Developing an evidence-based approach to management knowledge using systematic review

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Developing an evidence-based approach to management knowledge using systematic review

Abstract

Undertaking a review of the literature is an important part of any research project. The researcher both maps and assesses the relevant intellectual territory, in order to specify a research question, which will further develop the knowledge base. However, traditional 'narrative' reviews often lack rigour, and in many cases are not undertaken as genuine pieces of investigatory science. Consequently they can lack a means for making sense of what the collection of studies is saying. These reviews can be biased by the researcher and often lack rigour. Further, the use of reviews of the available evidence to provide insights and guidance for intervention into the operational needs of practitioners and policy-makers has largely been of secondary importance. For practitioners making sense of a mass of often contradictory evidence has become progressively harder. The quality of evidence underpinning decision making and action has been questioned, for inadequate or incomplete evidence seriously impedes policy formulation and implementation. In exploring ways in which evidence-based management reviews might be achieved, the authors evaluate the process of systematic review used in the medical sciences. Over the last 15 years medical science has attempted to improve the review process by synthesising research in a systematic, transparent and reproducible manner with the twin aims of enhancing the knowledge base and informing policy making and practice. This paper evaluates the extent to which the process of systematic review can be applied to the management field in order to produce a reliable knowledge stock and enhanced practice by developing context sensitive research. The paper highlights the challenges in developing an appropriate methodology.

Keywords: Systematic Review, Context-Sensitive Research, Evidence-Based Practice

Introduction: The need for an evidence-based approach

Undertaking a review of the literature to provide the best evidence for informing policy and practice in any discipline, is a key research objective for the respective academic and practitioner communities.

The post world war II era witnessed a sharp focus of attention by academics and practitioners on the discipline and profession of management (Blake and Mouton, 1976; Tisdall, 1982). The pace of knowledge production in this field has been accelerating ever since and has resulted in a body of
knowledge that is increasingly fragmented and transdisciplinary as well as being interdependent with advancements in the social sciences (Friedman et al, 2000).

In management research the literature review process is a key tool, used to manage the diversity of knowledge for a specific academic inquiry. The aim of conducting a literature review is often to enable the researcher both to map and assess the existing intellectual territory, and specify a research question to further develop the existing body of knowledge. Management reviews are often narrative and have been widely criticised to be singular descriptive accounts of the contributions made by writers in the field, often selected for inclusion on the implicit biases of the researcher (Hart, 1998; Fink, 1998). Not surprisingly they have also been condemned for lacking critical assessment. The management research community perpetuates this type of practice by not actively commissioning infrastructural arrangements to ensure previous investments in literature reviews are not lost. This tolerance to loss of knowledge forms a high-risk strategy that will inevitably become unsustainable as organisations endeavour further into the networked and knowledge-based economy.

Reviews of the available evidence in management to assimilate ‘best evidence’ to provide insights and guidance for intervention into the operational needs of practitioners and policy-makes has largely become a secondary consideration.

Sufficient momentum from academics, practitioners and Government has stirred an urgent need to re-evaluate the process by which management researchers conduct literature reviews. Over the last 15 years medical science has attempted to improve the quality of the review process. This paper proposes the view that applying specific principles of the systematic review methodology used in the medical sciences to management research will help in counteracting bias and producing
transparent, high quality and relevant reviews. This will enhance the legitimacy and authority of the resultant evidence and thus provide a reliable basis for practitioners and policy makers to formulate decisions and take action. This is particularly sobering if one considers the growing pressures upon practitioners in today’s global trading environments to do this in shorter cycle times.

This paper will begin by discussing the evidence-based approach in medical sciences through the effective use of systematic reviews. The following sections will compare and contrast the nature of reviews in medical science and management research and evaluate the extent to which systematic reviews process can be applied to the management field. Finally this paper will present the challenges in designing an appropriate methodology for management research.

The origins of the evidence based approach

Since the 1980s British Central Government has placed an increasing emphasis on ensuring that policy and practice are informed through a more rigorous and challenging evidence base. The 'three E' initiatives (economy, efficiency and effectiveness) have focused attention on the delivery of public services and led to the development of detailed guidance and best practice manuals in many disciplines. This orientation has attracted considerable attention, and has attempted to base policy and practice on the best evidence available. Effectiveness in this context is concerned both with appropriateness and validity of the methods used by professionals in their day to day work to achieve their basic aims and also the overall ability of agencies to deliver the services they are required to provide (Davies et al., 2000). The movement has continued under New Labour and in May 1997 Tony Blair announced that 'what counts is what works', the intention being to signal a new 'post-ideological' approach to public policy where evidence would take centre stage in the decision-making process (Davies et al., 2000).
The evidence based approach in medical science and healthcare

The evidence-based movement has had a major impact in certain disciplines. Pre-eminent have been applications in medical science, where the pace of knowledge production has meant that making sense of an often contradictory mass of evidence has become increasingly difficult (Ohlsson, 1994). Specifically in the late 1980s, attention was drawn to the comparative lack of rigour in secondary research (Mulrow, 1987). Critics argued that the preparation of reviews of secondary sources were dependent on implicit, idiosyncratic methods of data collection and interpretation (Cook et al., 1997b; Greenhalgh, 1997). In addition, practice based on poor quality evaluations of the literature sometimes had led to inappropriate recommendations (Cook et al., 1997a). In 1991 Smith questioned the overall wisdom of much of medical science, arguing that only 15 to 20% of medical interventions were supported by solid medical evidence (Smith, 1991). The result, it was argued, was that patients were being regularly subjected to ineffective treatments and interventions, and for many practices there was little or no understanding of whether or not the benefits outweighed the potential harm (Davies et al., 1999).

