Management Decision

Emerald Article: Toward a theory of evidence based decision making

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Abstract

Purpose – The purpose of this paper is to integrate existing body of knowledge on evidence-based management, develop a theory of evidence, and propose a model of evidence-based decision making.

Design/methodology/approach – Following a literature review, the paper takes a conceptual approach toward developing a theory of evidence and a process model of decision making. Formal research propositions amplify both theory and model.

Findings – The paper suggests that decision making is at the heart of management practice. It underscores the importance of both research and experiential evidence for making professionally sound managerial decisions. It argues that the strength of evidence is a function of its rigor and relevance manifested by methodological fit, relevance to the context, transparency of its findings, replicability of the evidence, and the degree of consensus within the decision community. A multi-stage mixed level model of evidence-based decision making is proposed with suggestions for future research.

Practical implications – An explicit, formal, and systematic collaboration at the global level among the producers of evidence and its users akin to the Cochrane Collaboration will ensure sound evidence, contribute to decision quality, and enable professionalization of management practice.

Originality/value – The unique value contribution of this paper comes from a critical review of the evidence-based management literature, the articulation of a formal theory of evidence, and the development of a model for decision making driven by the theory of evidence.

Keywords Evidence based management, Theory of evidence, Mixed level model of decision making, Global collaboration, Management strategy, Management theory

Paper type Conceptual paper

1. Introduction

The study of evidence-based practices has become popular over the last few decades and there is a considerable body of literature targeted at promoting evidence based practices (Holloway, 2007; Reid and Spinks, 2007). While the available literature has added extensively to our knowledge about the benefits of evidence based practices in general and how evidence must be obtained, classified, and disseminated, findings have not been integrated systematically.

Decision making is arguably at the core of managerial tasks but often managers make decisions under pressure and with incomplete information. While some managers justify their choices on the basis of facts and evidence, many rely on out-dated information, personal experience, individual observation, or gut feelings (Pfeffer and Sutton, 2006). In addition, managers are confronted by an overload of information and engage in practices which are hard to evaluate and sometimes irrelevant to the organization and context (Pfeffer and Sutton, 2006). The results of poorly supported decisions are choices that waste company resources and even risk the

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future of the organization. Many managers simply need guidance to make decisions based on reliable evidence. However there is no systematic yardstick to clue the decision maker as to what evidence is most reliable. What exactly is evidence? What evidence should be considered, under which circumstances, and why?

Sackett *et al.* (2000) define two separate stages for evidence-based practice: first, it is the stage of generating evidence, which relies on the academic body of a profession, and second, the stage of using that evidence in practice, and making informed decisions based on those practices. This paper attempts to review existing knowledge on evidence-based decision making and proposes a theory of evidence that will allow managers to sort out the information needed for them to make a decision and place appropriate confidence in those decisions. Moreover this paper focuses on the process of evidence-based decision making and illustrates how constructs from different levels affect this process at each stage.

2. A critical review of the evidence-based management literature

While the field of evidence-based management is fairly young, it has become increasingly popular over the past few years. The existing literature is dominantly prescriptive, suggesting remedies to narrow the gap between research and practice in the field of management. The prescriptions are mainly in the areas of research methodology and management education and training, but very few attempt to explicitly describe and address the issue within the field of management. The literature is largely reflective of the authors' personal experience and perspective and generally lacks a solid empirical foundation. In addition, much of the literature draws on the philosophy of evidence-based medicine and examples of success from within the health care sector. While this research can be useful, it is important to note that recommendations on evidence-based medicine tend to be context independent and implicitly universal, while managerial prescriptions are contingent and sensitive to variation in the organizational context (Dean and Bowen, 1994). What seems to be lacking in the existing literature is a proper definition of evidence, and an agreed on theory and framework of evidence. Furthermore, the process of evidence-based decision making and the effects of authority, organizational politics, and context on that process, although acknowledged (Rousseau and McCarthy, 2007), are not conceptualized and theorized.

The main focus of the existing literature is on the role of researchers and educators who enable and facilitate the process of evidence-based management. There are discussions about the similarities and differences between health care professionals and management practitioners. Whatever evidence is available in the field, the role of the manager and how the evidence can be used as a foundation for decision making are issues that are not often discussed.

The origin of evidence-based approaches can be traced back to the 1980s when the British government increasingly emphasized the need for informed policy and practices based on an accurate and challenging foundation of evidence (Tranfield *et al.*, 2003). In particular it was the focus on the effectiveness of public services that gradually led to the development of detailed guidelines and best practices manuals in many disciplines (Tranfield *et al.*, 2003). The evidence-based approach became particularly influential in medical science and health care by critiquing the implicit and eccentric data collection and interpretation methods (Cook *et al.*, 1997b; Greenhalgh,

1997). Moreover, evidence-based medicine also resulted in identifying the most important and needed areas of research in medical practice through defining national level research strategies and encouraging effective dissemination and diffusion of research findings (Peckham, 1991). One of the most significant achievement of the evidence-based movement in the medical field was the improvement in the quality of the review process through systematic reviews that synthesize research in a transparent and reproducible manner (Cook *et al.*, 1997a,b; Wolf *et al.*, 2001). The literature then evolved by incorporating the systematic review and meta-analysis as key tools in developing evidence for practice through reducing bias by means of exhaustive literature searches of both published and unpublished studies (Cook *et al.*, 1997b). The literature on evidence-based management also suggests that a shift from traditional narrative reviews to systematic, context-sensitive research would be the appropriate methodology for developing evidence for the discipline (Tranfield *et al.*, 2003). While acknowledging this need, Tranfield *et al.* (2003) compare management research with medical research on dimensions such as the nature of the discipline, research culture, research design, review protocol, etc. They claim that the nature of the management discipline is divergent while that of medicine is convergent (Tranfield *et al.*, 2003). Consequently, the research culture in the field of medicine is subject to rigorous scientific evaluation while management research has a culture that is a split between positivist and phenomenological perspectives (Tranfield *et al.*, 2003). They acknowledge the similarities and differences between research in the two practices and prescribe systematic reviews and certain dissemination and reporting methods as the remedy for closing the gap between research and practice (Tranfield *et al.*, 2003). However, they do not sufficiently emphasize the role of formal international bodies such as Campbell and Cochrane Collaborations that regulate the main steps of planning the review, conducting reviews, and reporting and dissemination of results in the field of medicine. Their prescriptions lament the absence of similar independent institutions within the field of management to act as key agents to implement research into practice, which puts the burden solely on the shoulders of the researchers. In fact, there is no guidance in the management literature as to what passes as evidence and who is responsible for assessing the body of knowledge and evaluating the evidence that needs to be diffused to practitioners.

Another main focus of the literature on evidence-based management is educating managers. Rousseau and McCarthy (2007) suggest that if management education is focused on evidence, managerial decision making will improve and organizations will achieve better outcomes. This suggestion is mainly based on Peter Drucker's (1966) assertion of the repetitive nature of most business issues. It follows that for solving problems, managers can use related evidence-based principles to make effective decisions (Rousseau and McCarthy, 2007). Rousseau and McCarthy (2007) combine experiences in management education with those in the healthcare and offer descriptions of key features of teaching evidence-based management. They encourage educators to focus on principles where the science is clear and convergent (e.g. goal setting principles of Locke and Latham(1990). Moreover Rousseau and McCarthy (2007) acknowledge that management research is fragmented, which makes it difficult to keep current with research findings. They further suggest that educators should develop decision awareness in management students so that they understand that every small action or non-action is itself a decision and an opportunity to implement

evidence. However, there are several barriers for an evidence-based management education. For example, there exists no clear idea or rule for evidence in social science (Westen and Bradley, 2005). Furthermore, while medical education is extremely standardized, this is not the case for MBAs and other forms of management education. Having a degree in management is neither a guarantee for management competency nor a requirement for practicing management (Pfeffer and Fong, 2002; Ghoshal, 2005; Mintzberg, 2005). Organizations such as Association for the Advancement of Collegiate Schools of Business (AACSB) do not yet have the power to enforce a training paradigm or methodology that would standardize management education.

