

**DISRUPTIVE INNOVATION:  
ENABLING PRACTITIONERS TO TACKLE THE  
“INNOVATORS DILEMMA”  
WITH GRAPHICAL TECHNIQUES.**

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**ABSTRACT**

This paper presents the findings of part of a 30 month investigation, conducted to better understand the persistent failure of management practitioners to fund potentially disruptive innovations. A Mode 2 case study strategy was employed. The iterative transfer of knowledge, between four industrial cases and academia, has successfully culminated in new academic understanding of disruptive innovation and guidance for practitioners. It was found that funding decisions are mainly constrained by mental not physical processes. Organisations wishing to pursue disruptive innovations can challenge psychological attachments to incrementalism, and overcome the funding barrier, with a holistic understanding delivered through graphical portfolio tools.

**INTRODUCTION**

Organisational innovation effort is traditionally focused upon performance improvement in attributes most valued by the most demanding customers - those willing to pay higher prices. Thus, both incremental and radical innovations offer performance improvements that lead-customers [1] desire and expect [2, 3, 4]; however, occasionally revolutionary breakthroughs occur with a discontinuous impact upon this steady state [4, 5, 6].

Conventionally, discontinuous innovations offer revolutionary leaps forward in performance improvement, in directions that lead-customers desire, yet break the steady-state as they are not yet expected to be possible [4, 7]. However, there is a type of lesser understood discontinuity, known as 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 [4, 7, 8, 9]. For example, Ryanair and easyJet have pioneered the low-cost-no-frills airline industry in Europe and, by migrating into the frequent flyer markets, nearly all European air travel carriers are now trying to adopt the low cost model [10]. Christensen [4] and Gilbert [11] were the first to propose that there are two ways of delivering disruptive innovation - “low-end” and “new-market” disruptive strategies. *Both gain their energy from the fact that organisations get trapped into oversupplying their customers’ needs. ‘Performance oversupply’ creates a vacuum into which disruptive innovations can flourish by providing simpler propositions [12].*

Christensen’s [4, 12] low-end disruption thesis (Figure 1), states that performance oversupply leaves organisations vulnerable to new, simpler propositions entering the industry from below. A process of sustaining innovation, from the low-end niche

market, allows the disruptive innovation to migrate upstream, eventually disrupting and transforming the traditional industry. Examples include:

- Cannon’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 Personal Computer, which disrupted the more complex and more expensive 8 inch drives, produced for use in mini-computers by the likes of Shugart and Quantum.

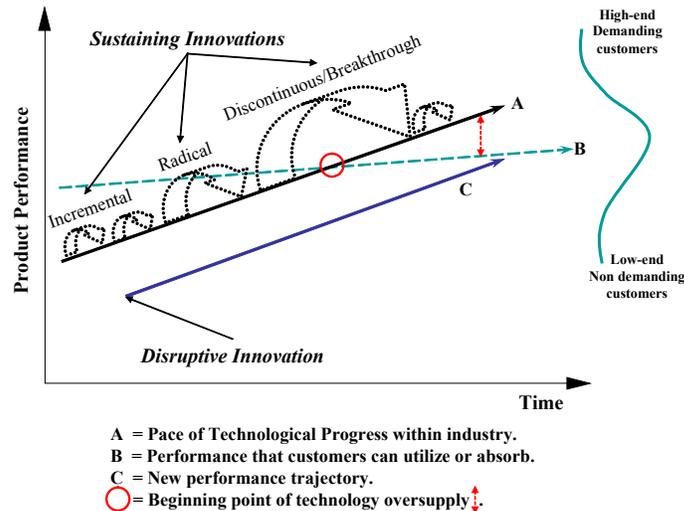


Figure 1. Revolutionary innovation as a disruption from below [12].

Gilbert’s [11, 13] thesis of a new-market disruptive strategy (Figure 2), states that industries can create or target emerging markets of ‘non-consumers’ - customers who have historically lacked the skill or money to buy and use their 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 sellable 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.

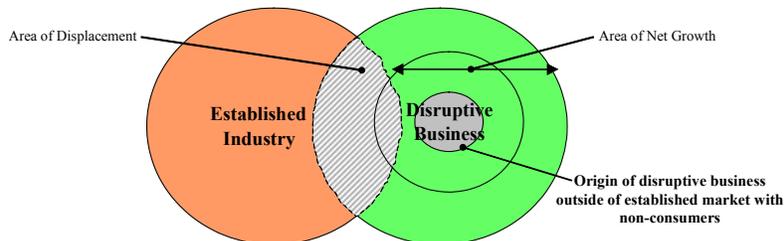


Figure 2. New-market disruption [11].

