Allocating Resources to Disruptive Innovation Projects: Challenging Mental Models and Overcoming Management Resistance


ABSTRACT

This research, based on four in-depth case studies, probes an overlooked unit of analysis in innovation management literature, namely management action and cognition, and offers a new qualitative contribution into resource allocation approaches that support radical innovation. The interpretivist approach revealed that a management team’s resource and path dependencies and prevailing mental models underpin resource allocation routines, which prevent managers from pursuing radical innovations. Of particular interest, were innovations that disrupt and re-shape the existing terms of economic engagement in established industries. It was found that managers with restrictive mental models will adopt up to five disruptive innovation rejection strategies: rewarding incrementalism; ignoring the positive aspects of disruptive innovations; focusing on historical perceptions of success; creating perceptions of success with high effort; and holding beliefs in the face of disconfirming information. Initial longitudinal data suggests rejection strategies can be overcome with holistic portfolio approaches.

INTRODUCTION

Foster and Kaplan (2001) conducted an analysis of the Standard & Poor’s index of 90 important US companies. An organisation joining the index in the 1930s could expect to remain listed for 65 years. This had dropped to just 10 years for companies joining in 1998. Today’s organisations face increasingly discontinuous business environments and it is well-recognised that firms need to periodically engage in the process of radical innovation for long-term survival (Foster and Kaplan, 2001; Betz, 1993; Christensen and Rosenbloom, 1995; Hamel, 2000; Schumpeter, 1975; Tushman and Anderson, 1986; Tushman and Nadler, 1986). However, while many companies achieve successful sustaining innovation, few organisations have established track records for undertaking repeated successful radical or disruptive change (Gilbert and Bower, 2002; Hamel, 2000). For example, an article in businesswire.com (2000) illustrates 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 innovations’.

Incremental and radical innovations offer performance improvements that lead-customers (McDonald et al., 2001) desire and expect (O’Connor and Rice, 2001; Rothwell, 1995; Christensen, 1997). However, occasionally revolutionary breakthroughs occur, with a discontinuous impact upon this steady state (Christensen, 1997; Dosi, 1982; Schumpeter, 1975). Discontinuous innovations offer revolutionary leaps forward in performance improvement, in directions that lead-customers desire, yet break the steady-state as they are not expected to be possible (Christensen, 1997;
DeTienne and Koberg, 2002). One type of discontinuous innovation is termed disruptive innovation. Disruptive innovations are characterised by processes, products, services or business models that offer lower performance along traditional trajectories. As such, they are under-valued by traditional lead customers and often generate lower gross margins. Perceived as “low-end” by industry incumbents, disruptive innovations introduce new types of performance criteria to niche markets. Through a period of exploitation and migration upstream towards higher-end customers, they eventually redefine the paradigms and value propositions on which existing industries are based (Christensen, 1997; DeTienne and Koberg, 2002; Charitou and Markides, 2003; Christensen and Overdorf, 2000). For example, Ryanair and easyJet have pioneered the low-cost-no-frills airline industry in Europe and, since they migrated into the frequent flyer markets, nearly all European air travel carriers are now trying to adopt the low cost model (Calder, 2003). Christensen (1997) and Gilbert (2002) propose that there are two ways to deliver disruptive innovation: “low-end” and “new-market” strategies. Both of these strategies are possible because many organisations get trapped into oversupplying their customers’ needs. This ‘performance oversupply’ creates a market vacuum into which disruptive innovations can be launched, by providing simpler propositions (Christensen and Raynor, 2003). Then a process of sustaining innovation allows the disruptive innovation to migrate upstream, eventually disrupting and transforming the traditional industry. Examples include:

- Canon’s introduction of simple table and desk-top photocopiers into small and medium sized enterprises, which eventually disrupted Xerox’s control of the high-speed photocopying industry.

- Seagate’s 5.25 inch disk drives used to launch the PC, which disrupted the more complex and more expensive 8 inch drives, produced for use in mini-computers by the likes of Shugart and Quantum.

Gilbert’s (2002; 2003) thesis of a new-market disruptive strategy states that companies can create or target emerging markets of ‘non-consumers’. That is, customers who have historically lacked the skill or money to buy and use the industry’s products. It is from this position, with incremental improvements, that they can build new net growth with more non-consumers and eventually enter and transform existing markets using the low-end approach. Examples include:

- eBay’s introduction of a facility whereby items, not saleable in traditional auction houses, could now be sold in a similar “to the highest bidder” fashion.

- Henry Ford’s introduction of comparatively inexpensive cars to non-auto consumers, transformed the traditional industry of expensive, customised car manufacturing.

The aim of this paper is to present research, based on four case studies, that offers a new qualitative contribution into resource allocation approaches that support radical and, in particular, disruptive innovations. The research found that resource and path dependencies limit freedom of action and cause managers to employ restrictive mental models that lead them to reject radical and disruptive innovations. This paper describes an intervention designed to help managers overcome common rejection strategies and evaluates its implementation in two of the case study organisations.

