Digitisation and Decision Making in the Boardroom

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Abstract

A key omission from empirical work in strategic decision making is to what extent and how the rapid increase in digitization of data influences senior decision makers such as Boards. This small research project indicates that this is a fruitful area for larger scale comparative research since current findings show a number of patterns and themes from organizations in various sectors. Key findings are that Boards do not commonly experience difficulties in the availability of digital data, but vary in the ways in which they use these data (or not). Some Boards cling to tried and tested ways of decision making, relying on others to synthesise digital data into very short paper-based reports. Sector and size seem to be key variables with larger organizations able to use specialists in digital data on the board to help decision making and sectors such as retail, service and construction as heavier users of digital data. Medium-sized and small organizations seemed less open to basing decisions at Board level on digital data, despite having access to such data at more operational levels such as in Marketing. It seems that Boards still demand data reduction in order to make strategic decisions, hence limiting their ability to use digital data in decision making. Finally, there were indications that Board may become increasingly 'data savvy' as new members are recruited in the future although it was noted that this could be a relatively slow process.

Keywords

Strategic Decision Making, Boards, Digital Data, Processes, Barriers and Opportunities.

Introduction and Background to the Research

In spite of a vast amount of research on how strategic (important, novel and resource hungry) decisions are made and what are the characteristics of their processes, there is almost no research on how and to what extent the digitisation of information has an influence on how decisions are made, nor on what is decided and implemented (Nutt and Wilson 2010). Empirical research in the UK (Hickson et al 2003) revealed that the 'knowledge base' that senior managers used to inform and influence their decision making was the single most important factor in the ultimate success of the decision (to what extent the decision achieved stated objectives). Although this study is one of the largest samples in the UK (55 cases), the research was historical and mainly spanned a period where information for decisions was

largely well known (extant knowledge), available in hard copy as reports and so forth (explicit knowledge), or resided in managers' heads as a function of their experience or judgement (implicit knowledge).

The explosion of knowledge which accompanied the rapid development and ease of access of digital data has arguably had a large impact on both how and what information senior managers access and use to inform their decision making. *A key research question, therefore, is whether or not digitisation and 'big data' has changed the process of managerial decision making and, if so, how and to what extent?*

There is no doubt that the presence of big data (a data explosion) is being felt in wider society as well as in business to business relationships and some public policy. But little is known about the impact the sharply increased volume, velocity and variety of digital data is having on the behaviours of those senior managers who take decisions that matter. McAfee (2012) suggests that profitability and productivity benefits ensue in organisations where big data and analytics are part of their operations, but does not investigate the processes by which this occurs, *nor how senior managers make such data part of their decision making routines and practices.* This highlights a second area for investigation.

Taking a resource based view of the firm (e.g. Wernerfelt, 1984; Prahalad and Hamel, 1990) it is useful to view data as a key resource which may be mobilised around current decisions, or which may be incorporated into organisational intelligence as a more latent routine (with the potential to be utilised in later decisions). Collinson and Wilson (2006) identified the creation of latent routines via knowledge acquisition as a key feature of successful organisations.

A fourth area for investigation builds on research which indicates that organisations which engage in effective and accurate scenario planning enjoy performance benefits in relations to their peers and competitors which do not (e.g. Schoemaker, 1993; Cornelius et al 2005). The question thus becomes *how big data and analytics can become part of the scenario development process to help accurate and effective decision making.*

A final area which the proposed research aims to investigate is arguably the opposite of the planning scenario process outline above. In short, decision making is inevitably about making choices under varying conditions of uncertainty. The extant literature on decision making almost always cites a lack of information as one key source of uncertainty and many models of risk have emerged as mathematicians, economists and strategists sought to 'measure' uncertainty (Nutt and Wilson, 2010) and hence reduce risk in decision making. In the era of big data and analytics, a lack of information is transformed into an abundance of information. Such a context may induce (rightly or wrongly) in decision makers a greater feeling of certainty and prompt them to take what are, in effect, highly risky decisions

Methodology

Qualitative research inquiry was appropriate for critically probing perspectives from a sample of 4 Board level Directors across different organisations to reveal as detailed as possible understanding (and contextualization) of the issues raised by the emergence of digital information and its implications for Decision Making. Participant Directors were selected for inclusion on the basis that they would enable exposure to a substantial depth of insight across

a range of organizations from different sectors (each Director having experience of more than one Board).

