

# **DETERMINANTS OF SUCCESSFUL ORGANISATIONAL INNOVATION: A REVIEW OF CURRENT RESEARCH**

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Papers published in the *Journal of Management Practice* electronic journal have been selected on the basis of their superior treatment of a particular subject of relevance to HRM. In most cases, the paper will have its origins in assignment work in units offered for study by the Department of Human Resource Management and Employment Relations. Worthiness for inclusion in the *JMP* is determined initially by the unit leader/examiner and subsequently endorsed by the *JMP* editors. In addition, the submission has passed an external process of review.

This paper was selected for publication because it provides some useful insights into aspects of organizational learning through a case study analysis. The paper was a requirement for the unit GSN215. While it is based on some observations with a particular organization, the arguments do not necessarily reflect or represent the views of that organisation.

## **ABSTRACT**

The purpose of this report is to examine the topic of organisational innovation. This is a vast multi-disciplinary area of research and is a relatively new area of inquiry. The literature reviewed is empirical, management-oriented research from an organisational perspective and is sourced from peer-reviewed journals.

The objectives of the review are: 1) to understand the current state of research through analysis and synthesis of academic research papers; 2) to determine what the current research identifies as the main determinants of successful innovation; and 3) to determine what research evidence there is for positive effects on competitiveness and profitability from the development of innovation. The study utilised the method of a research review. Research articles (20) were collected from relevant academic journals and are quantitatively and qualitatively analysed.

It was found that research in this area is in its infancy. Most researchers agree on a definition of innovation and, though research is fragmented from different perspectives, efforts are being made towards a cumulative body of research and a general theory. Systems theory provides a convenient and popular theoretical framework, however, new approaches to theory such as chaos theory and the fractal paradigm are providing new insights.

Of the twenty research articles reviewed, most focussed on organisational innovation and the manufacturing sector and used the method of surveys and interviews. In addition, only two of the studies focussed on Australian firms. A number of common innovation determinants were identified from the research at a macro organisational level. The three main ones were management support for an innovative culture, a customer/market focus, and a high level of internal and external communication/networking. The identified determinants are important factors that all managers need to address, but the importance of each factor will be weighted according to the context of the organisation and its unique contingency variables. Innovation is a management process and its development must come from the top down. It was surprising to find little research on the effect of innovation interventions on

organisational performance, however, this is probably due to innovation being a new research area and the difficulties associated with measuring innovation. It has been found though, in the few identified studies, that there is a positive relationship between an organisation's innovativeness and its performance.

Recommendations include working towards a cumulative body of research by defining innovation, stating the dimensions studied, and considering an holistic view. Managers need to be aware that innovation is a management-induced process, realise the determinants identified are dependent on the firm's context, and give more attention to performance measurement to gauge the contribution of the innovation interventions.

## **INTRODUCTION**

Organisations conducting business in the global environment are faced with significant competition. The search for competitive advantage has led to the recognition of innovation as a vital ingredient for survival and profitability in the 'Information Age'. Organisational innovation, the focus of this research review, is a dynamic and iterative process of creating or modifying an idea and developing it to produce products, services, processes, structures, or policies that are new to the organisation (Zhuang 1995; Nohria & Gulati 1996). Organisations that master this activity in a consistent manner, such as the multi-billion-dollar-a-year 3M, position themselves to maintain continuous competitive advantage.

The main purpose of this research review is to develop a clear perspective of current research in organisational innovation to help understand how organisations can successfully foster and develop innovation. This is a task of considerable import and value because of the 'innovation imperative' of organisations to obtain and maintain market advantage over competitors. This paper has three objectives: 1) to understand the current state of research through analysis and synthesis of academic research papers; 2) to determine what the current research identifies as the main determinants of successful innovation; and 3) to determine what research evidence there is for positive effects on competitiveness and profitability from the development of innovation.

The innovation literature is vast and multi-disciplinary. In order to maintain the organisational context and to limit the scope of the review, the research has been sourced primarily from management-oriented journals. The articles are, however, diverse and feature a range of research methods, organisational types, innovation perspectives and situations. Systems theory will underpin the paper, providing a framework for analysis, as it provides an established common language and a popular perspective for the study of organisations (Millett 1998).

## **LITERATURE REVIEW**

The innovation literature is diverse and this review section will explore and critically analyse a range of literature, theories and models to provide an analytical foundation for the review of the research articles. Innovation research has emanated from many fields of knowledge including management, psychology, economics, sociology and science. Within these and other disciplines, researchers tend to conceptualise innovation in different ways (Gopalakrishnan & Demanpour 1997; Tang 1998). As this paper attempts to unify and synthesise current innovation research to provide some useable broad principles for managers,

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the literature has been selected for its focus on the organisational unit.

### **A Definition of Innovation**

One of the initial difficulties in innovation research is defining exactly what innovation is. Common to all definitions is that an innovation is something new or novel. Beyond newness, definitions vary with academic perspective and application (Burgelman & Sayles 1986). Many researchers leave it to the reader to intuitively understand what is now a popular subject in management literature. Yet to omit a clear definition is to detract from conceptual understanding, possibly reducing the success of the innovation implemented or developed. This is because the validity and understanding of researchers' findings may be affected by the exclusion of specificity in a definition, promoting misunderstanding and confusion.

An implied feature of innovation is that it must be useful (Gronhaug & Kaufman 1988; Padmore, Schuetze & Gibson 1997; Cooper 1998). This distinguishes an innovation from an invention, which may not have practical application. Especially in a business sense, it is desired that an innovation contribute to the firm's performance in some way.

