.

This study is going to be cross-sectional and non-experimental research. An advantage of a cross-sectional study is low amount of time and cost involved to conduct the study. Since this research focuses on known outcomes, a non-experimental study will ideally suit and also help in avoiding the possibility of the researcher's bias. The study will be carried out as a mixed method multiple case based research. The data will be collected in two phases, quantitative phase through surveys and questionnaires; and in qualitative phase through open ended interviews and focus groups. Individual project level analysis would also be attempted to investigate intricacies and the modus operandi that project teams adopted to face sustainability challenges. Macro-economic issues will be dealt with during the qualitative phase and clarifications would be sought through constant communication in the form of e-mails and phone calls. Transcripts will be prepared of all interview recordings shall be content analyzed through a cross case analysis method. These transcripts will also be used for data triangulation in order to validate and verify the survey data (Miles and Huberman, 1994; Seale,2000).

Other sources of information such as companies' website content, company documentations, patent databases, environmental innovation awards listings, internal company reports, stakeholders reports and media reports on companies' environmental activities will also be browsed for making it a holistic study. It is also estimated that factors influencing market

performance of greener products shall be cross-functional; hence, adequate attention shall also be paid on the extent of co-ordination between green product innovation project teams and environmental specialists. Last but not the least, the study will attempt to understand the opinions of environmentally demanding customers and suppliers and the role they play in the development of green product innovation projects in its supply chain management.

Given the background and significance of our study, our central question is: “What is the impact of green product innovation on Saudi chemical industrial firms’ performance?”

Hypotheses

H1a: green product innovation increases the firms’ performance in Saudi chemical industry

H1b: circumstances variables have no effect on Saudi chemical industrial firms’ performance

Data and Variables

The data will be collected using a questionnaire. A five-point Likert scale, ranging from strongly disagree to strongly agree, will be used, taking weight from 1–5 to measure items reflecting the variables of the study.

Dependent variable: chemical industrial firms performance . In the questionnaire, we will ask sets of specific questions to determine the firms performance:

Question 1: Does the use of green product innovation increase your sales directly?

Question 2: Does the use of green product innovation preserve your current customers?

Question 3: Does the use of green product innovation attract new customers?

Question 4: does The use of green product innovation increased your overall profitability?

The independent variable: The green product innovation will be used as a proxy indicator of enhancing environmental quality

Question 1: does Your firm use less harmful raw materials in the production process?

Question 2: does Your firm useless toxic materials in the production process?

Question 3: does Your firm use environmentally friendly materials in the production process?

Question 4: does Your firm use low power consumption procedures (methods) in the production process.

Control variables: Five demographic variables of the respondents will be included in this study (educational level, current position, gender, age, and work experience) as control variables

Equation

The relationship can be described as $Y = F(G, X, \epsilon)$

Where, Y is the firm performance, G is the green product innovation, X is the control variables, ϵ is the error term

Analytical approach and Model Testing

This study will use hierarchical regression analysis models to find relative and incremental impact of eco-innovation activities on projects and their impact on market performance. The arguments shall be stated with the help of environmental Kuznets curve (EKC) hypotheses which will justify the relationship between variables. The green product innovation will be used as a proxy indicator of enhancing environmental quality to investigate its relationship with the financial performance of a firm. The causality issue between variables will also be measured through multivariate Granger causality framework. Fixed effect and Random effect methods for the panel data time series will be used. Other tests and models to be used in this study will be semi-parametric mixture effect model/GMM, Johansen Fisher panel integration test, autoregressive distributed lag model (ARDL), vector error correction model (VECM) and ordinary least square (OLS) method. This study will also carry out Unit Root tests & Structural Breaks Longrun co-integration & Pair-wise Causality for a linear approach; and tests like Quantile Unit Root test; Pair-wise Quantile Causality; Partial & Multiple Wavelet Coherence, for nonlinear approach.

