



Design, Risk and New Product Development in Five Small Creative Companies

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Five small creative companies were studied in detail over extended periods of the New Product Development (NPD) lifecycle. Design was a key aspect of company activity and central to the NPD process. Novel risk-tracking participatory methodologies were developed and employed to identify perceived risks at the outset of NPD and to track risk thereafter. Semi-structured interviews were undertaken on regular basis with company personnel responsible for design to provide rich contextual material. Results showed a wide diversity of perceived risk with little commonality amongst the companies – despite shared core criteria amongst the firms themselves, and the new products that were tracked. Implications for the sampled companies, and wider policy in respect of business support strategy, are considered.

Keywords - Creativity, Design, Participation, Risk, Small Companies.

Relevance to design practice - This research elicited the risks and risk perceptions involved in designing and developing new products. Design practices will be able to a) identify with common practices and b) utilise techniques in the research in order to recognise risk in design processes.

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Introduction

Creativity and risk are inexorably linked; both are infinite in their variety with the result that their combination usually defies accurate description. The environment in which the conception and development of new products takes place is complex and involves creativity and risk at a number of levels in a wide range of situations. As a consequence of the interdisciplinary nature of design-based new product development, risk calculations were considered inappropriate within such a broadly creative environment. This parallels Simon's (1996) view of design as something which reflects inner and outer environments, with the interface between the two being that which meets the desired goals.

Researching the breadth of such established design research fields requires a selective approach if meaningful contributions are to be made from newer perspectives – such as risk studies. An initial assessment of the literature from design which might contribute to a new study of risk was disappointing.

The aim of this research was to gain insights into risk assessment and decision-making by small companies as a new way to describe the design process. In previous work (Jerrard, Horne Martin, Newport, & Burns, 2002) we found that resolving such risks requires decisions to be made at critical decisions points. That work used case studies that looked retrospectively at product development and was undertaken for the Design Council. Design process risk involves both adventure and penalty; individual designers appear to determine the proportions and, considering risk within any process, develops alterations to how we might perceive

that process. This conflicts with the performative dimensions of economic theory (Callon, 1998), which are typically central to company risk policies.

The process we go through to learn how to take risks is a complex balance between rewards and adverse consequences (Jerrard & Barnes, 2006); ultimately the assessment of risk is a very personal affair. This may be a strategic process by which the balancing act is determined by a management committed to attempts to delineate timed uncertainties and opportunities around design. This is described by Halstead and O'Shea (1989) as desires for increased security and greater efficiency. Understanding design thinking for most of us is linked not just to the designer but also to the object he/she has designed. Opportunistic design thinking (see Guinden, 1990) however, pervades much of the environment in which it happens – all experience has a context, it is holistic and consequently its representation through traditional means will reduce any comprehension of it.

The research was also guided by our current economic preoccupations in the UK and elsewhere. As the role and importance of creative industries in the economy becomes more

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widely recognised (Department of Trade and Industry, 2005), understanding the nature of risk in NPD has significance both for successful business management and the development of sound economic policy (Cox, 2005).

Wider Arena of Risk

Perceiving and managing risk has become a central pre-occupation of modern life. Mutual insurance through risk sharing as a product of need and security has size limitations (see Genicot & Ray, 2003). Risk has become a managerial paradigm and default mechanism that has embedded itself into how companies, community organisations and the public sector operate. This, as described by Hutter and Power (2005), has led to an assumption that organisations exist in but are ontologically separate from, their environments. The simultaneous rise of the risk and creativity agendas is one of the great paradoxes of today, given that risk-avoidance strategies may often inhibit inventiveness. Such perceptions within organisations vary according to one's location within an organisation (Hutter, 2005), this is emphasised within teams where moral hazards are a problem (Hölmström, 1982). Risk-consciousness rises when conditions of uncertainty and the perception of powerlessness increase. The evaluation of everything from a perspective of risk has become a defining characteristic of contemporary society.

Academics in the field of Management have long recognised the positive dimension of risk. For example, Peters (1998) explicitly recognises the value of embracing risk in design and other creative endeavours:

Design is both a process and a state of mind that pervades the enterprise – openness to risk, a search for the unexpected, thoughtfulness about details. Design mindfulness, that transforms, that takes customers and companies to new places is inherently risky. To pursue the ultimate potential of design / design mindfulness is to routinely pursue the crazy, the surprising...