One main point of contention is whether innovation is a process, or an outcome (Ettlie 1980; Kimberly & Evanisko 1981; Rodgers 1983). This difference may be of use, for example, when studying stages of innovation as an organisational process, or researching at what point firms become innovative. Another difficulty in a specific definition concerns the timing of an innovation relative to other firms in the industry. Does a firm need to be the first mover or innovator to be considered innovative? Does it need to be in the first x% of adopters as proposed by some researchers (Rodgers 1983; Midgley & Dowling 1993)?

### **Dimensions of innovation**

The above, and other problems with defining innovation, can be related to the *dimensions* of innovation. Some dimensions are the *types* of innovation, the *stages* of innovation, and the *level of analysis* (Gopalakrishnan & Damanpour 1997).

#### *Types of innovation*

Three types of innovation identified by Gopalakrishnan and Damanpour (1997) are products versus processes, radical versus incremental, and technical versus administrative. Product innovations are outputs of the organisation, such as Gillette's new *Mach III* shaver. A process innovation assists to produce products or services (outputs) from inputs. An example is SPC's new processing technology allowing the sealing of fruit in plastic cups. On a continuum, innovation can be described as incremental to radical according to the degree of change required to implement the innovation (Cooper 1998). A technical (or technological) innovation is directly related to the production of a product, for example, a new chemical process, a new item of software, or an upgraded computer system. An administrative innovation relates to management oriented processes such as structure, human resource management, and accounting systems.

#### *Stages of Innovation*

The stages of innovation can be broadly grouped into two separate phases, generation of innovation and adoption of innovation (Gopalakrishnan & Damanpour 1997). Generation includes idea creation and problem solving for product or process solutions. The adoption

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phase is the acquisition and/or implementation of an innovation. Organisations can undertake one or the other exclusively, major in a particular phase, or engage in both.

### *Levels of Analysis*

Innovation can be studied at a national, industry, organisational, group or individual level. Each level can affect the conceptualisation of innovation. These dimensions and the problems discussed previously highlight the scope for variability in innovation definitions according to the approach of the researcher, the dimensions of innovation studied and the objectives of the inquiry.

This paper will view innovation from the perspective of the organisation and favours a broad multi-dimensional approach because this correlates with the organization-based objectives, is more representative of today's multi-faceted organisation and permits this review to include a wide variety of research from which to source some general innovation principles. The definition adopted by this review is that given in the introduction. It is considered concise, yet broad enough to include all activities of an innovative nature occurring in organisations.

### **Innovation Theory**

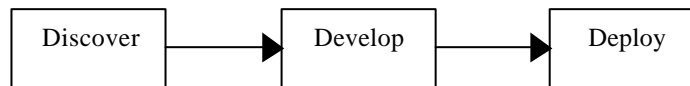
At present there is no 'general theory' of innovation. The difficulty, despite vast research from many fields, has been to unite the fragmented thinking into one umbrella theory. Innovation is an activity of more complexity than it appears. "The most consistent theme found in the organisation literature is that its research results have been inconsistent" (Wolfe 1994, p. 405). Because researchers come from many different fields, often study specific components of innovation, and emphasise various dimensions, a unifying general theory is yet to emerge. Many researchers believe a general theory is impossible due to the many complexities of innovation (Abramson 1991; Eveland 1991, cited in Wolfe 1994 p. 406).

In the absence of a general innovation theory, this paper will adopt systems theory as a framework for discussion. As Amabile (1988, p. 163) states:

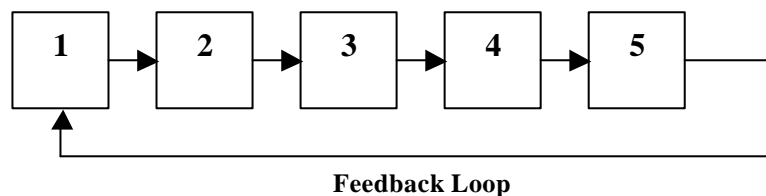
*"The organization (innovation) process occurs at the level of a system: a large number of individuals working together in different units on different aspects of the very general problem of implementing a new idea".*

A system is a group of sub-units that work together as an interrelated whole (Briggs 1992). The systems view organises the components of a firm as inputs, internal processes and outputs and studies the relationships between them (Vecchio, Hearn & Southey 1998). The General Systems Theory was developed by Ludwig von Bertalanffy, a German biophysicologist, in the 1950s (Hatch 1997). Bertalanffy's theory was an attempt to unite the sciences to explain scientific phenomena from a single atom to a society – all related through a hierarchy of systems (Hatch 1997). Each higher level system is composed of lower level systems (Cummings & Worley 1997). An organisation, for example, is a system residing in a super-system of a whole industry and is composed of sub-systems such as divisions and departments. Each of these levels interacts with, and influences, each other.

Numerous models have been constructed for the process of innovation, for example Tang (1998), Cooper (1998), Padmore et al. (1997), Klein and Sorra (1996) and Burgelman (1983). Innovation models have developed from over-simplified linear models to stage or process models (Figure 1).

**Figure 1: Linear and Stage Models****Linear Model**

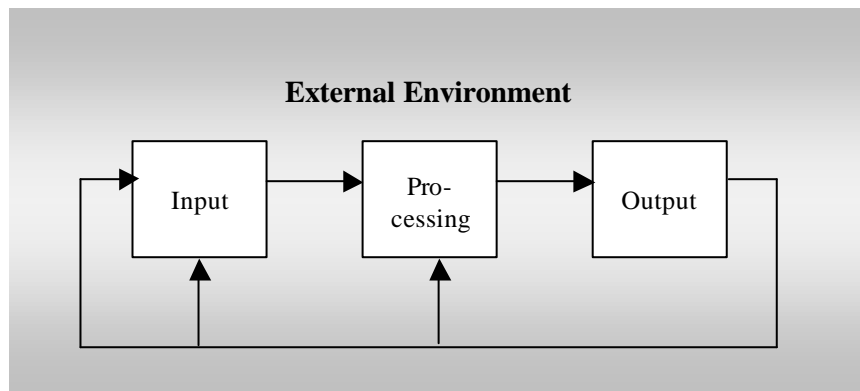
(Source: Padmore, T., Schuetze, H. & Gibson, H. 1998, 'Modeling Systems of Innovation: An Enterprise-centred View', *Research Policy*, vol. 26, no. 6, pp. 607)