Foster and Kaplan [16] 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. Clearly, today’s organisations face increasingly discontinuous business environments and it is well-recognised that firms need to periodically engage in the process of revolutionary innovation for long-term survival [15, 16, 4, 17, 18, 6,

19, 20]. However, while many companies achieve successful sustaining innovation, few organisations have established track records for undertaking successful revolutionary or disruptive change [4, 21, 18]. For example, an article in businesswire.com [14] 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'. The perils of continuity are stronger than ever [15, 18]. Thus a vital question in the strategic management of an organisation is: How can the business of today successfully innovate - to generate, develop and exploit ideas - in order to deliver *revolutionary new wealth creation* and *long term survival* for tomorrow? The answer, it would appear, could be found in a better understanding of disruptive innovation.

The authors are involved in leading a 30 month research project tasked with investigating disruptive innovation and practitioners' continual mismanagement of the phenomenon. The first stage of the research project identified four top barriers to disruptive innovation: (1) the strategic importance of disruptive innovation is not understood; (2) there exists an inability to recognise or generate disruptive concepts; (3) there are inappropriate funding routines, which fail to initiate or support potentially disruptive projects; (4) traditional new product/service development routines strangle all but continuous innovation. The aim of this paper is to present the findings of the preceding 12 month focused investigation into the funding barrier, in an attempt to deepen academic understanding and help practitioners to overcome this obstacle.

### **Inappropriate Funding Routines**

Unlike other barriers to disruptive innovation discussed in the literature (e.g. an inability to 'think-out-of-the-box' to generate non-linear ideas [22, 23] etc), there exists little, if any evidence that reports upon proposed solutions or authors attempts to overcome the barrier of inappropriate funding routines. Advice is available to practitioners and academics alike on how to manage potentially disruptive projects and how to launch and manage potentially disruptive concepts in the market place. However, as the director of R&D in one of the authors' industrial collaborators stated "... this knowledge on disruptive innovations will 'fall on deaf ears' if there's no money for such initiatives in the first place". If the funding barrier to disruptive innovation could be better understood, then perhaps management practitioners' ability to select, initiate and capitalise on funding potentially disruptive projects could be enhanced, generating options for longer term organisational survival.

A theory called 'resource dependence' [24] can be used to illustrate how funding routines are created, which prevent practitioners from benefiting from knowledge on disruptive innovation. The theory posits that a company's freedom of action is limited. Practitioners must ensure that they satisfy the needs of those entities outside the firm that give it the resources it needs to survive - primarily its customers and investors [4]. When existing customers do not want disruptive propositions, because of appearances of lower level performance, practitioners ignore the new concepts and become focused upon satisfying their customers as a key resource stream. When investors want to see immediate and significant returns on investment, small markets do not appear to be attractive solutions to the growth needs of companies. Once again resource dependence moves senior managements' attention away from disruptive innovation.

Inappropriate funding routines can also be explained by 'path dependence' [25], a similar phenomenon to 'resource dependence'. Many organisations remain focused upon historically dependent technology, product, or customer related paths, which support and enhance continuous innovation. Decision choices, 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 [26]. Such dependence upon a history or past has been found to place limits on companies' problem solving abilities [27, 28]. Therefore, path dependencies have a negative effect in terms of defining new futures, where core competencies become core rigidities [27, 28]. Tripsas and Gravetti [29] investigated the case of Polaroid and concluded that its failure to adopt disruptive digital technologies was mainly determined by the cognitive inertia, or the path dependence, of its corporate executives' decision making. Polaroid went into Chapter 11 bankruptcy in October 2001 because of its ties to its history. Its path dependence restricted the funding and initiation of appropriate projects and left the organisation open to the destructive forces of disruptive innovation.

The current body of knowledge on disruptive innovation provides numerous reasons for practitioners' mismanagement of the phenomenon and inappropriate resource allocation is one of these top inhibitors. The theories of resource and path dependence can be used to *describe and better explain* the existence of inappropriate funding routines, thus generating insights into the difficulties of funding potentially disruptive projects. However, despite growing understanding on the topic of disruptive innovation, academia has thus far failed to give a comprehensive description and analysis as to *why* these barriers and the resultant mismanagement occur in the first place. The literature fails to explain *why* managers build routines that consistently fall into the traps of resource and path dependence. Thus the funding barrier to disruptive innovation is described and acknowledged, but little has been done to explain why it occurs or to better understand it with a view to helping practitioners overcome this obstacle.

