The Relationship between Innovation Management Practice and Innovation Performance in the Mainstream and the Newstream: An Empirical Study of Australian Organisations

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ABSTRACT

The aim of this study was to examine innovation management practices of a large number of Australian companies in the manufacturing, services, computers, and construction sectors in order to determine the relationships between these practices and innovation performance in the mainstream (MIP) and new stream (NIP). Our study showed that the relationship between innovation management practice intensity explains a significant proportion of variance in MIP and NIP. Based on our findings, we conclude that innovation management practices vary between the mainstream and the new stream. Leadership commitment, innovation strategy and developing an innovation culture are the strongest predictors of innovation performance in both streams. These findings could help managers to ascertain which innovation management practices are important to create innovation-driven organisations.

Keywords: mainstream, new stream, innovation, performance, leadership, strategy

INTRODUCTION

Managers in the 21st century are confronted with pressures to create innovation-driven organizations to compete with low-cost countries such as China (Kanter, 1989; Tidd and Bessant, 2007; Narayanan, 2001). Innovation management is a company-wide initiative, which has the ability to integrate multiple capabilities and resources of the firm in order to satisfy existing customers by focussing on the mainstream of the organisation and to create new customers by focussing on the new stream of the organisation (Eisenhardt and Martin, 2000; Narayanan, 2001; Tidd and Bessant, 2007). This view is supported by Lawson and Samson (2001, p.381) who stated that *"..need for managers to coordinate daily mainstream operations, while also cultivating innovation and change within their companies."*

Mainstream activities provide organizational functioning through process innovation to reduce costs by eliminating waste, errors and defects and delivering products and services in-full-on-time to customers. On the other hand, new stream activities introduce a dynamic capability context to develop

new products and services in order to create new customers and to create and apply new knowledge (Lawson and Samson, 2001). Teece and Pisano (1994: 541) defined dynamic capability as the *"subset of the competencies/capabilities which allow the firm to create new products processes and respond to changing market circumstances."*

The implication here is that managers need to integrate mainstream and new stream capabilities to be able to compete on lower costs and differentiated products and services (Subramanian and Nilakanta, 1996; Lawson and Samson, 2001; Metz et al., 2007). Benner and Tushman (2003) propose that exploitation and exploration can coexist as part of an ambidextrous organization form (Tushman and O'Reilly, 1997), stating that *"..Ambidextrous organizational forms reconcile these paradoxical demands by building internally inconsistent architectures within a single organization that retain the benefits of experimentation and variability, along with the benefits of exploitation and process control."*

The arguments by Benner and Tushman (2003: 239) are valid but have not been tested empirically. The researchers recommend further research to be conducted in this area stating that *"..There has been a lack of research about how these institutionally mandated and pervasive practices affect innovation performance.."*

Furthermore, Metz et al., (2007: 48) calls for research involving e-Commerce, SDO and accelerated NPD *"..Future models need to integrate general notions of innovation capability with e-Commerce, SDO, and accelerated NPD. A balance between 'hard' and 'soft' capabilities is necessary for innovation to be successful and sustainable."*

The paper further develops innovation management constructs in the mainstream and the new stream, beyond the initial work of Lawson and Samson (2001), and tests these as part of an Innovation Management model (Lawson and Samson, 2001; Subramanian and Nilakanta, 1996; Clark and Fujimoto, 1991). This article will therefore investigate two research questions:

Research Questions:

1. *Which innovation management practices are best predictors of mainstream innovation performance and new stream innovation performance?*

2. *How do these practices vary between the mainstream and the new stream? Is there are set of innovation practices which apply to both streams?*

Answering the above questions will contribute to a deeper understanding of the business value and the strategic role of innovation management practices. This would help managers with the allocation of resources to those innovation practices that have the most significant effect on innovation performance in the mainstream and the new stream. The paper also makes a contribution by creating an understanding of how innovation management practices when combined could lead to the creation of innovative-driven organisations.

LITERATURE REVIEW AND THEORETICAL MODEL

The purpose of the literature review was to identify relevant innovation management practices which form the basis of a theoretical model within which hypotheses are formulated and tested (Sekaran, 1992).

Definition of Innovation

Prior to developing a theoretical model, I explored the various definitions of innovation management within the strategic and operations management domains, with the aim of adapting a definition that would provide focus for the research study (Bessant and Tidd, 2007). There are many definitions on innovation management in the literature. I have articulated an integrated definition of innovation management, adapted from Tidd and Bessant (2007) and Terziovski (2007): *"Innovation Management is the application of scarce resources to create value for the customer and the enterprise by developing, improving and commercialising new and existing products, processes and services."* Therefore, the innovation management practices that are included in the theoretical model should measure this view of innovation management across the four sectors (Tidd and Bessant, 2007; Burgelman, et al., 2004).