**Stage Model**

Stage models are expanded linear models, but may also include feedback loops. Feedback is information regarding the outcomes of the system, enabling a degree of future control of the system (Cummings & Worley 1997; Millett 1998). Stage models often describe new product development, having stages such as strategic planning, concept generation, design and test, production, and distribution and marketing (Padmore et al. 1997; Tang 1998). Typical stage models come from Wheelwright and Clark (1995), Crawford (1994), and Roberts (1988). The chain link model, such as that offered by Kline and Rosenberg (OECD 1992), has offered an improvement to the stage model as it recognises the multi-dimensional nature of innovation by including feedback loops *at each stage*.

These models above, however, suffer a number of shortcomings. First, they are primarily new product development models, which exclude process innovations and externally sourced ideas. Second, there is little attention given to the external environment, for example, a client or supplier's role in innovation. Third, the models are based on a series of steps, assuming the requirement of a rigid process for success. Tang (1998) offers an integrated model that is more applicable across organisational types and is based on a number of key constructs of innovation. While more general in approach, this model also neglects the effect of the external environment and feedback on *each step* in the process.

The above models are generally permutations of the Open Systems Model. The Open Systems Model (Figure 2) is an organisational model based on systems theory that depicts the organisation as a system that affects, and is affected by, its external environment, or super-system.

**Figure 2: Open Systems Model**

(Adapted from: Cummings, T. G. & Worley, C. G. 1997, *Organisation Development and Change*, 6<sup>th</sup> edn, South-Western College Publishing, Cincinnati, Ohio)

The model is composed of inputs, transformations and outputs. The inputs of an organisation are resources such as raw materials and knowledge. These inputs are transformed through an organisation's various processes to produce outputs such as products, services and ideas. An important component of the model is the feedback loop. This addition to the model supersedes older linear models and creates a non-linear model that receives constant feedback from its environment, which can substantially impact on future outputs (Briggs 1992).

Further developments in organisation theory have come from chaos theory and emphasise organisations as sensitive dynamical systems that are non-linear and unpredictable because they are open systems, influenced both by outside forces and internal fluctuations (Briggs 1992). This adds a more holistic or whole view of an organisation, showing a dynamic interconnection with its super-system, or environment. Chaos theory will no doubt be an influence on future models of innovation. Because the systems model is a 'base' model, can be applied across all organisations, and accommodates the wide variety of research reviewed, it will form the reference for this paper and a construct to link the various perspectives of the reviewed research literature.

The literature on innovation is varied in approach and as identified above, this is one of the main problems in working towards a general innovation theory. Most research has contributed to innovation knowledge through uni-dimensional studies such as new product development, new process development or adoption and diffusion. Cooper (1998) attributes much of the confusion surrounding innovation to the uni-dimensional construct, lack of comparative study, and failure to clearly define innovation. A summary of some researchers' ideas on innovation follows (Table 1).

**Table 1: Innovation Research Summary****Damanpour (1991)**

Found that the effects of determinants on organisational innovation are not necessarily unstable across different studies as found by Downs and Mohr (1976, in Damanpour 1991) and supported by other researchers. Concludes that cumulative research and theory building is possible. Suggests that the type of organisation and the scope of innovation are primary contingency variables, and type of innovation and stage of adoption are secondary variables. Also suggests that future research should be multi-dimensional and examine the whole organisation not just one or two isolated innovations.

**Wolfe (1994)**

Suggests that all dimensions of innovation are important contingency variables and that research should be comparative. Proposes that researchers clearly address:

- (a) which of the various streams of innovation research is relevant to the research question,
- (b) the stage(s) of the innovation process upon which a study focuses,
- (c) the types of organisations included in a study,
- (d) how a study's outcome variable is conceptualised, and
- (e) the attributes of the innovation(s) being investigated,

to minimise ambiguity and develop a cumulative information base. Also suggests that research should be differentiated into various research streams (diffusion of innovation, organisational innovativeness, and process theory research) to allow effective comparisons and synthesis as the streams have different foci.

**Fiol (1996)**

Uses the analogy of a sponge and suggests that an organisation, like a sponge, can only squeeze out what is absorbed – its ability to generate innovative outputs is limited by its potential to absorb and diffuse knowledge and other inputs. Research should be more sensitive to the broader institutional/market context that is the source of knowledge.

**Gopalakrishnan & Demanpour (1997)**

Reviews research across three disciplines of economics, sociology and technology management. Compares along the three dimensions of stage of adoption, level of analysis, and type of innovation, and then reconfigures these into five specific groups. States that with innovation being a complex construct, a cross-fertilisation of research across disciplines is required to de-fragment the research.

**Tang (1998)**

Digests innovation research from different perspectives to gain a 'panoramic' view of organisational innovation. Attempts to integrate the vast research and proposed a model based on six constructs of innovation: information and communication, behaviour and integration, knowledge and skills, project raising and doing, guidance and support, and external environment. Concludes that innovation is a more complex concept than many realise and managers must be aware of the organisation-specific context of variables and the complexity of their interaction.

**Padmore et al. (1998)**

Utilises a system approach to develop a cyclic model based on a generalised product development cycle. It is designed to be flexible, generalisable, simple, and quantifiable. It concentrates, however, on new product development (NPD) but also is an improved systems-based model.