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which is to routinely embrace risk...and the distinct possibility of rejection. (pp. 20-23)

It became clear from a search of risk literature that design and new product development risk is an emergent field and that linkages between formal views of design processes and risks within them are largely under researched. This study addresses this gap, a gap that is recognized by both experienced risk researchers and those committed to researching professional design processes.

Risk-taking in Design – An investigation of critical decision points in new product development

This 3 year research project focused on human or non-measurable aspects of risk which are not usually 'calculated' by standard risk assessment tools or formulas (e.g. Kleizer, Halman, & Song, 2002). Informal approaches to risk are especially relevant in small and medium companies which do not have the structure a larger company has to perform formal assessments. This echoes Turner's (1994) Second Risk Irony in that the mathematical and philosophical bases of risks are disputed, and the assertion that no amount of mathematical legerdemain can transform uncertainty into certainty (Gigerenzer et al., 1989). Perceiving of risks accurately is a measure of managerial competency as is their distribution; for example by using risk analysis to develop success factors, for new products, (see Montoya-Weiss & Calantone, 1994).

Our pilot study showed that the New Product Development (NPD) process moves from one domain of decisions to another, and may be represented by a flow, with critical decision points appearing at intervals. This flow and the critical decisions made did not follow a linear process with critical decision points logically spaced along the way. A complex scene emerged echoing the co-evolution of problem and solution in design (see Kolodner & Wills, 1996). We found that the NPD process is neither logical nor tidy; a human-centred process was revealed where risks emerge mainly from hindsight. Generally, and as expected, financial risks tended to be a major concern closely followed by personal risks. We investigated this further, attempting to understand such issues around design and NPD as they happen live in 'real-time' (see Dorst & Dijkhuis, 1995). Also indicated at this stage were the general areas of risk we might consider in more detail (finance, personal, design, sales etc).

The principal aims of the study were to build on previous work (e.g. Jerrard, Trueman, & Newport, 1999), tracking critical decision points, and observing current practice in risk assessment and management in design and new product development. By observing the nature of decision-making we sought to examine the perceived weight given by the decision-maker at the moment of decision and compare this with the overall assessment at the time of product launch. The aim was to consider how the decision-making process was viewed decision-makers. Such complexity was initially reduced to 4 specific research themes although an additional 3 arose from broader reflection (below).

Overall the project sought to address a selected research questions from the following:

1. How is risk assessed in small companies when critical design decisions are made?
2. What kind of communication exists among the design team and the decision makers during the process of New Product Development?
3. What is the perceived weight of importance given to decisions made 'live' against a reflection over those same decisions at a later stage?
4. Is it possible to map the considerable literature based on management of risk in general management to the design function in creative companies?
5. Is it more appropriate to establish design as an integrated feature where risk is shared between decision 'locations'?
6. Should we acknowledge that creativity in the design of new products is delightfully risky and defies a description?
7. What is the nature of risk sharing between designer's decisions and those made by consumers?

It soon became clear that such an ambitious list could only be partly addressed, however, we have been able to link all questions to the results. Early participation and the individual nature of the companies studied brought Questions 1, 2, 5 to prominence.

Methods

The main aim of this study was to gain specific insights into risk perception and sharing, and design decision-making by small companies during NPD. The authors utilised a number of methods to research risk in design including the development of detailed case studies from companies which are developing new design-based products. Managerial research appears to lack adequate techniques to comprehensively integrate the study of interpersonal processes (Vallaster & Koll, 2002). Participatory observation (see Eden & Huxham, 1996; Huxham & Vangen, 2003; Cassell & Johnson, 2006) is a technique that allows detailed investigation of social phenomena - an approach to record and analyse decision-making processes. Fieldwork was based on an investigation of live NPD projects emphasizing the assertion that design knowledge resides in processes (Cross, 2006). Critical decision points were tracked while decisions were being made and current practices in risk assessment were observed and the techniques used to minimise risks were also examined. The failure to devise generic models for NPD relates increasingly to our (late 1990's) cultural instability. This as Schön (1973, pp. 28-29) has suggested means that all of the institutions of the state are in a continuous process of transformation. According to Schön (1992) this has given rise to a new understanding of design and research processes, he states that: "...the practitioners of artificial intelligence in design would do better to aim at producing design assistants rather than knowledge systems phenomenologically equivalent to those of designers" (pp. 131-148).