The National Health Service (NHS) Research and Development Strategy (1991) identified that too little research was being carried out in the important clinical areas and that much of the existing research was ad hoc, piecemeal and poorly conducted (Peckham, 1991). The report also argued that researchers rather than practitioners, managers or policy-makers drove the research agenda. Further, there was little dissemination, let alone diffusion, of research findings. The Strategy not only argued for an increase in the level of research conducted but also for systematic reviews of existing research on important clinical or operational questions, assessing the best evidence available, collating the findings, and presenting them in a way that was accessible and relevant to decision-makers (Peckham, 1991).
Systematic review – a key tool in developing the evidence base

Over the last decade medical science has made significant strides in attempting to improve the quality of the review process by synthesising research in a systematic, transparent and reproducible manner to inform policy and decision making about the organisation and delivery of health and social care (Cook et al., 1997a; 1998; Wolf et al., 2001).

Systematic reviews differ from traditional narrative reviews by adopting a replicable, scientific and transparent process, in other words a detailed technology, that aims to minimise bias through exhaustive literature searches of published and unpublished studies and by providing an audit trail of the reviewers decisions, procedures and conclusions (Cook et al., 1997b). The process of systematic review and its associated procedure, meta-analysis, has been developed over the last decade and now plays a major role in evidence based practices.

Whereas systematic review identifies key scientific contributions to a field or question, meta-analysis offers a statistical procedure for synthesising findings in order to obtain overall reliability unavailable from any single study alone. Indeed, undertaking systematic review is now regarded as a "fundamental scientific activity" (Mulrow, 1994). The 1990’s saw several organisations formed with the aim of establishing agreed and formalised procedures for systematic review and to undertake systematic reviews to synthesise and disseminate evidence across all areas of healthcare. These organisations included the Cochrane Collaboration, the National Health Centre for Reviews and Dissemination and the National Institute for Clinical Excellence.

Evidence based approaches in other disciplines

The movement to base practice on the best available evidence has migrated from medicine to other disciplines. In the UK, the Department of Education and Skills (DfES) has established a Centre for
Evidence-Informed Policy and Practice in Education. Furthermore, a ‘What Works? Programme’ was introduced in the probation service following the Crime Reduction Strategy published by the Home Office in July 1998. The aim of the programme was to develop successful intervention programmes based on hard evidence so that they could be used as models for day-to-day probation practice (HM Inspectorate of Probation (HMIP), 1998; Home Office, 1998). An Effective Practice Initiative has also sought to address the difficult problem of ensuring that offender supervision changes in line with research evidence on what works (Furniss and Nutley, 2000). In 1999 the Department for the Environment, Transport and the Regions (DETR) commissioned a review of the evidence base as it relates to regeneration policy and practice (DETR, 1999; Nutley and Davies, 2000). Other disciplines such as nursing (Evans and Pearson, 2001), housing policy (Davies et al., 1999; Maclennan and More, 1999), social care (Macdonald, 1999) and criminal justice (Laycock, 2000) have also adjusted the approach with varying degrees of success. In 2001, the Economic and Social Research Council (ESRC), funded the establishment of a network (the Evidence Network) of multi-disciplinary centres dedicated to the improvement of the evidence base for policy and practice in social sciences (ESRC, 1999). This national coordination centre, the ‘Evidence Network’, aims to use systematic review to inform and improve decision making in Government, business and the voluntary sector.

Internationally, in February 2000, the Campbell Collaboration was launched in Philadelphia by about 150 pioneering social scientists. This equivalent of the Cochrane collaboration aims

"to help people make well informed decisions by preparing, maintaining, and promoting access to systematic reviews of studies on the effects of social and educational policies and practices" (The Campbell Collaboration, 2001).
Within the approach taken by the Campbell Collaboration, delegates considered questions such as how practitioners might engage the review process, what makes research useful and useable, and what standards and quality criteria distinguished reliable from unreliable research? In this sense, discussions addressed the need for research to be both well founded and socially robust. This emphasis on producing a science base which is both rigorous in formulation and relevant to practice is a key characteristic of an evidence based approach.

The quality of information accepted as evidence in a discipline is dependent on a number of criteria. These include the broad intellectual approach, the value system adopted by researchers and commissioning bodies and the usual research methods employed (Davies et al., 1999). Medical science has traditionally adopted a ‘normal science’ approach within which double-blinded randomised controlled trials (RCTs) have been widely accepted as the most rigorous methods for testing interventions before use. So far, systematic reviews have tended to be applied in, and emanate from, fields and disciplines privileging a positivist tradition, attempting to do for research synthesis what RCTs aspire to do for single studies (Macdonald, 1999). Systematic reviews entail a series of techniques for minimising bias and error, and as such systematic review and meta-analysis are widely regarded as providing 'high-quality' evidence. Figure 1 highlights the hierarchy of evidence in the medical sciences (Davies et al., 1999).