Gaining in-depth and quality access to Board Directors proved a time consuming and often frustrating process since persuading Directors to participate; finding convenient dates in diaries; re-arranging interviews and last minute cancellations all made data collection very difficult.   In the end, we gained access to 4 Directors.   Interviews were recorded and transcribed in full.   Typically, interviews lasted between one and three hours.

Transcriptions were then examined by the researchers and the data were manually coded into patterns and themes guided by such factors as recurrence (informants kept mentioning these aspects); surprise (informants described unusual events, outcomes or processes) or immediate relevance for decision making.   These themes are discussed in more detail in the next sections.

Summary of Findings

In this section, we draw on the data from the informants (who are anonymised) and look at key themes (in no intended order of importance or significance).

(i) Data Reduction and Channelling: Boards Clinging to 'Traditional' Processes

Despite all informants acknowledging the marked increase in volume and availability of data, they all described the process by which the Board received and used data to make strategic decisions as predominantly non-digital. By the time information gets to the Board, it is summarised and synthesised in ways which have been traditional and institutionalised since largely pre-digital eras. In addition, the experience of most informants indicated that the use of digital data in Board decision making was relatively infrequent.

"I haven't really seen a huge amount of collated and shaped big data informing strategic or board decisions." (ME)

Exceptions to this situation seemed to be in sectors where data use was already very high, in which case the view was that developments in big data and digital are less disruptive:

"I don't think we've heard that phrase {big data} used by any of the people we deal with because they're used to dealing with diverse sorts of information and this is just another sort of information." (CR)

In cases where the use of digital was seen as low, this does not seem to be the result of a lack of awareness by Boards, rather it is an indication that Boards appear sluggish to adopt new forms of data input. There appear to be three main reasons why this is the case.   First, data are reduced and often simplified significantly for presentation to the Board. Middle managers and Functional Directors may well use digital data extensively, but by the time this information is fed to the Board, it is mostly in the form of shortened reports in traditional paper form. As one informant noted:

"So I think that's the other problem, is that big data may well be being used within the organisation, but because of this channelling effect as you go towards the top, and

simplification, I'm not sure that the boards ever really get to grips with big data, they get to grips with manipulated data, I think, instructed data." (ME).

Secondly, the view was also expressed that some Boards viewed the proliferation of digitised data as yet another tool or fad in the management lexicon and treated it accordingly. Whilst this may be expected, our informants also commented that some Boards may access to such data but be unable to know how to use the data for decision making and implementation.

"But then, that big data decision is only indicative of a general mindset, because if they have that mindset about big data, which is just the latest tool available, you can probably track back and say they've probably had that mindset about pretty much all the tools that have come along" (ME)

"Others will say, we'll try and use big data,…….. but they can't execute." (ME)

Others were dubious about the potential for big data to fundamentally improve current ways of working.

"I think there are still battles going on as to the value of some of the data, and I think there's still scepticism about the quality of some of the data and I think people haven't got their heads around the potential of what's out there with some of this, they've been grown, they've developed in a modular mindset and had not grasped there's other ways of doing things. So you take the forestry sector, if you've been a forester you've been trained in how to grow a tree, how to plant a tree, how to measure a tree; the idea of using drones, real-time data collection or satellites that collect data and have earth monitors and to use weather satellites and collect absolutely masses of data to actually allow you to measure what's going on … and that's not what they've being trained in." (CR).

