Unexpected Challenges to Strategic Directions in High Technology Organizations

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Abstract

High technology organizations operate in dynamic environments which are a source of challenges and opportunities that can potentially disrupt their strategic directions. Studies on strategic challenges in high technology companies have traditionally focused on competitive threats, changing markets and shifts in technology yet this research reveals unexpected and disruptive challenges arise both internal and external to the organization and certain actions and characteristics of these organizations can moderate the disruptive impact.

Key words ● strategic challenges ● high technology ● uncertainty ● competitive advantage ● disruptions

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There is a wealth of research on high technology organizations and entire journals dedicated to understanding how strategy can leverage their capabilities, performance and competitive advantage, yet surprisingly, research on strategic challenges in high technology companies is rare. Certainly there are numerous studies on the contingencies and imperatives for high technology companies; these frequently focus on enhancing performance and building competencies through knowledge (Capello 1999; Hirose and Yamamoto 2007), innovation (Beaver 2001; Thompson and Heron 2006), networking, collaboration and alliances (Melkers and Kiopa 2010; Moensted 2010) as a few examples of the many perspectives exploring the strategic advantage in high technology firms. Nonetheless, research exploring what high technology organizations identify as the most important challenges and disruptions to their strategic direction is not extensive. This study explores the challenges and disruptions to strategic direction, faced by contemporary high technology companies and also seeks to ascertain if there are characteristics or actions that can moderate the impact of those disruptions.

In addressing this problem this paper is organized as follows. Following this introduction, a review of literature that provided the basis for the research propositions in presented. In the third section the methods of data collection and analysis are discussed, followed by presentation of the results and their interpretation and discussion. The paper concludes by considering practical implications and suggestions for further research.

Theoretical Background

It is obvious that organizations operating in different industries face different environmental conditions; where some environments may be simple and stable, others are highly complex, or uncertain. While used rather ambiguously in literature, the term 'uncertainty' generally refers to ambiguity in conditions or environment, or, occasionally it more specifically refers to risk. Even though in most cases, organizations are unable to

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influence uncertain environments, (Robbins and Barnwell 2006), organizations are not completely defenseless against the potentially disruptive impact of highly uncertain environments. Literature suggests that certain organizational characteristics or actions can moderate uncertainty by increasing flexibility. Among others, flexible and organic structures (Lawrence and Lorsch 1967), flexible strategies (Robbins and Barnwell 2006) as well as frequent environmental scanning (Hubbard, Rice et al. 2008) and engaging in strategic alliances (Mason 1993)have been found to be effective moderators. Samples that were studied for the purpose of identifying factors that moderate the impact of uncertainty consisted of manufacturing and industrial firms (Lawrence and Lorsch 1967; Burnes 2005). These operated in environments that were relatively uncertain, however did not have the unique challenges of high technology environments and it is this gap which we address here.

High technology industries have frequently been used as examples of very uncertain environments, if not the most uncertain environments of all sectors (Courtney, Kirkland et al. 1997; Hills and Sarin 2003). Duncan (1972) used R&D intensive organizations (including high technology) as a polarized example of organizations exposed to very high dynamism and very high complexity. Consequently as they operate in uncertain environments, high technology companies frequently face challenges to their strategic direction from unexpected disruptions, opportunities and change. Many of those challenges, in particular challenges that relate to the high dynamism of industry, have been discussed by literature. These include the frequently very short life cycle of high technology products (Brown and Eisenhardt 1997) resulting in products becoming obsolete quicker than others. As a result high technology companies are forced to innovate frequently in order to remain competitiveness.

The highly uncertain external environments of high technology companies are the source of many challenges to strategic direction. The most noted of these are the "traditional" competitive challenges that can generally be captured by environmental and industry analysis tools, such as Porter's 5 Forces and macro-environmental analysis (Hubbard, Rice et al.

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2008). These are therefore unlikely to hit the company by surprise, as companies are able to plan for and even prevent them (Porter 2008). Industry analysis cannot provide a complete mapping, especially for uncertain environments, like the high technology sector. Therefore, due to the dynamic and uncertain environments of high technology companies, it is possible that these companies face other disruptions that cannot be unveiled by environmental and industry analysis. Such challenges or disruptions may have slipped beneath the academic radar as research struggles to embrace a broad understanding of the dynamic, complex and evolving nature of these contemporary organizations. This research aims to unveil these previously unrecognized challenges. On the basis of previous research we expect high technology companies will in fact face unexpected challenges to their strategic direction.