Resource-based View of the Firm

The resource-based view (RBV) of the firm is used to explain how firms develop competitive advantage through innovation capability (Coff, 1997). The RBV theory argues that sustainable

competitive advantage arises from unique bundles of resources that competitors cannot imitate (Barney, 1991; Coff, 1997; Rouse and Daellenbach, 2002). The RBV is concerned with management practices and how managers implement these practices to achive sustained performance (Lawson and Samson, 2001; Schroeder et al., 2002).

Therefore, successful innovation management practice is the ability of an organisation to integrate and manage multiple practices or the ability to synthesise the mainstream and the new stream operating paradigms (Lawson and Samson, 2001). Lawson and Samson (2001) acknowledge that a paradox exists in managing the tension between stability and change. This tension is consistent with Abernethy et al. in Benner and Tushman (2003), who questioned whether it is possible for organisations to pursue both exploration and exploitation simultaneously. Therefore, the paper further develops innovation management practices in the mainstream and the new stream, beyond the initial work of Lawson and Samson (2001) discussed above.

In addition to the paucity of research in this area of innovation management, new enabling factors such as e-Commerce, Sustainable Development Orientation (SDO) and a focus on accelerating New Product Development (NPD) have emerged, as potential contributors to the development of innovation capability (Metz et al., 2007). For example, Gertakis (2001) has illustrated how the new product design process can integrate environmental factors within a commercial context. Sustainable Development (SD) has clearly begun to assert itself as a driver for innovation.

Larson (2000:305) defined sustainability as *"The innovative and potentially transformative corporate activities that generate new products and processes that challenge existing practice."* Nidumolu et al., (2009:58), in a recent Harvard Business Review article argue, that *"In the future, only companies that make sustainability a goal will achieve a competitive advantage. This means rethinking business models as well as products, technologies, and processes."* However, there is a general agreement in the literature that there is no one set of practices that comprise sustainable development and apply to all enterprises across all industries (Hunt and Auster, 1990; Goldsmith and Samson, 2002; Nidumolu et al., 2009). Goldsmith and Samson (2002) proposed that enterprises with higher SDO are more likely

to be successful in the long term, but not necessarily in the short-term. However, their proposition has not been empirically tested.

Furthermore, e-Commerce can drive communication and networking effectiveness both internal and external to the organization. Metz et al., (2007) report on a study conducted by Chang et al. (2002), which found a positive relationship between firms that integrated e-Commerce with corporate strategy and firm performance. However, Konings and Roodhooft (2002), based on a sample of 836 Belgian firms, found that e-Business had no effect on the productivity of small firms, but had a positive effect on the productivity of large firms. Metz et al., (2007) predict that e-Commerce can facilitate communication and networking ability both within and outside the organisation. In addition, accelerated NPD is considered increasingly critical for increased competitiveness (Metz et al., 2007; Narayanan; Lawson and Samson, 2001, Bessant and Tidd, 2007).

Accelerated NPD is considered increasingly critical for firm competitiveness (Pisano, 1996; Metz et al., 2007). There are several factors that may accelerate the NPD process (Metz et al., 2007; Mabert et al., 1992; Sohal et al., 2002). These factors include cross-functional teams, outside influences such as vendor participation in the NPD process and systematic project control. However, Metz et al., 2007: 20) argues that *"..There is a need to understand the role of NPD more generally within innovation capability, E-Commerce, and Sustainable Development."*

There are gaps in the literature which integrate e-Commerce, SDO and NPD, with innovation management concepts such as leadership, culture, and strategy (Lawson and Samson, 2001; Narayanan, 2001). Criteria outlined by Whetton (1989, p.490), is used to select the relevant constructs to be included in the theoretical model: comprehensiveness and parsimony. These constructs were selected on the basis that they form part of the innovation management practice - mainstream and new stream innovation performance relationship (Damanpour, 1991; Saleh and Wang, 1993; Subramanian and Nilakanta, 1996). We excluded some factors, which added little additional value to our understanding of the drivers and enablers of innovation.