In other disciplines such as education, social services and criminal justice there is often both less consensus regarding the appropriate methodology to be used for evaluating the evidence base, and little agreement as to how use research evidence to inform policy and practice (Davies et al., 1999; Laycock,; Macdonald,1999; Maclennan and More, 1999). Further, policy questions are rarely addressed by the use of RCTs. For example, in social care the nature of evidence is often hotly
disputed and there exists strong resistance to privileging one research method over another. Indeed, post-modern perspectives generally mistrust any notion of objective evidence.

**Figure 1: The Hierarchy of Evidence Within Medical Science**

<table>
<thead>
<tr>
<th>Hierarchy of evidence</th>
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<tr>
<td>I-I Systematic review and meta-analysis of two or more double blind randomized controlled trials.</td>
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<tr>
<td>I-2 One or more large double-blind randomized controlled trials.</td>
</tr>
<tr>
<td>II-1 One or more well-conducted cohort studies</td>
</tr>
<tr>
<td>II-2 One or more well-conducted case-control studies</td>
</tr>
<tr>
<td>II-3 A dramatic uncontrolled experiment</td>
</tr>
<tr>
<td>III Expert committee sitting in review; peer leader opinion</td>
</tr>
<tr>
<td>IV Personal experience</td>
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</tbody>
</table>

(Source: Davies et al., 1999: 11)

Divergences such as these are deeply rooted in the ontological and epistemological assumptions of specific fields. Despite these difficulties Davies et al (2000) argue optimistically:

"The different ontological and epistemological starting points in different professional traditions undoubtedly colour the methods and enthusiasm with which professionals engage with evidence. However, what is clear is that there remains in all of the areas examined great potential for research evidence to be vastly more influential than hitherto" (4).

**The nature of management research**

The nature of the field of management research has been subject, over the years, to considerable analysis and discussion. Much of this discussion and debate has focused upon the ontological status of the field, particularly its fragmented and divergent nature. For example, Whitely (1984a and b), in two influential articles, investigated the scientific status of management research as a
‘practically oriented social science’. He identified its fragmented state and argued that the consequences of this is a,

“low degree of reputational control over significance standards … (which) means that the significance of problems and preferred ways of formulating them are unstable, subject to disputes, and are assessed by diffused and diverse standards” (1984a: 343).

Whitely (2000) further refined this position, suggesting that the continued fragmentation of the management field may displace academics as key stakeholders in the research process. In comparing management research with industrial, work and organisational psychology, Hodgkinson (et al. 2001) also conclude that there is a considerable and widening divide between academics and other stakeholder groups and that "this divergence is likely to further proliferate irrelevant theory and untheorized and invalid practice" (45).

Pettigrew (1997), in the much the same vein as Whitely, emphasised the significance of the social production of knowledge in viewing management research, emphasising stakeholder perspectives. His influential view was that management research faces a series of challenges,

“best captured in a series of concurrent double hurdles, which together raise a wide spectrum of cognitive, social and political demands on (the) skills and knowledge of (management) researchers” (291).

He argued for a thematic approach,
“to meet the double hurdle of embeddedness in the social sciences and the worlds of policy and practice” (292).

Berry (1995) offered a Gallic perspective, arguing strongly the case for the importance of qualitative work. Several writers (Pfeffer and Sutton, 1999, Wind & Nueno, 1998, van der Ven, 1998, Aram, 2000) have argued convincingly for the applied nature of management research. Likewise, Hambrick (1994) and Huff (2000) both used their addresses as Presidents of the Academy of Management to address the ontological status of the field. More recently, Wilcoxson & Fitzgerald (2001) focus on the nature of management as a discipline and the consequences of this for researchers and practitioners in an Australasian context. The 1990s saw an extensive debate concerning the nature of management research within the British Academy of Management, which focused on the ontological status of the field, and particularly the extent to which academic-practitioner relations were to be privileged. Creating a management research which was both theoretically sound and methodologically rigorous as well as relevant to the practitioner community was a theme explored in a report sponsored by the British Academy (Starkey and Madan, 2000). This discussion was developed further in a special issue of the British Journal of Management, (Hodgkinson [ed] 2001).

Comparing the management and medical fields

Tranfield & Starkey (1998), in an influential article which both reflected and drove the debate in the British Academy of Management, used Becher’s (1989) dimensions drawn from the sociology of knowledge to characterise management research as “soft” rather “hard”, “applied” rather than “pure”, “rural” rather than “urban”, and “divergent” rather than “convergent”. The creation of such a profile using dimensions drawn from the sociology of knowledge, enabled contrasts to be made
with other disciplines, and particularly medical science, where systematic review has been applied
to considerable effect. Comparison can be made in both epistemological and ontological realms.