The study will involve a sequence of time series techniques to investigate the relationship between green product innovation projects and their impact on financial performance of the selected chemical firms of Saudi Arabia. The procedure will begin with five panel unit root tests to examine the stationary properties of the variables. If the time series are found integrated, the next step will be the panel co-integration test for a long-run equilibrium relationship. Accordingly, these five widely-used panel unit root tests will be employed to clearly identify the order of integration for the variables. Second, in order to estimate the cointegration relationship between variables, the Pedroni(1999, 2004) panel cointegration tests will be performed followed by a fully modified ordinary least squares (FMOLS) technique provided that all the variables are found to be integrated. Pedroni panel tests have a distinctive advantage over traditional cointegration tests in case of homogeneous panels since they permit the cointegrating vector to differ across sampled companies and under different hypotheses (Pedroni, 1999). Finally, when the panel cointegration relationship is present, a panel type vector error correction model (VECM) will be constructed to detect Granger causality and the impact direction.

RESULTS AND DISCUSSIONS

Table 1. Variation of the key dichotomous variables by year and industry

Panel A: Variation of corporate green technology innovation by year and industry										
Year:	Green technology innovation							Subtotal	total observations	%
	2009	2010	2011	2012	2013	2014	2015			
Construction industry	0	1	2	3	5	2	2	15	22	68.18
Electricity, heat, gas and water production and supply industry	1	1	1	2	4	2	2	13	22	59.09
Information transmission, software and IT services	0	1	1	1	1	2	2	8	9	88.89
Manufacturing	19	20	21	24	27	25	30	166	202	82.18
Mining	5	9	10	9	10	10	6	59	76	77.63
Real estate	0	2	0	0	0	1	1	4	32	12.50
Synthetical industry	0	0	0	0	0	0	0	0	1	0.00
Transportation, warehousing and postal services	1	1	1	1	1	1	0	6	31	19.35
Wholesale and retail trade	0	1	0	2	0	2	0	5	12	41.67
Total by year	26	36	36	42	48	45	43	276	407	67.81

Table 2. Generalized estimating equation results

Dependent Variables	Green Management Innovation _{t+1}			
	Model 1	Model 2	Model 3	Model 4
1. Control Variables				
Own	0.130	0.224	0.150	0.193
Ind	-0.431	-0.282	-0.306	-0.337
Reg	-0.330	-0.364	-0.446	-0.475
Lev	3.482**	2.446 ⁺	2.501 ⁺	2.564 ⁺
SC	-0.005	-0.008	-0.006	-0.007
FP	7.143*	6.836*	6.434*	6.289*
Size	-0.183†	-0.175	-0.160	-0.145
2. Independent Variable & Moderating Variable				
QM		-2.920**	-2.897**	-2.918**
ER			0.197	-0.089
3. Moderating Effect				
QM × ER				0.809 ⁺
Dependent Variables	Green Technology Innovation _{t+1}			
	Model 5	Model 6	Model 7	Model 8
1. Control Variables				
Own	0.041	0.037	0.132	0.196
Ind	-0.457	-0.392	-0.382	-0.449
Reg	0.211	0.268	0.371	0.234
Lev	1.535	0.892	0.857	0.935
SC	0.011	0.012	0.008	0.005
FP	2.974	2.031	2.530	2.288
Size	-0.127	-0.102	-0.121	-0.100
2. Independent Variable & Moderating Variable				
QM		-0.979**	-1.027**	-0.994**
ER			-0.268	-0.805*
3. Moderating Effect				
QM × ER				1.089*

Notes: † p<10%, *p<5%, **p<1%, Two-tailed. N = 407.

The reasons why Saudi chemical firms are chosen for this study are: first, to align it with the international perspective of greening the industrial scene; second, these firms would be easily accessible to the researcher as their being in the home country. The choice of companies will also be made on the basis of their commitment towards sustainability and environmental issues as would be evident from their policies, disclosures, environmentally-specific patents and projects undertaken. The unit of analysis in this study will therefore be green product innovation projects in four to five sampled organizations from the chemical industrial sector. This will allow the researcher to investigate issues related to innovativeness of green products that these firms might have developed or planning to develop. The study will also examine the motivations level of these firms to engage in green product innovation projects and how they address sustainability issues, risks and challenges.