Comparing the use of evidence in management and medical practice, it has been suggested that culture, research base, and decision making processes are very different in these two fields. In the field of medicine, the process of making evidence-based decisions is considered to be a multi-stage process that is affected by constructs from different levels. For example, the Promoting Action on Research Implementation in Health Services (PARIHS) framework proposes that for a successful implementation of evidence-based practice, there needs to be "clarity about the nature of the evidence being used, the quality of context, and the type of facilitation needed to ensure a successful change process" (Rycroft-Malone, 2004). While emphasizing the role of researchers as creators of evidence, and physicians as the main decision makers and users of evidence within the health care sector, Rycroft-Malone (2004) also takes the patient into consideration as the key stakeholder of the process and recognizes the importance of contextual constructs such as culture in both decision making and the implementation process. In an attempt to clarify the first stage of evidence-based management, a theory of evidence is proposed that offers a set of dimensions against which evidence can be evaluated such as methodological fit, contextualization, replicability, transparency, and consensus. The theory is driven by the principles of quality in social science research.

Focusing on the second stage of evidence-based management- using evidence to make informed decisions- a model is proposed based on a number of basic principles. First, the decision making process in organizations is not viewed from a purely rational perspective. There is no presumption of an ideal world in which rational decision making requires a complete search of all available practices and information about their consequences (Choo, 1996). It is, however, assumed that in reality, after the problems are simplified due to the capacity of human mind for formulating and solving complex problems (Simon, 1997), decision making in organization would be conducted by the principle of bounded rationality, rather than by comprehensive, objective rationality. Three categories that are mainly identified as bounds to human rationality are the decision maker's mental skills, habits, and reflexes (Simon, 1997). Based on similar logic, in order to understand managers' perception of evidence and their use of it in decision making, the model also takes the effects of experience and judgment on the process of decision making at the individual level. It discusses how available evidence will be used as the basis for decision making in the context of experience and bounded awareness. Bounded awareness refers to the "common tendency to overlook obvious, important, and readily available" evidence (Bazerman and Moore, 2008).

Second, the model adopts a multi-level perspective and postulates a cross-level effect of contextual factors on the process of evidence-based decision making. In health care practice, the context is considered to be limitless as it can include communities and

cultures that are in turn influenced by social, economic, political, historical, and psychosocial factors (Rycroft-Malone, 2004). In the proposed model, the term context is used to refer to the organization, which is the relevant environment for pushing research evidence into practice. It is suggested that these contextual factors at higher levels of analysis can facilitate or confine the process of evidence-based decision making.

Third, the model discusses how demand for transparency of decisions and the decision process as well as the growth of public-interest and advocacy organizations have resulted in demands for higher levels of accountability on the part of decision makers (Gregory and Keeney, 1994). As a result, the decision process is also affected by the need to consider the often-conflicting objectives of different stakeholders. Decision makers need to generate alternatives that are based on stakeholders' values to achieve a certain balance (Gregory and Keeney, 1994). According to Clarkson's (1995) Stakeholder Framework, this perspective brings factors from various levels of analysis (institutional, organizational, and individual) into the model. The model incorporates the concept of agency theory in the process of decision making and includes the moderating effect of the decision maker's preferences and values. Finally, it acknowledges that choosing the final decision from the generated alternatives is a process that is ethically bounded. Before developing the model and building propositions, a discussion on the concept of evidence-based practice along with some definitions are provided. In addition, the critical steps that the field of medicine has taken toward evidence based practice are presented as a success story that can be used in benchmarking evidence-based management. The discussion is followed by a definition of what passes as evidence. Finally, based on the principles mentioned previously, a theory of evidence-based decision making is proposed.

3. Evidence-based practice

In medical practice, evidence-based medicine evolved as a way to minimize the gap that existed between research and clinical practice. This gap had serious consequences and often resulted in suboptimal medical care and procedures, as well as potential for unnecessary and avoidable harm to patients due to the lack of efficiency and effectiveness of incorporating the latest findings and procedures in practice (Sackett and Rosenberg, 1995a). In the field of medicine the gap between research and practice was particularly obvious due to the existence of large unwarranted variations in the provision of medical care (Wennberg, 1996). This claim is supported by studies which showed that some people were receiving more medical care than they actually needed while some were receiving less than required (Schuster *et al.*, 1998). Studies also argue that the gap between research and medical practice is brought to light due to the growing observance of cases of overuse, underuse, and misuse of specific medical procedures (Chassin and Galvin, 1998). These studies and reports were all proof of the need for a practice which enables doctors to trace, decisively evaluate, and integrate evidence into their clinical practice. Sackett and Rosenberg (1995b) name such practice as evidence-based medicine. Sackett (1997) defines evidence-based medicine as a "way of thinking" that can be used to promote the implementation of research findings in clinical routines and practice and suggests that the best available knowledge about what actually works should be used in a "conscientious, explicit and judicious" manner in order to make decisions in medical care (Sackett, 1997). To make it more simple and

practical, evidence-based medicine can be defined as integrating physician's individual clinical expertise with the best external clinical evidence obtained from systematic research.

The existence of a gap between research and practice holds true in management and organizational science (Rynes *et al.*, 2001; Pfeffer and Sutton, 2006). Similar to evidence-based medicine, evidence-based management is an approach that tries to enhance the quality of decisions made to solve organizational problems by deriving principles from external, systematic research to guide management practices (Rousseau, 2006). Although there is no strong proof and systematic research yet suggesting evidence-based management actually improves organizations' performance and helps managers make better decisions (Reay *et al.*, 2009), the absence of proof cannot be used to discount evidence-based management's benefits to organizations (Briner *et al.*, 2009). The generation of proof however, can convince people that evidence-based management approach can lead to better decisions within organizations.

Abrahamson and Eisenman (2001) describe the field of management as a market in which knowledge is the main commodity that is bought and sold. From their point of view, on the supply side of this market, there are consultants, journalists, and management scholars. These are the people who produce and disseminate knowledge which is consumed by those on the demand side of this market such as managers, students, executives, etc. (Abrahamson and Eisenman, 2001). Management scholars are also on the demand side of this market, in that they expand and explore the knowledge that is already disseminated into the market.

What is of concern, however, is that the state of this market is rather gloomy. According to Pfeffer and Sutton (2006), parts of the knowledge available out there consist of "deeply flawed standards" that are sometimes counterproductive. Evidence-based management, simply put, is a way to regulate methods of gathering and assessing management and business knowledge to produce better standards and guidelines. It is a way of steering the marketplace of management ideas (Pfeffer and Sutton, 2006) to achieve a higher quality of business knowledge which has been regulated, controlled, evaluated, and therefore considered more reliable.

The argument that evidence-based management is effective can be drawn from a rational interpretation based on the effectiveness of evidence-based medicine for curing patients and for structuring efficient public health policies. Pfeffer and Sutton (2006) argue that companies which base their decisions on evidence have a competitive advantage. This is mainly because management by intuition, the alternative approach to basing decisions on evidence (Gaynard, 2010), is hardly defensible. The traditional approach to decision making either relies largely on personal experience or blindly follows the advice of business books or consultants which are mostly driven by traditional beliefs or weak evidence (Rousseau, 2006). Thus, when there is little or no reliable information available to make decisions, the managers with the evidence-based management way of thinking, try to act on the basis of logic and evidence, rather than on guesswork and hope (Pfeffer and Sutton, 2006).

Although the term evidence-based management is relatively new, the basic idea is not. The notion that management research can and should be transferred into practice so that practitioners can benefit from it has been in the literature for a long time (Rousseau, 2006). However, it has not yet found its way to the heart of the practice, and

for several reasons, practitioners still prefer to rely on their own judgment or traditional beliefs. Several researchers have investigated the reasons that have precipitated this sad state of disconnect between research and practice in the field of management.

Explanations such as the fear of losing authority, the preference for only hearing good news rather than the truth, or the inefficiency and messiness of the marketplace of business ideas (Pfeffer and Sutton, 2006) have all been suggested as reasons for the unpopularity of evidence-based management among managers. The gap between research and practice in the field of management is particularly bothersome because the academic world of management and its research exist primarily to further the management profession. If the link between these two is nonexistent or broken, the legitimacy of the academy in this field will be under scrutiny.