Whereas medical research enjoys considerable and extensive epistemological consensus, this is
untrue of management research in general. The consequential difficulties of establishing agreed
thresholds for high quality work results from this lack of consensus.

Key ontological differences between management research and medical science concern the
dimension “convergent – divergent”. The extent to which a discipline resides at one end of this
dimension or another is purported to depend upon similarities in research ideologies, values and
quality judgements which create a shared sense of nationhood amongst researchers within the field
(Becher 1989). Agreements concerning key research questions to be addressed lead to a relatively
low tolerance of deviance, but have the advantage of defining disciplinary boundaries, making
them easy to defend. Thus, the extent to which disciplines are opening up research questions, or
addressing a previously defined and agreed agenda, dictates positioning on this dimension.
Management research is a relatively young field, far less well developed in terms of agenda and
question formulation than much of medical science. As a result there tends to be low consensus
concerning key research questions in management research. Studies in the field therefore rarely
address identical problems share a research agenda, or more importantly, ask the same questions.
As a result the extent to which meta-analysis, or its qualitative equivalent, meta-ethnography, can
be used to group and synthesise findings is much more questionable in management research. For
example, replication studies are extraordinarily difficult to find within the management research
field.
An evidence-based approach to management knowledge

Tranfield, Denyer, Smart

Figure 2 outlines the similarities and differences between medical science as an applied field of study stemming from the biological sciences, and management research as an applied field with strong connections to the social sciences.

Figure 2: Differences Between Medical Research and Management Research

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<tr>
<th>Nature of the discipline</th>
<th>Medicine</th>
<th>Management</th>
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<tr>
<td>Research Culture</td>
<td>Subjected to rigorous scientific evaluation</td>
<td>Split between positivist and phenomenological perspectives</td>
</tr>
<tr>
<td>Interventions</td>
<td>Can be measured through experiments</td>
<td>Experimentation may or may not be feasible</td>
</tr>
<tr>
<td>Research designs</td>
<td>Based upon a hierarchy of evidence</td>
<td>Triangulation is recommended</td>
</tr>
<tr>
<td>Theory</td>
<td>Concerned with what works - did the intervention offer overall benefits</td>
<td>Concerned with why something works or does not work and the context in which this occurs</td>
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<tr>
<td>Aims of policy</td>
<td>Generally reducing illness and death and improving health</td>
<td>Multiple and competing and the balance between them may change over time</td>
</tr>
<tr>
<td>Weight of inputs into policy</td>
<td>Scientific evidence</td>
<td>Many extraneous factors</td>
</tr>
<tr>
<td>Methods</td>
<td>Predominantly quantitative</td>
<td>Quantitative and qualitative</td>
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<tr>
<th>Literature Reviews</th>
<th>Systematic review and meta analysis</th>
<th>Largely narrative reviews</th>
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<tbody>
<tr>
<td>The need for a review</td>
<td>Reviews of effectiveness are used by clinical practitioners</td>
<td>To develop a research question and inform empirical research practice</td>
</tr>
<tr>
<td>Preparation of the review</td>
<td>A brief scoping study is conducted to delimit the subject area</td>
<td>Usually an informal/adhoc process involving the researcher, peers and supervisor</td>
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<tr>
<td>Review protocol</td>
<td>A plan prior to the review states the criterion for including and excluding studies, the search strategy, description of the methods to be used, coding strategies and the statistical procedures to the employed protocols are made available by international bodies to enhance networking the exchange of knowledge</td>
<td>Level of formality and standardisation in designing/adopting protocols is usually low Unacceptable to &quot;tightly&quot; plan literature review, as this may inhibit the researchers capacity to explore, discover and develop ideas</td>
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<tr>
<td>Identifying research</td>
<td>A comprehensive, structured search is conducted using predetermined keywords and search strings</td>
<td>Identifying a field/sub-fields of study generally occurs through informal consultation Implicit idiosyncratic methods of data collection are used</td>
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<tr>
<td>Selection of studies</td>
<td>Inclusion and exclusion criteria are expressed in the protocol to ensure a review of the best available evidence Draw upon ‘raw data’ from ‘whole studies’ for analysis to create a study in its own right</td>
<td>Based on studies that appear relevant or interesting Researchers bias disables critical appraisal Decisions regarding choice are not recorded precluding any audit trails ‘Raw data’ is often not available in academic articles, which usually represent ‘partial studies’ Precise inclusion/exclusion criteria are often not formally agreed, applied recorded or monitored</td>
</tr>
<tr>
<td>Study quality assessment</td>
<td>Studies are assessed against predetermined criteria. The internal validity of the study is judged. Assessing and including qualitative studies is problematic</td>
<td>Poor evaluating of the fit between research methodology and research questions Researchers tend to rely on the quality rating of a particular journal, rather than applying quality assessment criteria to individual articles</td>
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<td>Data extraction</td>
<td>Data extraction forms are used which act as a historical record for the decisions made during the process and provides the basis on which to conduct data synthesis</td>
<td>Data extraction is not formally guided by explicitly stated inclusion and exclusion criteria Data extracted is not comprehensively recorded and monitored</td>
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<td>Data synthesis</td>
<td>A qualitative synthesis provides a tabulation of key characteristics and results Meta-analysis pools the data across studies to increase the power of statistical analysis Aims to generate ‘best’ evidence</td>
<td>Generally narrative and qualitative Higher levels of subjectivity associated with what is taken from an article for analysis and synthesis Lack explicit descriptive and thematic analysis Specific tools and techniques from the field of qualitative data analysis are increasingly applied</td>
</tr>
<tr>
<td>Reporting and Dissemination</td>
<td>Standardised reporting structures used Non-explanatory style adopted Short scripts Recorded and made widely available through internationally recognised institutions Comprehensible by practitioners</td>
<td>Non-standardised reporting structures Interpretive long scripts The explanatory power improved through the use of analogy, metaphor and homology Process of knowledge production, omitted Sometimes incomprehensible by practitioners Lack links between different literature</td>
</tr>
<tr>
<td>Evidence into practice</td>
<td>Collaborative process and practice oriented</td>
<td>Implementation of evidence is often an afterthought</td>
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The main question here is to what extent the principles, processes and practices developed in the more convergent field of the medical sciences can inform the review process in the management field to create transparent, systematic, reproducible and relevant reviews, thereby increasing potential for the application of results by practitioner and academic communities. As management research questions need to be clearly specified, either as replication of an existing study, further development of an existing study, or a new study to meet a defined 'gap' in the literature, a more systematic literature review process can help to justify/qualify the near/final research question, which is posed. Further, the process described/proposed in this paper values and takes steps to encourage participation, by both academics and managers/policy-makers, and is pragmatic in intent.