CONCLUSIONS

In this paper, we identify such successful green product innovation projects in the sampled chemical firms in order to prepare a blueprint for success and offer benchmarks for other industries to follow. Besides, emphasis in this study will be given to impart the required training to the personnel and will also demand supportive government policies and regulations for the success of green projects. We make a skillful use of Analytical software and programs in order to implement various models chosen for this study and use advanced methods wherever required quantitative transactions.

The implementation of green product innovation projects requires an adaptable and flexible environment which is difficult to build in the current context due to a resistance to change in socio-political and cultural attributes. However, this study will attempt to build a motivating environment with the help of influencing factors. Last, but not the least, the researcher will adhere to the guidelines and recommendations suggested by the tutor from time to time. The researcher will also remain updated with the latest reports and research happening in the field of study through an active participation in academic conferences and communication with the experts in the field.

REFERENCES

- Ahsan K, Gunawan I (2010) Analysis of cost and schedule performance of international development projects. *Int J Proj Manage* 28:68–78
- Akintoye A, Beck M, Hardcastle C, Chinyio E, Asenoya D (2001). The financial structure of private finance initiative projects. *Proceedings of the 17th ARCOM Annual Conference, Salford University, Manchester, 1: 361–369.*
- Alawamleh M, Popplewell K (2011) Interpretive structural modelling of risk sources in a virtual organisation. *Int J Prod Res* 49(20):6041–6063

- Albarq, A. N. (2014). Industrial Purchase among Saudi Managers: Does Country of Origin Matter. *International Journal of Marketing Studies*, 6(1), 116-126.
- Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental strategies and green product development: an overview on sustainability-driven companies. *Business Strategy and the Environment*, 18(2), 83-96.
- Al-Khalil MI, Al-Ghafly MA (1999). Important causes of delays in public utility projects in Saudi Arabia. *Constr. Manage. Econ.*, 17: 647–655.
- Allen M, Carpenter C, Hutchins M, Jones G (2015) Impact of risk management on project cost: an industry comparison. *J Inf Technol Econ Dev* 6(2):1
- Andersen ES, Grude KV, Haug T (1995). *Goal directed project management*. London: Kogan Page.
- Arab News (n.d) Retrieved January 23, 2017, from <http://www.arabnews.com/node/411132>
- Aragon-Correa, J. A. and S. Sharma: 2003, 'A Contingent Resource-Based View of Proactive Corporate Environmental Strategy', *Academy of Management Review* 28(1), 71–88.
- Artto KAP, Dietrich H, Nurminen MI (2004). Strategy implementation by projects. PMI Research Conference, 12th-14th July, London.
- Azam, M., & Khan, A. Q. (2015). Urbanization and environmental degradation: Evidence from four SAARC Countries—Bangladesh, India, Pakistan, and Sri Lanka. *Environmental Progress & Sustainable Energy*.
- Azam, M., Khan, A. Q., Abdullah, H. B., & Qureshi, M. E. (2015). The impact of CO2 emissions on economic growth: evidence from selected higher CO2 emissions economies. *Environmental Science and Pollution Research*, 1-14.
- Banerjee, S. B., Iyer, E. S., & Kashyap, R. K. (2003). Corporate environmentalism: Antecedents and influence of industry type. *Journal of Marketing*, 67(2), 106-122.
- Bansal, P. and K. Roth: 2000, 'Why Companies Go Green: A Model of Ecological Responsiveness', *Academy of Management Journal* 43(4), 717–748.
- Barber R (2005) Understanding internally generated risks in projects. *Int J ProjManag* 23:584–590
- Barbiroli, G., & Raggi, A. (2003). A method for evaluating the overall technical and economic performance of environmental innovations in production cycles. *Journal of Cleaner Production*, 11(4), 365-374.
- Barccarini D (2005). Understanding project cost contingency: A survey. The Queensland University of Technology Research Week International Conference.
- Baumann, H., F. Boons and A. Bragd: 2002, 'Mapping the Green Product Development Field: Engineering, Policy and Business Perspectives', *Journal of Cleaner Production* 10(5), 409–425.
- Berchicci, L. and W. Bodewes: 2005, 'Bridging Environmental Issues with New Product Development', *Business Strategy and the Environment* 14(5), 272–285.
- Berger, I. E., P. H. Cunningham and M. E. Drumwright: 2007, 'Mainstreaming Corporate Social Responsibility: Developing Markets For Virtue', *California Management Review* 49(4), 132–157.
- Bourgeois LJ (1980). Strategy and the environment: A conceptual integration. *Acad. Manag. Rev.*, 5: 25-39.
- Bower D (2000). A systematic approach to the evaluation of indirect costs of contract variations. *Constr. Manage. Econ.*, 18(3): 263 – 268.
- Cainelli, G., De Marchi, V., & Grandinetti, R. (2015). Does the development of environmental innovation require different resources? Evidence from Spanish manufacturing firms. *Journal of Cleaner Production*, 94, 211-220.
- Chamorro, A., & Bañegil, T. M. (2006). Green marketing philosophy: a study of Spanish firms with ecolabels. *Corporate Social Responsibility and Environmental Management*, 13(1), 11-24.
- Chan WK, Zailani S, Fernando Y (2009). Critical factors influencing the project success amongst manufacturing companies in Malaysia, *Afr. J. Bus. Manag.*, 3(1): 16-27.
- Charan P, Shankar R, Baisya RK (2008) Analysis of Interactions among variables of supply chain performance measurement system implementation. *Business Process Manag J* 14(4):512–529
- Chen, C.: 2001, 'Design for Environment: A Quality-Based Model for Green Product Development', *Management Science* 47(2), 250–263.
- Chen, Lai, and Wen, (2006) "The influence of green innovation performance on corporate advantage in Taiwan". *Journal of Business Ethics*, vol. 67, No.4, PP. 331-339.