The model shown in Figure 1, consists of 12 independent factors and two dependent factors, Mainstream Innovation Performance and New stream Innovation Performance. These are discussed

under the Methodology section. The independent factors are: innovation capability; e-Commerce; management of technology; organisational intelligence; sustainable development orientation; people competence; leadership and business strategy; NPD strategy; intellectual property protection; knowledge management; commercialisation of products; TQM and learning organisation (Subramanian and Nilakanta, 1996; Lawson and Samson, 2001).

METHODOLOGY

Survey Instrument

A survey instrument was designed for the study titled *Assessment of Innovation Capability Models to Create Innovation Driven Companies*. The questionnaire contained six major headings: Basic company data; New Product Development; e-Commerce; Sustainable Development Orientation; and Innovation Capability. The questionnaire was pilot tested on 10 sites in Australia chosen at random, and subsequently revised. Based on the feedback from the pilot study, the final version of the questionnaire was 12 pages in length.

Sample

A systematic random sampling procedure was used to draw a sample of 1,000 companies from four industry sectors: manufacturing, service, computer and construction, from a Dunn and Bradstreet data file of 20,000 firms as defined by the Standards Industry Classification (ASIC). Our unit of analysis is the firm.

Respondents

The majority of respondents were private companies with sales under $50 million in sales (112 out of 136). Foreign owned companies are mainly large, with 9 out of 14 having sales over $50 million. Public companies are both large and small, with 17 over $50 million sales, and 15 under $50 million sales. Most of the small companies are privately owned, with 86 respondents having sales below $10 million. More than 70 percent of the respondents were CEOs, Managing Directors and General Managers. An overall response rate of 22 per cent was achieved, which is considered quite acceptable for this type of research.

Assessment of Potential Non-Respondent Bias

A survey of non-respondents was conducted to test whether there was any response bias in the sample

in accordance with response bias procedure developed by Ergas and Wright (1994). The data was statistically analysed to identify a number of questions from the survey that had high predictive validity for the rest of the questionnaire results. These validating questions were asked by telephone survey to a randomly selected 25 non-respondents from the original survey. Analysis of the results revealed that there was no significant response bias in the sample. Therefore, there is no reason to believe that the respondents were any different to the population of managers.

Mainstream and New stream Innovation Performance

Multi-item dependent variables were used to explain innovation performance in the mainstream and the new stream (Venkatraman and Ramanujam, 1986; Metz et al., 2007). The performance variables (listed below) were selected from Question 6 in the ARC questionnaire, innovation performance measures. These questions were based on ordinal scales (Subramanian and Nilakanta, 1996). The following performance variables were used to measure innovation performance in the mainstream: customer satisfaction, employee morale, and ecological efficiency/degree of recycling. The following performance variables were used to measure innovation performance in the new stream: revenue from new products, number of innovation adoptions, time of innovation adoption, and time-to-market (TTM).

Confirmatory Factor Analysis

The independent constructs in Table. 3 and the dependent constructs in Tables 4 and 5 were subjected to Confirmatory Factor Analysis (CFA) to ensure that they were reliable indicators of those constructs (Hair et al., 1992). A cut-off loading of 0.40 was used to screen out variables, which were weak indicators of the constructs. The composite reliabilities of the independent and the dependent constructs meet Nunnally's recommended standard (Cronbach Alpha ≥ 0.70) for early stage research (Nunnally, 1978).

DISCUSSION OF RESULTS

Bi-Variate Correlation Analysis and Multicollinearity

Table 1 shows the bi-variate correlations between the 12 independent constructs that make up the theoretical model and the two dependent constructs, MIP and NIP. Multicollinearity occurs when any single predictor variable is highly correlated with a set of other predictor variables. According to Hair

et al., (1992) multicollinearity is a data problem and not a problem of model specification; however, it has a substantial effect on the results of the regression procedure and therefore has to be carefully checked. Highly collinear variables can distort the results or make them unstable, and thus not generalizable.

We observe from Table 1 that all independent constructs have a positive and significant relationship with MIP and NIP. Based on these results, it is reasonable to conclude that multicollinearity of the independent variables does not appear to be a problem, as the inter-correlation coefficient between the variables is well below r=0.9 (Hair et al., 1992).

Multiple Regression Analysis

Table 2 shows the multiple regression of the 12 independent variables of the innovation model regressed on the dependent variables: *MIP and NIP.* From these analyses, our intent was to test the hypotheses listed in Table 6 and hence contribute to knowledge about the relationship of individual innovation practices that are best predictors MIP and NIP. The t values and the Sig. t in Table 2 were used to directly compare each factor in the model as to their relative explanatory power of the dependent variables.