**Applying the medical model - is it feasible in management research?**

Despite the relative infancy of systematic review, a reasonable consensus has emerged as to its desirable methodological characteristics (Davies and Crombie, 1998). The Cochrane Collaboration's *Reviewer Handbook* (Clarke and Oxman, 2001) and the National Health Service Centre for Reviews and Dissemination (2001) provide a list of stages in conducting systematic review (see figure 3).

**Figure 3: Stages Of A Systematic Review**

<table>
<thead>
<tr>
<th>STAGE I - PLANNING THE REVIEW</th>
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<tr>
<td>Phase 0 - identification for the need for a review</td>
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<td>Phase 1 - Preparation of a proposal for a review</td>
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<td>Phase 2 - Development of a review Protocol</td>
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<tr>
<th>STAGE II - CONDUCTING A REVIEW</th>
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<tr>
<td>Phase 3 - Identification of research</td>
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<td>Phase 4 - Selection of studies</td>
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<td>Phase 5 - Study quality assessment</td>
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<tr>
<td>Phase 6 - Data extraction and monitoring progress</td>
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<td>Phase 7 - Data synthesis</td>
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<th>STAGE III - REPORTING AND DISSEMINATION</th>
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<td>Phase 8 - The report and recommendations</td>
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<td>Phase 9 - Getting evidence into practice</td>
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(Source: Clarke and Oxman, 2001)
STAGE I - PLANNING THE REVIEW

Prior to beginning the review a review panel is formed encompassing a range of experts in the areas of both methodology and theory. Efforts should be made to include practitioners working in the field in the panel. The review panel should help direct the process through regular meetings and resolve any disputes over the inclusion and exclusion of studies. The initial stages of systematic reviews may be an iterative process of definition, clarification and refinement (Clarke and Oxman, 2001). Within management it will be necessary to conduct scoping studies to assess the relevance and size of the literature and to delimit the subject area or topic. Such studies need to consider cross-disciplinary perspectives and alternative ways in which a research topic has been tackled previously. The scoping study may also include a brief overview of the theoretical, practical and methodological history debates surrounding the field and sub fields of study. Where fields are comprised of semi-independent and autonomous subfields, then this process may prove difficult and the researcher is likely to struggle with the volume of information and the creation of trans-disciplinary understanding.

Within medical science the researcher will also arrive at a definitive review question. The review question is critical to systematic review as other aspects of the process flow from it. In systematic review the outcome of these decisions are captured through the formal document called a review protocol. The protocol is a plan that helps to protect objectivity by providing explicit descriptions of the steps to be taken. The protocol contains information on the specific questions addressed by the study, the population (or sample) that is the focus of the study, the search strategy for identification of relevant studies and the criteria for inclusion and exclusion of studies in the review, (Davies and Crombie, 1998). Once protocols are complete they are registered with the appropriate review group editors, such as the Cochrane Collaboration. If satisfactory, the review is
published to encourage interested parties to contact the reviewers and to avoid duplication of studies.

Any management review protocol may contain a conceptual discussion of the research problem and a statement of the problem's significance rather than a defined research question. Further, management reviews are often regarded as a process of exploration, discovery and development. Therefore, it is generally considered unacceptable to plan the literature review activities closely. A more flexible approach may make explicit what the researcher intends to do a priori but could be modified through the course of the study. The researcher would need to state explicitly what changes had been made and the rationale for doing so. The aim would be to produce a protocol that did not compromise the researcher's ability to be creative in the literature review process, whilst also ensuring reviews be less open to researcher bias than are the more traditional narrative reviews.