## **METHODOLOGY**

To ensure that academically robust management research, into topics such as disruptive innovation, is relevant and reliable, it must be closely mapped to the needs and experiences of industrialists [30]. Authors, such as Stewart et al [31] state that there is a complex, challenging and sometimes problematic relationship between management practice and the practice of management research. There are difficulties in satisfying a dual academic-industrial audience. The challenge is further enhanced by the entrenched perception that a push for industrial relevance in management research has negative consequences for academic rigour and vice versa [32, 33]. The pursuit of rigour and relevance has generated increased support for investigative strategies such as 'action research' [34]. Similarly the concept of 'Mode 2' research has been elevated to the fore of management inquiry by academics such as Hill et al [33] and Huff [35], along with others from institutions such as the British Academy of Management [36]. Action research and the Mode 2 approach can offer researchers an opportunity to simultaneously seek relevance without sacrificing rigour. Thus, the current research takes advantage of a collaborative academic-industrial approach inspired by the 'Mode 2' and 'action research' strategies. The investigation was founded upon four features that typify the Mode 2 approach to research [31]: (1) The research problem, 'How can organisations understand and foster disruptive innovation?', was framed in the context of application; (2) A heterogeneous group of both academics and practitioners were engaged in the investigation using a trans-disciplinary approach; (3) The group had a socially-distributed research capability; (4) Theory-building and application were combined in the co-production of new knowledge. The 30 month investigation has employed Yin's [27] and Eisenhardt's [38] approaches to the use of case studies for building theory (four cases were appropriately selected and used), along with an extensive and on-going literature survey and on-going expert interviews. The multi-method research strategy has been

employed to triangulate findings and to co-create understanding with industry on how organisations can foster disruptive innovation.

Two of the four cases will be used to illustrate the findings presented in this paper from the preceding 12 months of the investigation. The first case reported in this paper is a small-medium sized plastics mouldings manufacturer based in France (case A), and the second is the principal division of a large manufacturing company based in Israel (case B). Multiple qualitative data collection techniques have been used within the cases over the 12 month period; they were conducted over four phases (see table 1): 10 interviews, 6 two to three day workshops and monthly informal email and telephone conversations. The data have been analysed using methods recommended by Eisenhardt [38] and Miles and Huberman [39]. The data collection methods generate two primary units of analysis [40] ‘management actions taken’ and ‘individual managerial cognition’ and two secondary units of analysis ‘the internal organisational context’ and the ‘external organisational context’ The intended output of the research plan was an in-depth understanding of resource allocation routines, including efforts to finance non-linear initiatives; and the delivery of insights into how practitioners can overcome the aforementioned funding barriers.

PHASE	DATA COLLECTION TECHNIQUE	OBJECTIVES
<b>Phase 1:</b> Building groundwork understanding	- 4 x interviews (one with each of the four cases). Email discussions.	To build agreement of research process and initial understanding of funding barriers within each case.
	- 1 x three-day multi-organisational workshop (4 cases, 15 participants).	To better understand funding barrier and to generate a view from practitioners of feasible solutions.
	- 2 x semi-structured telephone interviews with cases A and B.	To conduct in-depth follow-up analysis.
<b>Phase 2:</b> Building deeper understanding	- 2 x semi-structured telephone interviews with cases A and B PLUS informal email and telephone conversations.	To gather in-depth data and present initial findings in order to iteratively home in on roots of problems.
	- CASE A: 1 x Two-day workshop with senior management team (5 participants), including tour of site.	To deliver more detailed understanding of funding barrier and individual requirements of solution types.
	- CASE B: 2 x Telephone conferences with senior managers and engineers (4 participants in total).	To deliver more detailed understanding of funding barrier and individual requirements of solution types.
<b>Phase 3:</b> Implementing intervention	- CASE A: 1 x Two-day workshop with senior management team (5 participants).	To conduct a two-day implementation of the resource allocation intervention.
	- CASE B: 1 x One-day workshop with senior management team and senior engineers (16 participants).	To conduct a one-day implementation of the resource allocation intervention.
<b>Phase 4:</b> Building management implications	- 2 x semi-structured telephone interviews with cases A and B. - 2 x presentations on the intervention from senior practitioners of cases A and B to wider research group.	To conduct in-depth follow-up analysis and to ensure no researcher bias of the evaluation of researcher led interventions.