- Chen, Y. S., S. B. Lai and C. T. Wen: 2006, 'The Influence of Green Innovation Performance on Corporate Advantage in Taiwan', *Journal of Business Ethics* 67(4), 331–339.
- Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, 47(6), 822-836.
- Chuang, S. P., & Yang, C. L. (2014). Key success factors when implementing a green-manufacturing system. *Production Planning & Control*, 25(11), 923-937.
- Chung, Y. and C. Tsai: 2007, 'The Effect of Green Design Activities on New Product Strategies and Performance: An Empirical Study among High-tech Companies', *International Journal of Management* 24(2), 276–288.
- Conway, S., & Steward, F. (1998). Networks and interfaces in environmental innovation: a comparative study in the UK and Germany. *The Journal of High Technology Management Research*, 9(2), 239-253.
- Curlo, E. (1999). Marketing strategy, product safety, and ethical factors in consumer choice. *Journal of Business Ethics*, 21(1), 37-48.
- Dangelico, R. M. (2015). Green product innovation: where we are and where we are going. *Business Strategy and the Environment*.
- Dyllick, T. and K. Hockerts: 2002, 'Beyond the Business Case for Corporate Sustainability', *Business Strategy and the Environment* 11(2), 130–141.
- EIA. (2013). Overview: Saudi Arabia. U.S. Energy Information Administration (EIA) viewed 12/03 2014. Retrieved from <http://www.eia.gov/countries/cab.cfm?fips=SA>
- Eisenhardt, K.M.: 1989, 'Building Theories from Case Study Research', *Academy of Management Review* 14(4), 532–550.
- EPA. (2014). Basic Information: Definition of Green Building. United States Environmental Protection Agency, Retrieved from <http://archive.epa.gov/greenbuilding/web/html/about.html>
- Eswarlal VK, Dey PK, Budhwar P, Shankar R (2011) Analysis of interactions among variables of renewable energy projects-A case study on renewable energy projects in India. *J Sci Ind Res* 70:713–720
- Fan M, Lin NP, Sheu C (2008) Choosing a project risk handling strategy- An analytical model. *Int J Prod Econ* 112:700–713
- Fan M, Lin NP, Sheu C (2008) Choosing a project risk handling strategy- An analytical model. *Int J Prod Econ* 112:700–713
- Fang C, Marle F (2012) A simulation based risk network model for decision support in project risk management. *Decis Support Syst* 52:635–644
- Fang C, Marle F (2012) A simulation based risk network model for decision support in project risk management. *Decis Support Syst* 52:635–644
- Fodha, M., &Zaghdoud, O. (2010). Economic growth and pollutant emissions in Tunisia: An empirical analysis of the environmental Kuznets curve. *Energy Policy*, 38(2), 1150-1156. doi: <http://dx.doi.org/10.1016/j.enpol.2009.11.002>
- Fraj-Andre's, E., E. Martinez-Salinas and J. Matute- Vallejo: 2008, 'A Multidimensional Approach to the Influence of Environmental Marketing and Orientation on the Firm's Organizational Performance', *Journal of Business Ethics* (published on-line October 2008).
- Fullerton, R. R., &Wempe, W. F. (2009). Lean manufacturing, non-financial performance measures, and financial performance. *International Journal of Operations & Production Management*, 29(3), 214-240.
- Gauthier, C.: 2005, 'Measuring Corporate Social and Environmental Performance: The Extended Life-Cycle Assessment', *Journal of Business Ethics* 59(1/2), 199–206.
- GhaffarianHoseini, A., Dahlan, N., Berardi, U., GhaffarianHoseini, A., Makaremi, N., &GhaffaianHoseini, M. (2013). Sustainable energy performances of green buildings: A review of current theories, implementations and challenges. *Renewable and Sustainable Energy Reviews*, 25(September), 1-17. <http://dx.doi.org/10.1016/j.rser.2013.01.010>
- Ghalayini, A. M., & Noble, J. S. (1996). The changing basis of performance measurement. *International Journal of Operations & Production Management*, 16(8), 63-80.
- Ghosh, S. (2010). Examining carbon emissions economic growth nexus for India: A multivariate cointegration approach. *Energy Policy*, 38(6), 3008-3014. doi: <http://dx.doi.org/10.1016/j.enpol.2010.01.040>

