Quality Management in Industrial Research and Development
– A Preliminary Report

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ABSTRACT
The importance and understanding of quality concepts was probed in a study responded to by industrial research managers. Quality initiatives used were identified and their effectiveness assessed. The level of understanding and application at a number of levels in the organisation was sought. The existence of current programs to increase quality understanding and application was examined, as were the aims of such programs. Major impediments and drivers were identified.

Keywords: Quality, Industrial R&D, Quality Concepts, Criteria for Success

1.0 Introduction
TQM was introduced into Kodak Australia in 1983. One of the authors was involved in this and was responsible for TQMs introduction into the Research Laboratory. (Harvey 1991) This introduction was highly successful, with the Research Laboratory participating fully in Kodak winning the inaugural Australian Quality Award for the best Quality Managed Company, and then the Australian Quality Prize. Kodak is the only winner of the Prize to date.

The Australian Industrial Research Group (AIRG) is comprised of heads of private industry research organisations in Australia. Collectively they manage the majority of industrial research in Australia. In 1993, the AIRG established the theme for its year’s meetings as ‘Quality in R&D’. (AIRG 1993). AIRG members were the primary source of input to this study.

This study arose from learnings during these activities.

1.1 Importance of this Study
During 1993 in the sessions on quality run by the AIRG, it became clear to the author that few industrial research managers had a sound working knowledge of basic quality principles. This was based on observation at the annual AIRG two-day conference and its daylong meetings during the year.

Such information is anecdotal by nature, so the current study seeks to place this knowledge on a more quantifiable basis.

This study is being conducted in a contractionary environment for industrial research and development in Australia. This is evidenced by the membership of the AIRG falling from over 100 to a little over 70. This falls even further to 50 if one removes retirees whom have continued membership. Many of these remaining 50 are operating in survival mode. As a consequence, quality initiatives often suffer. Given the financial benefits that can come from reducing costs caused by poor quality practices, improving quality should be seen as a way of making the R&D dollar go further, not as a dispensable cost.

Wide ranging studies had been done overseas. In Miller (1995), a survey of 45 companies in North America, Europe and Japan was used to identify 10 practices that were used most often in managing for quality in R&D. The article discusses the uneven
penetration of quality practices and how different firms apply quality to their R&D function. It concludes that fundamental quality principles are applicable to R&D but analyses the unique approach needed. Davidson (1996) identified the factors and practices which differentiated organisations with continuing successful and pervasive quality programs from those with waning or abandoned programs. No one approach was successful, but some had a higher probability of success than others. Some studies were limited to one company. The study by Keiser and Blake (1996) is of particular interest to those working in R&D because it reports on how the Nalco Chemical Company had difficulties applying standard quality approaches to research, so modified their approach in a structured way leading to successful acceptance. Patino (1997) also reports on how quality approaches were adapted to fit an R&D environment at Coors Brewing. The emphasis here is on defining what is meant by the “quality terminology” used in a research context and on increasing the understanding of this by the people in R&D. Other studies are devoted to one aspect of quality. These can be core areas, such as Team Work, Spain (1996), where a structured approach, “Deliberation Analysis” is described. In Blake (1996), Quality in R&D is linked with “Right Writing”, a useful but peripheral area.

1.2 R&D Context and Environment
A recent study by the Business Council of Australia, BRW (1998), drew attention to the fall in R&D expenditure following the reduction in the R&D tax concession in 1996. It had been growing at 13% per annum, but this changed to a decline of 9% after 1996, with greater falls in the future predicted by the respondents to the BCA study. Such a turn around is a serious concern. In a period of economic stringency in Australia and a severe economic downturn in Asia, the future looks bleak for Australian industry. This is compounded when we are reducing our investment in the future through cutting back on industrial research. The Industry Commission Report (IC1995) finds that the return to the whole economy of R&D may be very high. This makes it even more important for Australia to be at international best practice levels in all aspects that affect industrial research. Quality is an obvious area that needs to be targeted, as large benefits are achievable by modest efforts. For these benefits to be achieved, a “quality baseline” needs to be established. With this information it is possible to plan programs to improve the understanding and application of quality in industrial R&D. Such programs will provide opportunities for studying the development of quality understanding in research organisations, its introduction into practice and the benefits from it.

2.0 Industrial Research Quality Study
2.1 Aims
This study is investigating:
- The current status of quality in industrial R&D
- The perceived knowledge of the participants.
- Quality programs that have been used.
- The perceived need to increase understanding of quality
- The perceived need to increase application of quality

2.2 Methodology
Interviews
Preliminary interviews were conducted with a limited number of current and recent industrial research managers.
Pilot questionnaire
Then a questionnaire was developed and trialed on a somewhat larger group of industrial research managers.
Questionnaire

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A final questionnaire was then drawn up which probed the respondents’ and their organisations’...