Table 1. A research plan to investigate inappropriate finding routines.

### DELIVERING A DEEPER UNDERSTANDING OF FUNDING ROUTINES

Data analysed from the “phase 1” three-day cross-functional workshop involving all four cases, interviews and email discussions, showed clear evidence of a disconnection between potentially disruptive innovations and resource allocation. Senior management from each of the industrial collaborators revealed inadequacies in their current mechanisms. A significant need for management support was exposed, along with the need for tools to help with allocating resources to disruptive innovation. Furthermore, in seeking to better understand the nature and impact of inappropriate funding routines, initial characteristics transpired for an ideal solution to the funding barrier. Five top themes emerged from the data analysis:

1. Senior management need help to “see the whole innovation playing field – not just incrementalism”, thus facilitating the identification and support of potentially disruptive opportunities.
2. Senior management need help to “legitimise the allocation of resources” to potentially disruptive opportunities.

3. Senior management want “best practice funding guidance” and want help with communicating this to the business, i.e. how to provide and protect resources to support the development of niche market offerings and how to create return on investment commitments that allow practitioners to be patient for growth but ensure their impatience for profitability.
4. Senior management want to prevent projects with a dominant history or dominant people from soaking resources away from disruptive opportunities.
5. Senior management want help to achieve the above objectives whilst delivering best practice innovation management at all points in the new product, service, and process development cycle. (e.g. maximising benefits from investment into innovation, preventing project gridlock, delivery of strategic aims and a balanced focus between sustaining and potentially disruptive projects).

A further outcome of phase 1, not to be underestimated, was an increase in trust within the research group, this enabled the open sharing and cross case examination of many personal experiences in the pursuit of innovation.

#### Inappropriate Funding Routines: A problem of the mind not one of process

The existence of open communication and trust, between the academic and industrial parties, became the key facilitator of the deeper investigation into the funding barriers of the two cases. Early in phase 2 of the investigation, the authors discovered that the funding barrier seemed not to be grounded in managements’ ill equipped resource allocation processes, nor was it based upon a lack of intended strategic commitment. It was found that budgeting committees, production and marketing executives were reporting that that 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 unequivocally demonstrated that the problem’s roots were in the practitioner's cognitive processes.

It was decided to use the observation of a cognitive root to the funding barrier as a tool to illicit deeper insights within the latter stage of phase 2 data collection. The researchers described and presented to the practitioners a common problem that was occurring across the cases. When presented with potentially disruptive opportunities, management in both cases A and B reported that they recognised and even felt the existence of inconsistencies between their current understanding of their organisation and the new opportunities. The inconsistencies between conflicting perceptions of current business and opportunities with disruptive potential, led to feelings of uneasiness and even resentment. The existence of such conflict creates a cognitive driver to employ strategies to reduce the dissonant feelings. The strategies ultimately resulted in the rejection of the potentially disruptive opportunities in order to alleviate the practitioners reported uneasiness.

The discussion with practitioners in both cases about the “anti-disruptive cognitive process” facilitated a deeper analysis of past and present situations in which potentially disruptive opportunities were present. The analysis of phase 2 data revealed practitioners’ employment of numerous cognitive strategies, all used to reduce the feeling of uneasiness that accompanies potentially disruptive innovations. Furthermore, the use of these strategies could be linked to one root cause, the existence of restrictive ‘mental models’.

#### Mental Models: A root cause for the employment of disruptive innovation rejection strategies

It was observed that the top management teams in both cases appeared to possess shared, deeply ingrained, assumptions and generalisations and even images of their organisations. These images both influenced how management understood the world and how they took action. Management awareness of these shared images was virtually non-existent and an understanding of their impact was almost entirely missing. Thus, despite espousing support for radical innovation, the management teams within both cases possessed images of their organisations that only really supported a “more of the same” approach.