**Cooper (1998)**

Proposes that innovation exists as a multi-dimensional concept as few innovations are uni- or even bi-dimensional. Suggests the use of the popular innovation typologies of product versus process, administrative versus technical, and incremental versus radical. Also suggests a valid critique of the multi-dimensional approach may be the number and types of possible dimensions.

In summary, current researchers tend to agree that innovation research, especially in organisations, needs to be more holistic in approach by examining the multi-dimensional nature of innovation throughout the whole organisation, must recognise the interrelatedness of innovation processes, and recognise the contextual nature of contingency variables. Cross-discipline and comparative studies are also required to help unite historically fragmented

approaches. Finally, there is agreement that research specify the particular dimensions used by the researcher to analyse innovation, though agreement on what these dimensions should be is yet to be reached.

## RESEARCH METHODOLOGY

This section will document the method of research used in this paper and give reasons for the particular approach taken. Other points that will be addressed are the reliability and validity of the data, limitations and delimitations, and the sources of data.

### Documentation of Method

This paper takes the form of a research review. This method, though not strictly a research methodology in itself (hence neither positivist or phenomenological), nevertheless provides an addition to existing knowledge by analysing and synthesising the research undertaken by others, which can be processed qualitatively and quantitatively as a set of data (Hussey & Hussey 1997; Marchant & Wiesner 1999). Research articles have been collected from relevant academic journals and will be subjected to both qualitative and quantitative analysis.

Qualitative research is rational, explorative and interpretive and is especially suitable for the examination of systems and processes where there are interactive relations among variables such as in organisations (Ghauri, Grunhaug & Kristianslund 1995; Krathwohl 1998). The qualitative method is useful for inductive and exploratory research as it leads to the understanding of phenomena and theory generation, particularly where human behaviour and functions (as within an organisation) and non-quantitative variables are present (Ghuari et al. 1995). Qualitative research is also appropriate for this research review because, as the data sample is small (20 articles), the reliability of statistical analysis would be low. A qualitative approach will help to analyse and compare and contrast the main findings, directions, and shortcomings of the research. The result will be a synthesis of the research to arrive at a statement of the current status of innovation research, its implications for management, and suggestions for the direction of future research.

In addition, some attention will be given to quantitative analysis. Though it will not be rigorous in a statistical sense, the systematic numerical analysis of the data in the form of tabling, graphs etc. will assist to structure the analysis, allow more depth in comparativeness, and help visually represent the information (Strauss & Glaser, in Hussey & Hussy 1997).

The articles for the review were found by searching databases such as Emerald, ABIX, Webspirs and EBSCO. Journal titles were searched using the keywords 'innovation' and 'organisation' and had to satisfy the following criteria:

1. Must have been published in the last 4 years
2. Source must be a peer-reviewed publication
3. Must focus on innovation in organisations
4. Must demonstrate qualitative and/or quantitative analysis

The sources included journals such as *Academy of Management Review*, *Research Policy*, and *Journal of Product Innovation Management*. A minimum of twenty items of research was required for this review and, though this target was met, it was more difficult than expected

due to a relatively small volume of empirical research that met the criteria and limits on search time.

### **Reliability and Validity**

Reliability is concerned with the research and results in terms of replication (Hussey & Hussey 1997). Similar outcomes should be obtainable if the research is repeated. The prime objective of this research review is to understand current innovation research and it is likely that another researcher following the same method with the same data would offer similar conclusions, even though the opinions of a different researcher would add a degree of subjectiveness. This is because the review method is a summary and synthesis of existing empirical research, thus reliability would be reasonably high.

The concept of validity refers to the probability that an assertion or finding is true (Dooley 1984). By reviewing research from peer-reviewed research journals the validity of the data set would be quite accurate in representing organisational innovation. The selection criteria also helped to strengthen validity.

### **Limitations**

This review is limited to providing a macro view of innovation in organisations and seeks to find some general principles that may be applied across a wide range of industries and organisation types. This approach may present a weakness in that in attempting to make cross-industry generalisations, the research and recommendations may be too broad and neglect to provide results that translate into useable, actionable recommendations at the firm level for various organisations. It is possible that situational and contingency factors dictate innovation as context-sensitive in nature, and, therefore, require industry — or even firm-specific — analysis.

A further limitation is that by utilising electronic databases for the research review search, those journals not indexed by the databases cannot be searched, therefore, some relevant existing research may have been excluded from the search.

### **Delimitations**

The focus of this study is innovation within organisations. The research articles have been selected to reflect this and are primarily management oriented. This excludes, for example, individual level research, which is mainly psychology-based, and research at the societal or national level, which is usually the domain of economic inquiry.

## **RESULTS**

This section has been organised to directly address the three objectives of this research review. As 'it is often impossible to disentangle the results and the analysis' (Hussey & Hussey 1997, p. 291) in qualitative/phenomenological research, some analysis and discussion will necessarily accompany/form the results. However, most of the discussion will appear in the discussion section.

### Objective 1: To understand the current state of research through analysis and synthesis of academic research papers

The table below (Table 2) summarises the research that forms the data set. It is a broad cross-section that represents some of the most recent research. It ranges from a case study of a single organisation (Cho 1996) to a study of 6005 service firms using secondary data (Sirilli & Evangelista 1998). The table compares and contrasts the data. Eighty-five percent of the researchers studied eight or more organisations and forty-five percent over one hundred organisations. Those that adopted a macro view by studying a larger number of organisations are considered more useful to this study as the findings would offer a higher degree of generalisability. Sixty-five percent of the studies focussed on organisational innovation, while the balance emphasised new product/service development.