Mainstream Innovation Performance (MIP)

Table 2 shows 4 out of the 12 independent constructs have significant explanatory power of MIP: Innovation Capability (F1): (t=3.296, sig t=0.001); Sustainable Development Orientation (F5): (t=2.810, sig t=0.005); Leadership and Business Strategy (F7): (t=3.013, sig t= 0.003); and TQM and Learning Organisation (F12): (t=2.717, sig t=0.007). Based on these findings, hypotheses H1(a), H5(a), H7(a) and H12(a) have been supported. The correlation and regression analyses show that Innovation Capability, Sustainable Development Orientation, Leadership and Business Strategy, and TQM and Learning Organisation are highly significant predictors of mainstream innovation performance, and are stronger in their predictive validity than the other factors in the regression models, explaining 34.6 per cent of mainstream innovation performance

New stream Innovation Performance

Table 2 also shows 4 out of the 12 independent constructs to have significant explanatory power of new stream innovation performance, in order from highest to lowest explanatory power: Innovation Capability (F1): (t=2.438, sig t=0.016); Leadership and Business Strategy (F7): (t=4.941, sig t= 0.000); New Product Development (NPD) (F8): (t=3.109, sig t=0.002); and Intellectual Property Protection (F9): (t=2.267, sig t = 0.025). Based on these findings, hypotheses H1(b), H7(b), H8(b) and H 9(b) were supported, since the respective regression models show much stronger beta values and statistical significance, and are stronger in their predictive validity than the other factors in the regression models, explaining 41.8 per cent of new stream innovation performance

Practices Common to MIP and NIP

It is interesting to note that the regression models for the mainstream and new stream dependent constructs use multiple practices to explain the relationship between innovation practice and innovation performance outcomes. Therefore, groupings of innovation management approaches are required to explain innovation performance in the mainstream and the new stream. This means that a single innovation practice is not sufficient to explain innovation performance improvement significantly. What is most significant in this regard is that those innovation practices that were found to influence innovation performance the most strongly in the mainstream and the new stream had one important characteristic in common; they relate to leadership, culture and development of innovation capability.

CONCLUSION

With respect to the first research question, this study concludes that the best predictors of innovation performance in the new stream are Innovation Capability, Leadership and Business Strategy, New Product Development, and Intellectual Property. This finding is consistent with the literature which contends that new stream activities introduce a dynamic capability context to develop new products and services in order to create new customers and to create and apply new knowledge. On the other

hand, best predictors of mainstream innovation performance were found to be Innovation Capability, Sustainable Development Orientation, Leadership and Business Strategy and TQM/Learning Organisation. This finding is consistent with the literature which contends that innovation management practices in the mainstream provide organizational functioning through process innovation to reduce costs by eliminating waste, errors and defects and delivering products and services in-full-on-time to customers.

With respect to the second research question, it is reasonable to conclude that innovation management practices vary between the mainstream and the new stream, however, there is a set of innovation management practices which leadership commitment, innovation strategy and developing an innovation culture are common to both streams which act as a catalyst to reconcile these paradoxical demands and help to retain the benefits of experimentation and exploitation.

IMPLICATIONS FOR MANAGERS

Lawson and Samson (2001) argued that successful innovation management practice is the ability of an organisation to integrate and manage multiple practices or the ability to synthesise the mainstream and the new stream operating paradigms. These findings should assist managers with the allocation of resources to those innovation practices that have the most significant effect on innovation performance in the mainstream and the new stream. The paper also makes a contribution by creating an understanding of how innovation management practices when combined could lead to the creation of innovative-driven organisations by managing the paradox between stability and change.

LIMITATIONS AND FUTURE RESEARCH

Although the study is one of the most comprehensive studies in this field, it does suffer from limitations, and these give rise to a number of suggestions for future research. The survey methodologies have several limitations that should be addressed in interpreting the findings. The research reported here is of a purely cross-sectional data set, which is a limitation of all partly cross-sectional studies. This limitation restricted the testing for the lags between the existence of innovation practices and innovation performance changes, and the ability to trace the progress of particular companies longitudinally.

A longitudinal study is recommended which would measure Innovation category scores across a three to five year period examining the relationships and their development through time. This should be a structured study using a statistically credible sample and multivariate data analysis methods. In addition to cross-sectional surveys, in-depth case studies should be considered. These studies would provide detail on the impact of the Innovation Management categories and the improvement initiatives on these measures, which many firms are engaging to determine the rich fabric of how these initiatives lead to innovation performance changes. Structured interview processes would also be able to investigate additional systematic factors that relate to innovation performance changes apart from those presently measured by the Innovation Management model, which might lead to an improvement of the measures.