**Stage II - Conducting a Review**

A comprehensive, unbiased search is one of the fundamental differences between a traditional narrative review and systematic review. Although sometimes taking considerable time, and almost always requiring perseverance and attention to detail, systematic review has been argued to provide the most efficient and high quality method for identifying and evaluating extensive literatures (Mulrow, 1994). A systematic search begins with the identification of keywords and search terms, which are built from the scoping study, the literature and discussions within the review team. The reviewer should then decide on the search strings that are most appropriate for the study. The search strategy should be reported in detail sufficient to ensure that the search could be replicated. Searches should not only be conducted in published journals and listed in bibliographic databases,
but also comprise of unpublished studies, conference proceedings, industry trials, the internet and even personal requests to known investigators. The output of the information search should be a full listing of articles and papers (core contributions) on which the review will be based.

Only studies that meet all the inclusion criteria specified in the review protocol and manifest none of the exclusion criteria need be incorporated into the review. The strict criteria used in systematic review are linked to the desire to base reviews on the best quality evidence. As decisions regarding inclusion and exclusion remain relatively subjective, this stage of the systematic review might be conducted by more than one reviewer. Disagreements can be resolved within the review panel. The process of selecting studies in systematic review involves several stages. The reviewer will initially conduct a review of all potentially relevant citations identified in the search. Relevant sources will be retrieved for a more detailed evaluation of the full text and from these some will be chosen for the systematic review. The number of sources included and excluded at each stage of the review is documented with the reasons for exclusions.

Within the medical domain there is a tension between the statistical benefits of including a large number of primary studies and conducting high quality reviews of fewer studies using more selective methodological criteria of inclusion and exclusion (Davies, 2000). Quality assessment refers to the appraisal of a study's internal validity and the degree to which its design, conduct and analysis have minimised biases or errors. Individual studies in systematic review are judged against a set of predetermined criteria and checklists to assist the process (Oxman, 1994). The relevance of a study to the review depends on the relevance of its research questions and the quality of its methodology. The reviewer should avoid including,
"all studies that meet broad standards in terms of independent and dependent
variables, avoiding any judgement of quality" (Slavin, 1986: 6).

Systematic reviews have traditionally been applied in fields and disciplines privileging a positivist
and quantitative tradition. Therefore, establishing criteria of the inclusion and exclusion of
qualitative studies provides a further challenge. With qualitative studies there is no possibility of
testing statistically the significance of the results. Qualitative research, by its very nature,

"is non-standard, unconfined, and dependent on the subjective experience of both
the researcher and the researched… it is debatable, therefore, whether an all-
encompassing critical appraisal checklist along the lines of the User's Guides to the
Medical Literature could ever be developed" (Greenhalgh and Taylor, 1997).

However, there is a growing interest even in medical research in the potential contribution of
qualitative research findings, and this might inform the application of systematic reviews to
management research. Several authors have suggested questions that can help judge the quality of
qualitative studies (Greenhalgh and Taylor, 1997; Popay, Rogers et al. 1998; Mays and Pope, 1996;
BSA Medical Sociology Group, 1996). Popay and Rogers suggest that a quality assessment would
include the following:

- A primary marker: is the research aiming to explore the subjective meanings that people give to
  particular experiences and interventions?
- Context sensitive: has the research been designed in such a way as to enable it to be sensitive /
  flexible to changes occurring during the study.
• Sampling strategy: has the study sample been selected in a purposeful way shaped by theory and/or attention given to the diverse contexts and meanings that the study is aiming to explore?

• Data quality: are different sources of knowledge/understanding about the issues being explored or compared?

• Theoretical adequacy: do researchers make explicit the process by which they move from data to interpretation.

• Generalisability: if claims are made to generalisability do these follow logically and/or theoretically from the data?

Whereas systematic reviews draw upon ‘raw data’, in management research this data is often not made available in articles by authors. In many cases the articles only represent the results of parts of studies that satisfy the orientation of the editors of a particular journal. Therefore, the decisions regarding the selection of studies actually become decisions about the selection of ‘articles’ based on the more subjective findings and conclusions of the author rather than the ‘raw’ data. Some management researchers may conduct some form of quality assessment of the research articles, by evaluating the fit between research methodology and research questions. However, management researchers usually rely on the implicit quality rating of a particular journal, rather than formally applying any quality assessment criteria to the articles they include in their reviews. (i.e. refereed journals are better than practitioner journals). The difficulty in specifying and conducting quality assessments of studies is a major challenge in developing a systematic review methodology for management research.

To reduce human error and bias, systematic reviews employ data extraction forms. These often contain general information (title, author, publication details), study features, and specific
information (details and methods) and notes on emerging themes coupled with details of synthesis. The Cochrane Collaboration states that data extraction forms serve at least three important functions. First, the form is directly linked to the formulated review question and the planned assessment of the incorporated studies, providing a visual representation of these. Second, the extraction form acts as a historical record of the decisions made during the process. Third, the data extraction form is the data repository from which the analysis will emerge (Clarke and Oxman, 2001).