**Table 2: Summary of Research Data Set (n = 20)**

Author(s)	Purpose	Focus	Innov Type*	Meth-od**	Main Point
Atuahene-Gima (1996)	Compares innovation performance in manufacturing & services	600 Australian service & manufact. firms	NPD/NSD	Q/S	Innovation factors and perception are different btwn the two
Balbontin et al (1999)	Compares NPD success factors in American and British firms	49 UK & 38 US high technology companies	NPD	Q	Common critical success factors are: participative leadership, mgmt support & good information flow
Yamin et al. (1999)	Examines relationships between innovation and performance	237 Australian manufacturing companies	OI	SDA	Highly innovative companies are more profitable
Spivey et al. (1997)	Development of fractal paradigm	A top org. in US Dept. of Defence	NPD	C	Macro view of innovation can be seen in fractal perspective
Tang (1999)	Validation of inventory of organisational innovativeness	871 members of a professional engineering soc.	OI	Q/S	The inventory could be useful in assessing a firm's innovation
Sirilli & Evangelista (1998)	Technological innovation comparisons of manufacturing & service firms	6005 Italian service firms	NSD/PI	SDA/S	Show more similarities than differences
Nobel & Birkinshaw (1998)	Examines global innovation in multi-national organisations	15 Swedish Multi-national R&D units	OI	Q, I	Provides a number of implications for MNC managements
Ozsomer et al. (1997)	Investigates factors of organisational & environmental innov.	142 Fortune 500 manufacturing firms	NPD	Q/S	Strategic posture is the most important factor in increasing innov.
Soderquist et al. (1997)	Examines innovation management in French SMEs	84 French SMEs	OI	Q	Key innov. factors are a customer focus & cont. improvement
Cho (1996)	Shows how Samsung organised for innovation	Samsung Corporation, Korea	OI	C	Suggests a 'Clustered Web' organisational structure for innovation
Zhuang et al. (1999)	Studies managers' understanding of innovation issues	199 practicing managers of various orgs.	OI	Q, I	Many managers have not been able to create an innovative culture
Kusunoki (1997)	Looks at effect of problem-solving approaches	Compares Matsushita and	NPD	C	Tech.-based firms should not approach

Author(s)	Purpose	Focus	Innov Type*	Meth-od**	Main Point
	on radical NPD	Ricoh			radical innovation in a technology-based way
Hurley & Hult (1998)	Examines the effect of organisational culture on innovation	9648 employees of a large US govt R&D unit	OI	Q/S	An innovative culture facilitates adaptation & innovativeness
Keogh (1999)	To understand the importance of information and knowledge in innovation	20 SMEs in Scotland	OI	Q	Firms must develop HR and nurture knowledge to be innovative
Muffatto & Panizzolo (1996)	Studies innovation and NPD in the Italian motorcycle industry	8 firms (Italian & Japanese in Italy)	NPD	Q/S	Partnerships played a key role in the firms studied
Subramanian & Nilakanta (1996)	Studies relationship between innovation & org. characteristics & perform	143 bank managers	OI	Q/S	Innovativeness does improve organisational performance
Shaw (1998)	Examines NPD in the UK medical industry	11 UK medical equipment manufacturers	OI, NPD	C	Internal and external knowledge management and networking is needed for success
Birchall et al. (1996)	Comparison of technological innovation in SMEs in UK, France and Portugal	233 SMEs: UK 68, France 77, Portugal 88	OI	S, Q	Innovation variables are interdependent and an integrative and broad approach is needed
McGourty et al. (1996)	Presents a behavioural model of innovation	14 US best-of-best companies	OI	I	Culture modification through management practices can encourage innovativeness
Zien & Buckler (1997)	Searches for common principles of innovative organisations	12 US, European & Japanese Companies	NPD/OI	I	Each firm needs unique innovative structures but 7 universal principles are given

\* NPD = new product development, NSD = new service development, OI = organisational innovation, PI = process innovation.

\*\* Q = questionnaire, S = survey, SDA = secondary data analysis, C = case study, I = interviews

Briefly, some of the main points from this table are that the questionnaire/survey method is the most common, only two of the studies focus on Australian organisations, the research is mostly concerned with manufacturing firms, organisational innovation is the type of innovation most frequently researched, and a wide variety of business cultures is examined.

## **Objective 2: To determine what the current research identifies as the main determinants of successful innovation**

Table 3 shows the determinants of innovation identified in the research. Some of the researchers did not highlight any specific determinants because of the particular focus of their research. For example, Yamin et al. (1999) concentrated on performance measures using secondary data and did not examine specific innovation determinants. Other researchers focussed on specific aspects and identified only two or three determinants relevant to their study.

**Table 3: Determinants of Innovation**

Authors	MS	CF	CN	HR	TM	KN	LS	CD	SP	FS	CI	TE
Atuahene-Gima (1996)	X	X		X	X							
Balbontin et al. (1999)	X	X	X				X	X				
Yamin et al. (1999)												
Spivey et al. (1997)	X	X	X	X	X							
Tang (1999)	X		X			X	X					
Sirilli & Evangelista (1998)		X										X
Nobel & Birkinshaw (1998)												
Ozsomer et al. (1997)									X	X		
Soderquist et al. (1997)		X									X	
Cho (1996)			X	X	X					X		
Zhuang et al. (1999)	X							X				
Kusunoki (1997)												
Hurley & Hult (1998)	X								X			
Keogh (1999)				X		X						
Muffatto & Panizzolo (1996)												
Subramanian & Nilakanta (1996)												
Shaw (1998)		X	X			X						
Birchall et al. (1996)	X	X	X								X	
McGourty et al. (1996)	X			X								
Zien & Buckler (1997)	X	X	X		X							
<b>Totals</b>	9	8	7	5	4	3	2	2	2	2	2	1

Coding:	MS	Management support for an innovative culture
	CF	Customer/market focus
	CN	Communication/networking – internal & external
	HR	HR strategies that emphasise innovation
	TM	Teams and teamwork
	KN	Knowledge management, development and out-sourcing
	LS	Leadership
	CD	Creative development
	SP	Strategic posture
	FS	Flexible structures
	CI	Continuous Improvement
	TE	Technology adoption

The most important determinant identified was management support for innovation and an innovative culture. The encouragement of innovation is a management function and must be a ‘top down’ effort and this is reflected in the results (Table 3). Figure 3 is a graphic representation of the number of times the identified determinants appeared in the reviewed research.