The internal validity of the Innovation Management model constructs is acceptably strong, but far from perfect. Further empirical research could be 'tighter' than the present study by pretesting factors which more accurately reflect the Innovation Management model, and which would hopefully achieve higher validity scores. Further research on refining the constructs and their elements is warranted. The nature of all hypotheses would call for a longitudinal comparison in order to analyse innovation performance in the mainstream and the new stream, before and after the implementation of the innovation-based strategy.

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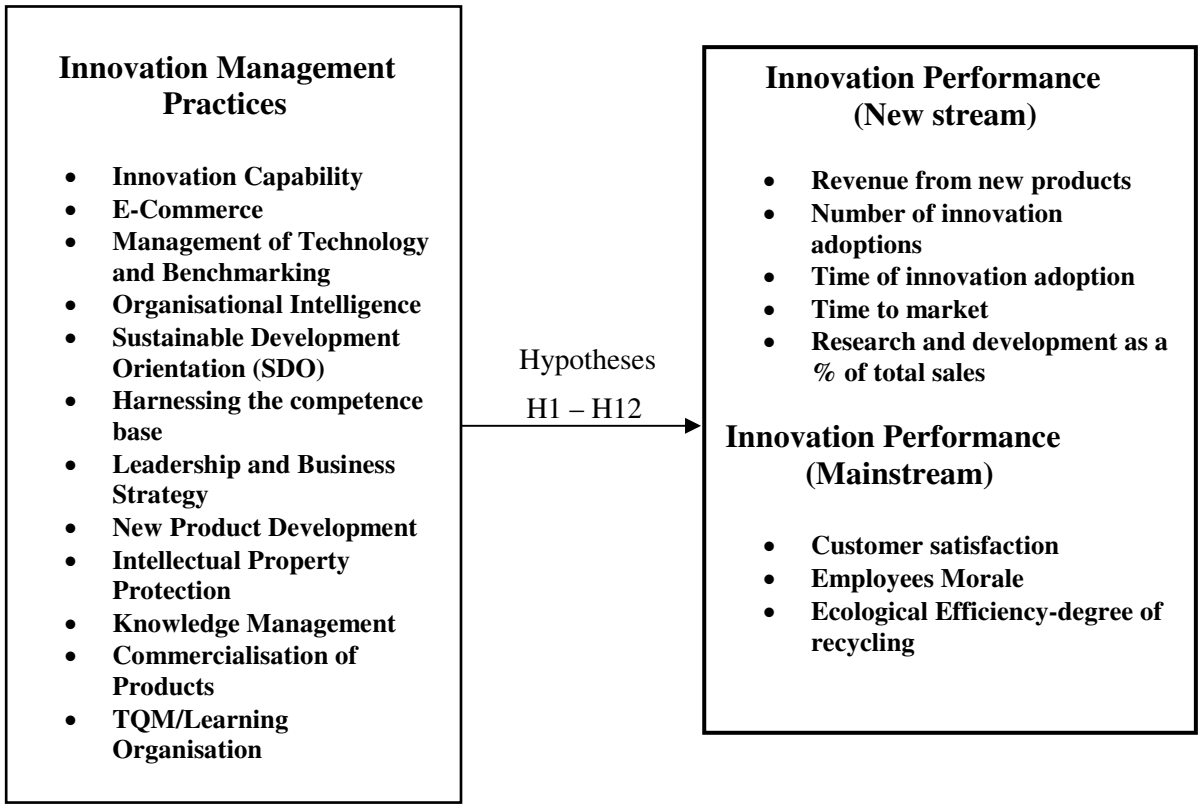