4. Evidence-based medicine to evidence-based management
In addition to the explanations provided by scholars as to why decisions in organizations are not yet based on research findings and evidence, another valid argument is that the field of evidence-based management is suffering from the very illness it is trying to cure. That is, while the paradigm of evidence-based management is trying to encourage the adoption of a cumulative body of knowledge in the management field that is validated, verified, and ready to use by managers, it does not boast of a strong body of knowledge of its own. One reason for this may be due to the lack of an agreed-on theory and framework in the field (Baba, 2004).

Pfeffer and Sutton (2006) suggested that in order for evidence-based management to become a practice in real organizational context, management can learn from the successful steps that other professions, such as medicine, have taken toward evidence-based practice. Although it has been discussed in medical literature over the past two decades, the movement of evidence-based medicine likely has its roots in an essay published in the 1970s by Archibald Leman Cochrane in which he criticized the medical profession for not having an "organized critical summary [...] of all randomized controlled trials" (Cochrane, 1989). The challenge that Cochrane put on the medical profession later resulted in an independent international organization with the mission of establishing a knowledge base of up-to-date and accurate health care information – the Cochrane Collaboration- (Cochrane, 1989). Half a century after Cochrane's critical review of the medical profession and decades after Sackett's movement, evidence and evidence-based practice has become popular, even fashionable (Shortell *et al.*, 2001), and has found its way through other fields such as education, policy making (Shortell *et al.*, 2001), and management. However there are some specific steps that the profession of medicine has taken toward an evidence-based practice, especially toward establishing a strong cumulative body of knowledge that seems to be the Achilles' heel of management.

The field of management in particular suffers from the absence of intellectual coherence in many of its subfields (Baba, 2004). Pfeffer and Sutton (2006) point out some of these incoherencies such as whether companies should really pursue excellence (Peters and Waterman, 2004) or is the whole notion just a myth (Crawford and Mathews, 2003)? Should we avoid conflicts or not? Is charismatic leadership the key to success or is it quite the opposite? There are even contradicting ideas on the most researched and studied theories of management such as goal theory. While many

argue that a challenging goal enhances performance, others imply that it can systematically reduce productivity. In the end, it may come down to which book one had read or which business school one had attended.

The management literature is also suffering from significant variation in which research is integrated into textbooks (Stambaugh and Trank, 2010) and course syllabi (Charlier et al., 2011) which makes it more challenging to achieve intellectual coherence.

In the field of medicine, physicians are to some extent equipped with comprehensive and cumulative databases of the latest research and evidence in health care, such as the Cochrane Collaboration. Through this collaboration, health care providers, policy makers, and even patients are constantly preparing, updating, and facilitating access to a comprehensive database of latest research and clinical evidence through systematic reviews (Bero and Rennie, 1995). The timing is right for the field of management because researchers, practitioners, and other parties in organizational and management studies now have access to advanced technologies, research methods, bibliographic systems, and software (Chalmers and Altman, 1995), thus rendering the development of a comprehensive database of evidence possible.

Learning from the profession of medicine, one recommended approach is a paradigm shift which imposes changes on part of the researchers, publishers, facilitators, and organizations (Walshe and Rundall, 2001). For example, at the academic level, Walshe and Rundall (2001) call for a change away from a fragmented research strategy to one that is more coherent at national and global levels. They also suggest a research direction that is more need-led and practice-oriented rather than research-led (Walshe and Rundall, 2001). They further recommend that research quality be enhanced through funding larger scale research and investing more in training researchers to provide more appropriate research methods (Walshe and Rundall, 2001). At the publisher and facilitator level, they recommend more modern ways of disseminating research findings (such as online databases), along with simplifying research findings in summaries and clinical guidelines, and pushing the research findings to their probable users rather than waiting for practitioners to pull the information toward themselves (Walshe and Rundall, 2001). This is a comprehensive guideline that focuses on the integrated aspects of a profession and calls for change in many different segments that can be a model for evidence-based management. The questions that still remain are: What is it that should be "pushed" to the probable users? How should the summaries and guidelines be prepared? How can the quality of research be improved? What passes as evidence?

5. Meaning of evidence

In the field of medicine, evidence is defined as the interpretation of empirical data which results from "formal research or systematic investigations using any type of science or social science methods" (Rychetnik et al., 2002). Fortunately the quality of research and the characteristics of evidence in the field of evidence-based medicine have been well established (Fletcher and Sackett, 1979; Woolf et al., 1990). One of the main approaches to defining what qualifies as evidence in evidence-based medicine is through the use of categories of quality at different levels (Tillett et al., 1998; Sutherland, 2001). For example, a very well-known categorization is based on a hierarchy of study design (Campbell et al., 1963). Based on this grading scheme, the strongest evidence is derived from at least "one systematic review of multiple

well-designed randomized controlled trials", in the lower levels there are evidences "from at least one properly designed randomized controlled trial of appropriate size", "well-designed trials such as pseudo-randomized or non-randomized trials, cohort studies, time series or matched case-controlled studies", "well-designed non-experimental studies from more than one centre or research group or from case reports", and "opinions of respected authorities, based on clinical evidence, descriptive studies or reports of expert committees" (Oxford Centre for Evidence-based Medicine, 2011).

The systematic logic behind the grading schemes and guidelines for evaluating evidence is mostly based on the rules established by the Canadian Task Force on the Periodic Health Examination (Fletcher and Sackett, 1979), which suggests specific criteria for evaluating and grading information including quality of study methods, number of studies, magnitude of effect, consistency, and generalizability of the findings. Therefore, a higher level of evidence results from a greater number of studies with better quality in design and methodology and with greater magnitudes. These experiences in evidence-based medicine suggest that the management profession should establish an independent organization for reviewing and grading all the findings in management and organizational studies and create a cumulative body of knowledge for managers.

6. Toward a theory of evidence
In order to address the challenge of what evidence is in managerial fields and the framework against which evidence can be evaluated and graded, a theory of evidence is proposed. "Evidence" is an ambiguous word (Miller and Safer, 1993). The most relevant definition for our purposes is evidence as a fact, organized body of information, or observation, which is presented to support or justify beliefs or inferences (Goodman and Royall, 1988; Sackett *et al.*, 1996). In our view, in order for evidence to be useful it has to be rigorous and it has to be relevant to the context where it is invoked. In other words, rigour and relevance are at the heart of generating and evaluating evidence. That said, Briner *et al.* (2009) argue that it is both unfeasible and undesirable to copy the hierarchical evaluation system of the Cochrane model for grading evidence in management research. Briner *et al.* (2009) reason that all academic fields are different and what counts as "best" evidence is contingent on its appropriateness to the question being asked (Boaz and Ashby, 2003). This contingent nature seems to be captured in Upshur *et al.*'s (2001) 'inclusive model' of evidence. This model illustrates evidence through two dimensions of method and context. Methodology is mainly concerned with how observations are conducted, collected, aggregated, analyzed, and interpreted. Context of the evidence, which in the medical field may range from individual care to population health and social policy, captures the extent to which evidence is tailored to the need of individuals or generalizable to the scope of population (Upshur *et al.*, 2001). The main contribution of this model is that it takes a step further from the purely hierarchical approach to evidence and acknowledges that evidence should be understood "as a mediation between the context of its use and method of its production" (Upshur *et al.*, 2001). This understanding of evidence is particularly important because while quantitative research and measurement is essential for reasoning in the physical sciences (Vineis, 1997),

qualitative research and meaning is also required for implementing the preferences and values of different stakeholders in the context of the practice.

As Briner *et al.* (2009) suggest, for the question of "what effect does intervention X have on outcome Y?", a meta-analysis of randomized trials may produce the best possible evidence, while for answering the question of "how do women interpret their role on male-dominated boards?", qualitative methods may be more appropriate to generate evidence. Furthermore, there are questions which require theory as well as evidence from which processes can be inferred. Therefore, for more complex management decisions, different forms of evidence need to be integrated (Briner *et al.*, 2009). Consequently, unlike the Cochrane's hierarchical grading of evidence, the best evidence in the managerial field can be quantitative, qualitative, theoretical or any combination of the three. In addition to the academic research findings, managers also need other sources and types of evidence depending on the circumstances and the type of decision they are making such as financial information, surveys, public opinion, practical experience, and internal organizational research.