Argyris [41] notes that people do not always behave congruently with their espoused theories, they do however behave congruently with their “theories-in-use”, or what Senge [42] calls mental models. The shared mental model of the management team within each case appeared to be built upon common elements of each individual’s mental model, but also guided by the dominant top executives’ perspectives. This shared view significantly affected the support that was given to the initiation of projects and how senior management perceived the impact of potentially disruptive innovations. Mental models have hugely powerful effects upon what we do because they affect what we see [42]. For example, in case A, top management were firmly attached to a clear vision of their business. The team’s vision was so loyal to its key product range that their plastic mouldings technologies and competencies, although applicable to other sectors, remained focused in one particular market. This shared mental model prevented support for the application of knowledge to unfamiliar markets and even blinkered them from the disruptive potential of competitors. Senge [42] states “...that many of the best ideas never get put into practice... because they conflict with deeply held internal images of how the world works, [mental models are] images that limit us to familiar ways of thinking and acting.” (p 174)

Using the term ‘mental model’ enables a better understanding of management practitioners’ perception of inconsistencies between funding options. It explains why the management teams, in both cases A and B, were led to the employment of rejection strategies. Senge [42] observes that if a person anticipates dissonance between an opportunity and their established mental model, then he or she should be expected to react to minimise or completely avoid the perceived probable discomfort. Thus, feelings of uneasiness that accompany disruptive innovations are aroused because of a cognitive dissonance in the prevailing mental model. Mental models create skewed perceptions, which deliver a failure to see the disruptive potential in new concepts. New values are attached to potentially disruptive ideas, which differ from the actual values of those concepts. The result is the rejection of ideas incongruent with mental models in an attempt to alleviate the presence of unwanted conflicting emotion.

The authors concluded from the phase 2 data collection that to overcome the barrier of inappropriate funding routines, the implementation of new financing processes and strategies alone will not work. Senior management need tools or interventions to help them to understand how their current mental models determine a fixed and narrow view of innovation as incrementalism. Managers need to be able to *see* how their current actions (which are driven by their cognitions) lead to the disregarding or mismanagement of potentially disruptive innovations. In fact, Senge [42] 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).

### **Designing an Intervention: Illustrating mental model impact with graphical tools**

Observations of the restrictive impact of senior managers shared mental models, motivated the development of an intervention in the form of a group process directed

toward senior practitioners. The data showed if practitioners could see how and why *they* inhibit the allocation of funding to disruptive innovations, then they will be in a more self aware position to tackle the barrier. Thus the intervention needed to expose and explain the prevailing mental models that were at the root of the funding barrier. For the senior management teams to fund disruptive innovation, they needed to be able to *see* differently. As it is claimed by *seeing* wholes we learn to foster health [42], it was decided that a ‘visual tool’, which can deliver ‘holistic understanding’, should form a large component of an intervention to the funding problem.

Portfolio Management (PM) is a recognised and trusted graphically based management tool, utilised by senior management teams within many of the world’s most innovative organisations [43, 44]. Using graphical and visual techniques to deliver a holistic understanding of innovation activity, PM improves resource allocation decisions [43, 44]. However, there are very few references to the pursuit of disruptive innovation in the publications of the leading edge PM thinkers. Furthermore, PM methods, in their current form, have not been developed to encourage the funding of potentially disruptive initiatives [45]. Despite claims to the contrary, nearly two-thirds of approximately 300 organisations, participating in a recent on-line conference on disruptive innovation, stated they believed that portfolio approaches are the best way to deal with the unpredictability of innovation that moves beyond the steady state [45].

These findings led the authors to develop an intervention called the “Disruptive Portfolio Management (DPM)” tool. Like other portfolio approaches, the DPM was designed to provide a holistic understanding of innovation activity for improved funding decisions. However, unlike other portfolio approaches, the DPM 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 justify investment into potentially disruptive projects in the future.

#### Overview of the Disruptive Portfolio Management Tool:

A process overview for the implementation of the DPM methodology was designed and agreed upon with the industrial collaborators. Financial measures were traditionally favoured by the management practitioners in both cases for assessing innovation initiatives. However, a concentration upon financial measures delivers the worst performing portfolios [44]. Therefore, the authors designed and prepared an innovation project assessment process, founded upon series of questionnaires called the dimensions ranking checklists (DRCs). The DRCs have two objectives: (1) To assess individual innovation initiatives on a range of standard PM measures, plus a cluster of qualitative and quantitative measures focused upon disruptive innovation, in order to gauge the impact of the initiatives under consideration (e.g. incremental, radical, discontinuous or potentially disruptive); (2) To assess individual innovation initiatives at varying stages of maturity, from early stage idea to advanced innovation project. The assessments can be completed as ‘homework’ by the relevant project managers or R&D team. Each case selected at least 10 high priority innovation projects, and a small selection of recently killed initiatives for assessment with the DRCs. The output of this assessment was designed to be mapped onto seven large scale portfolio maps or “Bubble Diagrams” (where projects are plotted on 1m<sup>2</sup> X-Y axes on a variety of parameters). Four of the maps were standard portfolio management views and three were designed to specifically account for disruptive innovation. The aim was to present to each of the senior management teams a holistic graphical representation of their portfolio’s of priority innovation projects. The lead author then designed a one to two day DPM workshop that would introduce the

concept of disruptive innovation (to the full senior management team responsible for innovation strategy and resource allocation) and facilitate the participants through an analysis of the data from their portfolio maps.