Figure 1 – Innovation Management Model – Independent and Dependent Constructs

FACTORS	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
F1: Innovation Capability	1.00	.438**	.342**	.431**	.340**	.431**	.573**	.520**	.420**	.473**	.400**	.578**
F2: e-Commerce	.438**	1.00	352**	.445**	.377**	.445**	.412**	.427**	.498**	.366**	.375**	.485**
F3: Management of Technology	.342**	.352**	1.00	.463**	.463**	.422**	.385**	.293**	.442**	.511**	.172 .013	.524**
F4: Organisational Intelligence	.431**	.445**	.422**	1.00	.345**	.463**	.410**	.399**	.476**	.440**	.421**	.559**
F5: Sustainable Development (SDO)	.340**	.377**	.463**	.345**	1.00	.307**	.406**	.351**	.410**	.408**	.230**	.418**
F6: Harnessing the competence base	569**	.358**	.483**	.463**	.307**	1.00	.374**	.336**	.429**	.463**	.272**	.512**
F7: Leadership and Business Strategy	.573**	.412**	.385**	.410**	.406**	.374**	1.00	.565**	.426**	.393**	.344**	.568**
F8: New Product Development (NPD)	.520**	.427**	.293**	.399**	.351**	.336**	.565**	1.00	.495**	.304**	.529**	.438**
F9: Intellectual Property Protection	.420**	.498**	.442**	.476**	.410**	.429**	.426**	.495**	1.00	.373**	.463**	.461**
F10: Knowledge Management	.473**	.366**	.511**	.440**	.408**	.463**	.393**	.304**	.373**	1.00	.231**	.517**
F11: Commercialisation of Products	.400**	.335**	.172*	.421**	.230**	.272**	.344**	.529**	.463**	.231**	1.00	.314**
F12: TQM and Learning Organisation	.578**	.485**	.524**	.559**	.418**	.512**	.568**	.430**	.462**	.517**	.314**	1.00
F13: Innovation Performance - Mainstream	**.479****	**.181****	**.335****	**.204****	**.372****	**.328****	**.475****	**.257****	**.169****	**.335****	**.133****	**.465****
F14: Innovation Performance – New stream	**.431****	**.255****	**.177****	**.222****	**.268****	**.172****	**.557****	**.542****	**.404****	**.142****	**.378****	**.279****

** Significant at the 0.01 level of significance

Table 1 – Bi-Variate Correlation Analysis

Dependent. Variables	Innovation Performance		Innovation Performance (Mainstream)		Innovation Performance (New stream)	
Independent Variable	**t**	**Sig t**	**t**	**Sig t**	**t**	**Sig t**
F1: Innovation Capability	**3.476**	**.001**	**3.296**	**.001**	**2.438**	**.016**
F2: e-Commerce	-1.054	.294	-1.376	.170	-.660	.510
F3: Management of Technology	.197	.844	.761	.447	.087	.931
F4: Organisational Intelligence	-1.195	.234	-1.776	.077	-.798	.426
F5: Sustainable Development (SDO)	1.093	.276	**2.810**	**.005**	.671	.503
F6: Harnessing the competence base	-1.413	.159	.324	.747	-.1.742	.o83
F7: Leadership and Business Strategy	**5.300**	**.000**	**3.013**	**.003**	**4.941**	**.000**
F8: New Product Development (NPD)	**2.203**	**.029**	-.650	.516	**3.109**	**.002**
F9: Intellectual Property Protection	.705	.482	-1.738	.084	**2.267**	**.025**
F10: Knowledge Management	-1.125	.262	.217	.829	-1.814	.071
F11: Commercialisation of Products	.933	.352	-.268	.789	1.291	.198
F12: TQM and Learning Organisation	-.048	.961	**2.717**	**.007**	-1.191	.235
N	185		197		192	
F	12.750		9.700		12.424	
Adj R Sq.	**.433**		**.346**		**.418**	