Whilst this may be expected, our informants also commented that some Boards may have access to such data but not know how to use it for decision making and implementation. A shortfall in resources, such as technical skills and time seem partly to blame:

"Obviously there's been a massive growth throughout the planet of (digital data)………but it was growing much faster than the ability (of Boards) to analyse it." (SE)

Thirdly, digital data and organizational strategy appear to be relatively disconnected, or at least treated separately by Boards. As one Director commented:

"no one ever asked anybody about what was their internet structure, no one talked about internet strategy, but it's all actually interlinked. And then it became really quite obsessive, what are you doing in terms of your internet strategy, what are you doing in terms of embracing data and trends, and that really... it didn't take off until after the internet boom and people started realising that's so much information out there, the only way that you can actually continue to grow your business is by making sure you embrace it………. But the vast majority of the companies (are) incredibly slow at adopting new data inputs". (SE)

Related to the above three points is that it seems that is not the availability of data itself which is important, but how it is used. Competitive advantage comes from how the data are used (decision making) and not their availability (which is open to most). One Director commented:

"We're all using the same data because the data is freely available. It's just about how we're interpreting it, how we're using it, and how we're bisecting it and cutting it, and saying, no, you shouldn't use that, you should use that. So it's exactly that point" (SE)

The final two quotes from informants reinforce the above points:

"...what you tend to find in boards is that people arrive at a board and they say, I'm now a director, I'm big picture stuff, and I'm future and... they actually lose touch with the detail. Even if they go away for their away days, the CEO has a vision, they sit down, they come with an overarching strategy, they come back with the overarching strategy, and they tend to hand that down, as you say, to the executors of the thing, and say, get on with that, chaps, try and interpret our vision and our strategy in your strategic business units, or in your functions, or whatever. Which is the reason why strategies go wrong, because that means they lose control of the detail, and if you lose control of the detail, it's very difficult then to really work out and sense when, where, things are going wrong, how badly, how fast, and what corrective actions you need. And the more layers you put in, you get this refractive index of decision-making, every layer that you go through is both time and... so it delays things, and it also muddies the waters." (ME)

"... whereas information's coming back up to the board for them to make... let's take the raw case where they're looking at their strategy for the first time in a year or two, and they're going to go away for an away day, away for a couple of days, what sort of things are they asking for. So they go to the operational heads, the strategic business unit heads, the marketing heads, or whatever, and they say, right, we're going away to look at strategy, we now need some papers that tell us what's happening in our market. So everybody diligently goes out, they do the research, and then the big data that they may have used gets condensed down into a two-page, or a three, something that a director, his attention span can deal with, if you like." (ME)

(ii) Decision Making at Board Level

The predominant theme here was that the ways in which Boards make decisions do not seemingly lend themselves to adopting and using masses of relevant digital information. Although this may vary by organizational size and sector (see next section below), informants all concluded that decision making processes at Board level posed some problematic barriers for digital data.

The first theme was that of 'satisficing' behaviour being predominant. This concept (using solely what is satisfactory and sufficient information for decision making) has long being recognised, the portmanteau word first being coined by Cyert and March (1963). The paradox of having large amounts of relevant and accurate data available today, whilst Boards still preferred to rely on satisficing behaviour to make decisions was marked:

". I'm still not sure that the decision-making processes are particularly robustly informed, either in the information on which they're basing their decisions, or the process in which they're applying to making the decisions. And by this I mean the information is not complete, which it never is in strategy, but it's probably still (around) the 40%...and.. a lot of them are working quite happily down at 40%, 50% (information)", (ME)

Secondly and linked to this, was the suggestion by our informants that Boards generally preferred to play safe and work with what is known and familiar to them rather than explore more novel and less well-trodden alternatives. There seemed to be two major reasons for this – avoidance of straying too far from the familiar and feeling a decision had to be made:

"I don't think the decision-making, from what I can see, is all that robust, and there's almost a feeling of discomfort of going wide, and what I call divergent or creative, in assessing the scope of the issues". (ES)