While it is clear that uncertain environments are more likely to be the source of challenges than stable environments (Duncan 1972; Robbins and Barnwell 2006), it cannot be concluded from literature whether such challenges are indeed disruptions, and if they are, what makes them disruptive. Therefore, the second proposition suggests that high technology companies are likely to experience both types of challenges i.e. disruptive (causing upheaval of the existing organizational systems and processes) and non-disruptive (can be accommodated within the existing organizational systems and processes). Further it is likely that challenges that can be unveiled by industry or macro-environmental analysis tools (such as Porter's 5 Forces) are less likely to be disruptive. Therefore we expect that while some of the challenges to strategic direction high technology companies face will be likely to be disruptive, it is also likely that other challenges will not and that in fact those that are unexpected challenges are more likely to be disruptive to strategic direction than anticipated challenges will be.

Another objective of this research is to reveal what high technology firms do in order to moderate the disruptive impact of disruptions. To this end the literature suggests that certain characteristics of the organization, or actions that the organization undertakes, can moderate

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or completely prevent the disruptive impact of some disruptions on strategic direction (Burns and Stalker 1961; Lawrence and Lorsch 1967; Robbins and Barnwell 2006). The objective of the research was therefore to identify these characteristics of, and actions undertaken by high technology companies to moderate challenges to strategic direction. From the literature we expect certain *characteristics* of high technology organizations can moderate the disruptive impact of challenges. In addition it is likely that certain *actions* undertaken by high technology organizations can moderate the disruptive impact of challenges.

Methodology

As the research problem here sought to look beyond existing research in an attempt to disclose new insights, qualitative methods were chosen to support such exploratory and inductive research with the aim to generate a new theoretical understanding from the results. From this position it was clear that case studies were appropriate and semi-structured interviewing a suitable data collection method because grounded theory requires the collection of detailed, in-depth, evidence-rich information from a few participants to elucidate potential issues, rather than the more deliberate, survey constrained data collection from many participants for collation and statistical analysis in the alternative theory testing approaches (Glaser and Strauss 1967). As such, case studies together with face to face interviews were deemed the most suitable method for collecting the evidence-rich information required to investigate high technology companies to reveal the sources of challenges and disruptions to their strategic direction, thus were used.

Subsequently, one Australian ICT organization and one Australian biotechnology organization were identified as suitable organizations for this research. As this research was concerned with identifying challenges and disruptions to strategic direction, the selected interviewees were from senior management and executive positions involved in strategic planning in order that they be able to provide relevant information to the following research

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themes in the interview process.   Consistent with the exploratory methodology, semi-structured in-depth interviews were conducted with three managers of the ICT company and four in the biotechnology organization which provided over 8 hours of evidence rich information and revealed an extraordinary set of challenges and disruptions.

The data analysis process involved the coding of the transcribed interviews into key themes and emergent issues by content analysis using Nvivo8 qualitative software. The purpose was to prioritize themes and issues on the basis of how frequently they were raised i.e. within interviews, across interviews and across the two different industry cases. Once themes and issues were identified they were subsequently assessed to identify priority, similarity, consistency and interpreted with respect to how they informed the propositions.

Challenges and Disruptions Results

Funding was the most significant challenge raised by the interviewees from the high technology organizations in this research. This included funding of the company's operations, access to funding for future operations, and the risk of funding being withdrawn. Human resource issues (HR) were another theme that was mentioned frequently and emphatically across both cases. This category includes challenges issues involving the management of people, both at the executive and the lower levels of the organization. The management of R&D and highly specialized staff was a major challenge which although it was generally an expected challenge, it was viewed as highly disruptive particularly where there was an unexpected loss of key research expertise.

A major category of challenges noted by was 'operational issues', which included all challenges that relate to the organization's day to day operations and production process such as challenges resulting from problems with products, resources or the production process. Due to the fact that high technology companies were studied, many of those challenges

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related to the R&D process. The most significant unexpected disruptions noted were
equipment failure and product failure, followed by accidents in the production process.

Competitive threats were a category of challenges that originated from the industry
environment. It includes all challenges that can be described by "Porter's 5 Forces" as well as
by Christensen's "disruptive technology" theory. A number of challenges were mentioned
which fall into this category such as adverse reactions to products, changes in industry
structure and customer demand which were considered neither unexpected nor disruptive.

The strategic planning process was noted as a category which includes challenges
related to planning and strategy. The most disruptive of this challenges were considered to be
the existence of too many goals and also not enough flexibility or processes to achieve current
expectations. While these challenges were considered disruptive they were not deemed
unexpected. Discussions with the managers of these high technology organizations also
raised 18 influences which they believed moderated disruption in their organization. Of these
moderators 12 were noted as organizational actions and 6 organizational characteristics. The
actions raised by managers were allocated to four categories – 1) planning, controlling and
implementing strategies; 2) training and staffing; 3) interaction with the environment; 4)
investments.