- Ghosh, S., & Kanjilal, K. (2014). Long-term equilibrium relationship between urbanization, energy consumption and economic activity: Empirical evidence from India. *Energy*, 66, 324-331. doi: <http://dx.doi.org/10.1016/j.energy.2013.12.052>
- Ginsberg, J. M., & Bloom, P. N. (2004). Choosing the right green-marketing strategy. *MIT Sloan Management Review*, 46(1), 79.
- Gluch, P., Gustafsson, M., & Thuvander, L. (2009). An absorptive capacity model for green innovation and performance in the construction industry. *Construction Management and Economics*, 27(5), 451-464.
- González-Benito, J. and O. González-Benito: 2006, 'A Review of Determinant Factors of Environmental Proactivity', *Business Strategy and the Environment* 15(2), 87-102.
- Govindan, K., Rajendran, S., Sarkis, J., & Murugesan, P. (2015). Multi criteria decision making approaches for green supplier evaluation and selection: a literature review. *Journal of Cleaner Production*, 98, 66-83.
- Grant KP, Cashman WM, Christensen DS (2006) Delivering projects on time. *Res Technol Manag* 49:52-58
- Gray CF, Larson EW (2002). *Project Management*. Boston: McGraw- Hill.
- Greenbiz: 2009, 'Green Product Trends: More Launches, More Sales', on line available at: <http://www.greenbiz.com/news/2009/04/24/green-product-trends>. Last accessed on 30 June 2009.
- Hall, J. and H. Vredenburg: 2003, 'The Challenges of Innovating for Sustainable Development', *MIT Sloan Management Review* Fall, 61-68.
- Han S, Kim DY, Kim H, Jang WS (2008) A web-based integrated system for international project risk management. *Autom Constr* 17:342-356
- Hanna AS, Ibrahim MW, Lotfallah W, Iskandar KA, Russell JS (2016) Modeling project manager competency: an integrated mathematical approach. *J Constr Eng Manag* 142(8):04016029
- Hartono B, Sulistyo SR, Praftiwi PP, Hasmoro D (2013) Project risk: theoretical concepts and stakeholders' perspectives. *Int J Proj Manag*.
- Hasan, Z., & Ali, N. A. (2015). The impact of green marketing strategy on the firm's performance in Malaysia. *Procedia-Social and Behavioral Sciences*, 172, 463-470.
- Hellström, T.: 2007, 'Dimensions of Environmentally Sustainable Innovation: The Structure of Eco-Innovation Concepts', *Sustainable Development* 15(3), 148- 159.
- Horbach, J. (2008). Determinants of environmental innovation—new evidence from German panel data sources. *Research policy*, 37(1), 163-173.
- Huo X, Zhang L, Guo H (2016) Antecedents of relationship conflict in cross-functional project teams. *Proj Manag J* 47(5):52-69
- Hwang BG, Zhao X, Gay MJS (2013) Public-private partnership projects in Singapore: factors, critical risks, and preferred risk allocation from the perspective of contractors. *Int J Proj Manag* 31:424-433
- Hwang, B., & Ng, W. (2013). Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management*, 31(2), 272-284. <http://dx.doi.org/10.1016/j.ijproman.2012.05.004>
- Ilker, I. M. (2012). The impact of green product innovation on firm performance and competitive capability: the moderating role of managerial environmental concern. *Procedia-Social and Behavioral Sciences*, 62, 854-864.
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74. doi: [http://dx.doi.org/10.1016/S0304-4076\(03\)00092-7](http://dx.doi.org/10.1016/S0304-4076(03)00092-7)
- Ittner, C. D., Larcker, D. F., & Randall, T. (2003). Performance implications of strategic performance measurement in financial services firms. *Accounting, Organizations and Society*, 28(7), 715-741.
- Jacob, J., & Cherian, J. (2012). Green marketing: A study of consumers' attitude towards environment friendly products. *Asian social science*, 8(12), 117.
- Jafari, Y., Othman, J., & Nor, A. H. S. M. (2012). Energy consumption, economic growth and environmental pollutants in Indonesia. *Journal of Policy Modeling*, 34(6), 879-889. doi: <http://dx.doi.org/10.1016/j.jpplmod.2012.05.020>
- Kaming PF, Olomolaiye PO, Holt GD, Harris FC (1997). Factors influencing .construction time and cost overruns on high-rise projects in Indonesia. *Construct. Manag. Econ.*, 15: 83-94.
- Kammerer, D. (2009). The effects of customer benefit and regulation on environmental product innovation. Empirical evidence from appliance manufacturers in Germany. *Ecological Economics*, 68(8), 2285-2295.