"...So this desire to make a decision, without actually being rigorous, robust, and sometimes even coherent in what you're doing, they'll flip-flop between one and the other – and I have seen that at all levels as well and what I find boards doing is rushing into action." (ME)

Thirdly, the distinction between operational decision making and strategic decision making by the Board came into focus. One informant spoke about the benefits that water companies are gaining from using satellite data to spot water loss and leakage much sooner than previously was possible and without having to directly access private land:

"... if you took the old approach to it, when you had an issue of water catchments and pollution you'd have to ask where is this coming from and send a team and hopefully you'll find it and understand it, by which time it's usually too late, the damage has been done [whereas now] at least if you're going to send people out you'll know exactly where you want to do and increasingly you'll try to get them to those points before it becomes an issue." [CR]

The same informant also acknowledged that the strategic use of digital data in the water industry was very limited, partly due to issues of ownership and regulation which resulted in a focus on keeping costs low. The clear distinction was that whilst digital data may inform and help decision making at the operational levels, this was much less the case at Board level.

"I don't know how Procter & Gamble does it, but I believe they have a system whereby, certainly for the senior management, their operations managers, their category managers, and product managers, they have almost like a cockpit, which has been designed from their global business services group, so that they have a grip on pretty much what's going real-time"... "and that must be the interface really for the human-machine contact, but behind that must be some big data crunching going on, but that's more at the operational level". (ME)

There was the (perhaps obvious) suggestion that, over time, Boards would consist of individuals who were much more savvy with big data in digital form, so strategic decision making may change:

"It should favour those who are more data driven; more analytical." (CR)

However, informants indicated that this may stimulate more action at operational and functional management levels, but that the information coming up to the Board would (again) be confined to more conservative reports and precis of more complex data.

Informants also indicated the important role of consultants as gatherers of large quantities of data and that made Boards quite dependent upon consultants:

"I suspect a lot of Boards are very reliant on consultancy advice actually and are probably getting information second-hand. You can't particularly blame the Board directors for that because it's not their area of expertise, and that adds to risk actually because we are going through, and I know it's a cliché, a revolution, a cultural revolution really in the way that product is distributed, ideas are translated, etc, which has literally killed some industries and has made others. And it does strike me that the people running business are in quite a weak position and not always often able to embrace some of these changes, and who knows where those changes will take us in the next five or ten years" (ES)

Irrespective of whether Boards outsource data capture and management to external suppliers, there were implications for public accountability that follow this greater access to big data which need to be managed:

"Oh, potentially because not only do they have access to this data as a company, me and you could go out and access this data and we can say, excuse me, what are you doing about this? So the rights of redress from the consumer and the lobby groups and environmentalists, whoever, they can access quite a lot of this information, a lot of which is in the public domain." (CR)

(iii) Organization Size and Sector

Despite the limited number of informants, it seems that there is plenty of scope for variation depending on the size or the sector of the organization. It seems clear that variation in either size or sector will provide scope for Boards to vary in terms of decision making and the use of digital information.

In terms of size, informants noted that very large organizations had the potential to focus on large data since they had a relatively large number of Directors and could afford to specialise (at least in theory). Sector appears also to be significant with some embracing digital data (e.g. retailers and property sales) and others appearing to ignore it (e.g. builders' merchants). But it is equally clear that there are significant differences within sectors too (see below).

Concentrating on large organizational size, one informant commented:

"So if you take someone like GlaxoSmithKline, with 15 directors, 11, well, ……if they wanted to, they could put a whole department onto big data and things like that. Whereas you then come down to, I don't know, mid-cap companies, FTSE 250, FTSE 350, and of course, not only do the volume and amount of resources available to gather big data and shape it in a way that the board can receive it, you also get, is the board really interested in receiving it? So there's that issue as well." (ME)