While Upshur *et al.*'s (2001) model of evidence is focused on evidence in the field of medicine and defines method and context related to health care related practices, its foundation can be a strong base for a theory of evidence in the field of management. In the proposed model, there are three main assumptions. First, evidence is that which is assumed to have a contingent nature. Based on this assumption, it is argued that the best evidence is the evidence which is produced with the proper methodology and from a context as close as possible to the context the evidence is to be implemented in. The second assumption is that the process by which evidence is generated should be replicable and transparent. Third, it is assumed that the probability of the accuracy of evidence is higher when consensus about that research evidence is higher. Therefore, we argue that the best evidence needs to be evaluated against methodological fit, contextualization, transparency, replicability, and consensus.

The issue of methodological fit in managerial and organizational studies, defined as "internal consistency among elements of a research project" (Edmondson and McManus, 2007) plays a significant role in enhancing the quality and reliability of research findings (Bouchard, 1976; Campbell *et al.*, 1982; Lee, 1999; McGrath, 1984). More importantly, methodological fit results in a more convergent body of knowledge (Edmondson and McManus, 2007). Simply put, methodological fit emphasizes not only selecting the right research method but also asking the right question, and using the most powerful approach to answer it (Bouchard, 1976). Overall, while the philosophical world view of the researcher affects the choice of methodology, the nature of the research question at hand is believed to be a significant factor in determining the appropriate research method (Creswell, 2009). In the field of organizational studies, research is categorized into the three general categories of quantitative, qualitative, and mixed method research (Creswell, 2009). Qualitative research strategies follow a postpositivist world view and challenge the traditional scientific belief of the existence of the absolute truth or knowledge, particularly when studying human behaviour (Phillips and Burbules, 2000). Survey research and experimental research are known to be the most common forms of quantitative studies that focus on describing behaviours and attitudes of a population by studying a sample of that population or studying how specific treatments can result in a certain outcome (Creswell, 2009). Qualitative research strategies, which have become more visible during the past few decades,

adopt methods such as ethnography (LeCompte and Schensul, 1999), which studies individuals in their natural settings over a period of time and collects data through observation and interview, case studies, phenomenological, and narrative research (Creswell, 2009). Qualitative studies rely on social constructive (Crotty, 1998) and participatory (Kemmis and Wilkinson, 1998) world views that are based on the assumption that individuals develop subjective understandings and meanings from their experiences. Finally, mixed method or hybrid research strategies function under a pragmatic world view (Cherryholmes, 1992; Creswell, 2009) that is not necessarily committed to any one system of philosophy and reality and uses both quantitative and qualitative methods with different approaches to collect and analyze data. Creswell (2009) claims that different problems call for different approaches and points out that previous research and known facts about the phenomenon and problem play an important role in determining the appropriate research method (Creswell, 2009). For example, qualitative and exploratory research is useful when there is yet no clear understanding of which variables and constructs need to be studied. Furthermore, qualitative studies may provide a deeper perspective on a particular group of individuals.

In another important work on the subject of methodological fit, McGrath (1964) categorizes how different research methods such as experimental simulations, laboratory experiments or computer simulations are appropriate for answering different questions. McGrath (1964) also emphasizes the importance of the "state of prior knowledge" for determining the right research method and stresses that field studies are very appropriate methods in validating established theories in the real world setting.

Edmondson and McManus (2007) define four key elements in determining the right methodology for field research, namely research question, prior work, research design, and contribution to literature. The foundation of their framework is defining the state of different theories in management research along a continuum from mature theories to nascent ones (Edmondson and McManus, 2007). According to their framework, mature theories are well developed and usually have broader points of agreement over constructs and the relationship among them. Nascent theories on the other end propose new connections between phenomena. By describing theories on a spectrum of maturity, Edmondson and McManus (2007) recommend which types of questions need to be asked at different levels and whether qualitative, quantitative, or mixed method research strategies are the most appropriate way of tackling the research question. In addition, they make suggestions on the appropriate data collection techniques and analytic approaches. The significant contribution of this framework is a notion of methodological fit that systematically recognizes how previous studies affect the research methodological decisions and the ways in which they will contribute to the literature. It is a valuable tool that can steer the body of knowledge in management to a more convergent state. A poor methodological fit may result in the re-invention of the wheel under a new name, losing the opportunity of generating new knowledge, and engendering some unevenness in the evidence (Edmondson and McManus, 2007) that would lead to a divergent body of knowledge and produce unreliable pieces of information.

> P1. In the context of evidence-based management, evidence is more reliable when its method of production fits with the type of managerial question.

Another aspect that affects the accuracy and reliability of the generated evidence is the issue of contextualization. The Merriam-Webster dictionary defines context as "the interrelated conditions in which something exists or occurs" (2011). It refers to the environment and setting that surrounds the phenomenon under investigation. Contextualization helps to link observation to "relevant facts, events, and points of view" (Rousseau and Fried, 2001).

Attention to contextualization has significantly increased over the past 30 years (Roberts *et al.*, 1978; Cappelli and Sherer, 1991; Johns, 2006). One reason for this increasing interest in contextualized research is globalization. Globalization is a term mainly used to describe the increasing integration of political, informational, and financial domains of regional economies around the world. As Friedman (2005) states: "The World is [now] flat". In business terms, this means that markets are being integrated and a new economy is emerging in which businesses function across boundaries and borders. In such an environment, organizations are faced with new dynamics of different cultures and business settings, and managers need evidence from other cultures and environments to be able to make the right decisions. This calls for more comparative studies that simultaneously look for emergent universality and cultural specificity (Adler, 1983, 2002). Studies across different cultures and environments call for special attention to the process through which constructs and research methodologies are transformed across national borders (Rousseau and Fried, 2001; Adler and Gundersen, 2008;). This issue highlights the importance of including contextual factors in different stages of research in order to achieve more convergence and acknowledge contextual differences as a major source of conflicting findings in the management literature (Rousseau and Fried, 2001).

Another factor that makes the role of contextualization essential for ensuring the reliability of evidence is that the nature of work is changing and is significantly modifying the nature of the relationship between the worker and the organization (Rousseau and Fried, 2001). First of all, the political context of employment is shifting as governments are increasingly regulating the relationship between employers and employees which has led to an increase in lawsuits against organizations (Howard, 1995). While some believe that the power of unions and labor organizations tend to weaken during globalization (Wallerstein and Western, 2000), others argue that labor unions can actually be strengthened in developing economies because of the urban wage rate and globalization (Beladi *et al.*, 2011). This suggests that organizations and employees are increasingly striving toward either synergy or compromise between their interests. Second, today's economic environment is extremely technology-driven (West, 2011). This has resulted in the emergence of virtual businesses, the elimination of many intermediaries, an increase in the speed of transactions, and significant changes in the power distribution within organizations. Third, workers and their skills have also changed dramatically. The significant boost in life expectancy at birth shows that the working-age of the population and the number of elderly employed has increased (Perry, 2010). Immigration has also resulted in dramatic changes in the work force and has resulted in a multicultural workplace in which individuals come from varied cultural backgrounds, with different values, and degrees from a variety of educational systems around the world (Maré *et al.*, 2010). The changes in the structure of jobs have also been advantageous to women and have lessened the sex segregation of the labor market (Barnes, 2010). Now Millennials and the children of Generation X

and the Baby Boomers are gradually entering the work force. This generation is believed to be the first "digital native" generation (Prensky, 2001; Tufts, 2011) for who the computer and the Internet is considered to be an integral part of life rather than just task-enabling technology. As Millennials enter the workforce in large numbers, the business rules are bending to accommodate them (Twenge and Campbell, 2008; Wey Smola and Sutton, 2002).

According to Rousseau and Fried (2001), contextualization of research would make it possible to face the previous challenges as it would facilitate comparison of constructs of a particular study in a particular site to those of previous research. It also helps to specify the frame of reference and point of view that a particular study focuses on (Rousseau and Fried, 2001). Moreover, contextualization allows researchers to understand how historical events and time may affect results, and to compare different characteristics of their samples of workers, units, or organizations to those of previous researchers (Rousseau and Fried, 2001). More importantly, it would provide a new perspective through which researchers can explain similarities or differences between their findings and that which exists in the literature. This would provide more sophistication and contextual finesse to the managerial body of knowledge. In essence, contextualization of organizational research acknowledges the complexity of social reality under investigation and produces more reliable evidence by understanding the dynamic interplay between contextual factors and the constructs and relationships of interest (Bamberger, 2008).