## A RESOURCE ALLOCATION INTERVENTION: THE FINDINGS

### Evaluating the Intervention

The senior management team of case A, consisting of five members, took part in a two-day DPM workshop in France and a one day workshop was conducted in Israel with the R&D director and 15 senior members of case B. The methodology has allowed both cases to see emerging patterns in their approach to innovation. For example, there was recognition that they overly focused on technology and not the markets; they attempt to skip the niche marketing approach needed to enable disruption and they succumb to the pressure to seek high revenue mainstream markets. The management teams in both cases reported that they now have, for the first time, a 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 could legitimise the allocation of resources to the pursuit of disruptive innovation. Furthermore, this positive feedback was reiterated two months after each intervention, both in follow-up interviews and in presentations made by the practitioners to a wider research group on the impact of the DPM tool. The methodology forced critical discussion in both cases. This enabled the teams to better understand the weaknesses and strengths of their individual projects and also to better understand their approach to innovation and their ability to foster disruption.

### Inappropriate Funding Routines: A better understanding

During the groundwork data collection activities and the DPM interventions, the practitioners in both cases A and B shared significant insights into their management actions, underlying management cognition and the resultant innovation activity. The management teams reported numerous examples of times when they had been faced with the choice of selecting between projects of a sustaining or potentially disruptive nature and had chosen to allocate resources to the former. Analysis of the data revealed five key management trends. Furthermore, five common ‘disruptive innovation rejection strategies’ were identified.

#### Trend 1: Companies deliver a narrow selection of innovation projects based on a restricted view of innovation

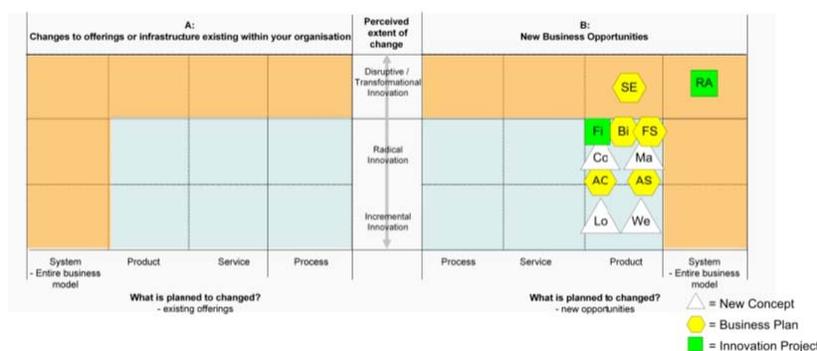


Figure 3. Case B's restricted mental model of innovation

The portfolio maps were placed upon the walls of the workshop rooms and were used to stimulate a holistic understanding of how the teams, in both cases, were currently funding their innovation effort. It was clear that the management teams had

a very narrow view of what innovation is. These illustrations enabled the participants to understand and question, for the first time, how their mental models of innovation restricted their organisation to a path of incrementalism (e.g. see Figure 3, note how the projects are clustered in one small area). The head of one innovation team in case B stated “I feel like we’ve seen the light; now we know its time to get disruptive”.

#### Trend 2: Strategies for reducing perceptions of risk are not sought

The second theme was that potentially disruptive projects are seen as too risky because of the rejection strategies employed. Strategies for reducing risk will not be sought (e.g. partnering) until the prevailing restrictive mental model(s) are acknowledged and understood.

#### Trend 3: Commercial risk tends to be harder to handle than technical risk

Practitioners in both cases showed time and again that potentially disruptive initiatives are less likely to be funded if commercial risk is perceived to be high. Confident in their own experience with and reliance upon a group of technologies, the practitioners were more likely to favour projects with technical difficulties than those facing market uncertainties. The introduction of notions such as empathic design helped to give both cases confidence in unfamiliar market niches.

#### Trend 4: Project-by-project planning kills disruptive innovation

Product planning appeared to be “done blind”. Evidence showed that without a holistic view of their innovation activity management in both cases were more reluctant to fund potentially disruptive projects. A holistic view illustrated imbalanced and generated holistic decision making.