"Bigger firms clearly have adopted it and if you meet the CEO or CFO of Rolls Royce it's likely you'd have a very, very different answer. But if you were meeting the CEO from Imperial Tobacco……….., they just wanted to look for markets where people smoke a lot and I think where they could produce the cheapest. They really didn't care for anything else. They patented their branding and that was it. So you have some real differences" (SE)

Decision making seems different in medium sized companies:

"I haven't seen boards of large to mid-cap companies at board level really focusing seriously on big data. Now, to be fair, I haven't talked about some of the big retailers, or the big

manufacturers like Procter & Gamble, and people like that, who will use big data, and I know they use big data in a massive way, but at the category, brand, and product level, so their category managers, their brand managers, they are using this all the time in terms of customer insights. How that gets up to the board and informs both their strategy and governance approach, and all the rest of it, I don't know, but I do know that those are the sort of companies that use big data at the marketing level, which must inform strategy, but then I don't know how the board uses it. But from my experience, I haven't seen huge... and I've looked at quite a few board papers coming through, because one of the things you do in the evaluation area is you try and look at board papers, say for a year, what's coming through the board, how is the board dealing with issues, and what have you, and I see very little – actually, I don't remember seeing anything in there that says here is an evaluation based on big data, on huge analysis". (ME)

Sector differences (between and within) were revealing too. Consider the following quote from an informant comparing Tesco and Morrisons in the retail sector:

"Tesco absolutely embraced the need to have information on everything, not just their customers, but just how the whole business ran. They wanted to be a retailer but basically a technologically advanced retailer. Morrisons however believed in providing value on the shop floor. They tried to be cheap and cheerful but nice. They just didn't embrace the whole concept of using data. We discussed it many times with the new CEO in terms of their systems and when he came in they really didn't have any and they were running it as if it was 25 years ago. Now I think there's been a lot of change since then but they've been very slow" (SE)

Although it would be wise not to take a snapshot view. Things appear to change quite quickly over time. For example:

But I'm just again reminded of the Tesco experience when they set up their loyalty card. That initially had a very significant positive impact on their sales and there's obviously been a fade on that. Different companies as well have a different degree of sophistication in terms of targeting customers. At one simple level you order something... we were talking about Amazon, and they'll send you a very random email that because you bought X you might want to buy Y...which is one approach, but it strikes me this market is quite embryonic and the use of analytics is something that some of the smarter companies are beginning to develop. I think it plays to the hands of big companies that actually have access and if you're Tesco and one in three people in the country are shopping in your shops, you've got more goods as another example and you've got a pretty accurate survey as to what's going on. If you are a very small organisation it is more random albeit technology does allow small organisations to blossom as well. So I think it's the one somewhere in the middle that is possibly the most challenged" (ES)

A predictable aspect of digital data is that new sectors of the economy have emerged as organizations specialise in mining and selling data, as this informant whose firm supply data to agricultural and land-based businesses explains:

"We are the supplier of big data, we crunch the big data, to help organisations to make decisions, and therefore our perspective is driven by oil and water where we've spent a lot of time, ie we had the contract for forestry or related land assets, so our big data is all about land assets, what's on the land, what's underneath the land, how the water flows over that land, is it polluted, how can you know about it, which has been an issue for hundreds of

years, except now it is more possible that you can collect far more reliable, real-time data to be able to do something about it at a reasonable cost, if not very low cost. So that's where we're coming from, because us as a business, we are just the generators of that data and translating it into information which is useful and into a format and channel that allows you to use it as you see fit." (CR)

Whilst other organizations have set up internal specialist functions in order to mine data and make sense of it. Some of the most sophisticated data mining in house can be seen in sectors that one might not initially associate with such a cutting edge approach (one informant talked about the real estate sector:

There's a company I'm very close to called X... They spend a lot of their time having someone, or two people, employed specifically to look for trends, to mine data, to look at retail, to look at information in terms of tourism and a lot of the decisions they make in terms of where they're going to buy property and actually where they're going to build, who they're going to have coming into occupy..... decision making really is based on data." (SE)

Informants also emphasised how quickly the real estate sector was changing toward using digital data. These organizations are moving away from emphasising traditional methods of matching houses, sellers and buyers to studying trends and analytics of house buying both locally, nationally and internationally. Big data give even the most traditional real estate organization the opportunity to operate and make decisions at these levels.