In both biotechnology and ICT organizations, the category of actions relating to the
planning, controlling and implementation of strategies were emphasized as the major
moderators of disruptions. In particular in both cases actions which enabled the organizations
for be as informed and prepared for the future were top of the list with scenario planning, risk
analysis and contingency strategies all noted as a means to manage any potentially disruptive
challenge. Investment was second category of organizational actions noted by both ICT and
biotechnology the managers as moderators of disruption. Organizational characteristics were
also mentioned as providing a moderating influence to disruptions for these organizations. Of

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the 6 characteristics noted, three categories were identified; these were 1) culture, 2) structure, and 3) staff.

An innovative and flexible organizational culture was mentioned as by mangers of both organizations as a characteristic that contributed to the moderation of disruptions. Similarly both suggested diversification also enabled them to moderate disruptive influences. Ensuring staffing was optimized appeared to be an important characteristic for these high technology organizations with both revealing that having skilled staff was important way to help reduce disruptions.

Discussion and Suggestions for Future Research

The evidence from discussions with the managers of these high technology companies confirmed many of the challenges previously recognized in the literature such as competitor threats, disruptive technology, changes in customer demand, and challenges originating from the macro-environment. The issue of funding as the most significant unexpected and disruptive challenge to high technology organizations offers pertinent reminder of the tenuous basis of R&D intensive organizations. In particular the threat of a disruption to funding of the R&D pipeline remains the biggest single disruptive challenge well beyond operational, competitive or shifts in the general environment.

Beyond challenges and associated disruptions to the product pipeline, the next area where the managers perceived the greatest challenges was the nest step along that pipeline in the operational domain of the organization. Failure of equipment during the production process or failure of the product to perform were noted as major disruptions to the strategic direction of these high technology organizations as clearly either would signal a significant challenge to organizational activities. With respect to the coordination of operational activities, the managers noted a number of unexpected challenges such as problematic aligning research and corporate goals, problems in manufacturing, cost pressures and

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unrealistic deadlines however while generally they didn't expect these issues to arise in the course of their activities they were not considered disruptive when they did.

As well as noting numerous unexpected and disruptive challenges in the product development and production side of operations, the managers of these high technology companies also noted a significant domain of challenges with respect to staff. While most operational and personnel challenges were generally considered more disruptive than unexpected, conversely it was apparent that challenges arising from changes in the general environment were considered more unexpected than disruptive, acquisitions and takeovers aside.   It appears that managers were sufficiently aware of the dynamic context of their environment recognize these shifts and challenges to be familiar contingencies so while challenges were still unexpected when they did occur they were not deemed disruptive . A particularly interesting result was with respect to the perception of competitive threats.

Finally in discussing challenges and disruptions to the strategic agenda of their organization, the managers of these high technology organizations considered the challenge of managing multiple goals and limited flexibility the most disruptive to strategic direction.   In view of the evidence from these interviews it's clear that high technology companies do in fact face challenges to their strategic direction which they consider are unexpected supporting proposition one. In sum this evidence reveals that managers of high technology companies face unexpected challenges from all three organizational environments – internal, industry and general environments and further that challenges from the industry and internal environments are deemed most disruptive. The rationale for investigating the relationship between expected and disruptive challenges was the assumption that companies can prepare themselves for expected challenges (either by adjusting characteristics or actions), so these challenges would be less likely to become disruptive. Based on the results of this research however, this does not seem to be the case as it was clear anticipated challenges could be disruptive and unexpected challenges may not be. In addition the investigation aimed to

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determine if there were unexpected challenges experienced by these high technology

organizations that arose as a result of their dynamic operating environment and which may

have been previously understated in the literature. It is significant that most of the

characteristics and actions revealed by these managers are not aimed at the prevention of

particular disruptions, but rather aspects of a contingency plan to moderate the impact of

many of the potential disruptions to strategy that they noted. Further, it appears that actions

and characteristics which increased flexibility were considered effective in moderating

disruptive impacts, no matter what the particular disruptions. The disruptions and challenges

to strategic direction revealed in this research have illustrated that both expected and

unexpected challenges may be disruptive and further, many of these will be derived from the

organizations internal environment.

Conclusion

While high technology environments have been discussed in strategic management

literature extensively, this study presented a different focus to consider strategic challenges

and disruptions arising from domains that have not previously been explored. Further, these

results make a significant contribution to theory through their specificity to high technology

companies. While this study is limited to its Australian context and its inductive approach it

has satisfied its research goal in revealing high technology organizations do experience

unexpected disruptions to their strategic directions and further that some organizational

characteristics or actions can moderate the disruptive impact of those challenges. Clearly

there is significant opportunity for further research into disruptive challenges to strategic

direction in high technology organizations particularly with respect to the interpersonal

dynamics of the workforce and the flexibility required in the organization to ensure it is

supported as a moderating influence rather than allowing it to become a disruptive challenge.

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