**RESOURCE ALLOCATION AND RESOURCE AND PATH DEPENDENCIES**
The key to organisational survival is the acquisition of resources from the external environment (Ansoff, 1965; Pfeffer and Salancik, 1978). Resource Dependency Theory (Pfeffer and Salancik, 1978) proposes that an organisation is dependent upon its economic environments, where dependencies are defined as the outcome of the level of importance that is attributed to a given resource (an input or output) and the extent to which it is controlled by the organisation or by other stakeholders in the environment. Hence, resource dependencies limit a management team’s freedom of action to satisfy the needs of those entities outside the firm that give it the resources it needs to survive. The primary stakeholders that give a firm the financial resources it needs to survive are its customers and investors (Ansoff, 1965; Pfeffer and Salancik, 1978). Customers provide an organisation with resources when they purchase goods and services that meet their needs and investors provide resources to garner a return on that investment by way of a share of the business/profits, dividend or interest (Ansoff, 1965; Pfeffer and Salancik, 1978; Burgelman and Sayles, 1986; Christensen and Raynor, 2003). Organisations with multiple products, numerous suppliers and various sources of investment are therefore less resource dependent than those with one core product category, or one major supplier or one primary investment channel. The management teams’ freedom of action is often limited to satisfying important existing customers and to producing adequate returns for its most demanding investors.

Resource dependency theory is a useful lens through which to consider how managers may develop and apply resource allocation routines that inhibit the pursuit of potentially disruptive products and services. When existing customers fail to express a need for a potentially disruptive proposition (for example, because it appears to offer a lower level of performance or is too different from the norm), a resource dependency perspective suggests that a manager is likely to ignore the disruptive concept and channel resources into improving the status quo in order to better satisfy the needs of this key resource stream (Burgelman and Sayles, 1986). Similarly, when investors demand rapid and significant returns on their investment, resource dependencies divert managers’ attention and finances away from disruptive innovation. The small markets from which disruptive innovations are likely to emerge do not appear to be attractive solutions to the growth needs of the company (Christensen, 1997).

The view that resource dependencies can restrict resource allocation routines, and therefore stifle the pursuit of disruptive innovation, can be further enhanced by the concept of path dependence (Penrose, 1995). In aiming to satisfy the key customers and investors that provide a firm with its resources, management teams develop organisational routines and processes that, over time, become embedded within the historical context of the business and its operations (Tidd et al, 1997). Evidence shows that decision choices regarding the future that are framed within the context of an organisation’s history are less likely to be met with resistance than those which migrate from the traditional path (Walsh and Ungson, 1991). Hence, “history matters; growth is essentially an evolutionary process and based on cumulative growth of collective knowledge” (Penrose, 1995:xiii). An organisation’s accumulated knowledge and experience of how it has delivered success will often manifest itself in management routines and processes directed towards satisfying its key stakeholders (Tidd et al, 1997; Christensen, 1997). These routines and processes create path dependencies that can often dictate (or at least significantly influence) the trajectory that is taken in the future, generating efficient allocation of resources for sustaining innovations. However, when an organisation’s core competencies are heavily path
dependent, they are liable to become its core rigidities when pursuing ‘new to the world’ or ‘new to the organisation’ product development (Leonard-Barton; 1992; Leonard, 1995; Ahuja and Lampert, 2001). Consequently, if path dependencies result in an inability to unlearn or to rapidly learn new competencies, corporate entrepreneurial activities, such as the pursuit of disruptive innovation, become inhibited (Leonard-Barton, 1992) and are attributed much higher perceptions of risk (Christensen and Raynor, 2003). Therefore, many organisations focus on historically dependent technological, product, or customer related paths, which support and enhance continuous innovation and compel managers to focus on innovations that sustain or at best improve the status quo.

The Polaroid Corporation was a world-leading producer of photography equipment from 1947 to 1997, yet it filed for Chapter 11 bankruptcy in October 2001. Analysis of the Polaroid case reveals that the primary reason for the collapse of the business was the top management team’s failure to embrace digital photo storage technology and their embedded ties to the technologies and business models that had delivered past success. The path dependence of Polaroid’s business development was nowhere more evident than in its corporate executives’ decision making processes. Thus, cognitive inertia had trapped Polaroid’s leaders into only supporting projects that sought to improve the status quo. This left the organisation vulnerable to the destructive forces of disruptive innovation (Tripsas and Gravetti, 2000).

RESOURCE ALLOCATION AND MENTAL MODELS

Bounded rationality introduces the concept that agents within a system do not always behave optimally, rationally or consistently and that their problem-solving strategies generally emerge through a process of self-discovery (Simon, 1957). The perspective that bounded rationality offers has inspired a generation of researchers, many of whom “…are starting to see how the choices we make are swayed by a complex range of factors such as emotions, social context and uncertainty… [in fact] when we weigh up the cost and benefits of various courses of action, we do not just consider the material gains but also the social and emotional ones” (Spinney, 2004:32-33). Understanding of these less rational decision-making mechanisms has been fruitfully extended by those contributing to the study of ‘mental models’ (Minksy and Papert, 1969), which are individually or socially constructed psychological tools that people use to construct, deconstruct and utilise knowledge (Senge, 1990). Teams will often share mental models that are built upon the common elements of each individual’s mental models, but are also guided by the dominant top executives’ perspectives (Senge, 1990). Mental models act as maps, at either the team or individual level, that help people to process information at faster rates, yet they also determine and influence the level of importance that is placed upon incoming information (Swan, 1997). Consequently, one of the strengths of mental models is that they enable people to create rapid and penetrating insights. However, a limitation is that in creating ways of seeing, they can also distort perspective and create ways of not seeing (Senge, 1990; Kiesler and Sproull, 1992). In other words, “…the way we see our options can colour the decisions we make” (Spinney, 2004:35).