Note: *All tests are two-tailed *p<.05. **p<.01. ***p<.001*

Table 2 – Multiple Regression Analysis

Variables	Description	Factor Loading	Chronbach Alpha
F1	**Innovation Capability**		
	We have effective "top down" and "bottom up" communication processes.	0.699	
	Knowledge is freely shared in our organisation	0.687	
	We have eliminated barriers between departments	0.673	
	There is a high degree of unity of purpose throughout our organisation	0.656	
	Senior management actively encourage change	0.652	
	Senior management implement a culture of innovation	0.649	$\alpha = 0.925$
F2	**e-Commerce**		
	Collaborative product design/service coordination across locations	0.732	
	Knowledge directories	0.597	
	Internet-enabled linkage of purchase, inventory with suppliers	0.730	
	Real-time transactions of orders	0.792	
	Co-ordination of delivery arrangements	0.814	
	Customer self-service via web sites	0.678	
	e-Commerce has enabled us to restructure our business model	0.740	
	e-Commerce has enabled us to engage in global innovation networking	0.680	$\alpha = 0.762$
F3	**Management of Technology and Benchmarking**		
	Market research studies	0.526	
	Benchmarking undertaken in product areas	0.815	
	Benchmarking undertaken in relative cost position	0.754	
	Benchmarking undertaken in operating processes	0.796	
	Benchmarking undertaken in technology	0.795	
	Benchmarking undertaken in quality procedures	0.801	$\alpha = 0.891$
F4	**Organisational Intelligence**		
	Routine gathering of opinions from clients	0.583	
	Gathering of information from suppliers	0.624	
	Gathering information through strategic intelligence	0.692	
	Learns about new products and processes through publications	0.625	
	Learns about new products and processes through informal networks	0.747	
	Learns about new products and processes through networks	0.753	
	Learns about new products and processes through hired skilled employees	0.559	
	Learns about new products and processes through suppliers	0.585	
	Learns about new products and processes through consultants	0.515	$\alpha = 0.854$
F5	**Sustainable Development Orientation**		
	Environmental ("green") protection issues are proactively managed	0.695	
	When we develop our SDO plans we always incorporate customer requirements.	0.589	
	Marketing of "green" products has improved our competitive position.	0.780	
	We source 'environmental' technologies to strengthen our innovation capability.	0.819	
	We design new products for energy efficiency.	0.765	
	We design new products for ease of disassembly /recycling.	0.753	
	'Learning' culture has triggered environmental driven change.	0.783	
	Environmental ("green") protection issues are proactively managed	0.449	$\alpha = 0.824$
F6	**Harnessing the competence base**		
	Aligned employee behaviours with stated organisational values.	0.658	
	Hiring procedures focus on who will best 'fit in' with the organisation's culture.	0.449	
	Promotes employees based on merit.	0.651	
	Regularly conducts formal performance appraisal of employees.	0.607	
	Rewards employees based on how well they perform their job.	0.660	
	Rewards employees based on how well their work group or team performs.	0.669	
	Restructuring is a part of our innovation philosophy.	0.504	
	Where does your organisation fit in relation to ISO 9000 certification	0.440	

	Advanced financial performance measures: EVA (Economic Value Added).	0.482	$\alpha = 0.799$
F 7	**Leadership and Business Strategy**		
	Is "first to market" with new products and services	0.749	
	We are the first organisation to introduce new products and services in the market	0.696	
	Produces a continuous stream of state-of-the art products and services	0.778	
	Responds to early market signals concerning areas of opportunity	0.858	
	Develops "best in industry" products and services	0.690	$\alpha = 0.856$
F8	**New Product Development (NPD)**		
	Our organisation has a strategy for NPD	0.668	
	We use cross-functional team as part of our NPD process	0.610	
	We use the requirements of domestic customers in designing new products/services	0.601	
	New product development pathways are documented	0.578	
	We use the requirements of overseas customer in designing new products/services	0.539	
	Our organisation has a strategy for NPD	0.668	
	We use cross-functional team as part of our NPD process	0.610	$\alpha = 0.721$
F9	**Intellectual Property Protection**		
	Patents used for protecting the competitive advantage of new/improved products	0.613	
	Secrecy used for protecting the competitive advantage of new/improved products	0.611	
	Conduct regular audits of new inventions	0.678	
	Resource a dedicated invention, R&D or IP unit	0.712	
	Have a formal plan to commercialise inventions	0.660	
	Explicit tracking of competitor tactics	0.622	
	Forecasting sales, customer preferences	0.711	$\alpha = 0.759$
F10	**Knowledge Management**	0.595	
	Employment satisfaction is measured regularly	0.414	
	Board members	0.719	
	Customer satisfaction and retention measures	0.846	
	Employee satisfaction and retention measures	0.779	
	Organisational knowledge management performance measures	0.730	
	Employment satisfaction is measured regularly	0.590	$\alpha = 0.794$
F11	**Commercialisation of Products**		
	Lead time used to protect competitive advantage	0.695	
	Moving quickly down the learning curve used to protect competitive advantage	0.752	
	Control over distribution used to protect competitive advantage	0.560	
	Organisational knowledge used to protect competitive advantage	0.715	
	Product complexity used to protect competitive advantage	0.676	
	Regularly discuss new ideas at senior management meetings	0.629	$\alpha = 0.813$
F12	**TQM/Learning Organisation**		
	Within our organisation, time is critical organisational value	0.657	
	All employees strive to enhance customer value creation	0.643	
	Our marketing and operation units work closely	0.594	
	Customises products/services to fit customers' needs	0.562	
	Develops customer loyalty	0.482	
	Responds quickly to customer needs	0.553	$\alpha = 0.764$