- Kaplan, S.: 1999, 'Discontinuous Innovation and the Growth Paradox', *Strategy & Leadership* 27(2), 16–21.
- Kasman, A., & Duman, Y. S. (2015). CO2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries: A panel data analysis. *Economic Modelling*, 44, 97-103. doi: <http://dx.doi.org/10.1016/j.econmod.2014.10.022>
- Kassaye, W. W. and D. Verma: 1992, 'Balancing Traditional Packaging Functions with the New 'Green' Packaging Concerns', *SAM Advanced Management Journal* 57(4), 15–29.
- Kumar R (2005). *Research methodology: a step-by-step guide for beginners*. 2nd ed., Frenchs Forrest: Pearson Longman.
- Lientz BP, Rea KP (1995). *Project Management for 21st Century*. San Diego: Academic Press.
- Marshall, M. E., & Mayer, D. W. (1992). Environmental training: It's good business. *Business Horizons*, 35(2), 54-57.
- Maxwell JA (1996). *Qualitative research design: An interactive approach*. Applied Social Research Methods Series, 41, Thousand Oaks: Sage Publications.
- McAdam, R., Hazlett, S. A., & Anderson-Gillespie, K. (2008). Developing a conceptual model of lead performance measurement and benchmarking: A multiple case analysis. *International Journal of Operations & Production Management*, 28(12), 1153-1185.
- McKinsey & Company: 2008, 'How Companies Think About Climate Change: A McKinsey Global Survey', *The McKinsey Quarterly* February.
- Menon, A., Bharadwaj, S. G., Adidam, P. T., & Edison, S. W. (1999). Antecedents and consequences of marketing strategy making: a model and a test. *The Journal of Marketing*, 18-40.
- Miles, M. and M. Huberman: 1994, *Qualitative Data Analysis* (Sage, London, UK).
- Miles, M. P. and J. G. Covin: 2000, 'Environmental Marketing: A Source of Reputational, Competitive, and Financial Advantage', *Journal of Business Ethics* 23(3), 299–311.
- Miles, M. P. and L. S. Munilla: 1993, 'The Eco-Oriented: An Emerging Business Philosophy', *Marketing Theory and Practices* 1(2), 43–51.
- Mintzberg HJ, Lampel J, Quinn B, Ghoshal S (2003). *The strategic process*. England: Pearson Education Limited.
- Mohanty, B. (2012). *Low carbon green growth roadmap for Asia and the Pacific*. United Nations Economic and Social Commission for Asia and the Pacific, Thailand
- Mosly, Ibrahim (2015). Barriers to the Diffusion and Adoption of Green Buildings in Saudi Arabia *Journal of Management and Sustainability*; Vol. 5, No. 4; 2015
- Nakamura, E. (2011). Does environmental investment really contribute to firm performance? An empirical analysis using Japanese firms. *Eurasian Business Review*, 1(2), 91-111.
- Ottman, J. A., E. R. Stafford and C. L. Hartman: 2006, 'Green Marketing Myopia', *Environment* 48(5), 22–36.
- Ottman, J. A.: 1997, *Green Marketing: Opportunity for Innovation* (NTC/Contemporary Books, Lincolnwood, IL).
- Palm K, Lindahl M (2015) A project as a workplace: observations from project managers in four R&D and project-intensive companies. *Int J ProjManag* 33:828–838
- Patton MQ (2002). *Qualitative research and evaluation methods*. 3rd ed., Thousand Oak: Sage Publications.
- Patton, M. Q.: 1990, *Qualitative Evaluation and Research Methods*, 2nd Edition (Sage Publications, Newbury Park, CA).
- Peattie, K.: 1992, *Green Marketing* (Pitman Publishing, London, UK), pp. 64–78.
- Peattie, K.: 1995, *Environmental Marketing Management: Meeting the Green Challenge* (Pitman publishing, London, UK).
- Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1), 653-670.
- Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric theory*, 20(03), 597-625.
- Porter, M. and C. van der Linde: 1995, 'Green and Competitive: Ending the Stalemate', *Harvard Business Review* September–October, 120–133.
- Porter, M. and F. L. Reinhardt: 2007, 'A Strategic Approach to Climate', *Harvard Business Review* 85(10), 22–26.