Accordingly, the design and NPD process was considered from the Design Council pilot study. In general this approach requires the participant observer to seek out the meaning of

experiences through empathic involvement (see Bruyn, 1966). The main area of focus was on the human centred/ non-measurable aspects of risk, which are generally not 'calculated' by standard assessment tools.

Staged Methodology

A novel and staged methodology was developed to identify risk areas and track decision-making during new product development in design-led small companies. The primary aim of the process was to establish trust between key company personnel and the fieldworker in order to capture rich and insightful (essentially) qualitative data. Ultimately, the goal for the fieldworker was to become an embedded participant (though still essentially an 'outsider') in the company culture. The process aimed to track decision-making live (as it happened) in light of changing risk perception over the sampling period. A survey of the literature indicates that this research process has not been attempted in this way before. The research ensured that company personnel and not the researcher promoted precise descriptions of risk. A series of visits was established for each individual company (tailored to key developments for each new product, availability of personnel etc), though all companies shared a process by which objectives were agreed at the outset and reviewed regularly.

Identifying Participating Companies

Initially, forty suitable design-led companies were considered, from an established DTI/Design Council database of approximately 350 from across the UK. All were serial innovators in small domestic product design. It was important that the participating companies were in the process of starting a new product lifecycle and that the product was considered innovative by those producing them. The aim was for a 2 year (or less) product cycle to 'fit' within the time available for research, although the methodology inevitably had to track 'real-life' time-frames. Ten companies were initially short-listed that expressed a positive initial attitude to participation and fulfilled the core project criteria; five were eventually selected for study.

Although specific records on the background of the individuals chosen were not developed, they all occupied a key role on the development of new products within their companies and were committed to the promotion of design centred activities within their own job or within a team. They were by their activity deemed to central to both design and risk taking although individual capability and capacity research was beyond the scope of this particular study.

Selection of Companies for Study

First impressions are important and may have a lasting effect; researchers are effectively being 'received' into the company culture - albeit in a preliminary fashion. The act of involvement (and ensuing element of self-discovery) by company personnel may eventually provide commercial value (or at least some financial implication). The in-depth process of re-evaluating risks on a regular and semi-formal basis is likely to throw a new light

Table 1: Individual risk form example

Identified risk areas	Critical	Significant	Important	Marginal	Negligible
Protecting IPR					
Linking NPD with funding deadlines					
Acquiring affordable specialist components					
Suppliers changing component specifications					
Cash flow					
Change in premises					
Location change– staff impact					
Special Engineering					
High initial costs on relatively low sales					
Components loss during design phase					
Retaining / replacing key personnel					

onto the NPD process. All participant companies were in the process of starting a new product lifecycle but the products under development varied these included: protective safety clothing, catering equipment, aids for the visually impaired and home entertainment equipment.

The individual nature of the companies however led to parallel case research rather than comparisons. During this period a wide range of secondary material helped characterise the company culture, their products and their development process. These included: photographs, company literature and website material, notes from telephone conversations, emails, informal interactions etc. Semi-structured interviews were initially undertaken with selected key personnel in order to identify perceived risk at the onset of the NPD. This material was also used to draw-up individual 'risk forms' for each participant (example shown in Table 1). At this and subsequent stages informality between researcher and company personnel proved to be beneficial.

Ongoing Interviews and Risk Forms

A tailor-made risk form (reflective diary) was produced for each person/company and was used as a prompt for the participants. The interviewees were able to reflect on their original selection of risk areas and to (re)consider in light of the current situation. Each risk area was graded according to a 5 point scale of relative importance and 'new' risk areas were added as required. Confidentiality issues applied both to the individual perceptions of risk and to wider considerations of the product/business under observation.

Regular semi-structured interviews were then undertaken to provide detailed 'commentary' on risk issues as the NPD process continued. The risk forms were again used in conjunction with the interviews to record the perceived relative importance of risk areas. Coordinating the start/finish of data capture with the start/finish of the product development timeline is unlikely to be a perfect fit in any design/NPD research project, thus, sampling periods were inevitably 'ragged'. The final field work interviews were conducted and 'feedback' sessions offered to participating companies providing an opportunity to reflect overall on the material gathered. This also enabled participants to access a

structured record of their judgements and responses to risk areas and issues, and act on the results – if they wished.

The data collected comprised lengthy recorded transcripts and participant forms. These provided 'time-based narratives' for each product and company. They were reviewed using criteria linked to the stated research questions and linked through the specific contexts of company, product and individual. Wider reference was made to company history and (where possible) photographs of the products and ranges. Co-relations between stated risk perceptions by individuals around a product's development (as it happened) were made in the context of each company.