Table 3 - Confirmatory Factor Analysis and Reliability Analysis – Independent Constructs

Variables	Factor Loadings	Reliability of Construct
Customer Satisfaction	.441	
Employee Morale	.517	
Ecological Efficiency	.428	
		$\alpha = 0.72$

Table 4 - Confirmatory Factor Analysis and Reliability Analysis–Dependent Construct (MIP)

Variables	Factor Loadings	Reliability of Construct
Revenue from new products	.632	
Number of Innovation Adoptions	.764	
Time of Innovation Adoption	.461	
Time to Market (TTM)	.415	
R&D as a % of Sales	.685	$\alpha = 0.76$

Table 5 - Confirmatory Factor Analysis and Reliability Analysis–Dependent Construct (NIP)

HYPOTHESES	Corr. Coeff (r)	T	Sig T	Support/ Reject
H1 (a) The relationship between innovation capability and innovation performance in the mainstream is positive and significant.	**.479 ****	**3.296**	**.001**	**Support**
H1 (b) The relationship between innovation capability and innovation performance in the new stream is positive and significant.	**.431 ****	**2.438**	**.016**	**Support**
H2 (a) The relationship between e-Commerce and innovation performance in the mainstream is positive and significant.	.181 **	-1.376	.170	Reject
H2 (b) The relationship between e-Commerce and innovation performance in the new stream is positive and significant.	.335 **	-.660	.510	Reject
H3 (a) The relationship between management of technology and innovation performance in the mainstream is positive and significant.	.177 **	.761	.447	Reject
H3 (b) The relationship between management of technology and innovation performance in the new stream is positive and significant.	.335 **	.087	.931	Reject
H4 (a) The relationship between managing organisational intelligence and innovation performance in the mainstream is positive and significant	.204 **	-1.776	.077	Reject
H4 (b) The relationship between organisational intelligence and innovation performance in the new stream is positive and significant.	.222 **	-.798	.426	Reject
H5 (a) The relationship between Sustainable Development Orientation (SDO) and innovation performance in the main stream is positive and significant.	**.372 ****	**2.810**	**.005**	**Support.**
H5 (b) The relationship between Sustainable Development Orientation (SDO) and innovation performance in the new stream is positive and significant	.268 **	.671	.503	Reject
H6 (a) The relationship between Harnessing the Competence Base and innovation performance in the mainstream is positive and significant	.328 **	.324	.747	Reject.
H6 (b) The relationship between Harnessing the Competence Base and innovation performance in the new stream is positive and significant.	.172 **	-1.742	.083	Reject.
H7 (a) The relationship between Leadership and Business Strategy and innovation performance in the mainstream is positive and significant.	**.475 ****	**3.013**	**.003**	**Support.**
H7 (b) The relationship between Leadership and Business Strategy and innovation performance in the new stream is positive and significant.	**.557 ****	**4.941**	**.000**	**Support.**
H8 (a) The relationship between New Product Development (NPD) and innovation performance in the main stream is positive and significant.	.257 **	-.650	.516	Reject.
H8 (b) The relationship between New Product Development (NPD) and innovation performance in the new stream is positive and significant.	**.542 ****	**3.109**	**.002**	**Support.**
H9 (a) The relationship between Intellectual Property Protection and innovation performance in the mainstream is positive and significant.	.169 **	-1.738	.084	Reject.
H9 (b) The relationship between Intellectual Property Protection and innovation performance in the new stream is positive and significant.	**.404 ****	**2.267**	**.025**	**Support.**
H10 (a) The relationship between Knowledge Management and innovation performance in the mainstream is positive and significant.	.335 **	.217	.829	Reject.
H 10 (b) The relationship between Knowledge Management and innovation performance in the new stream is positive and significant.	.142 **	-1.814	.071	Reject.
H 11 (a) The relationship between Commercialisation of Products and innovation performance in the main stream is positive and significant.	.133 **	-.268	.789	Reject.
H 11 (b) The relationship between Commercialisation of Products and innovation performance in the new stream is positive and significant.	.378 **	1.291	.198	Reject.
H 12 (a) The relationship between TQM/Learning Organisation and innovation performance in the mainstream is positive and significant.	**.465 ****	**2.717**	**.007**	**Support.**
H 12 (b) The relationship between TQM/Learning Organisation and innovation performance in the new stream is positive and significant	.279 **	-1.191	.235	Reject.

Table 6 – Testing of Hypotheses