**Figure 3: Frequency of the Appearance of Innovation Determinants in the Reviewed Research**

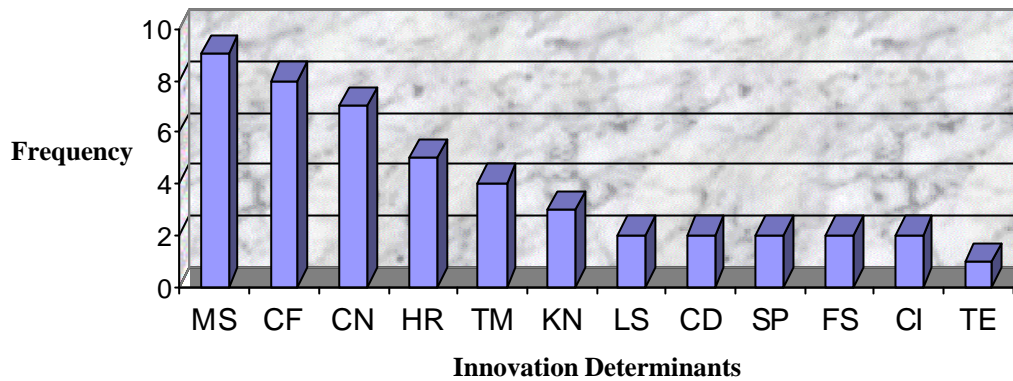
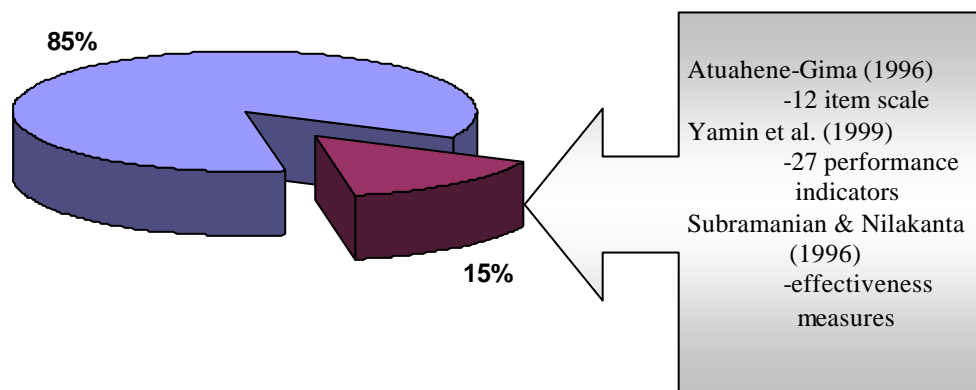


Figure 3 shows management support was the most frequently identified factor of innovation. This was followed by customer/market focus and communication/networking, identified 8 and 7 times respectively. Other determinants that featured frequently were human resource innovation strategies, teams emphasis, and knowledge management.

**Objective 3: To determine what research evidence there is for positive effects on competitiveness and profitability from the development of innovation**

Only three studies out of the twenty reviewed gave attention to the effect of innovativeness on performance (Figure 4). The researchers’ conclusions are shown in Table 4.

**Figure 4: Percentage of the Research that Examines Innovation Performance**



**Table 4: Summary of Findings on the Effect of Innovativeness on Organisational Performance**

Author(s)	Performance Measurement	Conclusion
Atuahene-Gima (1996)	Respondents rated the degree of innovation success on a 12-point scale in terms of market share; sales, growth and profit objectives; cost efficiency, etc.	The potency of factors affecting innovation performance differs between service and manufacturing firms
Yamin et al. (1999)	27 items based on four dimensions: marketing effectiveness, asset management, operation efficiency, & financial performance	Innovative companies are more profitable, though highly innovative companies may not necessarily outperform average innovators
Subramanian & Nilakanta (1996)	Effectiveness measures (revenue generation focus) such as market share, sales etc.	The results show that innovativeness does improve organisational performance

Atuahene-Gima (1996) examined the difference between manufacturing and service firms and compared innovation factors that affected performance, rather than measuring performance improvements. Yamin et al. (1999) and Subramanian and Nilakanta (1996) looked more directly at the effect of innovativeness on performance and both studies concluded that there is a positive relationship between a firm's innovativeness and its performance. It was somewhat surprising to find few researchers included an examination of the effects of innovation on organisational performance, but this was supported by Subramanian and Nilakanta's (1996) observation that few studies to date have focussed on this important issue.

In conclusion, an examination of the research data set shows that Australian studies are under-represented and that there is a bias towards manufacturing firms and organisational innovation. The most frequently occurring determinant was management support for an innovative culture, followed by customer/market focus and internal and external communication and networking. Only three studies examined the important area of post-innovation performance, which was surprising considering the need to evaluate the financial success of innovation interventions. However, two of the studies found a positive innovativeness-performance relationship.

## DISCUSSION

This section will interpret the findings of the review to obtain an outcome for each objective and a summarising statement about current research in organisational innovation. The findings will be linked to the literature review and relevant theory and will lead to a set of recommendations useful for management and suggestions for future direction in research.

### **Objective 1: To understand the current state of research through analysis and synthesis of academic research papers**

Innovation research is a relatively new field of inquiry. Even current research does not agree on a theoretical perspective and the objective of a unifying theory of innovation is as yet not met. There is, however, evidence to suggest that researchers are seeking a convergent process to enable cumulative effort to work towards a general theory and suitable models for innovation in organisations. Most researchers accept a broad definition of innovation such as the one adopted by this paper (see introduction) and most innovation models are permutations

of the Open Systems Model. Systems theory is an organisational theory that provides a convenient and popular framework for the study of innovation in organisations.