Summary Company Descriptions and New Products Tracked

Company 1 is a social enterprise developing innovative and attractive fluorescent, reflective clothing and accessories for children to make them safer when cycling and walking. Incorporated in 2004, it is a common ownership worker's cooperative with nine salaried members of staff and three volunteers. The organisation is run with a strong ethos of staff involvement in decision-making. It is based in the east midlands and recent company activity has been marked by a rapid increase in sales turnover. The company offers over 200 products, primarily selling to local authorities and schools. The product tracked during the study was a new high-visibility garment incorporating a novel surface design element.

Located in the south of England, *company 2* was the largest of the 5 companies studied. This long-established company designs and develops high-quality hi-fi equipment, including loudspeakers. It is well known for the history and quality of research undertaken aimed at improving the sound quality of its products. The product selected for study was a new constituent (loudspeaker) of an integrated 'home-entertainment system' (comprising audio and visual elements). Interestingly, during the study, the company introduced a formal business system to consider risk in a structured formulaic manner for each new product under development. In its management of risk this company was the most transparent – and adaptable. They typified the expectation that risks in NPD were soluble through formulation.

Located at a small coastal town in the south-west peninsular, *company 3* designs, develops and manufactures a range of safety headwear for rescue services, military organisations and recreational markets. This small company employs less than 20 people; the lack of funding and structure mitigates against a formal business-system approach to risk. However, this enabled a closer relationship to be developed between the risk taker and the actual product. The Managing Director (MD) is passionate about ‘surf culture’, the product studied was a new safety helmet aimed specifically at surfers. The helmet features a novel, multi-benefit inflatable lining that improves buoyancy, increases thermal insulation and facilitates a better fit for the wearer.

Company 4 is another small enterprise, located in the south midlands area. This company designs and develops a range of innovative catering equipment based on ‘induction energy’. This technology has a number of latent benefits including rapid cooking time, reduced cleaning requirements and energy-saving potential. The product tracked was an innovative multi-element hot plate. During the study the MD was approaching retirement – resulting in a range of personal and organisational ‘hand-over’ issues to consider.

Located in the north-west of the country, *company 5* produces a range of products designed to assist visually-impaired people. The firm has received a number of R&D development grants to develop its products; these included a unique chemically coated paper which enables infinitely-variable relief printing (allowing touch to discern pattern, diagrams, maps etc). The product tracked was a new desk top printer, capable of handling these specialist chemical-coated papers. The company underwent a major reorganisation during the study involving moving to larger purpose-built premises through a major personal financial commitment from the MD.

Results

During the study the interviewees were asked to identify the future risks which they perceived to be significant. Despite the relatively small sample size, a very wide range of risks were identified (Table 2). Notably, only 2 of these specific risks were common to 3 or more companies, and only 6 common to 2 companies. This highlights the very individual nature of risk perception in companies, even where firms share a number of core characteristics (small size, focused on product design, serial innovation, UK location etc). It was found that only some of the original research questions could be fully answered. Risk assessment (Question 1) and communication (Question 2) were found to be complex and ad hoc. Regardless of the common features of these companies, there is no management process which follows a generic risk process pattern. The only recognisably common risk issues are: competition, correct pricing, developing and protecting IPR, technical risks (around components) and the retention of key personnel. This might suggest that there is a preoccupation with developing a management consistency within such complex processes. These were largely un-weighted (Question 3) and not based on a management’s formal and abstracted view of risk (Question 4).

Despite this lack of commonality, a number of broad (non-discrete) risk domains were recognised, including:

- Financial: operational finance, access to working capital, pricing.
- Personal: personal finance, family circumstances.
- Intellectual Property: developing and protecting ideas, research needs.
- Regulatory compliance: policy changes, safety issues, new standards.
- Markets: competition, consumer / customer response.
- Technical: manufacturing processes, new technologies, components.
- Partnerships / collaborations: networks, cross-functional teams, formal / informal partnerships, e.g. suppliers, specialist input, distribution networks.
- Organisational: capacity, skills, support / commitment to NPD.