Understanding the role of mental models in decision making reveals that people do not always behave congruently with their espoused aims. Instead, they behave congruently with their implicit, conscious and unconscious “theories-in-use” (Argyris
Thus, mental models can be used as a lens through which we can consider managers’ perceptions of resource allocation options and organisational bias towards incremental innovation. For example, managers who anticipate dissonance between an opportunity and their established mental models are generally expected to react to minimise or completely avoid the perceived potential discomfort that this conflict is likely to generate (Senge, 1990; Kiesler and Sproull, 1992; Harmon-Jones and Mills, 1999). Cognitive dissonance (Festinger, 1957) could therefore explain why potentially disruptive innovations fail to garner organisational support. Disruptive innovations are incongruent to the prevailing dominant mental models of the individuals with strategic resource allocation responsibilities. For example, Polaroid Corporation’s failure to embrace disruptive digital technologies illustrates the power of strong, deeply held mental models, especially those of an organisation’s top management team. Thus, a management team’s bias towards the status quo could be seen as a consequence of ‘cognitive dissonance avoidance’ (Festinger, 1957; Harmon-Jones and Mills, 1999).

Individuals actively avoid cognitive dissonance by attaching new values to the concept that is incongruent with their mental model, in order to generate a false assessment of the actual value of that concept (Festinger, 1957). The result is the rejection of incongruent ideas in an attempt to alleviate the presence of potential or perceived unwanted conflicting emotion (Harmon-Jones and Mills, 1999). Mental models may not only generate a skewed perception that underpins the failure to see the disruptive potential in a new concept, but they may also be a major psychological cause for the rejection of potentially disruptive innovations: “…many of the best ideas never get put into practice… because they conflict with deeply held internal images of how the world works, [as mental models are] images that limit us to familiar ways of thinking and acting” (Senge, 1990:174).

This research has investigated how resource and path dependencies and restrictive mental models can be overcome, by developing an intervention that challenges the current innovation mindsets of managers and the resource allocation routines used within their organisations.

**METHODOLOGY**

This research has adopted a case study approach (Yin, 1994: Eisenhardt, 1986), where four cases were selected to represent both manufacturing and service companies and small and large organisations. Within the cases, multiple data collection and analysis methods were used, including semi-structured interviews, questionnaires, workshops with participant observation, and document/email analysis.

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<th>PHASE</th>
<th>DATA COLLECTION TECHNIQUE</th>
<th>OBJECTIVES</th>
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<tr>
<td>Phase 1: Building initial understanding</td>
<td>- 4 x interviews (one with each of the four cases).</td>
<td>To build agreement of research process and initial understanding of funding barriers within each case.</td>
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<td>Email discussions.</td>
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<td>- 1 x three-day multi-organisational workshop (4 cases, 15</td>
<td>To better understand funding barrier and to generate a</td>
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Phase 1 of the research involved initial semi-structured interviews with a senior manager responsible for innovation in each of the four cases. Then a three-day workshop was held with 15 participants from across the four organisations. More in-depth interviews were then conducted by phone with two of the four cases (the manufacturing organisations). These two cases became the focus for the research. The first case study company is a small-medium sized plastics mouldings manufacturer (case A), and the second is the principal division of a large manufacturing company (case B). Multiple qualitative data collection techniques, as shown in Table 1, have been used within the cases over a 12 month period, including interviews, workshops and monthly informal email and telephone interviews between the researchers and managers in the case study companies. Interviews were recorded and transcribed and detailed notes were taken in the workshops and subsequently transcribed. The data

<table>
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<th>Phase 1</th>
<th>Participant view from managers of feasible solutions.</th>
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<tr>
<td>- 2 x semi-structured telephone interviews with cases A and B.</td>
<td>To conduct in-depth follow-up analysis.</td>
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### Phase 2: Building Deeper Understanding

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<th>Activity</th>
<th>Description</th>
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<tr>
<td>- 2 x semi-structured telephone interviews with cases A and B PLUS informal email and telephone conversations.</td>
<td>To gather in-depth data and present initial findings in order to iteratively home in on roots of problems.</td>
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<td>- CASE A: 1 x Two-day workshop with senior management team (5 participants), including tour of site.</td>
<td>To deliver more detailed understanding of funding barrier and individual requirements of solution types.</td>
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<tr>
<td>- CASE B: 2 x Telephone conferences with senior managers and engineers (4 participants in total).</td>
<td>To deliver more detailed understanding of funding barrier and individual requirements of solution types.</td>
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### Phase 3: Implementing Intervention

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<th>Activity</th>
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<tr>
<td>- CASE A: 1 x Two-day workshop with senior management team (5 participants).</td>
<td>To conduct a two-day implementation of the resource allocation intervention.</td>
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<tr>
<td>- CASE B: 1 x One-day workshop with senior management team and senior engineers (16 participants).</td>
<td>To conduct a one-day implementation of the resource allocation intervention.</td>
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### Phase 4: Building Management Implications

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<th>Activity</th>
<th>Description</th>
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<tr>
<td>- 3 x semi-structured telephone interviews with members of cases A and B (3 months, 6 months and 9 months after the interventions).</td>
<td>To conduct in-depth follow-up analysis.</td>
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<tr>
<td>- 2 x presentations on the intervention from senior managers of cases A and B to a wider research group (2 months after the interventions)</td>
<td>To ensure no researcher bias of the evaluation.</td>
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<td>- 1 x 1-day multi-organisational workshop with Cases A and B plus business leaders from two businesses within a wider research group, to clarify, analyse and discuss the implications.</td>
<td>To confirm and validate the insights and implications drawn from the researcher-led interventions within a broader organisational context and within the literature.</td>
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Table 1. A research plan to investigate inappropriate finding routines.
have been analysed using qualitative data analysis methods (Miles and Huberman, 1994; Strauss and Corbin, 1990) to identify common themes. After the implementation of the interventions, which were designed by the researchers, follow-up interviews were conducted with the participants who attended the intervention workshop to aid its evaluation. These were also recorded, transcribed and analysed for dominant and recurrent themes.