> *P2.* In the context of evidence-based management, evidence is more reliable when its method of production includes more contextual factors.

One of the concerns regarding the reliability of evidence and research findings for the purpose of evidence-based decision making is the widespread deficiencies in social science research (Van de Ven, 2007). The medical field had also faced a similar concern (Simera *et al.*, 2009) especially as research became more commercialized and funded by different organizations who benefitted from particular results privileging their products and services rather than from true and accurate results (Sharpe, 2002). To address this issue and to also strengthen the conflict of interest policies and procedures in medical research, academic institutions and influential journals have taken steps to make it possible for editorial boards and authorized government agencies to have access to the data used in research reports (Sharpe, 2002). An international network, Enhancing the Quality and Transparency of Health Research (EQUATOR) has also been launched (Simera *et al.*, 2009), with the aim of promoting transparent and accurate reporting (Groves, 2008). EQUATOR network provides authors and journals with specific guidelines on requirements of transparent reports tailored for different research methods (Groves, 2008). Similar guidelines need to be developed for the field of management in order to ensure the accuracy of research findings by allowing funding agencies, editorial boards, and eventually the Collaboration, when it is in place, to access the data. These guidelines need to specify the type and amount of information required in a research report that would make replication of the research possible. Therefore it is proposed that:

> *P3.* In the context of evidence-based management, evidence is more reliable when its method of production is more transparent.

The purpose of evidence-based management is to boost confidence in research findings by making explicit their context, methodology, and their applicability to the context of their development. Another dimension against which evidence needs to be evaluated is the replicability and consistency of results. Replication is argued to be "at the heart of any science" (Utts, 1999) and is known to be a critical test of objectivity (Chaplin and Krawiec, 1979; Fiorentine and Hillhouse, 2003). It is also an important means through which theories can either be confirmed or falsified (Lamal, 1990). Management theories are often argued to be challenging in this matter as organizations are inherently complex, open, and functioning in constantly changing contexts (Astley and Van de Ven, 1983; Fabian, 2000). As a result, organizational researchers have been more focused on theory building (Weick, 1989; Lewis and Grimes, 1999; Pentland, 1999; Locke, 2007) than on testing the theories (Davis and Marquis, 2005; Hambrick, 2007). This is unfortunate because although social science theories have limited scope and limited predictive and explanatory power compared to other disciplines, they are at least to some extent, empirically testable (Lamal, 1990). Like other sciences, they can make propositions that can be confirmed by experience. In other words, replications promote external validity, as long as the findings are in agreement with those of the study being replicated (Lamal, 1990). Furthermore, replication can be particularly useful when there are disagreements over previous findings (Sidman, 1960).

Replicability is about producing similar results in similar settings (Sekaran, 2006). For quantitative studies, replicability of research and convergence of managerial knowledge can be improved by clearly identifying the sources of errors such as in measurement, sampling, internal validity, and statistical conclusion (Malhotra and Grover, 1998). As surveys are known to be a common form of data collection in quantitative studies, "replication of experiment" can be obtained from deriving a "coefficient of agreement" between different tests of a measurement (Maxwell and Pilliner, 1968; Mellenbergh, 1977). Eventually, these should become part of the methodology of the Collaboration.

For qualitative studies, the story is somewhat different. For example, Janesick (1994) suggests generalizability may indeed be an issue. She argues that the value of case studies, as an example of qualitative studies, is in their uniqueness and therefore replicability is pointless (Janesick, 1994). Huberman and Miles (1994), on the other hand suggest that replication in case studies is possible through successive waves of data collection. This form of replication is not for the sake of generalizability but rather for understanding the conditions under which a particular finding appears and operates (Huberman and Miles, 1994).

The issue of replication is of particular concern in the field of organizational research as most journals are more interested in reporting novel studies and findings rather than replications for confirmation studies. Therefore, there is not much incentive in conducting this type of research (Lubin, 1957). Theory testing is less glamorous and the reward structures are skewed toward theory building. Management research programs are funded for theoretical impact as opposed to replication of existing theories. This is a challenge for evidence-based management as it discourages large scale development of evidence. In the context of evidence-based management, replication is particularly valuable as it not only helps to take management science to a more convergent state through replication of quantitative studies, but also helps to contextualize research findings through replication of qualitative studies. This calls for

a different view of research in management with appropriate recognition and reward system.

  P4. In the context of evidence-based management, evidence is more reliable when its method of production is more replicable.

It is logical to expect evidence to be evaluated and assessed before being disseminated to managers and implemented into practice. In the inefficient marketplace of managerial ideas and practices, systematic reviews are one way to condense evidence into a manageable and readable format (Chalmers and Altman, 1995; Cook *et al.*, 1997b). In addition, they can provide practitioners with an overview of the extent to which researchers and scholars agree or disagree on certain research findings. According to GreenFact foundation, a not-for profit organization with the mission of bringing complex scientific consensus reports on health and environmental studies to the reach of non-specialists, scientific consensus represents the experts' and specialists' collective position and opinion on a subject at a given time (GreenFact, n.d.). While scientific consensus is not always an articulation of "truth" and not all scientists are unanimous about results and research findings, consensus is still the best bet for practitioners. A high level of consensus among particular practices can be used as an indicator of the reliability and dependability of research findings (Pfeffer, 1993). Scholarly consensus has long been used to evaluate paradigm development in different disciplines (Kuhn, 1970). Furthermore, higher consensus results in more efficient communication between researchers that can lead to shared definition of concepts, agreement on the frontiers of the discipline (Lodahl and Gordon, 1972), and collaborative research (Pfeffer, 1993). In general, while different subspecialties of organizational studies have different levels of consensus on evidence, the field itself is known to have a low level of paradigm development (Pfeffer, 1993). That said, scientific consensus can still be used as a basis for accepting the reliability and validity of evidence in managerial science as it is the case for other disciplines such as environmental policies, medicine, etc. (Devlin and Williams, 1992; Lindzen, 1992; Hauschild *et al.*, 2008; Kahan *et al.*, 2011).

  P5. In the context of evidence-based management, evidence is more reliable when there is greater consensus.

As was discussed, evidence-based management suggests that managers need to base their decision on sound evidence in order to increase the probability of making the right decision. However, for evidence to be reliable and of a high quality there needs to be a systematic assessment of the research findings. Learning from the discipline of medicine and Cochrane guidelines for generating evidence, we propose that these assessment and reviews need to be the output of an independent organization with the aim of producing high-quality, evidence-based management databases. These reviews need to be updated frequently and take the most recent research into consideration (Higgins and Green, 2011).

We propose that the initial step in conducting these reviews is to clearly define the review question, determine an appropriate methodology, (Higgins and Green, 2011) and use methodological fit as the main criterion for selecting, reviewing, and evaluating related studies. In order to generate the best evidence from the selected research, studies should be ranked according to their degree of contextualization,

replicability, and transparency. The evidence becomes stronger when there is scholarly and expert consensus and agreement over the findings. In essence, what the theory of evidence seeks is convergence among the dimensions. It is this convergence that ensures optimization of rigour and relevance. This convergence is engineered through a formal collaboration (similar to the Cochrane model) of management scholars, editors of management journals, and practicing managers (see Figure 1). In other words, a strong collaboration among both the producers and users of evidence is likely to enhance the quality and strength of evidence.

  P6. The evidence is stronger when there is a greater degree of overlap between the dimensions of methodological fit, contextualization, replicability, transparency and consensus. The overlap is engineered and enhanced by an established collaboration among the producers and users of evidence.