The literature review showed the diversity of opinion and approach, yet the desire to seek a more congruent research path is also evident by the favouring of a holistic (whole-organisation), multi-dimensional approach that recognises the importance of contextual variables, the interrelatedness of innovation processes, and the importance of identifying the innovation dimensions used by the researcher.

In an attempt to capture a broad cross-section of the latest research in innovation, twenty items of research were reviewed. Table 1, in comparing and contrasting the research, shows how broad the array of research is. Many different types of organisations were studied and, though all studied innovation, many studied particular aspects of innovation. For example, Atuahene-Gima (1996) makes comparisons and identifies differences in innovative performance in manufacturing and services firms, Nobel and Birkinshaw (1998) examine multinational corporations (MNCs), and Kusunoki (1997) looks at the effect of organisational culture on innovation. A majority focussed on specific aspects of organisational innovation, while the others studied new product development (NPD).

The results of the research were also varied. This was more a function of the scope and perspective of the research, type of organisation and innovation, and the context and objectives of the study, rather than conflicting results. While each of the studies contributed to the body of knowledge about innovation, the fact that there were no clearly identifiable themes throughout the data set was very noticeable, and continued the shortcomings of past research. The main reason for this is the lack of a common theory base from which to guide the research and enable it to be linked to other research. This is perhaps due to the infancy of innovation research, but may also add weight to the belief of some that a unifying theory is unattainable due to the complexities of innovation.

Researchers would increase the cumulative value to their research by following the suggestions of Damanpour (1991), Wolfe (1994), and Cooper (1998) by taking a more multi-dimensional approach, clearly specifying the innovation dimensions studied, and nominating an organisational theory base.

One solution to the above problems has been offered by Spivey's et al. (1997) *fractal paradigm*. A fractal image is formed by plotting (on a computer) the points of an iterated equation. The resulting image, which depends on the type of equation and the variables used, is often characterised by self-similarity at various levels of magnification. The metaphor of a fractal image is used to account for the myriad of variables and cascading complexities in innovation research. Just as some fractal images exhibit self-similarity and complexity at all levels of magnification, so too do organisations have similar management and resource factors and complexities at each level of the innovation process and level of analysis (Spivey et al. 1997).

The fractal paradigm provides a framework for understanding and managing the innovation process, which consists of the same set of concerns, regardless of the 'focal length' of the researcher's viewpoint. Spivey et al. (1997) classifies these concerns into resource and management areas then make further sub-divisions. This distinction is similar to the input and processing stages of the Open Systems Model, but goes further to suggest that the

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complex input-processing-feedback interaction occurs at every stage or level in the innovation process. The fractal paradigm, as well as chaos theory, will no doubt have an influence on future research.

**Objective 2: To determine what the current research identifies as the main determinants of successful innovation**

Innovation as a general concept is a popular managerial phenomenon. It seems widely accepted that in today's competitive global business environment, in order to sustain high performance, firms must embrace innovation as one of the strategic keys for success. But are there identifiable innovation determinants that lead to success? The answer to this question is ultimately the goal of all innovation researchers, but is made very difficult by the multiplicity of variables that can be considered.

In the research reviewed, twelve different determinants are identified. A specific determinant can be seen as an input or process component in the Open Systems Model that clearly contributes to the innovative output. The objective was to examine the breadth of recent research to try to identify common determinants, identified by the research, that were factors in successfully innovative companies. As noted previously, because of the narrow focus of some of the research, specific determinants were often few in number. Table 2 is simply a reflection of the occurrence frequency of some generalised factors. There may be some degree of randomness to the sample of research, and thus the occurrence of various factors, but it is likely that the more important determinants will be indicated by a theme in the results. Some generalisations and categorisation was necessary, as not all researchers used the same terminologies or classifications.

The act of classifying the determinants from the research demonstrates the fractal paradigm of Spivey et al. (1997). For example, an HR strategy that emphasises innovation was one of the common determinants identified that, at a higher level of 'magnification', includes many sub-units, such as training and development, that are sub-systems in themselves. It is easy to see how the cascading and inter-related variables make the study of innovation challenging. Damanpour (1991) found, however, that these determinants are not necessarily unstable across different studies. This is somewhat supported by the results of this review. In order from highest to lowest frequency, the determinants identified are:

1. Management support for an innovative culture
2. Customer/market focus
3. Communication/networking
4. HR strategies that emphasise innovation
5. Team structures
6. Knowledge management
7. Leadership, creative development, strategic posture, flexible structures, continuous improvement, and technology adoption.

The systems approach recognises that everything interacts with everything, but also that in practice some interactions are more important than others (Padmore et al. 1998). The determinants identified are probably representative of these more important interactions at a macro organisational level.

Management support for an innovative culture was the most frequently occurring determinant. The vital importance of managerial factors is supported by most researchers — Yamin et al. (1999); Subramanian and Nilakanta (1996); Spivey et al. (1997); Damanpour (1991); and Tang (1998), for example. Under the fractal paradigm of Spivey et al. (1997) the determinants are classified into two main sets of factors, management and resource factors, again emphasising the importance of management in the overall innovation process. Knowledge management is one determinant that seems often overlooked but, as stated by Fiol (1996), an organisation's potential for innovative output is limited by its knowledge absorption and diffusion.

The balance of emphases on each of these determinants is dependent on the context of the organisation. Contingency variables differ with each firm and the concept of innovation and its determinants for success must be moulded to fit each organisation.