#### Trend 5: The temptation of “big money” mass market strategies

Both companies put pressure on their innovators to automatically adopt mass market strategies. Consequently, project managers assumed that potentially disruptive projects need massive investment and that they should be complicated and technically sophisticated. Even when evidence is provided to show that potentially disruptive products should be initially targeted at low-end or emerging market niches, managers still want to target “big money”. Knowledge transfer on disruptive innovation is needed if management teams are to change this trend and organisations need a change of mind-set, if they are to avoid the temptation of trying to force disruption directly upon mainstream customers.

#### Summary of the Observed Disruptive Innovation Rejection Strategies

##### *Rejection Strategy 1: Rewarding incrementalism:*

One strategy used by management to avoid funding potentially disruptive ideas was to focus on current organisational rewards. It was found in both cases that explicit rewards offered, for example promotions and financial incentives, had a negative effect upon practitioners’ decisions to pursue disruptive innovation. The rewards reduced creativity and caused management to disregard evidence that suggested their organisation’s current technologies or business models may be put to better use in opportunities differing to current practice. For example, in case B, job creation was one of the major measures that was rewarded, thus the initiation of new product development projects for small niche markets, as characterised by disruptive innovation, was not supported. In case A, explicit rewards were focused upon current production line enhancements – once again steering management’s attention to incrementalism. It was found in both cases that implicit rewards, for example a sense of belonging and respect from peers, also had a negative effect upon practitioners’ decisions to pursue disruptive innovation. Both cases A and B appeared to display an

“Emergency Room” culture [22], especially case A, which is 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 is little support for suspending judgement, building empathy for new ideas and nurturing potentially disruptive concepts. When such a culture dominates and is rewarded, creativity is reduced and new ideas are quickly killed. There is evidence to suggest that the negative effects of rewards upon creativity and innovation are common for other organisations too [23]

*Rejection Strategy 2: Ignoring positive aspects of disruptive opportunities*

Managers admitted (in retrospect and in trust) to occasions where they rejected disruptive opportunities, in favour of sustaining innovation, by removing the positive aspects of the rejected prospect and/or removing the negative aspects of the chosen initiative. For example, in case A the management team had recently faced a decision between two dissonant projects. Should they increase the allocation of resources to a project that was to deliver a new high-end product in their existing range or invest resources into a project with disruptive potential in a new and totally different emerging market? The senior management were insistent that they could deliver new wealth generation by encouraging customers to move into the high-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 and that the high-end was small, shrinking and already saturated. Much of the customer base, it would seem, were now happy to purchase cheaper, lower quality, substitute products from China. Alternatively, evidence showed that the emerging market within the unfamiliar industry (although currently small with only potential for large growth) could provide case A with a new high margin revenue stream. 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 as advanced technology and facilities as case A 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: (1) they felt the emerging market was “not yet large enough” and (2) 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 – feelings of “uneasiness” surrounding disruption were alleviated with the decision taken in favour of incrementalism.

*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”. Almost the whole management team in case B were comfortable with the idea that they could generate ‘disruptions’ in unfamiliar market places. However, past success, with world beating technologies, made many of them believe that they would not be disrupted in their current mainstream markets, despite preliminary evidence of ‘technology oversupply’ in several product categories. Similar evidence existed in case A. It would seem that the organisational memory for the factors that have been responsible for recent successes, become embedded in the cognitive processes of the organisation’s management practitioners. Consequently, current perceptions of success prevent

practitioners from perceiving the potential for disruptive change in their primary technologies and customer offerings, thus ideas that go against the grain of history generate feelings of uneasiness and do not get funded.

*Rejection Strategy 4: Creating perception of success with high effort*

Evidence in the data, linked to the amount of effort expended on current innovation initiatives, points to another cognitive strategy employed by practitioners to reduce the feeling of uneasiness surrounding disruptive innovation (thus legitimising allocation of resources to sustaining innovations). Both cases cited examples of “prestige innovation projects” where huge 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 technologies for familiar markets. The data analysis revealed a correlation between the amounts of reported effort, which 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 the practitioners, in the face of growing year on year competition, commit more and more effort, yet achieve less and less benefit. Despite the performance analysis results, which illustrate that such project teams had hit 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 measured benefits calculations. The perception of exaggerated attractiveness provides insights into the cognition of practitioners faced with the choice of funding a project of a sustaining or potentially disruptive innovation. The experience of uneasiness generated by the existence of a potentially disruptive innovation can be alleviated by deciding to fund the unjustly attractive, but perceptually desirable, high-effort incremental innovation and rejecting the potentially disruptive alternative.

