

# Understanding and Enabling Disruptive Innovation.

*Category: Doctoral Paper*

Track: Innovation and Creativity

Pete Thomond (*corresponding author*)  
International Ecotechnology Research Centre  
Building 53  
Cranfield University  
Cranfield  
Beds, MK43 0AL  
Tel: + 44 1234 754191  
Fax: + 44 1234 750163  
Email: [p.thomond@cranfield.ac.uk](mailto:p.thomond@cranfield.ac.uk)

Dr Fiona Lettice  
International Ecotechnology Research Centre  
Building 37  
Cranfield University  
Cranfield  
Beds, MK43 0AL  
Tel: + 44 1234 754966  
Fax: + 44 1234 750163  
Email: [f.lettice@cranfield.ac.uk](mailto:f.lettice@cranfield.ac.uk)

## **Understanding and Enabling Disruptive Innovation.**

The research problem is to understand the integrated factors contributing to “Disruptive Innovation”. The aim is to provide enterprises with clarity on the term’s meaning, impact and implications, in an attempt to develop tools that will help managers to enable disruptive innovation to happen within their enterprises’. The research is contributing to a European Commission co-sponsored project.

Innovations can be thought of as falling onto a continuum from evolutionary to revolutionary (Christensen, 1997; Hill and Jones 1998; Tidd et al, 1997; Trott, 1998; Veryzer, 1998). While evolutionary innovation is critical to sustaining and enhancing shares of mainstream markets (Baden-Fuller and Pitt, 1996; Hill and Jones 1998; Johnson and Scholes, 1997), revolutionary breakthroughs lie at the core of wealth creation (Schumpeter 1975). In fact, by definition, revolutionary innovations serve as the basis of future technologies, products, services and industries (Christensen, 1997; Christensen and Rosenbloom, 1995; Hamel, 2000; Tushman and Anderson, 1986).

The term ‘disruptive innovation’ has been used to describe innovation that is of highly revolutionary or discontinuous nature, in which customers and consumers embrace new paradigms in favour of the old. The term is becoming more widely recognised, however, the current study has found that although many of the multifaceted and interrelated issues of disruptive innovations have been described by numerous authors, a deep understanding of the entire subject and how it is defined is missing as are tools to help enterprises to continually manage and enable disruptive innovation as a competitive strategy.

This paper explores the concept of disruptive innovation as presented in the literature and how it differs from other types of innovation<sup>1</sup>.

To begin to understand disruptive innovation it is useful to consider some examples such as the light-bulb industry's disruption of the candle industry and the desktop computer industry's disruption of the mainframe and minicomputer computer industries. An example of disruptive innovation currently in progress is the DVD industry disrupting the VHS industry. A potential disruptive innovation might be "flash card memory", as the technology improves it has the potential to disrupt the disk drive industry.

That firms need to periodically engage in the process of revolutionary or disruptive innovation for long-term survival is well-recognised (Betz 1993; Christensen, 1997; Christensen and Rosenbloom, 1995; Hamel, 2000; Tushman and Anderson 1986; Tushman and Nadler 1986). BusinessWire.com (2000) illustrated that one-third of the companies listed in the 1970 Fortune 500 had vanished by 1983 and attributed almost all of this demise to companies not anticipating and/or embracing disruptive change. Many companies can and do spend heavily on technology development and market research, however, almost all investment is devoted to evolutionary innovations that make current offerings perform better in ways customers already value (Day and Schoemaker, 2000).

Few organisations understand or have established track records for undertaking successful disruptive innovation (Christensen, 1997), in fact most are reluctant to follow this path and find themselves disadvantaged by embedded structures,

---

<sup>1</sup> At the time of writing the research has been underway for six months. At the conference in September the semi-structured interviews at four organisations will have been completed and the findings will be presented.

capabilities and outlooks (Abuja and Lampert, 2001; Christensen, 1997; Day and Schoemaker, 2000; Hamel, 2000; Overdorf, 2000; Tushman and Anderson, 1986).

The desire to maintain a stable and efficient context to satisfy mainstream market demands, forces many organisations into a focus on the ‘familiar’, the ‘mature’ and the ‘proximate’. Thus most organisations fall into learning traps preventing them from ‘exploring’ potentially disruptive ideas (Abuja and Lampert, 2001). In addition the problem types created by these standard business routines actually hinder truly creative thinking (Unsworth, 2001).