The data extraction process requires a documentation of all steps taken. In many cases double extraction processes are employed, where two independent assessors analyse a study and their findings are compared and reconciled if required. Data extraction can be paper based or computer based. The development of the data extraction sheets is flexible and may depend upon the nature of the study. When devising the form, reviewers should consider the information that will be needed to construct summary tables and to perform data synthesis. Data extraction forms should include the date of extraction, the details of the information source (title, authors, journal, publication details, or any other identifying features of the study such as population characteristics, context of the study and methodological quality). Links to other concepts, identification of emergent themes and key results and additional notes also need to be included on the data extraction form.

Research synthesis is the collective term for a family of methods for summarising, integrating and, where possible, cumulating the findings of different studies on a topic or research question (Mulrow, 1994). There are three main types of research synthesis, narrative reviews, qualitative systematic reviews, and meta-analysis. The simplest and best known form of research synthesis is a narrative review that attempts to identify what has been written on a subject of topic. Such reviews make no attempt to seek generalisation or cumulative knowledge from what is reviewed.
Qualitative synthesis involves the tabulation of study characteristics and results to summarise their findings. This approach allows a qualitative assessment of the evidence. It is often supplemented by quantitative synthesis (meta-analysis) if possible and appropriate. Meta-analysis is usually attributed to the work of Gene Glass (1976) who used the term to refer to the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings. The pooling of data allows for an increase in statistical power and a more precise estimate of effect size.

Within management research few studies address the same research question and measure the phenomenon in the same way. Therefore it is unlikely that meta-analysis may be performed. Instead, a two stage synthesis could be adopted. The first would provide full (rough-cut and detailed), descriptive analysis of the field. This is achieved using a very simple set of categories using the extraction forms. For example, who are the authors, how many of the core contributions are from the US, how many European? What is the age profile of the articles? Can the fields be divided into epochs in terms of volume of orientation of study? Do simple categories divide up the field? For example, can the field by divide sectorally? By gender? Or simple categories 'borrowed' from associated cognate disciplines such as psychology or sociology (interpretivist v positivistic or behavioural v cognition studies for example). The researcher should be able to provide a broad ranging descriptive account of the field with specific exemplars and an audit trail, justifying their conclusions.

Researchers would also need to conduct a thematic analysis, outlining that which is known and established already from data extraction forms of the core contributions. They may wish to focus on the extent to which consensus is shared across various themes. They may also want to identify key emerging themes and research questions. Whatever overarching categories are chosen for the
tabulation, researchers should again provide a detailed audit trail back to the core contributions to justify and ground their conclusions. Linking themes across the various core contributions wherever possible and highlighting such links is an important part of a thematic analysis. A thematic systematic review would have to draw conclusions from study findings, rather than the study data:

"It is highly unlikely that such a synthesis will involve a re-analysis of primary data which may be in the form of transcripts from interviews, for field-notes from studies involving participant observation. Rather, the data to be analysed are most likely to be the findings of the studies involved. These might take the form of substantive themes arising, for example, from in-depth interviews. Within qualitative research (and arguably all research) theory plays a pivotal role in informing the interpretation of data. Whilst few authors appear to have considered the role for theory-led synthesis of findings across studies an argument can be made for exploring the potential for this approach" (Clarke and Oxman, 2001, section 4: 20).

The methods for conducting a thematic analysis are a further challenge in developing systematic reviews in management research. Meta-ethnography may offer an approach for conducting an interpretive synthesis of qualitative research and other secondary sources through a process of identifying themes, patterns, and connections within a body of literature:

"Our meta-ethnographic approach enables a rigorous procedure for deriving substantive interpretations about any set of ethnographic or interpretive studies… A meta-ethnography can be considered a complete study in itself. [Meta-ethnography]
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compares and analyses texts, creating new interpretations in the process. It is much more than what we normally mean by literature review" (Noblit and Hare, 1988: 9).

Unlike meta-analysis, meta-ethnography is not limited to synthesising strictly comparable studies. It is the summary and synthesis of the findings of qualitative studies, it attempts to "be interpretive rather than aggregative" (Noblit and Hare, 1988:11). It attempts to go beyond single accounts but "instead of doing this by aggregating samples and identifying consistencies and variability between studies it does this by constructing interpretations, not analyses, and by revealing the analogies between accounts" (Noblit and Hare, 1988: 8).

It identifies 'key metaphors' in the study, in "the themes, perspectives, organisers, organising principles and/or concepts revealed" (Noblit and Hare, 1988: 14).

Other tools and techniques established in the field of qualitative data analysis may also be applied to aid a thematic analysis. For example Hart (1998) uses trees, maps and argumentation analysis with some guidance on how to record the outputs of such activity. Once more, an important factor is ensuring that some degree of flexibility is allowed in the process of cumulation so the researcher is able to reflect on the findings, which will allow a better comprehension of field of study.

STAGE III - REPORTING AND DISSEMINATION

A good systematic review should make it easier for the practitioner to understand the research by synthesising extensive primary research papers from which it was derived. By tabulating the descriptive analysis and the thematic analysis the reader is therefore not required to analyse in detail the methods sections of each paper, contrasting, for example different data analysis and
presentational formats (Greenhalgh, 1997). The systematic review report provides details of all steps, methods used and decisions taken in the review, the results of the review, an interpretation of these results and recommendations for practice.