*Rejection Strategy 5: Holding beliefs in the face of disconfirming information*

Both cases A and B appeared to hold beliefs that were unchangeable in the presence of disconfirming information. Case B, for example, had identified a potentially disruptive business opportunity in an unfamiliar market. Senior management kindly agreed to share their idea 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, from academic literature, on the implementation of disruptive strategies. Concordantly, a one-day interactive workshop was designed and implemented with the project team and a cross functional support group from other areas of the business unit. There were 32 participants in total who took part in the state of the art knowledge transfer activity. At the end of the workshop 80% of the ‘junior’ members of the group reported that the workshop had contributed “high benefits” to their professional development and understanding of disruptive innovation (20% medium-to-high benefits). All of these people reported that they believed the theories discussed would help the project succeed as did all of the senior members of the group who had not previously been involved in the project. Conversely, 80% of the senior project members reported their disappointment with the notion that disruptive innovations should be initially launched with comparatively small projects for specific niche markets. The distinct majority of the senior project team dismissed the

information and sought to persuade other participants within the workshop to do the same. They believed in the potential of their concept so much, that they wanted to launch a multi-million dollar, 5-10 year project that would compete directly with industry incumbents in their mainstream market. Thus another strategy employed in both cases A and B was simply the dismissal and/or misinterpretation of information that was inconsistent with beliefs of the practitioners.

## **MANAGEMENT IMPLICATIONS**

The cases have provided an excellent insight into the 'funding routines' problem. The following management implications can be offered to companies seeking to tackle funding barriers to foster disruptive innovation:

- Graphical 'maps' generated to illustrate a holistic view of the innovation activity can be employed to create an understanding that is otherwise very difficult to achieve. Holistic understanding has proven essential when justifying investments into disruptive innovation.
- Management meetings to discuss innovation, become significantly more focused on the task in hand when graphical 'maps' are used to illustrate a holistic view of innovation activity. "What we've delivered in this workshop in two days would have taken us at weeks without your help, and we still would be able to see what was really happening" said the director of case A.
- Holistic graphical representations improve dialogue and communication. This generates more directed, open discussion and prevents one person or one group from dominating the resource allocation process.
- Holistic tools such as the DPM can, with positive effects, increase management's self awareness of their mental models and their impact. Interventions that assist management teams with the surfacing, testing and improving of their internal mental models of how the world works will generate business benefits.
- It is essential to reduce the perception of risk surrounding potentially disruptive innovation in order to remove the 'funding routines' barrier. Reducing perception of risk can be achieved through the combination of (1) knowledge on the theory of disruptive innovation; (2) recognition of prevailing mental models and an understanding of why potentially disruptive opportunities have been 'killed' in the past; (3) an holistic view of innovation activity, which can be used to legitimise 'ring-fencing' resources for potentially disruptive initiatives.
- Top management must deliver a strategic commitment to disruptive innovation and hold supporting mental models. If such a commitment exists, a holistic view of the innovation activity can help organisations to align actions with strategic goals, thus facilitating the selection and initiation of potentially disruptive projects.
- The understanding of disruptive innovation must be communicated across a wider audience than those responsible for resource allocation for it to be absorbed and adopted by organisations.

## **CONCLUSIONS**

It is believed that the Mode 2 approach adopted by the authors has proved vital in establishing the academic rigour of the investigation whilst also addressing a pertinent industrial problem in the context of practice. The focus of this research has been on transferring knowledge iteratively between practice and theory and theory and practice. This has facilitated the development of new knowledge on the theory of disruptive innovation and how it can be fostered in practice by organisations.

The aim of the current research was to better understand the existence of the failure to fund potentially disruptive innovations. At the onset of the investigation into

the issue of inappropriate resource allocation routines, the authors envisaged that they would focus on inappropriate financing mechanisms and return on investment and probability of success calculations. Instead the authors stumbled into managerial psychology, which literally skews reality to support incrementalism. Graphical portfolio management tools, integrated with theory from disruptive innovation, appear to help tackle the funding barrier. The research has found that management practitioners with a holistic understanding of innovation activity can be facilitated to challenge (and maybe even change) dominant mental models that prevent potentially disruptive innovations from receiving essential financial and managerial support.

*[ACKNOWLEDGEMENTS: The current investigation contributes to the IST fifth framework project "Disrupt-it" to which the authors are indebted and give thanks to all who have collaborated]*

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