All of these companies took major risks centred on the location (Question 5) of an individual’s assigned responsibilities. However, such assigned responsibilities progressed with the development of the product from one individual to another. The research generated a wide variety of inter-related material – part physical (questionnaire, transcript, risk-form, photographs) and part human (memory, impression, judgement, and feeling). Valid interpretation and robust analysis of this rich and potentially insightful material requires careful consideration – environment, language and perception are all important aspects of understanding the particular gravity of the risks involved. In most situations the companies, personnel, products, risks and researchers appear to be operationally unique and so attempts to reduce or generalise are consequently both difficult and of limited value. This particularly addresses the integrated and tacit and ‘slippery’ nature of risk taking (Question 6) which was associated with the particularly informal aspects of NPD. Risk discussion was therefore either shared within complex meetings or it was associated with an individual’s hunch. A number of highly informative stories may be derived – a narrative on risk and creativity in the adventure that is design and NPD.

Themes from the Data

Emotional drivers: A ‘free-spirited’ quest for adventure and independence was identified together with a search for products that ‘leave their mark’. These attributes were characteristic of the creative enterprises – particularly the very small ‘micro’ firms. This is about a personal attitude to risk which shapes NPD and wider company strategy. Emotional drivers are key elements in an entrepreneurial adventure – the hallmark being a positive attitude to risk. Consequently, it is clear that financial gain may be secondary to the personal benefits of entrepreneurial aspiration.

Cultural context: The cultural, geographical and historical contexts of companies are important, shaping the organisation and the development of new products. To understand risk and NPD in small creative companies, one has to be cognisant of location, origins and the cultural milieu.

Table 2: Specific risks perceived by 5 companies embarking on NPD

Companies		1	2	3	4	5	
Competition	In niche market	X		X			
	Growing international competition	X			X	X	
	Growing UK competition				X		
Financial	Relatively high costs for low-quantity components		X			X	
	Over-running budgets		X				
	Supplying all stockists = high artificial demand		X				
	Ability to produce cost-effective products			X			
	Correct pricing		X	X			
	Building adequate sales				X		
	Continuity / predictability of supplier costs				X		
	Controlling costs				X		
	Cash flow – stocking issues					X	
	High initial costs on relatively low sales					X	
	Loans – high gearing	X					
	Premises	Affording new premises					X
		Finding new premises	X				
Finding replacement leaseholder						X	
Property maintenance						X	
Design-related	Waiting for industrial design to come through		X				
	Many iterations – ‘fuzzy front end’		X				
	Incorporating enough USPs			X			
	Public perceptions of product efficacy	X					
Suppliers	Key suppliers – will they deliver?	X	X		X		
	Suppliers changing component specifications					X	
	Reliance on limited number of suppliers	X					
Component Parts	Packaging		X				
	Development of crossovers and drive units		X				
	Complexity and expense of cabinet		X				
	Cabinet manufacturing / production capability		X				
	Expense of outer mouldings					X	
	Unusual paint		X				
	Damage to components during design phase					X	
	Components becoming discontinued					X	
	Specialist new dye needed	X					
Intellectual Property Rights	Developing and protecting IPR				X	X	
	Developing strong branding	X					
	Research needed to validate products	X					
Legislation/Compliances	Test compliances		X				
	Compliance with new standards	X					
	Legal issues with competitors	X					
Technical	Technical risks – components		X		X		
	Capacitors – variable impact on sound quality		X				
	Technology development risks whilst on timeline		X				
	Production of technical manuals – tends to be late		X				
	Psycho-acoustic phenomena		X				

Table 2: Specific risks perceived by 5 companies embarking on NPD (Continued)

Companies		1	2	3	4	5
Markets	Reaction of customers			X		
	Sales – direct vs shops			X		
	New market (high end)		X			
	Developing international markets				X	
	Seasonality of products	X				
HR / Organisational	Retention of key personnel		X			X
	Internal competencies				X	
	Internal organisational change				X	
	Redundancies				X	
	Impact on staff through change of location			X		X
Co-ordination/Strategic	Timescale for components		X			
	Lead time for tooling, bedding-in components etc		X			
	Attempting to meet ideal launch periods (Sept and Jan) means compressed timescales for tooling etc		X			
	Late decision changes		X			
	Clarifying / agreeing objectives				X	
	Decision changes by key partners				X	
	Overstretched management				X	
	Coordinating NPD with external funding deadlines					X
Business Relationships	Delivery of services from external partners			X		
	Building relationships with key customers	X				
Personal	Personal financial investment	X				
Other	Manufacturability		X			
	Manual handling – weighty products		X			
	Damage in transit		X			
	Other wastage					X

Trust: In order to justify and accept risk – trust is required. For example, trust in consumer's future demand for a new product or trust in suppliers to provide in time. This theme is linked to partnership working, though more abstract. Essentially, having trust allows risk to be shared.