On the other hand, informants also pointed to sectors where the data 'revolution' had left them virtually untouched. One sector which fitted this category (e.g. construction) was highlighted by informants as being untouched, but pointed to other comparable sectors (e.g. electrical components) where there was evidence of change, albeit it sometimes hard.

"A builder's merchant, for example, 90% of the customers who turn up queue and wait. IT is only important for stocking purposes" (ES)

"In the biggest distributor in the UK of small scale components for industry, over 50% of their sales were by traditional catalogue and this was a problem for them because they had dual costs. They had to have an online offering which was growing, but they still had to produce this thick catalogue which they sent out and which most people actually used". (ES)

Again, the temporal dimension is important and informants emphasised that significant changes were likely to happen over time in various sectors. Comparing builders' merchants and electrical components five years from now, one informant commented:

"My guess is electrical components will have moved quite a long way online, but builder's merchants may not have". (ES)

(iv) Strategy, Planning and Data

One strong theme that emerged from the data was that data availability and analysis (however big) were predominantly about looking at what had happened in the past and making sense of it, whilst strategy (and strategic decisions) are predominantly about positioning for the future. The latter still has to deal with uncertainty and inevitable approximations and assumptions (as well as associated risks) in making strategic decisions. The plethora of digital data seemed

largely to help organizations make sense of recent trends or, in many cases, defend market share – essentially in a reactive mode.

"It's this defensive thing. It's a very interesting question actually, this notion that... I mean, in strategy there has always been the reactive versus proactive. It's effectively the same thing, defensive versus forward looking offensive. But you kind of think with all the data that's around, you'd find much more proactivity, much more development, but actually from what you're saying my much smaller number of observations too is that that's not the case. Actually it's about defensive positioning a lot of the time" (SE)

Another informant clarified:

"It's a hindsight thing, and strategy is a foresight and intuitive thing. As I say, from what I can see from the way big data is used at the moment, it is very much used at trying to work out behaviours, and maybe have a look at some trends, let's say the consumer market, insurance market, things like that, it's used to look at what has been past behaviour, does it inform future behaviour, and because you've got a lot more data on a lot more people, it's the stability, and the weight of numbers and crowds, I think. I'm just not sure how big data works, in terms of the strategic argument". (ME)

The perceived usefulness of the data, however, was also shaped by how quickly its influence could be felt. In the case of satellite data that is used to appraise land assets, having instant feedback on the state of the land allows near instant intervention in relation to the use of fertilisers and insecticides within the current growing cycle.

"I think they see the availability of data gives you flexibility because they can see things happening as it's happening as opposed to watching history, and certainly what we've shown to them is they don't have to wait a year to tell the farmer what to do, they can tell them within ten days." (CR)

Whilst strategic planning has been heavily criticised as being unrealistic and often unrealisable, it is the case that many organizations use scenario planning as a way of shaping their strategies into a less reactive or defensive mode and begin to adopt a more proactive, positioning approach based on the large amounts of available data to help build more robust scenarios. It would seem logical that greater amounts of data would help reduce the uncertainty and perhaps complexity of predicting the future. Our informants agreed that this was theoretically possible, but all agreed that the necessity to make decisions faster (over a shorter time frame) worked against careful planning.