**Objective 3: To determine what research evidence there is for positive effects on competitiveness and profitability from the development of innovation**

The results of the effect of innovation on performance show few of the researchers gave attention to this area. Only two of the studies directly examine innovation performance. There are probably three main reasons for this: 1) the difficulties associated with measurement; 2) the difficulty of separating innovation determinants from other variables likely to have an effect on performance; and 3) the fact that innovative effort does not always translate directly into improved firm performance.

There are no guidelines available that assist researchers to find an appropriate performance measure for innovation. Performance is usually measured in terms of the output (see Systems Model in Figure 2) or the end product, but can also be measured, for example, by increases in employee motivation in the case of a process or operational innovation. Subramanian and Nilakanta (1996) suggest using either (or both) an efficiency measure, which has a cost-benefit focus, or an effectiveness measure, which has a revenue generation focus. These are measured by indicators such as financial ratios, market share, sales etc. Another type of measurement is the tracking of new patents for product innovations.

Problems in innovative performance measurement abound. The researcher must decide at what point the innovation becomes an innovation, take into account the effect of related and non-related variables, and decide the scope of the measure. Atuahene-Gima (1996) used a 12-item scale where respondents were asked to rate the degree of success of an innovation. This is a method that relies on the subjective judgement of managers, but is another of the many methods available. Subramanian and Nilakanta (1996), in their study of 143 bank managers using revenue generation type measures, found that innovativeness does improve organisational performance. Yamin et al. (1999) also found a positive relationship between innovativeness and increased performance, though highly innovative firms may not outperform moderately innovative firms in all measures of effectiveness.

Research suggests that there is certainly a positive effect on performance for innovative organisations, however, this is an area where few empirical studies have been undertaken and, while a positive relationship has been identified, this area requires a much higher degree of in-depth research.

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## Summary

This discussion has highlighted some important points in relation to innovation. A general theory is yet to emerge, but researchers are working towards a cumulative body of research. A number of determinants for successful innovation were identified at a macro organisational level, the use of which is contingent on an organisation's contextual variables. Innovation does appear to increase performance, though much more research in this area is required.

## Evaluation

The purpose of this research review was to understand the current thinking on organisational innovation and discover how it may further contribute to organisational performance and success. With this broad task in mind, a wide variety of research articles were gathered. The review has indeed revealed some important information useful to researchers and managers at a macro organisational level. While taking an overview approach and, therefore, lacking in some detail, it was particularly useful to highlight the need for concerted effort towards cumulative research, theory building, and integration of innovation research approaches. Some recommendations based on the findings of the research review follow.

## RECOMMENDATIONS

### For researchers:

- Researchers must clearly define their concept of innovation to avoid confusion about how the researcher understands innovation.
- The dimensions of the innovation should be clearly stated including the type of organisation, type of innovation, scope of the innovation, stage of the innovation, and level of analysis to facilitate a more integrated, cumulative research body.
- A research stream or theory base should be nominated and justification given to promote a cumulative body of research.
- Researchers need to recognise the interrelatedness of organisation variables by considering an holistic view.
- More attention must be given to how innovativeness affects organisational performance.
- Australian organisations would benefit from more research into Australian firms.
- More research is needed into service firms, new service development, and process innovation to offer a more balanced and complete picture of innovation.
- New paradigms such as fractal and chaos theory should be explored.

### For managers:

- Innovation success determinants are reliant on many interrelated variables, including the context of each individual organisation, which must be taken into account.
  - The twelve identified determinants provide a macro level starting point. The most important was found to be management support. Other important determinants are a customer/market focus and a high level of internal and external communication/networking. The organisation's contingency variables will dictate a unique mix of emphases on different determinants.
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- Measurement of performance improvement after an innovation intervention is important to gauge its success. Though there are different problems associated with accurate measurement this should not be neglected.
- Innovation research at the organisational level is very much in its infancy, but it nevertheless has been shown that performance can be increased by innovativeness. It is the responsibility of management to cultivate an innovative culture, structures and processes and adopt innovation as a strategic prerogative.

## CONCLUSIONS

Innovation is a relatively new area of research that has been approached from many disciplines. While there is not yet a general theory of innovation it is expected that efforts towards cumulative research, comparative studies and cross-disciplinary understanding will assist in the development of a general theory and suitable models. Research to date has been rather fragmented, however, efforts are being made to promote guidelines for cumulative research to build a framework that allows a more complete picture of the innovation concept. Innovation is a complex subject, and while theories such as systems theory can help understand innovation in the organisational context, new approaches such as the fractal paradigm should be explored. In conclusion, the theory of innovation is still in its infancy although most researchers are agreed on a definition and progress is being made towards a general theory.

An examination of a broad range of innovation research has revealed, at the macro level, a range of determinants for successful organisational innovation. These are very much dependent on the context of the organisation and its various contingency variables and will be balanced according to each organisation's unique requirements. One of the more important findings was that innovation is a function of management, and support and efforts towards cultural change must come from the top of the organisation. A customer/market focus and a high level of internal and external communication/networking were also identified as important. It is concluded that innovation is a management process that is context specific, though the identified determinants for successful innovation are general principles that all organisations must consider.

Some gaps in the research were evident. Australian companies would benefit from more research into Australian organisations as only two of the studies focussed on firms in Australia. This provides research opportunities. Also, more attention should be directed to service firms, new service development, and process innovation to help balance current research and provide a more complete view of innovation.

Finally, few researchers have examined the effect of innovation interventions on organisational performance. This is probably due to the fact that innovation is a relatively new research area and that it is difficult to measure. However, research has shown that there is a positive relationship between innovative effort and increased performance. This is an area of great importance as it enables critical feedback about the effectiveness of innovation interventions. While there are measurement difficulties, research continues to clarify the innovation concept, and it is concluded that researchers and organisations must devote more attention and resources to this vital diagnostic/feedback activity.

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