- Pujari, D., G. Wright and K. Peattie: 2003, 'Green and Competitive. Influences on Environmental New Product Development Performance', *Journal of Business Research* 56(8), 657–671. Mainstreaming Green Product Innovation 485
- Pujari, D., K. Peattie and G. Wright: 2004, 'Organizational Antecedents of Environmental Responsiveness in Industrial New Product Development', *Industrial Marketing Management* 33(5), 381–391.
- Pujari, D.: 2006, 'Eco-Innovation and New Product Development: Understanding the Influences on Market Performance', *Technovation* 26(1), 76–85.
109. Pujari, Devashish (2006) Eco-innovation and new product development: understanding the influences on market performance *Technovation* Volume 26, Issue 1 January 2006, Pages 76-85
- Rahbar, E., & Abdul Wahid, N. (2011). Investigation of green marketing tools' effect on consumers' purchase behavior. *Business strategy series*, 12(2), 73-83.
- Rahman, S., &Khondaker, A. (2012). Mitigation measures to reduce greenhouse gas emissions and enhance carbon capture and storage in Saudi Arabia. *Renewable and Sustainable Energy Reviews*, 16(5), 2446-2460. <http://dx.doi.org/10.1016/j.rser.2011.12.003>
- Rehfeld, K-M., K. Rennings and A. Ziegler: 2007, 'Integrated Product Policy and Environmental Product Innovations: An Empirical Analysis', *Ecological Economics* 61(1), 91–100.
- Rennings, K., & Rammer, C. (2011). The impact of regulation-driven environmental innovation on innovation success and firm performance. *Industry and Innovation*, 18(03), 255-283.
- Rose D, Sullivan O (1996). *Introducing data analysis for social scientists*. Buckingham: Open University Press.
- Roy, R., D. Wield, J. P. Gardiner and S. Potter: 1996, *Innovative Product Development* (The Open University, Milton Keynes).
- SAMA, 2015. Saudi Arabian Monetary Agency: Fifty Annual Report, pp. 356.
- Saudi Arabia Sustainable Energy. (2015). Saudi Arabia's 2015 fiscal budget. Retrieved 9 September 2015, from <http://sustg.com/wp-content/uploads/2014/12/2015-Budget.pdf>
- Seale, C.: 2000, *The Quality of Qualitative Research* (Sage, London, UK).
- Shahbaz, M., Sbia, R., Hamdi, H., &Ozturk, I. (2014). Economic growth, electricity consumption, urbanization and environmental degradation relationship in United Arab Emirates. *Ecological Indicators*, 45, 622-631. doi: <http://dx.doi.org/10.1016/j.ecolind.2014.05.022>
- Sharma, S. and H. Vredenburg: 1998, 'Proactive Corporate Environmental Strategy and the Development of Competitively Valuable Organizational Capabilities', *Strategic Management Journal* 19(8), 729–753.
- Shrivastava, P.: 1995, 'Environmental Technologies and Competitive Advantage', *Strategic Management Journal* 16(summer), 183–200.