UNDERSTANDING RESOURCE ALLOCATION ROUTINES: AVOIDANCE OF DISRUPTIVE INNOVATIONS, AN ISSUE OF MINDSET NOT FORMAL PROCESS

How managers allocate their time and resources is a complex dynamic, which is diffused throughout all levels of the business. This makes resource allocation a difficult issue to manage, especially when trying to foster the pursuit of disruptive innovation. Analysis of the data captured by this investigation revealed seven common factors that influence resource allocation processes to favour sustaining innovation: senior executive and senior management values; prevailing cost structures; opportunity size threshold; management development systems; incentive and compensation schemes; customers’ actions and competitors’ actions, as shown in Figure 1.

![Resource Allocation Influencers Diagram](image)

Figure 1: Influencers of the resource allocation processes that are inappropriate for disruptive innovation

These results revealed an unexpectedly high number of value-based influences, as opposed to mechanistic financial techniques and measures. Figure 1 was discussed
with the participating managers using the perspectives of resource and path dependencies and mental models and each factor was found to be attributable, to a greater or lesser degree, to these phenomena.

‘Senior and executive management values’ were observed to have the most significant impact on the resource allocation process, where resources allocation options were limited due to managers’ shared, deeply ingrained, assumptions and generalisations and even images of the role of innovation and their organisation. These assumptions, values and images influenced how the managers understand the world and how they take action, yet an explicit awareness of these shared images was virtually non-existent and an understanding of their impact was almost entirely missing. Despite espousing support for innovation that goes beyond incrementalism, the managers had mental models which only supported a “more of the same” approach.

The data collected and analysed in Phases 1 and 2 of the research revealed that managers were reporting that they were simply “not comfortable” with allocating resources to concepts that were not valued by traditional lead-customers. This was especially true for concepts that also lowered performance along traditional trajectories, whilst potentially offering lower gross margins. The data demonstrated that this was as a result of the practitioner's cognitive processes. Later in phase 2 data collection, the researchers described and presented a common problem that was occurring across the cases. When presented with potentially disruptive opportunities, managers reported that they recognised and felt the existence of inconsistencies between the new opportunities and their current understanding of innovation and their organisation’s goals. The conflicting perceptions between the current business situation and new opportunities with disruptive potential led to feelings of uneasiness and conflict. The existence of such conflict creates a cognitive reaction to reduce the dissonant feelings, which ultimately results in the rejection of the potentially disruptive opportunities in order to alleviate the uneasiness. In both cases, the interviews with managers about the “anti-disruptive cognitive process” facilitated a deeper analysis of past and present situations in which potentially disruptive opportunities were present. This led to the finding that despite the importance of formal resource allocation mechanisms, the issue of unsupportive and restrictive mental models was the primary cause for the bias towards sustaining innovation.

Data analysis from both cases revealed that the top management teams shared deeply ingrained assumptions, generalisations and images of their organisations, which led to incremental innovation strategies. For example, despite espousing the aim of delivering radical innovations in multiple markets, the top management of case A were firmly attached to a singular model of their business. Loyalty to this model and their core product range ensured that their plastic mouldings technologies and competencies, although applicable to other sectors, remained focused in one particular market. This shared mental model prevented the application of their knowledge to develop products for unfamiliar markets and also prevented them from properly perceiving the disruptive threat of their competitors.

The researchers concluded from the phase 1 and 2 data collection that to overcome the barrier of restrictive mental models, the implementation of new financing processes and strategies alone would not work. Senior management would need tools or interventions to help them to understand how their current mental models determine a
fixed and narrow view of innovation, leading to incremental product strategies. Managers need to be able to see how their current actions, which are driven by their cognitions, lead to the rejection or mismanagement of potentially disruptive innovations. In fact, Senge (1990) predicts that a major breakthrough in the practice of organisational management in the future will be “… the discipline of managing mental models – surfacing, testing and improving our internal picture of how the world works” (p170).

UNDERSTANDING RESOURCE ALLOCATION ROUTINES: THE DEVELOPMENT OF A PORTFOLIO BASED TOOL TO PROBE MECHANISMS AND MINDSET

Data analysed from Phase 1 of the research process, which included a three-day cross-functional workshop, interviews and email discussions, and involved senior managers from all four case study organisations, showed clear evidence of a disconnection between potentially disruptive innovations and resource allocation. Senior management from each of the case studies reported perceived inadequacies in their current funding routines. To overcome path dependence and reduce the impact of inappropriate funding routines, which prevent disruptive innovation opportunities from being pursued, five themes emerged from the data analysis. First, the research participants felt that they needed “help to see the whole innovation playing field – not just incremental innovations”, thus facilitating the identification and support of potentially disruptive opportunities. Secondly, there was a need for “help to legitimise the allocation of resources to potentially disruptive opportunities”. Thirdly, the participants felt they needed access to “best practice funding guidance”, help to communicate the importance of disruptive innovation to employees and help with the different approaches required to develop and market such innovations. Fourthly, they wanted methods or tools to help to prevent dominant managers or projects with a dominant history from soaking resources away from disruptive opportunities. Finally, the research participants wanted support to maximise the benefits from investment into innovation. They wanted to prevent project gridlock, to better deliver strategic aims and to achieve a balanced funding of both incremental and potentially disruptive projects.