7. A mixed-level theory of evidence-based decision making
After the initial stage of generating and evaluating evidence, the next stage is the process of evidence-based decision making, for which a model is proposed. In the model, evidence-based decision making is viewed as a dynamic process through which evidence is obtained, interpreted, and used as a basis for decision making. The theory does not take the common six-step rational decision making process perspective of defining the problem, identifying the criteria, weighing the criteria, generating alternatives, rating the alternatives on each criterion, and making the optimal decision. This is because rational decision making has rarely been observed in actual organization settings (Rode, 1992; Bazerman and Moore, 2009), owing to the limitations
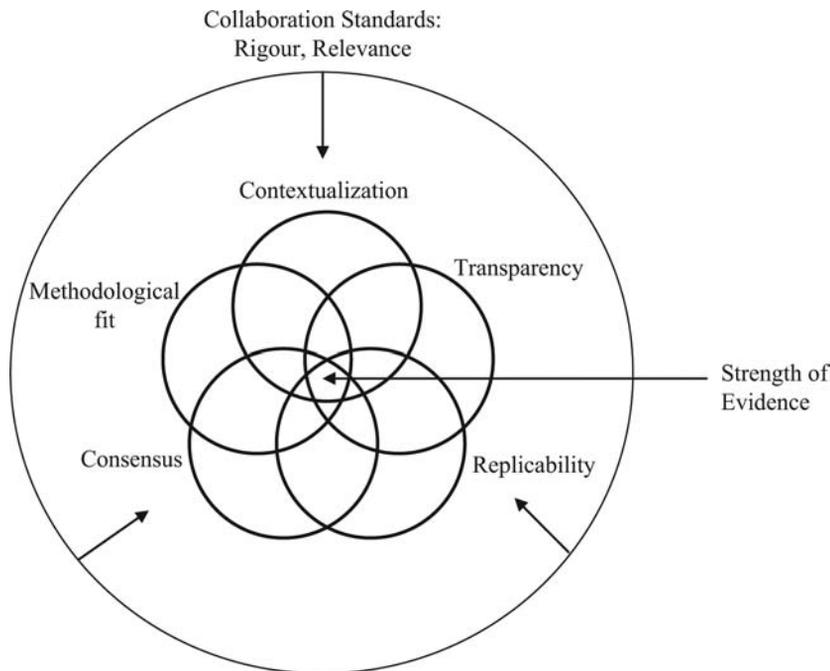
Figure 1.
Theory of evidence

in human informational and computational rationality (March, 1978). The model focuses on how evidence is transformed into management decisions within the organizational context. Regardless of whether evidence is disseminated to managers through their education and training or is sought by them according to their own chosen methods, it is not always used in a rational manner. The model views evidence-based decision making as a multi-level phenomenon expressed at the individual level, but influenced by cross-level constructs at individual, organizational, and institutional levels independently and interactively. At the individual level, what managers use as evidence for generating decision options is a function of their education, training, experience, and judgment. Furthermore, the process of evidence-based decision making is influenced by managers' preferences and values as well as stakeholders' preferences within institutional, organizational, and individual contexts. Finally, managers may also face ethical constraints at both organizational and individual levels in making the final decision from the generated decision options.

7.1 A mixed-level model
Based on the previous argument a mixed-level model of evidence based decision making is presented in Figure 2:

  P1.   Evidence-based decision making is a multi-level phenomenon expressed at the individual level, influenced by cross-level constructs at individual, organizational, and institutional levels independently and interactively.

Highlighting the importance of decisions managers make on the performance of their firms, Rousseau (2006) argues that managerial competence is an important and vital factor for organizations. The debate over ways to evaluate training and competency for practitioners is far more consistent in the medical field than in the field of management (Shaneyfelt *et al.*, 2006). One possible reason is that medicine is better developed as a profession than management. For example, the profession of medicine involves the application of a specialized body of knowledge and an effort to continuously enlarge that knowledge (Swick, 2000). Moreover, those in the medical profession are educated with a unique and agreed on body of knowledge (Cruess and Cruess, 1997). They also
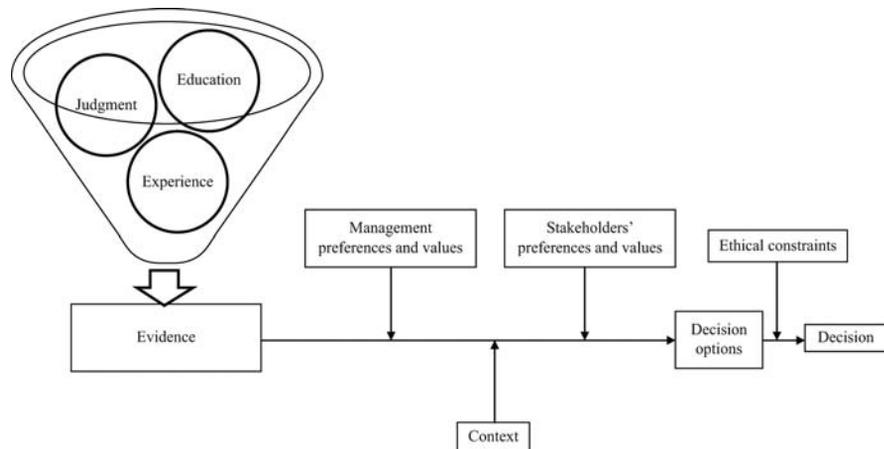

Figure 2.
Model of evidence based decision making

go through long periods of training subsequent to their education (Cruess and Cruess, 1997). While it is well-known that sound management practices are crucial for the survival and success of organizations (Rubin and Dierdorff, 2011), there are concerns about the accuracy, reliability and relevancy of what is actually taught in MBA programs and other business education curricula (Datar *et al.*, 2011; Rubin and Dierdorff, 2011). This is quite unlike the practice in medical education.

Looking at the history of management, business schools have recently been promoting the idea of management as a profession and are taking steps toward becoming the primary custodians of management training (Khurana, 2010). They also have the means of disseminating research evidence to future managers through formal management education programs. Nevertheless, having a formal education by itself is not a guarantee that management students have actually been exposed to the best available evidence and are familiar with the strongest research findings. Even textbooks do not incorporate important research findings and many who are teaching in business schools are not fully aware of scientific evidences in the field (Trank and Rynes, 2003). In fact, many management education programs do not focus on research evidence at all (Trank and Rynes, 2003). There are studies that suggest that what is taught in business schools is not strongly related to what is actually important for successfully leading a business. Consequently the schools are not very effective in training their graduates toward professional competence and subsequent career success (Pfeffer and Fong, 2002). This is largely due to the absence of rigorous and relevant evidence, gathered systematically and available readily.

Some findings show that business schools over-emphasize quantitative analytical techniques and underestimate the importance of leadership, interpersonal and communication skills (Porter and McKibbin, 1988, p. 65). Some even argue that management education re-enforces the "technicist and commonsensical understandings" of those enrolled in these programs (Grey and Mitev, 1995), which are not necessarily backed by evidence. However, this is not the case for all business schools, and graduates from schools that actually expose their students to research-based evidence may have higher probability of transferring their learning into practice and base their decisions on this information.

In addition to the formal education that is offered in business schools, managers have the opportunity to be enrolled in various continuing education programs such as executive or enterprise education programs and workshops. In medicine, the continuing education programs are widely used in order to enhance the implementation of evidence by practitioners, and to expose them to the best available practices supported through research findings (Kitson *et al.*, 1998; Sackett *et al.*, 1996; Cullen *et al.*, 2011). Although the effectiveness of this method in increasing the quality of care is still under question (Davis *et al.*, 1992), the evidence shows that it substantially increases physician's knowledge (Davis *et al.*, 1992).

Ideally, managers can be exposed to best evidence through related management journals and specialty periodicals. However, in a study conducted among nearly 1,000 human resources vice presidents, Rynes *et al.* (2002) noted that there is a widespread disagreement or lack of knowledge about some effective HR practices in spite of the strong foundation of evidence they are built on. In a later study, Rynes *et al.* (2007) reported that these effective HR practices are also under-represented in the periodicals and journals available to these managers. Such fragmentation of knowledge and

balkanization among its adherents render evidence-based decision making difficult if not impossible.

Another individual difference that seems to affect the decision making process is an individual's prior experience. Experts are considered to be experienced, capable within a specific domain, and are believed to have superior ability to identify relevant information, and employ effective information-gathering strategies (Shanteau, 1992). In the case of evidence-based decision making, it would then be logical to assume that experts are able to distinguish between relevant and irrelevant evidence pertaining to the decision on hand. In addition, experts appear to be more knowledgeable, not only due to their highly developed perceptual/attentional abilities, ability to simplify complex problems, and greater creativity when faced with novel problems – but also because they possess up-to-date content knowledge (Shanteau, 1988). Experts have the cultivated ability to recall patterns of relevant information from their domain (Chase and Simon, 1973). From this we can see that expert managers would be more capable of recalling relevant evidence to their area of decision making compared to less-experienced managers.