- Understanding of quality principles
- Application of quality principles
- Perceived need to improve
- Use of resources to improve quality

...their perception of...

- The effectiveness of those quality activities tried
- Perceived constraints
- Perceived drivers

and if a current program was operating to improve quality.

2.3 Survey Response Statistics

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<tbody>
<tr>
<td>Questionnaires distributed</td>
<td>67</td>
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<tr>
<td>Returned questionnaires</td>
<td>38</td>
</tr>
<tr>
<td>Unwilling to participate as response was seen as inappropriate</td>
<td>7</td>
</tr>
<tr>
<td>Total Responses</td>
<td>45</td>
</tr>
<tr>
<td>Active AIRG membership</td>
<td>50</td>
</tr>
</tbody>
</table>

3.0 Outcomes of the Questionnaire

The preliminary analysis has been completed. Selected results are given below.

3.1 Priorities

Customer Focus was rated highly.

The emphasis on customers is part of many management programs so it is not a good indicator of quality understanding.
Output
Many considered the output as the area to concentrate on, but the overall response to this was bi-modal.

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<th>Rank</th>
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<td>8</td>
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3.2 Quality Concepts
It was generally considered that quality concepts were well understood in Research and there was a high level of application of these concepts.

<table>
<thead>
<tr>
<th>Agreement</th>
<th>No. of Responses</th>
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<tr>
<td>Agree</td>
<td>18</td>
</tr>
<tr>
<td>Agree</td>
<td>16</td>
</tr>
<tr>
<td>Agree nor Neither</td>
<td>12</td>
</tr>
<tr>
<td>Disagree</td>
<td>6</td>
</tr>
<tr>
<td>Disagree Strongly</td>
<td>2</td>
</tr>
</tbody>
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However, there was a discrepancy between respondents’ perception of understanding and application by senior management.
3.3 Quality oriented programs

Usefulness

Benchmarking was seen as the most useful quality program, followed by TQM.
Program effectiveness

Benchmarking was rarely mentioned as a program used, but rated well for effectiveness.

TQM was referred to quite frequently, yet TQM was not rated as particularly effective.

ISO

ISO rated fairly well on “usefulness”, but with a mixed response on “effectiveness”.
Usefulness

ISO Standards

Effectiveness

ISO

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Impact

The overall impact of quality programs on the Company was seen as greater than that on Research.

**Major Impact on Company**

![Bar chart showing the impact on Company]

**Major Impact on Research**

![Bar chart showing the impact on Research]
4.1 Response Inconsistency and Patterns of misunderstanding
It was common for answers within a single questionnaire response to be inconsistent. There were recurring patterns of answers which showed a misunderstanding of basic quality concepts.

e.g.
TQM rated highly
but
Continuous Improvement rated low

Application of quality principles rated higher than Understanding of quality principles

A program listed as very useful but not listed as having been done

A program listed as low in usefulness but high in effectiveness

5.0 Resources
Resources applied were often limited, as was the duration of the quality program. Quality was seen as “something we have tried”. Having tried once and failed some people are adamant e.g. that “TQM does not work in R&D”.

In many cases outside consultants were used. From discussions with industrial research managers this usually proved ineffective, as management did not develop the understanding that comes from a high level of involvement.

6.0 Preliminary Conclusions
In reading the responses to the questionnaire it was clear that the understanding of quality was low, except in a very few cases.

The lack of understanding of basic quality principles was deduced from responses which were revealing, such as a low priority given to the process while a high importance is given to the output. This can be readily understood as many R&D managers are in survival mode, and given the importance placed on “results” in industry. However this shows a lack of appreciation of the longer-term survival benefits which can flow from a quality initiative, but it does take effort and time. Often those under pressure perceive that the time is not available to develop an understanding of quality fundamentals, and to implement the resulting improvement opportunities.

The perceptions by industrial research managers of senior management understanding and application of quality principles varied. There were those who rated senior management’s grasp on quality as similar to, or slightly better than, Research, and those who rated them as very low for both understanding and application. The reality of these perceptions needs to be checked.

The responses did not reveal an understanding that there was a need to change the thinking of the workforce, or that this would take time.

Lip service was paid to the need to increase quality understanding and application, but there was usually no current program to do this and, in most cases, they were not interested in working with RMIT to improve their quality understanding and application. The willingness to rate application higher than understanding was a concern. No respondent identified this as problem.
6.1 Learnings to date
The evidence suggests that help is needed by Australian industrial research and development to understand and improve quality to be world competitive. Those who have expressed interest in working on quality are clearly the top priority. This should provide case study opportunities, which in turn will aid learning about how to be more effective in developing quality understanding and its application in industrial R&D.

References
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