Decision-making processes: These are shaped by the size and structure of the company. For very small firms decisions were typically made by perhaps only 1 or 2 key company personnel, although often in consultation with other company employees. The study recognised a more informal decision-making process in the smaller 'micro' firms, contrasting with a more formal business-system approach being developed in the larger company.

Change and unpredictability: Markets and the wider operating environment are turbulent and unpredictable. Strategies for success recognise that 'control' is generally not possible and draw on complex hedging of risks, often over long time periods. The development of a new product is not undertaken in isolation from other work including, of course, the development of other new products – sometimes of a completely different type.

Competition: Response to competition was often cited as a key risk area. The extent to which this is a real risk or media-

induced perception of risk is difficult to judge. This may be symbiotic; where a 'clouded knowledge' engenders vague caution (competition was rarely expressed in terms of specific competitor companies, for example).

Tacit knowledge: The study recognised the central importance of tacit or embedded knowledge in the design process, where knowledge of design (e.g. quality of materials) is not easily recorded.

Overall complexity: Design development, through each risk combination, was recognised as a common theme in all recorded risk perceptions. Greater risks were perceived at conceptual stages of NPD where resource commitment had not yet been made of where precise knowledge or experience was lacking. Financial risks tended to dominate most assessment and appear the most consequential although those risks associated with the reputation of the company and the potential performance of the product were significant. Vacillation between risks involved in (for example) design and finance made their separate perception and detection difficult. The transcripts showed that the type and size of risk fluctuated in the life of the product development periods around the immense complexities involved.

Discussion

The subject and the methodology employed forced an individual company approach and our ability to develop generic conclusions is therefore limited – the detail legislates against generic conclusions. For small companies the issue of ‘formal vs. non-formal’ approaches to risk is typified in 1 company (which was significantly larger than all the other enterprises studied) utilising a formal business-process to consider risk on a product-by-product basis. Interestingly, this process was actually introduced during the study. For the very small (or ‘micro’) enterprises resources may mitigate against formal systems and organisation structures favour more informal approaches (unsurprisingly, only the larger company had a specific risk post). Participation in the study did, on occasion, facilitate a certain anxiety about risk management amongst the firms – ‘shouldn’t we have a risk manager – because an outside collaborator is researching it?’ Previous work by the authors (Jerrard, Ingram, & Hands, 2002) suggested that risk around NPD for design-based entrepreneurs was dominated by both financial risk and risk of reputation. The results from the current study suggest that this may not always be the case; financial risk is limited to the promotion and selling process and how the product is viewed in competitive markets (Jerrard, Barnes, & Reid (2007). Both studies showed the NPD process is neither logical nor tidy, and a human-centred process was once again revealed. Generally designer’s decisions in NPD did not appear to relate to consumer risk (Question 7) rather more to those issues and problems within the company at the time.

All companies adopted a portfolio approach to risk / NPD – although specific products were tracked in detail during the study, the decision-making process is not undertaken in an isolated manner. Rather, new products are developed as part of a portfolio of activity – where parallel product and company development is continuously occurring and changing. Not all expressed a goal to ‘become bigger’ – growth in terms of company size and/or financial achievement was not necessarily the primary agenda (although growth in some other form – such as product quality – may be a key outcome). For creative micro-enterprises in particular, company ‘growth’ maybe more about doing things ‘right’ than simply producing more – with implications for policy support measures aimed at promoting small business growth.

Developing IPR is not as strong as one might assume, and in terms of risk will probably relate to a planned lifespan for certain products together with the required development speed, i.e. some products have short lives, their development may be ‘held up’ by considering protection. The retention of key personnel may be assumed to be a measure of technical competence – employing people with the necessary skills. Therefore risk responsibility might reside with entrepreneurial individuals thus reducing the sharing of risks. Other strongly recognisable features are: growing international competition and the perceived capacity for key suppliers to deliver. This is, perhaps, unsurprising as such risks may be seen as existing outside a control locus but central to the design-based NPD process. Design often represents a key set of features related to speculative markets as well as to quality assurance from suppliers.