"Decision-making is speeding up, that's not necessarily to say that it's getting any better or more effective, but there seems to be more data, more propensity for action, for faster decision-making. It may vary by industry again, or by sector, but it's a question of whether just having more information like that actually speeds up the process, or whether there's still that time for reflection, and time for, as you said, a human shaping, if you like." (ME)

There appeared to be a tension between time for reflection (based on the data) and then time to craft a future strategy, versus the urgency to make decisions quickly. The only exceptions to this appeared to be in very large organizations where a long-term strategy was both necessary and affordable. But even here, strategic decision making largely came down to judgement and feel rather than hard data. As one informant noted:

"You can't let the data make the decision" (ME)

Time (or history) also seemed to be important variables. The distinction here is between what we might term 'conventional' and relatively long standing firms with, for example, a holding company and a large number of different companies underneath and firms such as Apple and Google which have their origins in the data driven generation and are structured around the data rather than in the older and more conventional conglomerate organizational structure. These different kinds of organizations use data in very different ways. Older, traditionally structured organizations try to graft on data to their existing strategic processes whilst newer organizations can almost be argued to have been created by the data explosion and are structured in very different ways.

Some organizations occupy a half-way house position between the 'conventional' and these technology firms, perhaps because of a tradition of high data usage. For these firms, big data can offer a route to better problem solving and support their efforts to manage risk. One informant, reflecting on the use of big data by agricultural firms, commented on the trajectory which is being followed:

"I think they're all, because we don't want to actually hold their hands to actually work their brains, it's more around they've all got a realisation they have specific issues and they recognise that collecting large volumes of data will allow them to crack some of those issues, so they've all got to that first base. Some of them have invested historically fortunes collecting this data almost by hand and others have actually gone on to clever monitoring systems and realised what's possible. So we deal with British Sugar, for example, they have 4,000 growers in the UK and they provide certain types of data from that but we've actually allowed them to populate their growth models for sugar beet beyond the three variables they've used to 17..." (CR)

Discussion and Conclusions

Strategic decision making at the most senior levels (i.e. the Board) appears not to be as influenced or shaped by the large amounts of digital data available to feed into the process. Whilst it is certainly the case that operational managers use digital data to understand changes in markets, sales, production techniques and consumer trends, this information is predominantly not used at Board level, indicating something of a digital divide (or disconnect) between strategic and operational processes in many organizations.

Much of the literature examining Boards and Board behaviours would support this finding and would argue that Boards are inherently conservative; tend to emphasise control rather than proactive decision making and often meet relatively infrequently without the whole Board necessarily being present (see for example, Blair, 1995; McGee, Thomas and Wilson, 2010). The current research also raises questions about the efficacy of Board decision making and to what extent data are predominantly an operational rather than a strategic asset.

This infrequency of data use at Board level in our small sample would, of course need further research with a wider sample of both older firms (which are trying to adapt to the new world of big data) and younger firms (which have grown up with – and perhaps because of – big data.

It seems clear, however, from our limited sample that it is not the availability of data that presents problems for Boards, but more how the data are used and how they are used to advantage. Such a view goes against the commonly expressed "drowning in data" stereotype and rather points toward Boards not being able to select out the key data they need to inform and underpin strategic decision making.

Again, further research on a wider, comparative sample would provide more robust findings and see to what extent there were exceptions to the above patterns and themes. Given the data from our informants, it is highly likely that we would see variations due to size, sector and age of organizations. Such a study could become a landmark research project along the lines of studies such as the Aston programme on organizational structures and the Bradford Studies of Strategic Decision Making in the 1960s and 1980s.

It was revealing that most of our informants felt that strategic planning was not significantly helped (or improved) by more data being available. This was still the case where techniques such as scenario planning (which logically lend themselves to more data) were concerned. Informants all agreed that strategic decision making needed, above all, skills in interpretation, intelligence and gut feel.

Finally, our research pointed to the importance of differentiating between organizations which had adopted traditional structures (such as the conglomerate) and those that had evolved more flexible structures (such as Google and Apple). This would be important comparative research, not least to update the well-known (but perhaps wildly out of date) debates about strategy and structure (and which one precedes the other).

Our small number of informants – all of whom are Board Directors – nevertheless raised a number of issues on which there was substantial agreement. A larger, comparative piece of research would reveal to what extent these views were robust across a much wider selceltion of organizations.

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