That said, experts are also considered to be overconfident and poorly calibrated (Christensen-Szalanski and Bushyhead, 1981). An individual is highly calibrated when there is a good fit between the quantity of his/her correct responses and his/her probability estimate of that quantity (Spence, 1996). Research has distinguished calibration in experts in different domains. For example, it is suggested that expert weather forecasters are very well calibrated (Murphy and Winkler, 1977), while doctors seem to be poorly calibrated and overconfident (Christensen-Szalanski and Bushyhead, 1981). Because of this overconfidence, experts may become "cognitive misers" who cut their evidence seeking short (Mahajan, 1992; Shepherd *et al.*, 2003).

While managers' experience, including their formal education, involvement in continuous learning, and exposure to the evidence base of their field through specialty periodicals may affect their utilization of evidence in the decision making process, their rationality is bounded like any other human being. In their book "Judgment in Managerial Decision Making", Bazerman and Moore (2009) offer an overview of limitations of management rationality and its effects on managerial decision making. For example, the availability heuristic – relying on readily available knowledge in order to make decisions (Tversky and Kahneman, 1973) – suggests that managers are more likely to utilize information and evidence that they have been recently exposed to or have encountered an example of and therefore can easily recall. The vividness of experience also affects managers' decision making. Therefore, it is logical to expect that managers are more likely to utilize evidence they can easily retrieve not only because they have recently became familiarized with it but also because that evidence has been exposed to them more vividly in training sessions introducing a new technique. However, vividness is no substitute to veracity. As Pfeffer and Sutton (2006) suggest there are many false practices and "absolute nonsense" that are widely implemented by managers because they are made more appealing through persuasive promotions presented as "breakthrough" ideas. Managers may also selectively search and use evidence that is more likely to confirm their beliefs or the conclusion they desire to reach (Pfeffer and Sutton, 2006). In addition, a manager may choose to discard or accept evidence because of escalation of commitment (Bazerman *et al.*, 1984; McCarthy *et al.*, 1993; Rutledge, 2011) and a desire to stick with a previous course of action.

Based on the ideas and discussions presented here, the proposed model suggests that managers' implementation of evidence in the process of decision making in organizations depends on several individual level characteristics such as manager's training and education, experience, and judgment. These characteristics affect the managers' level of exposure to and knowledge of evidence, re-evaluation of scientific evidence, and their tendency to accept or discard it.

P2. At the individual level, what managers use as evidence for generating decision options is a function of their training and education, experience, and judgment.

Another issue that needs close attention is that in many organizations the management (the agent making the decision) is separate from the owners and shareholders (principals). Agency theory explores the effects of this reality on the actions and performance of managers. Through the lens of agency theory, the firm is viewed as a system in which complex written and unwritten contracts exist between individuals (Fama and Jensen, 1983). The main argument here is that both managers and owners of a firm strive to maximize their utility, while their interest may at times be conflicting. It is suggested that the principal (owner) would seek to control the agent (manager) through contracts that specify each party's rights, rewards, and incentive structure (Fama and Jensen, 1983). This reality affects the process of evidence-based decision making as managers tend to utilize evidence according to their ability to maximize their interests, while the controlling, monitoring, and incentive systems in place would impose a structure to protect the owners' interests.

In the field of medicine, the effect of economic incentives on the physicians' actions have been discussed through several studies (Held and Reinhardt, 1979; Gaynor and Pauly, 1987; Conrad et al., 1998; Grumbach et al., 1998; Pauly, 1992). The discussion expanded into the literature of evidence-based medicine, suggesting that when financial incentives are designed to reward cutting cost, physicians tend to use fewer tests or order less expensive tests, procedures, and treatments (Shortell et al., 2001). Using the same line of argument, when incentives to increase productivity are in place, physicians tend to produce more units of service or see more patients (Shortell et al., 2001). Moreover, incentives promoting quality achievement are known to be associated with behaviors targeting quality, which include prevention or early detection procedures such as immunization, mammography screening, etc. (Shortell et al., 2001). Although some of these incentive policies may result in one stakeholder's satisfaction under certain circumstances, they may also result in unsupported and suboptimal medical practices and the tendency to ignore evidence.

Evidence shows that compensation plans that link pay to performance and are approved by a firm's board of directors are positively related to shareholders' wealth (Smith and Watts, 1986). Examples of this type of incentive plan include compensating managers with company stock, salaries, and/or bonuses (Jensen et al., 2010). Although linking executives' pay to performance seems like a logical way of approaching managerial level incentives, there are still examples of publicly held companies in which executives are compensated regardless of their performance (Bebchuk and Fried, 2006; Jensen et al., 2010). There is a concern that top managers may act more like bureaucrats rather than the value-maximizing agents in those organizations (Jensen et al., 2010). In addition, it is well-known that monetary incentives do not always work

as the central motivator for peoples' behaviors (Pfeffer and Sutton, 2006). Benefits such as authority and power, status and prestige, and even public visibility affect the level and effectiveness of monetary compensation necessary for motivating managers to make decisions aligned with the interest of their firms' owners (Jensen *et al.*, 2010).

One factor that seems obvious in analyzing the extent to which evidence-based practice is implemented is the degree to which individuals are held responsible for the decisions they are making. This is at least the case in evidence-based medicine. Some scholars even argue that dismissal threats can play the same role in holding managers responsible for the decisions they make for the firm (Jensen *et al.*, 2010). Although the intensity of such threats is fundamentally different in the medical field and managerial field, the cost of disclosure can also be considered high.

Apart from the efforts of economic alignment between managers and the organization, the firm's compensation policies should be perceived as fair in order for managers to be motivated and willing to participate in courses of actions that benefit the owner (Lind and Tyler, 1988; Kim and Mauborgne, 1993; Korsgaard *et al.*, 1995). In the context of executive payment, the incentive policies are considered to be fair if they are tied to the external market (Coughlan and Schmidt, 1985; Deckop, 1988; Finkelstein and Hambrick, 1989; Jensen *et al.*, 2010). However, this "fairness" is often achieved through negotiation rather than through defined salary grades and ranges which are linked to the external market information (Bebchuk and Fried, 2006). Hence, one can infer that a just and reasonable incentive policy is more likely to motivate managers in implementing evidence-based management. Thus managers' values and preferences affect the process of evidence-based management as managers would be motivated to make decisions that serve their interests.

> *P3.* The process of generating decision options is influenced by managers' preferences and values at the individual level.

One issue that takes the decision making process in organizations beyond the conflict of interest between ownership and management is that there are various other stakeholders whose objectives are often contradictory. For example, managers are increasingly adopting environmentally-friendly strategies. Delmas and Toffel (2004) suggest that government, regulators, customers, competitors, community and environment interest groups, and industry associations have their own preferences and values that impose pressure on organizations and influence the process of decision making. The values, preferences, and power these principals and society have over the organization and the way they influence organizational practices can be studied through institutional theory at the institutional level (Delmas and Toffel, 2004).

As was discussed, within agency theory there are incentive systems, control strategies and reward mechanisms (Fama, 1980; Tosi *et al.*, 1997) that influence the process of evidence-based decision making at the organizational level. Moreover, employees are also considered to be stakeholders who influence the decision making process (Hill and Jones, 1992). For example, their individual preferences toward change implementation may affect the process. Managers may re-evaluate their decision options because of the pressure and power of stakeholders with conflicting values and preferences, at institutional, organizational and individual levels.

> *P4.* The process of generating decision options is influenced by stakeholders' preferences from institutional, organizational, and individual levels.

The process of translating evidence into practice also known as research utilization happens within an organizational context (Stetler, 2003). The context of an organization has a great impact on the process of research adoption and can either ease or hinder that process (Solberg *et al.*, 2000; Brendan McCormack *et al.*, 2002). There are many different aspects of an organization's context that may affect the implementation of evidence-based practice. Culture not only plays an important role in defining the context of an organization but also affects the way it operates. For example, even though compensation incentives seem like a necessary condition to promote evidence-based practice in an organization, they do not seem sufficient. While compensation systems and procedures are considered to be a way of managing and influencing the culture of an organization and shaping it in the desired manner (Kerr and Slocum, 1987), the culture itself influences the way compensation systems are designed (Schuler and Rogovsky, 1998), especially how CEOs and managers are rewarded (Tosi and Greckhamer, 2004). Therefore, it can be seen that a firm's compensation policies and procedures do not function independently of its culture. Thus, implementing evidence-based management and achieving an evidence-based organization needs some cultural and collective actions (Shortell *et al.*, 2001).