The initial phases of the research showed that if managers could see how and why they inhibit the allocation of resources to disruptive innovations, then they would be in a better position to overcome their bias towards incrementalism. To achieve this, it was decided that a visual tool, which can deliver an holistic understanding of the innovation situation, should form a large component of the intervention. Thus the intervention needed to expose and explain the prevailing mental models that were at the root of the management teams’ resource allocation barrier and enable them to see differently. Portfolio Management is a recognised and trusted, graphically based management tool, utilised by senior management teams within many of the world’s most innovative organisations (Cooper et al., 1999; Cooper et al., 2001). Using graphical and visual techniques to deliver an holistic understanding of innovation activity, Portfolio Management methods help to improve resource allocation decisions. However, there are very few references to the pursuit of disruptive innovation in the publications of the leading edge Portfolio Management thinkers. Furthermore, Portfolio Management methods, in their current form, have not been developed to
encourage the funding of potentially disruptive initiatives (Christensen, 2003). Despite claims to the contrary, nearly two-thirds of approximately 300 organisations, participating in a recent on-line conference on disruptive innovation, stated that they believed that portfolio approaches are the best way to deal with the unpredictability of innovation that moves beyond the steady state (Christensen, 2003). The authors therefore developed the intervention based on Portfolio Management tools, calling it the Disruptive Portfolio Management tool. Like other portfolio approaches, the Disruptive Portfolio Management tool was designed to provide an holistic understanding of innovation activity. However, unlike other portfolio approaches, the Disruptive Portfolio Management tool integrates a state of the art understanding of disruptive innovation. It was designed to enable participants to understand why disruptive opportunities had not been easily financed in the past, and to help to justify investment into potentially disruptive projects in the future.

Figure 2. Case B’s restricted mental model of innovation

The managers in both cases traditionally favoured financial measures for assessing innovation initiatives. However, a concentration upon financial measures delivers the worst performing portfolios (Cooper et al, 2001). Therefore, the authors designed and prepared an innovation project assessment process, founded upon a series of questions, presented in a questionnaire format, called the dimensions ranking checklist. The dimensions ranking checklist has two objectives. The first objective is to assess individual innovation initiatives on a range of standard Portfolio Management measures, combined with a cluster of new qualitative and quantitative measures focused on disruptive innovation characteristics, in order to gauge the “disruptive” impact of the initiatives under consideration. The second objective is to assess individual innovation initiatives at varying stages of maturity, from an early stage innovation idea/concept to an advanced innovation project. When the approach was implemented in Cases A and B, each organisation selected at least 10 high priority innovation projects and a small selection of recently killed initiatives for assessment. The output from the completed checklists was mapped onto seven large scale portfolio maps (an example of one is shown in Figure 2) or “Bubble Diagrams”, where projects are plotted on 1m^2 X-Y axes against different parameters such as degree of technical risk, degree of change required and so on. Four of the maps were standard portfolio management views and three were designed to specifically capture disruptive innovation. The aim was to present to each of the senior management teams an holistic graphical representation of their portfolio of innovation projects. A one day
workshop was designed to introduce the concept of disruptive innovation to the full senior management team responsible for innovation strategy and resource allocation. The participants were then facilitated through a review and discussion of the data presented on each of their seven portfolio maps, which had been prepared in advance of the workshop, based on their responses to the dimensions ranking checklist.

UNDERSTANDING RESOURCE ALLOCATION ROUTINES: THE IMPACT OF MENTAL MODELS AND THE IDENTIFICATION OF FIVE DISRUPTIVE INNOVATION REJECTION STRATEGIES.

The analysis of phase 2 and 3 data revealed managers’ use of five cognitive strategies, all used to reduce the feeling of uneasiness that accompanies potentially disruptive innovations, leading to their ultimate rejection.

Rejection Strategy 1 - Rewarding incrementalism:
It was observed, in both cases, that the prevailing explicit and implicit rewards had a negative effect upon managers’ decisions to fund potentially disruptive opportunities, where explicit rewards include financial incentives and promotions, and implicit rewards include a sense of belonging and respect from peers (Unsworth, 2001; Amabile, 1997). The rewards reduced creativity and caused management to disregard any evidence which suggested that the resources within their organisation’s existing and primary technologies or business models may be put to better use in opportunities differing to current practice.