- Smith PG, Merritt GM (2002) *Proactive risk management: controlling uncertainty in product development*. Productivity Press, New York
- Soylu, K., &Dumville, J. C. (2011). Design for environment: The greening of product and supply chain. *Maritime Economics & Logistics*, 13(1), 29-43.
- Stanley (2012), "The influence of green product competitiveness on the success of green product innovation Empirical evidence from the Chinese electrical and electronics industry" *European Journal of Innovation Management*, Vol. 15, No. 4, PP. 468-490.
- Sterling, S.: 2008, 'Momentum Builds for Sustainable Packaging', *Packaging World Magazine* February, 60.
- Taleb, H., & Pitts, A. (2009). The potential to exploit use of building-integrated photovoltaics in countries of the Gulf Cooperation Council. *Renewable Energy*, 34(4), 1092-1099. <http://dx.doi.org/10.1016/j.renene.2008.07.002>
- Taleb, H., & Sharples, S. (2011). Developing sustainable residential buildings in Saudi Arabia: A case study. *Applied Energy*, 88(1), 383-391. <http://dx.doi.org/10.1016/j.apenergy.2010.07.029>
- Turner JR (1999). *The handbook of projects-based management- Improving the processes for strategic objectives*. London: McGraw- Hill.
- Turner JR, Ledwith A, Kelly J (2010) *Project Management in small to medium sized enterprises: matching processes to the nature of the firm*. *Int J ProjManag* 28(8):744– 755
- Turpitz, K. (2004). The determinants and effects of environmental product innovations: an analysis on the base of case studies. *Zew Discussion Paper* 04-02.

Van de Ven, A. H., D. E. Polley, R. Garud and S. Venkataraman: 1999, *The Innovation Journey* (Oxford University Press, New York).

Wang, Q. (2014). Effects of urbanisation on energy consumption in China. *Energy Policy*, 65, 332-339. doi: <http://dx.doi.org/10.1016/j.enpol.2013.10.005>

Yazid A, Abdullah A, Hussain M (2014) A review of infrastructure project risk management. *Int Business Manag* 8(6):342–347

Yin, R. K.: 1981, 'The Case Study Crisis: Some Answers', *Administrative Science Quarterly* 26(1), 58–65.

Yin, R. K.: 1989, *Case Study Research: Design and Methods*, Revised Edition (Sage, Beverly Hills, CA).

Yin, R. K.: 2003, *Applications of Case Study Research*, 2nd Edition (Sage, London, UK).

York, J.: 2009, 'Pragmatic Sustainability: Translating Environmental Ethics into Competitive Advantage', *Journal of Business Ethics* 85(1), 97–100.

Zailani, S., Govindan, K., Iranmanesh, M., Shaharudin, M. R., & Chong, Y. S. (2015). Green innovation adoption in automotive supply chain: the Malaysian case. *Journal of Cleaner Production*, 108, 1115-1122.