There are several approaches to exploring the culture of an organization based on the nature of the problem at hand. In their book "Hard facts, dangerous half-truths and total nonsense", Pfeffer and Sutton (2006) point out two important sets of values that can contribute to the implementation the evidence-based practice: readiness to change beliefs and conventional wisdom, and obligation to collect facts and information required to formulate well-informed and intelligent decisions (Pfeffer and Sutton, 2006). Therefore, it can be concluded that cultural aspects associated with change and the organization's value system should be explored in studying the characteristics of an evidence-based organization..

Pfeffer and Sutton (2006) further suggest that one of the reasons managers do not use evidence as the basis of their decision making is that it changes the power dynamics inside the organization. In a culture supportive of evidence-based decision making, decision power would be distributed according to individuals' competency and mastery of evidence as a critical resource for decision making rather than organizational politics and structural power. Furthermore, adequate management information and decision support systems are essential for managers to make informed decisions and identify the relevance of the evidence to a particular problem. It is therefore proposed that:

P5. The process of generating decision options is influenced by the context in which the decision is being made through structural, environmental, cultural, and political constraints.

One aspect of decision making that has received substantial attention from researchers in the field of organizational studies is the issue of ethical considerations. Kohlberg (1969) proposed a theory of cognitive moral judgment for understanding the ethical decision making process. He suggested that individuals identify and reason out ethical dilemmas according to their moral cognitive development (Kohlberg, 1969). Based on Kohlberg's (1969) theory, Rest and Barnett (1986) developed a model of moral or ethical decision making that explored the link between moral reasoning and moral behaviour through the stages of moral awareness, evaluation, intention, and behaviour. Using

their model as a base, Trevino (1986) proposed an interactional model of ethical decision making in which the moral reasoning process was explained through interactions of individual and situational components. Subsequently, Jones (1991) further developed a framework of moral intensity in which he characterized an ethical issue based on six dimensions: magnitude of consequences, social consensus, proximity, probability of effect, concentration of effect, and temporal immediacy.

From another perspective, scholars such as Haidt (2001) and Gibbs (1991) suggested that the moral judgment and ethical decision making are intuitive and sometimes unconscious rather than controlled reasoning processes. Bazerman and Moore (2009) suggested that individuals' moral decision making is bounded ethically, and that they sometimes engage in ethically questionable behaviours that are even inconsistent with their own preferred values and moral cognitive development. The main reason they offer this type of unethical decision making is the ethical biases at different levels of analysis (e.g. over-claiming credit at the individual and organizational level, in-group favoritism at the individual and group level, and discounting the future) (Bazerman and Moore, 2009).

In the case of evidence-based decision making, ethics is mainly of concern where evidence-based practices may lead to decisions that seem at odds with common morality (Kerridge *et al.*, 1998). For example, in health care decision making, evidence may result in decisions that rationally benefit the population while at the same time may harm the interests of the individual and hence impose an ethical dilemma to the decision maker (Kerridge *et al.*, 1998). The proposed model here suggests that the process of evidence-based decision making is consciously or unconsciously influenced by ethical constraints at different levels, particularly when the decision maker needs to choose the final decision from the generated decision options. For example, research findings suggest that an individual's personal attributes such as religion (Hegarty and Sims, 1978; McNichols and Zimmerer, 1985), nationality (Hegarty and Sims, 1978; Becker and Fritzsche, 1987; Abratt *et al.*, 1992; White and Rhodeback, 1992), gender (Beltramini *et al.*, 1984; Chonko and Hunt, 1985; Ferrell and Skinner, 1988; Whipple and Swords, 1992) and age (Browning and Zabriskie, 1983; Izraeli, 1988; Callan, 1992) may affect the moral cognitive preferences or intuitive ethical decision making. Individual educational background (Beltramini *et al.*, 1984; Chonko and Hunt, 1985) and personality (Hegarty and Sims, 1978) may also impose ethical constraints at the individual level. Organizational level constraints such as the organization's ethical climate (Ferrell and Skinner, 1988), size (Weber, 1990), and the level at which the decision is being made (Chonko and Hunt, 1985) also affect the process. Industry ethical standards (Laczniak and Inderrieden, 1987) and the overall level of business environment competitiveness (Hegarty and Sims, 1978) would impose ethical constraints on the final choice at the institutional level.

> *P6.* The process of making a final decision from generated decision options is influenced by ethical constraints at institutional, organizational, and individual levels.

One last issue that needs to be taken into consideration is how constructs at different levels of analysis influence dynamics of the process. For example, the effect of ethical constraints on the decision making process may be impacted by the interaction between several individual and contextual variables (Trevino, 1986). These contextual

constructs can either arise from the nature of the decision problem and ethical dilemma at hand or the broader organizational culture (Trevino, 1986). The nature of the ethical dilemma itself or its existence may also vary based on organization's normative structure, responsibility for consequences and other pressures (Trevino, 1986). At the individual level, manager's education, experience, and training may also influence the moderating effect of ethical constraints on the decision making process, mainly because of their effects on manager's moral reasoning and development (Elm and Nichols, 1993; Wimalasiri *et al.*, 1996).

Another interesting interaction effect occurs between the contradictory interests and values of stakeholders across varying levels of analysis. As discussed by Evan and Freeman (1988), there is no preference of one stakeholder over others defined in the agency theory, and what actually influences the decision making process is a balance between their conflicting values and preferences. This balance may be better understood as a contingent phenomenon as the pressure, power, and influence of different stakeholders may vary due to situational and contextual factors.

   P7. The process of evidence-based decision making is influenced not only by the main effects of its constituent constructs but also by the interactive effect of those constructs at individual, organizational, and institutional levels.

8. Conclusion
As the preceding discussion suggests, managers need reliable evidence in order to be able to make solid and effective decisions. The theory of evidence proposed in this paper suggests that rigour and relevance of evidence as revealed in its quality and reliability can be assessed on five dimensions: methodological fit, contextualization, replicability, transparency, and scholarly and experts' consensus. The greater their alignment, the stronger is the evidence. We recommend that an independent organization needs to be established to review and evaluate most updated research findings against these dimensions and determine the strength of evidence, based on the degree of overlap between these different dimensions. The result of these reviews need to be at the core of management education and training in order to increase their exposure to best evidence and enhance evidence-based decision making in organizations. However, we also acknowledge that in reality the process of decision making may not be a purely rational process and managers may perceive and utilize evidence differently based on their experience and judgment. The context in which the decision is being made and the preferences and values of management and various stakeholders of the organization, across different levels of analysis, also influence the process of evidence-based decision making. In addition, there are different ethical constraints at the individual, organizational, and institutional levels that may affect the final choice.

This work contributes to the literature of evidence-based management by clearly defining what evidence is in the field of management and how it needs to be reviewed and evaluated. It also justifies the need for an independent organization for taking over the task of systematically reviewing the research findings and knowledge produced in the management discipline by academics and researchers. Moreover, we propose a multi-stage, cross-level model of evidence-based decision making which provides a comprehensive overview of the decision making process within organizations and takes constructs from different levels of analysis into consideration while

acknowledging the interactive effects of these constructs on the decision making process. Its contribution to the practice of management is the framework it offers for achieving a more convergent state of knowledge in the discipline and promoting professionalism by recommending a yardstick for the core body of knowledge that facilitates competent professional practice.

The main limitation of the proposed theory is the absence of empirical work that support the propositions and its heavy reliance on logic and argumentation. This highlights the need for future work testing the theory of evidence, empirically clarifying and operationalizing different evaluation dimensions, and assessing the rigour and relevance of evidence, based on the degree of overlap between the different dimensions. The model of evidence-based decision making must be tested in order to verify and validate the effect of various constructs on the decision making process from different levels of analysis. Testing this model would also shed light on the usefulness of the proposed collaboration similar to the Cochrane collaboration for the field of management.

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