For example, in Case B, it emerged that job creation was an important implicit performance measure that was rewarded by top management. Thus, the initiation of new product development projects for small niche markets, as characterised by disruptive innovations, gained little support in comparison to investment opportunities with familiar technologies that could generate immediate large scale job creation. In fact, in the 1990s, this implicit reward had driven Case B to incrementally increase the scope and quality of the specification of a contract with the US government. Consequently, when the customer cancelled the order, because of policy change and major technological over-supply, Case B suffered a significant setback. In Case A, explicit rewards were focused upon current production line enhancements, once again steering management’s attention towards incremental product development strategies. Moreover, both cases A and B appeared to display an “Emergency Room” culture (Allen et al., 1999), especially case A. This was characterised by the existence of implicit rewards for the ability to conduct ‘rapid fire’ analyses of situations, where judgements need to be made quickly, along with prompt action. When implicit rewards exist for reacting quickly, making fast assumptions and insisting upon quick action, there appears to be little support for suspending judgement, building empathy for new ideas and nurturing potentially disruptive concepts. When such a culture dominates and is rewarded, creativity would seem to be reduced and new ideas are quickly killed. This prevents ideas for potentially disruptive innovations from being developed or shared between individuals or across organisational boundaries. The experience of cognitive dissonance, when presented with a potentially disruptive opportunity, can encourage managers to focus their attention upon prevailing explicit and implicit incentives as a strategy to reward sustaining change and to reject potentially disruptive alternatives.
**Rejection Strategy 2 - Ignoring positive aspects of disruptive opportunities and/or removing the negative aspects of sustaining innovation:**

Participants of the Disruptive Portfolio Management interventions, from both cases, admitted to past occasions where they had rejected potentially disruptive opportunities, in favour of sustaining innovation. They had removed the positive aspects of the rejected disruptive innovation prospect and/or removed the negative aspects of the chosen sustaining innovation initiative. For example, in case A, the management team had recently faced a resource allocation dilemma between two dissonant project options. Should they either increase the allocation of resources to a project that was to deliver a new high-end product in their existing core range, or alternatively invest resources into a project with disruptive potential in a new and totally different emerging market?

For the first option, the senior management were insistent that they could deliver new wealth generation by educating customers to move into the high performing end of their market, where they forecasted higher revenues and higher margins. In doing so, they ignored the evidence, which showed that most of their customer losses were to be found at the low-end of the market. In addition, the high-end of the market was small, shrinking and already saturated. Much of the customer base, it would seem, had been oversupplied with performance by the traditional industry incumbents and were now happy to purchase cheaper, lower quality, substitute products from China.

For the second option, evidence showed that the emerging market within the unfamiliar industry could provide Case A with a new high margin revenue stream. However, this market was currently small, albeit with the potential for large growth in the future. Competitive intensity within the market for the new concept was low and the current players were ignoring non-consumers and low-end customers who were in a situation of massive technology oversupply. Furthermore, the current players did not have Case A’s technologies, facilities or competencies and would struggle to deliver the potentially disruptive proposition, which was based upon a cluster of simpler technologies.

Despite the evidence, the potentially disruptive opportunity was labelled by the senior management team as too risky for two reasons. Firstly, they felt the emerging market was not yet large enough and secondly, they were too unfamiliar with the emerging industry. The positive aspects of the opportunity with disruptive potential were removed and the lack of promise in manufacturing high-end products was ignored.

When presented with a potentially disruptive opportunity, prevailing mental models may encourage managers to employ strategies where they ignore the positive aspects of potentially disruptive opportunities and/or remove the negative aspects of sustaining alternatives.

**Rejection Strategy 3 - Focusing upon historical perceptions of success:**

“We’ve always been the world leaders in 'product X’”, said the director of R&D in case B, “we are the best in the world. No-one can make those like we do’”. The more the management team in Case B understood the principles of disruptive innovation, the more they were comfortable with the idea that they could generate ‘disruptions’ in unfamiliar market places. However, past success, with world-leading technologies, made many of them believe that they would not be disrupted in their
current mainstream markets, despite preliminary evidence of technology over-supply in several core product categories. Christensen (1997) notes this is a key indicator of a significant vulnerability to disruptive change. Similar evidence was present in Case A.

It seemed that an organisational memory existed within both organisations for the factors that have been responsible for past success. This had then become embedded in cognitive processes and management actions. Consequently, prevailing perceptions of success were preventing the managers from visualising or embracing the potential for disruptive change in their primary technologies and customer offerings. Ideas that were incongruent with the historical paths of Cases A and B were dissonant to prevailing mental models and were deprived of resources. However, it was observed in both cases that the notion of taking current technologies and competencies to unfamiliar markets with disruptive strategies was a more appealing proposition than ‘self cannibalisation’ (Chandy and Tellis, 1998). Despite this glimpse of potential, the commercial newness involved in entering unfamiliar markets with such strategies was deemed high-risk, making sustaining innovation the preferred ‘safer’ investment option.

Psychological inertia, caused by organisational memory and engrained management routines, creates a focus upon historical perceptions of success, hence potentially disruptive opportunities are rejected in favour of alternatives that sustain the status quo.

Rejection Strategy 4 - Creating a perception of success in relation to high levels of effort:
Evidence in the data, linked to the amount of effort expended on current innovation initiatives, points to another cognitive strategy employed by managers to avoid potentially disruptive innovations that are incongruent with prevailing mental models, which legitimise the allocation of resources to sustaining innovations. Managers from both cases A and B cited examples of prestige innovation projects, where significantly large amounts of effort were being invested. The targets of the high-activity, prestige projects were nearly always the improvement of highly mature products and/or next generation technological advances for familiar markets. The data analysis revealed a correlation between the amount of reported effort that management teams had invested into their prestige projects and the perception of attractiveness of the outcome of this resource allocation.