Practitioners can use the best available evidence provided by systematic review to inform their decisions. However, evidence based does not mean evidence determined (Davies et al., 1999). Decision-makers are likely, and should be encouraged, to use personal experience and problem solving skills rather than relying solely on the results of systematic reviews (Rosenberg and Donald, 1995; Bero et al., 1995) Values, resources and judgement all play a significant part of how findings from research are interpreted (Macdonald, 1999). Therefore within management there is a need to recognise that evidence alone is often insufficient and incomplete, only informing decision making by bounding available options. Developing a 'context sensitive' science (Nowotny, 2001) blurs the boundaries between science, policy and practice. Increasing the precision of a reliable evidence base in order that more sensitive judgements can be made by policy makers and practitioners is the ultimate aim of the application of systematic review procedures to management research.

There are interventions that might be used to improve the uptake of evidence by practitioners (Davies et al., 1999):

- Disseminating research findings in simple and accessible formats
- Using training regimes to put key messages across
- Issuing evidence-based guidelines to practitioners
- Identifying opinion leaders, advocates and 'product champions'
- Establishing inspection or audit regimes to monitor the implementation of evidence based guidelines
• Creating the demand for evidence by introducing tailor made performance targets

• Identifying existing best practice, coupled with incentives for these successful programmes to share their strategies with others.

The implementation of an evidence based approach requires changes at two levels, those that focus on changing individual practitioner behaviour, and those that are centred on the organisational level, attempting to alter the fabric, structure and culture of whole systems (Halladay and Bero, 2000). Many of the interventions studied in systematic review identify the organisation as a target for change rather than individual practitioners. They work in organizations that have embedded routines and established cultures, with limited and largely committed resources (Davies et al., 1999; Furniss and Nutley, 2000). To implement the evidence based approach requires the transformation of practice styles so that using the best evidence is an ongoing routine activity within the organisation and is developed as a process of organisational learning.

Conclusions

This paper began by arguing that reviews of existing research evidence in the management field lack both rigour and relevance. Anderson (et al. 2001) offer a four-fold characterisation of science. They term research that is low on rigour but high on relevance 'Popularist Science'. In contrast, 'Pedantic Science' is high on rigour but low on relevance, whilst 'Puerile Science' is neither rigorous nor relevant. Only 'Pragmatic Science' balances both rigour and relevance (see figure 4).
Figure 4: A Four Fold Typology of Research In Industrial, Work and Organizational Psychology

<table>
<thead>
<tr>
<th>Practical Relevance</th>
<th>Theoretical and methodological rigour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Quadrant 3: 'Puerile' Science</td>
</tr>
<tr>
<td>High</td>
<td>Quadrant 1: 'Popularist Science'</td>
</tr>
<tr>
<td></td>
<td>Quadrant 2: 'Pragmatic Science'</td>
</tr>
<tr>
<td></td>
<td>Quadrant 4: 'Pedantic' Science</td>
</tr>
</tbody>
</table>

(Source: Anderson et al., 2001: 394)

They acknowledge that the pursuit of 'pragmatic' research,

"that genuinely bears the hallmarks of scientific rigour (irrespective of whether it be quantitative and/or qualitative in nature), but which also engages a wider body of stakeholders in the knowledge production process, presents a set of formidable challenges for the management research community at this juncture" (46).

This paper has outlined the opportunities and challenges in applying ideas and methods developed in medical science to the field of management, with the aim of further developing and enhancing the quality of management reviews and ensuring that they are practitioner and context sensitive. The aim of systematic review is to provide collective insights through theoretical synthesis into fields and sub-fields. For academics, the reviewing process increases methodological rigour. For practitioners/managers, systematic review helps develop a reliable knowledge base of 'field tested and grounded technological rules' (van Aken, 2001) or 'what works, for whom in which circumstances' (Pawson, 2001). In this sense, systematic review can be argued to lie at the heart of a 'pragmatic' management research, which aims to serve both academic and practitioner communities.
References


BSA Medical Sociology Group.1996, Criteria for the evaluation of qualitative research papers. Medical Sociology News, v. 22


Davies, P. 2000, The Relevance of Systematic Reviews to Educational Policy and Practice. 1-16.

DETR. A Review of the Evidence Base for Regeneration Policy and Practice. 1999. DETR.


Furniss, J, S M Nutley, 2000, Implementing What Works with Offenders - The Effective Practice Initiative: Public
National Centre for Clinical Excellence. 2001, Homepage: http://www.nice.org.uk/


The Cambell Collaboration. 2001, Homepage: http://campbell.gse.upenn.edu/about.htm


The NHS Centre for Reviews and Dissemination. 2001, Homepage: http://www.york.ac.uk/inst/crd/centre.htm


Van Aken, J. 2001, Management research based on the paradigm of the design sciences: the quest for field tested and grounded technological rules, Eindhoven Centre for Innovation Studies, Eindhoven University of Technology, Working Paper 01.11