It would appear that the fundamental nature of disruptive innovation necessitates organisations to lead and not follow (Baden-Fuller and Pitt, 1996). Market research, however, can provide little or no benefit for exploring the potential of disruptive ideas, in fact it can even obstruct radical idea development (Trott, 2001).

If an organisation manages to foster a potentially disruptive idea, not only does it often face huge problems getting internal support (Rice et al, 2001) but there are massive obstacles to overcome to get it adopted by the mass market. Moore (1995) addresses the obstacles faced by companies trying to ‘cross the chasm’ from early market acceptance to gain the support of the ‘early majority’ and how to deal with the problems that occur when early majority begins to rapidly adopt the new technology or change. He shows that disruptive innovation only begins to be truly realised when the marketplace shifts to adopt a new paradigm in what he calls the “tornado” of adoption. Once the tornado begins it is not long before the majority of potential customers in the marketplace have undergone dramatic change in their past behaviour with the promise of gaining equally dramatic benefits from the new paradigm.

New paradigms represent discontinuities in trajectories of progress as defined within earlier paradigms - where a technological paradigm is a pattern of solutions for selected technological problems (Dosi, 1982). In fact, new paradigms redefine the future meaning of progress and a new class of problems becomes the target of normal incremental innovation (Dosi, 1982). Thus for a discontinuous innovation to be disruptive, successful exploitation is vital, which, results in significant transformation of the mainstream market and its value proposition.

Established firms decisions' to ignore technologies that do not appear to address their customers' needs become fatal when two paradigmatic trajectories of progress interact. Christensen (1997) uses the term 'disruptive innovation' to explain the impact of this interaction. Building upon the understanding of the effect of new technological paradigms he uses the notion of the 'value network' - "the context within which a firm identifies and responds to customers' needs, solves problems, procures input, reacts to competitors and strives for profit" (Christensen, 1997, p.31). As performance demanded by the customers of a value network increases over time so does the performance provided within a technological paradigm. Quite often the performance improvement provided has a different trajectory to the trajectory of performance improvement demanded by customers in the value network. When the trajectory slopes differ and performance provided exceeds performance demanded new technologies that were only performance-competitive in remote value networks may migrate into the low end of other networks. This provides innovators with a vehicle to new customers, who would have previously viewed the innovation as substandard; and enables them to offer established mainstream markets a new set of performance value attributes that are now more relevant than the current paradigm.

Thus the evolution of the value networks surrounding emerging or niche markets, that have not been satisfied by existing paradigms, can significantly disrupt and threaten key players in mainstream networks. Such change significantly affects the rise and fall of populations within organisational communities (Astley, 1985).

The extent of disruption that major breakthroughs cause can be broken down into subgroups of 'product' and 'process', furthermore, these can be either 'competence-destroying' or 'competence-enhancing' (Tushman and Anderson, 1986). Competence-destroying discontinuities are highly disruptive, requiring new skills, abilities and knowledge, are initiated by new entrants – or spin-off companies (Christensen, 1997; Hamel, 2000). They increase environmental turbulence and market uncertainty, usually delivering a new product class, a significant product substitute or a radical new way of making a product. Alternatively, competence-enhancing discontinuities “represent an order-of-magnitude improvement over prior products, yet build on existing know-how” (Tushman and Anderson, 1986, p.442). They are associated with little or even decreased environmental turbulence and reduced market uncertainty. Thus, disruptive innovation occurs in both products and processes and is at the extreme end of the continuum of discontinuous innovation.

Veryzer (1998) showed that organisations could deliver commercial discontinuities, technological discontinuities and innovations that are both commercially and technologically discontinuous, with each requiring a different management approach. He showed how customers perceive the value attributes of a product or service are important to discontinuities with potential for disruptive innovation.

It has been shown that revolutionary product or service innovation involves the application of significant new technologies, or significant new combinations of technologies, to new market opportunities (Tushman and Nadler, 1986), this can be

developed through exploring: 'novel technologies', 'emerging technologies', and, 'pioneering technologies' (Ahuja and Lampert, 2001).

Hamel (2000) suggests that the system level is where the real benefits of 'non-linear' or disruptive innovation can be found. He states that organisations can disruptively innovate with products or services but the real value is only unlocked when the larger system is factored into the disruption. By unpacking the 'business model' and exposing it to disruptive thinking, Hamel states that 'Business Concept Innovation' occurs and that this is the real essence of revolutionary innovation, causing disruption to preconceived ideas, markets and entire value networks.