In case A, for example, resources invested into prestige projects were targeted at improving core offerings, to retain market share and to remain competitive with insurgent Chinese rivals. It was observed that in the face of growing year-on-year competition, managers committed increasing levels of effort, yet achieved decreasing levels of benefit. Despite performance analysis, which illustrated that such project teams had reached the point of diminishing returns, senior management appeared keen to exaggerate the benefits of their high-effort projects, both in their own minds and to the rest of the business.

In both cases, the more effort the management teams had invested into their prestige projects, the more they sought to exaggerate the attractiveness of the outcome of this resource allocation. Perceived attractiveness was, therefore, linked to effort and appearance and not always to measured benefits. The perception of exaggerated attractiveness provides insights into the cognitions of managers faced with the choice...
of allocating resources to a project delivering a sustaining or potentially disruptive innovation. The research shows that the experience of dissonance generated by the incongruence of an investment option and a prevailing mental model can be alleviated by deciding to fund a more perceptually desirable alternative. Hence, unjustly attractive, high-effort sustaining innovations can continue to receive resources to the detriment of potentially disruptive alternatives.

The more effort that is seen to be put into sustaining innovations, the more managers can be inclined to perceive the outcome as desirable. This allows management to add consonant cognitions to such organisational behaviour and explains the maintenance of the preference for sustaining innovations in two ways: Firstly, they appear to contribute to the grand historic effort of the business. Secondly, they are more likely to require large amounts of resources immediately and they aim to deliver some immediate measurable benefit, thus increasing the perception of contribution and comprehensiveness. This is different to potentially disruptive opportunities, which often offer longer term benefits, or small but growing benefits, but may require less resources.

Rejection Strategy 5 - Holding beliefs in the face of disconfirming information:
The final rejection strategy, employed in both cases A and B, was simply the dismissal, refutation and/or misinterpretation of information that was inconsistent with the beliefs of the managers. Case B, for example, had identified a potentially disruptive business opportunity in an unfamiliar market. They had managed not to succumb to the previously mentioned rejection strategies and a development project had been initiated, using a borrowed resources. The senior members of the project team kindly agreed to share their potentially disruptive concept with the authors, for the benefit of the current research and in return for a workshop that introduced a summary of best practice guidance and advice on the implementation of disruptive strategies, from academic literature. Concordantly, a one-day interactive workshop was designed and implemented with the senior members of the project team and an additional cross-functional support group from other areas of the business. There were 32 participants in total who took part in the workshop. On concluding the workshop, 80% of the group who were non-project members reported that the day had contributed “high benefits” to their professional development, and their understanding of disruptive innovation and 20% reported “medium-to-high” benefits. All of these people reported that they believed the concepts and frameworks that were discussed would help the project succeed. Conversely, 80% of the senior members of the project team reported their disappointment with the notion that disruptive innovations are generally more successful when initially launched with comparatively small projects for specific niche markets. In fact, the distinct majority of this group dismissed the information and sought to persuade other participants within the workshop to do the same. They reported that they believed in the potential of their concept so much that they hoped the outcome of their development project would be able to compete directly with industry incumbents in the mainstream market. Hence, they simply chose to ignore the disconfirming information, believing instead that it was appropriate to launch a multi-million dollar, 5-10 year project, using a mass market sustaining innovation model. This also suggests that the project management team were also succumbing to rejection strategy 4 of creating a perception of success in relation to high levels of effort.
Of the participants involved in this research that struggled, failed or refused to accept the notion of disruptive innovation, all could be considered as competent and diligent managers, who wanted the best for their organisation. It appeared that there was an instinctive impulse to overvalue the beliefs that were held by the bulk of their influential peers. Thus, if an organisation’s influential majority focus upon sustaining innovation, it appears to be difficult to resist this path of development. Both cases A and B lacked an active community of practice which could influence managers to embrace the notion of disruptive innovation. Without an influential majority, the concepts and frameworks were rejected.

The psychological discomfort experienced when new potentially disruptive ideas challenge ingrained assumptions can compel some managers to hold onto their familiar beliefs and to misinterpret the potentially disruptive opportunity, rejecting it as an unviable investment option.

**Disruptive Innovation Rejection Strategies – implications and propositions:**
The identification of five commonly used disruptive innovation rejection strategies is a novel contribution to the literature on disruptive innovation. Furthermore, as each strategy appears to have a significant impact upon the pursuit of innovations that are characterised as counter-intuitive or counter to historic trajectories of development. This finding also has important implications for executive management teams. Table 2 provides a quick overview of these primary implications and propositions that were drawn from the data in a cross-case analysis with management practitioners from Cases A and B and two organisations from the wider research group.