Risks in NPD are interlinked with design within a complex process where risks are temporary, and difficult to portray. Although specific risks may be (conveniently) grouped into a number of risk themes in largely predictable categories (e.g. finance, competition etc) such groupings mask the underlying diversity of risk faced by creative companies; personal commitment to design always carries personal risks. For those concerned with trying to predict and address risk in small creative companies, such diversity of risk perception reveals some of the potential complexity faced by managers.

The development of a risk culture (and therefore an innovatory one) is partly based on the ability of individuals to collectively construct and then model ‘unknown’ space, beyond current experience. The potentially uncomfortable nature of such scenario building means that companies are often ‘shocked’ into innovation (Schroeder, Van de Ven, Scudder, & Polly, 2000). Such shocks may include impending business failure of any kind or entrepreneurial rivalry and ambition.

The changing nature of business, however, draws individuals into the unknown, and what is experimental becomes a safer place, even a haven. Risks often represent the first point of reflection within an emergent contractual business process. This is normally followed by complex judgements on returns, controls, duration and finally termination. Innovation risks therefore may be viewed in a variety of different ways depending on both individual perception and the ambient risk sharing culture within the firm. Consequently studying risk in innovation is difficult, ‘the big picture’ of a company’s innovation process is populated by large number of risky positions and strategies which are difficult to attribute or assemble in common space. This represents an approach described by Hutter (2002) which conceptualizes risks as interrelated to each other and having potential consequences for broader economic, natural, social and political environments.

Our study revealed frequent reference to use of intuition or ‘gut-feeling’ as a mechanism for aiding decision-making. Allinson, Chell and Hayes (2000) upheld the hypothesis that successful entrepreneurs (owner-managers) are more intuitive in their cognitive style than the general population of managers, whilst Andersen (2000) suggests that intuition as a decision-making style appears to be related to organisational effectiveness. Entrepreneurs often use intuition to explain their actions. But because entrepreneurial intuition is poorly defined in research literature, the ‘intuitive’ is confused with the ‘innate’ – what is systematic is overlooked, and unexplained variance in entrepreneurial behaviour remains high (Mitchell, Friga, & Mitchell, 2005).

The knowledge gained from our study has inspired 3 further research questions. The foremost questions being:

1. What are the benefits of risk management in design once the potential procedures are recognised?
2. Is it more appropriate to establish design as an integrated feature where risk is shared between decision ‘locations’? (That is, establish design investment initially to be openly financially and culturally based, thereby providing an expectation that 2 ‘types’ of investment may be concurrently required)

3. Should we acknowledge that creativity in the design of new products is delightfully risky and defies description?

This final question gives rise to an important point. Whilst it is recognised that formulaic approaches to risk have value, mechanistic approaches to risk have may gone too far – especially for the management of creativity in small enterprises. The risks identified and the complex environments found in this study demonstrate a range well beyond that which may be easily or usefully reduced by a formulaic assessment. In this context, formal risk calculation might even be considered an attack on creativity – a crude development in management that fails to recognise the (human) nature of risk for designer-entrepreneurs.

Conclusions

Day to day risk is traditionally linked to creative design investment but has never been quantified in a detailed way and the literature surrounding risk is surprisingly quiet about design. This may be due to a variety of factors including the relatively imprecise nature of both consumer response and quality of designer performance in relation to NPD from small creative companies. The risky labeling of design decision-making may be a reflection of our inability to describe complexity and the calculation of risk is equally mysterious within a human resource context. It is not clear whether management decisions to, for example, employ new designers to reposition product ranges is perceived by most as anything but a ‘gamble’. Similarly, potential design performance in a new market place defies accurate calculation although more predictable incremental output will have recent case detail.

The knowledge resulting from this type of research can contribute greatly to the companies being studied, providing a reflective tool for their creative practice. It is also informative to other small company’s NPD process when considering their decision-making and risk assessments. The academic audience will also benefit from the outcomes of this research work as further development of knowledge in the fields of creativity and design management, with potentially important implications for the development of business support policy. Overall, this study has provided unique insight into the way in which small companies perceive and assess design and risk during new product development, a largely under researched area. Complex relationships between design and other activities were revealed in detailed interview transcripts by using risk as a common theme. What makes this study distinctive is that the main area of focus is on the human/non-measurable aspects of risk and does not try to ‘calculate’ it by standard tools or formulas, a common fault of much risk research literature. The study provides a recognition that management process involvement (by designers) can be at the cost of innovation if it doesn’t (itself) provide leadership in risk-taking.

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