Thus, revolutionary innovations fall onto a continuum ranging from 'radical incrementalism' – that delivers significant change to the mainstream customer which, is mostly competence enhancing with low environmental turbulence and low market uncertainty - to 'disruptive innovations' – that deliver transformational change to the mainstream market and its value attributes which, are mostly competence destroying with high environmental turbulence and high market uncertainty.

Based on this understanding of disruptive innovation from the literature, the next phase of the research will identify how some organisations achieve disruptive innovation and what prevents most organisations from attempting disruptive innovation. Semi-structured interviews will be conducted within organisations selected for their innovative capability from these findings tools to support disruptive innovation will be developed, used and validated at four industrial partner sites. In this way it is intended that the research will help organisations to understand and enable disruptive innovation as a major competitive strategy.

## References

- Ahuja, G. and Lampert, C. (2001) Entrepreneurship in the Large Corporation: a longitudinal study of how established firms create breakthrough inventions. *Strategic Management Journal* **22**, 521-543.
- Astley, G.W. (1885) The two ecologies: Population and community perspectives on organisational evolution. *Administrative Science Quarterly* 224-241.
- Baden-Fuller, C. and Pitt, M. (1996) *Strategic Innovation*, Routledge, London.
- Betz, F. (1993) *Strategic Technology Management*, McGraw-Hill, New York.
- businesswire.com (2000) *Digital Disrupters Enables Companies to Thrive on Disruptive Innovation: Digital Disrupters(TM) Creates Groundbreaking B2B e-businesses in Unique Equity-Partnership Arrangements with Established Industry Leaders* (WWW document). Available at: <http://www.businesswire.com/webbox/bw.040500/200961158.htm>. Accessed 2001.
- Christensen, C.M. and Rosenbloom, R. (1995) Explaining the attacker's advantage: technological paradigms, organisational dynamics and the value network. *Research Policy* **24**, 233-257.
- Christensen, C.M. (1997) *The Innovators Dilemma: when new technologies cause great firms to fail*, Harvard Business School Press, Boston, Massachusetts.
- Day, G. and Schoemaker, P. (Oct 9, 2000) Don't Hesitate to Innovate. *Financial Times* Survey - Mastering Management edn, 6 The Financial Times Ltd. Hard Copy on File, Soft copy in z:/references/financial times (2000). Survey -

Mastering Management.

Dosi, G. (1982) Technological paradigms and technological trajectories. *Research Policy* 147-162.

Hamel, G. (2000) *Leading the Revolution*, Harvard Business School Press, Boston, Massachusetts.

Hill, C.W.L. and Jones, G.R. (1998) *Strategic Management: An Integrated Approach*, Houghton Mifflin Company, Boston, NY.

Johnson, G. and Scholes, K. (1997) *Exploring Corporate Strategy*, Prentice Hall, London.

Moore, G.A. (1995) *Inside the Tornado: Marketing Strategies from Silicon Valley's Cutting Edge*, HarperCollins, New York.

Overdorf, M. (2000) Meeting the Challenge of Disruptive Innovation. *Harvard Business Review* **March/April**, 69

Rice, M.P., Kelly, D., Peters, L., O'Connor and Gina Colarelli (2001) Radical Innovation: triggering initiation of opportunity recognition and evaluation. *R&D Management*, 31(4), 409-420.

Schumpeter, J.A. (1975) *Capitalism, Socialism and Democracy*, Harper & Row (originally published in 1942 by Harper and Brothers), New York.

Tidd, J., Bessant, J. and Pavitt, K. (1997) *Managing Innovation: Integrating technological, market and organizational change*, John Wiley & Sons Ltd, Chichester.

- Trott, P. (1998) *Innovation Management & New Product Development*, Pearson Education, Harlow.
- Trott, P. (2001) The role of market research in the development of discontinuous new products. *European Journal of Innovation Management* **4**, 117-125.
- Tushman, M.L. and Anderson, P. (1986) Technological discontinuities and organizational environments. *Administrative Science Quarterly* **31**, 439-465.
- Unsworth, K. (2001) Unpacking creativity. *Academy of Management Review* **26**, 289-297.
- Veryzer, R.W. (1998) Discontinuous Innovation and the New Product Development Process. *Journal of Product Innovation Management*, (15), 304-321.