<table>
<thead>
<tr>
<th>Rejection strategy</th>
<th>Primary implication</th>
<th>Proposition derived in collaboration with the industrialists.</th>
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<tbody>
<tr>
<td><strong>Rewarding incrementalism</strong></td>
<td>Mental models and how an organisation’s key innovation stakeholders are incentivised, appear to interact to have a significant impact upon the pursuit of innovations that are characterised as counter-intuitive or counter to historic trajectories of development, such as potentially disruptive opportunities.</td>
<td>If executive teams intervene with the reward systems within their organisations they may be able to ensure the simultaneous pursuit of sustaining and disruptive innovations. Particular attention must be given to uncovering and changing both implicit and explicit incentives and rewards that undermine the pursuit of innovation that moves beyond the steady state.</td>
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<td><strong>Ignoring positive aspects of disruptive opportunities</strong></td>
<td>The simultaneous pursuit of sustaining and disruptive innovations appears to be dependent upon an environment where managers do not feel compelled, either consciously or unconsciously, to ignore the positive aspects of potentially disruptive opportunities and/or remove the negative aspects of their sustaining alternatives.</td>
<td>If management teams ensure that both they and their staff are able to see and evaluate the ‘true’ value and benefits of an innovation opportunity, regardless of its ‘type’, then they may be more likely to ensure the pursuit of disruptive innovations.</td>
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<tr>
<td><strong>Focusing upon historical perceptions of success</strong></td>
<td>Executive management teams and the stakeholders of organisations who see the pursuit of disruptive innovations as paramount to the longevity of the business, will struggle to allocate resources to non-sustaining innovations</td>
<td>If an executive teams can ensure that their workforce is proud of its history but not tied to it, core competencies may be less likely to become ‘core rigidities’ (Leonard-Barton, 1992) in the face of potentially disruptive opportunities.</td>
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if the workforce is tied to its history and historical perceptions of success. Opportunities. Efforts to celebrate an organisation’s competencies whilst also preparing to both learn and unlearn for the future are likely to encourage the pursuit of disruptive innovations.

Creating perception of success with high effort
Managers may become ‘blinded’ by the ‘prestige’ that accompanies high levels of effort invested into an innovation initiative.

If managers intervene with how success is measured in their organisation, paying particular attention to uncovering the false perceptions of success attached to high-effort projects that are actually delivering diminishing returns on investment, they may be able to avoid wasting resources on high-profile, redundant sustaining innovations.

Holding beliefs in the face of disconfirming information
Managers are often compelled to hold onto their familiar beliefs and to misinterpret information when deeply ingrained assumptions are challenged and psychological discomfort is experienced as a consequence; without unearthing mental models, it will be difficult to challenge them with disconfirming information.

If executive managers uncover the deeply entrenched beliefs that undermine the pursuit of innovation that moves beyond the steady state they may be better prepared and more able when propagating the notion of disruptive innovation.

Table 2: Primary Implications of the Five Rejection Strategies

CHANGING MINDSETS WITH GRAPHICAL PORTFOLIO MANAGEMENT: EVALUATING THE INTERVENTION

For Case A, five of the senior managers of this small-medium sized company completed the dimensions ranking checklist and attended a disruptive portfolio management workshop. For Case B, 16 senior managers of this large organisation completed the checklist and attended a workshop. The intervention, using visual portfolio maps, allowed managers from both cases to see emerging patterns in their approach to innovation and forced to start a critical discussion. This enabled the senior managers to better understand the weaknesses and strengths of their individual innovation projects, but perhaps more importantly, to understand the overall picture of multiple innovation projects. This could then help them to more actively consider increasing numbers of disruptive innovation projects in future. The management teams in both cases reported that they now have, for the first time, “an holistic understanding of the entire innovation playing field”. Immediately following the intervention, the teams stated that they felt convinced about the importance of disruptive strategies and felt that they could now more easily legitimise the allocation of resources to the pursuit of disruptive innovation. Management meetings to discuss innovation become significantly more focused on the task in hand when graphical maps are used to illustrate an holistic view of innovation activity. “What we’ve delivered in this workshop in two days would have taken us weeks without your help, and we still wouldn’t have been able to see what was really happening” said the managing director of case A. Furthermore, this positive feedback was reiterated two months after each intervention, in follow-up interviews. Case A went on to cancel several projects, which were leading them down an incremental improvement path, with little likelihood
of success, because customers were becoming increasingly unwilling to pay more for enhancements to the existing products. They perceived that this had saved them considerable time and money. Case B now routinely ring-fence 5% of their annual innovation budget for disruptive innovations and a further 20% for radical innovation projects. This funding has been diverted from incremental innovation projects. In addition, a follow-up interview nine months after the intervention revealed that they now use the dimensions ranking checklist and disruptive portfolio management process in their annual strategic review of innovation to keep them focused on a more diverse innovation portfolio than they had previously pursued.

CONCLUSIONS

The cases have provided an excellent insight into the resource allocation routines problem, highlighting the five rejection strategies employed by managers that prevent disruptive innovations from being invested in: rewarding incrementalism; ignoring the positive aspects of disruptive innovations; focusing on historical perceptions of success; creating perceptions of success with high effort; and holding beliefs in the face of disconfirming information. The results of this research show that the barriers to allocating resources to disruptive innovation can be addressed. Graphical portfolio maps can be used to illustrate an holistic view of the innovation activity and to create an understanding of the resistance to supporting potentially disruptive projects that is otherwise very difficult to achieve. These holistic graphical representations contribute to improved dialogue and communication. This generates more directed, yet open, discussion and prevents one person or one group from dominating the resource allocation process. Holistic tools such as the disruptive portfolio management tool can, with positive effects, increase managements’ self awareness of their mental models and their impact. It is essential to reduce the perception of risk surrounding potentially disruptive innovation in order to remove the barriers to resource allocation for these projects. Reducing the perception of risk can be achieved through the combination of knowledge on the theory of disruptive innovation; recognition of resource and path dependencies and prevailing mental models and an understanding of why potentially disruptive opportunities have been discontinued in the past; and an holistic view of innovation activity, which can be used to legitimise the ring-fencing of resources for potentially disruptive initiatives.

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REFERENCES


