Evidence-based Entrepreneurship

Cumulative Science, Action Principles, and Bridging the Gap Between Science and Practice

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Boston – Delft

Foundations and Trends® in Entrepreneurship

Published, sold and distributed by:
now Publishers Inc.
PO Box 1024
Hanover, MA 02339
USA
Tel. +1-781-985-4510
www.nowpublishers.com
sales@nowpublishers.com

Outside North America:
now Publishers Inc.
PO Box 179
2600 AD Delft
The Netherlands
Tel. +31-6-51115274

The preferred citation for this publication is M. Frese, A. Bausch, P. Schmidt, A. Rauch, and R. Kabst, Evidence-based Entrepreneurship: Cumulative Science, Action Principles, and Bridging the Gap Between Science and Practice, Foundations and Trends® in Entrepreneurship, vol 8, no 1, pp 1–62, 2012

ISBN: 978-1-60198-530-9

Foundations and Trends® in Entrepreneurship
Volume 8 Issue 1, 2012

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Foundations and Trends® in Entrepreneurship, 2012, Volume 8, 6 issues. ISSN paper version 1551-3114. ISSN online version 1551-3122. Also available as a combined paper and online subscription.

Foundations and Trends® in
Entrepreneurship
Vol. 8, No. 1 (2012) 1–62

DOI: 10.1561/0300000044

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Evidence-based Entrepreneurship: Cumulative Science, Action Principles, and Bridging the Gap Between Science and Practice

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Abstract

The concept and desiderata of an evidence-based entrepreneurship (EBE) is discussed as a strategy to overcome the gap between knowledge developed in the field of entrepreneurship and its use in practice. Evidence constitutes the best summary of knowledge based on several sources of information (several studies, several different research groups, several different methodological approaches, among them the best methods available) which clearly goes beyond individual

experience and a few isolated studies. We argue that meta-analyses can and should be used in entrepreneurship research (and that they should also be used to review qualitative studies). Meta-analyses establish certain relationships; these should then be summarized in well-founded models and theories that can be translated into action principles. These action principles can then be used by various users of EBE. Users of EBE can be scientists, professionals who regularly deal with entrepreneurs (bankers, consultants, venture capital providers), policy makers (e.g., government), students of entrepreneurship, and last but not least the entrepreneurs themselves. Once a set of action principles has been developed from science, their application can be tested with the help of further evidence on the efficacy of interventions (including meta-analyses on the interventions). Evidence-based entrepreneurship (EBE) has the potential to change research, teaching, and practice.

> *"The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood... Indeed the world is run by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences are usually the slaves of some defunct economist . . . . It is ideas, not vested interests, which are dangerous for good or evil."*
>
> (Keynes, 1953, p. 306)

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1

Introduction

As described in the quote by John Maynard Keynes above, we assume that scientific knowledge often gets translated into practice without the practitioners even noticing their dependency upon those ideas. The task of science is to generate new knowledge, to answer essential questions, and to develop a good knowledge base that can make practice more effective and efficient and that protects practice from making wrong decisions. To accomplish these tasks, science typically produces scientific models and theories to integrate knowledge, conducts empirical studies, and reports incremental new knowledge. To help these tasks, science provides literature reviews on the current state of scientific knowledge and on the scientific knowledge of the efficacy of interventions. In short, the function of science is to produce evidence for propositions and to integrate this evidence into some kind of systematic theory or model. An important function of science is to support practice in becoming more effective and efficient. To do this it needs to develop good methods of summarizing the current knowledge and to develop interventions; these interventions should be derived from the most current scientific knowledge and should be more effective than traditional interventions.

In this article, we would like to introduce the concept of evidence-based entrepreneurship (EBE), discuss the implications of EBE, and sketch out its opportunities and limitations. The users of EBE can be the scientists themselves, professionals who deal with entrepreneurs, policy makers whose policies affect entrepreneurs, students of entrepreneurship, and last but not least the entrepreneurs themselves.

As a first definition, evidence is the best summary of knowledge based on several sources of information (several studies, several different research groups, several different methodological approaches, among them the best methods available). Evidence in this sense goes beyond individual experience and a few isolated studies. Basically, what we are suggesting in this article is to go beyond the $N = 1$ of personal experience (N stands for persons involved), the $N = 2 - 3$ of case descriptions or benchmarking (in this case, the N stands for number of companies that form the base for evidence), the $k = 1$ of policy suggestions (k stands for number of studies done), and the idea that the one "good study tells it all". All too often people rely on their own (limited) experience to make important decisions, they rely on a few successful examples (often in the sense of benchmarks), and policy makers often rely on one study or only a very few that they happen to have commissioned, and scientists all too often believe that only one or a few good studies really explain everything important about an issue.

We shall present an alternative viewpoint — an evidence-based approach that provides practical suggestions and good knowledge for practitioners. Much of the following exposition is related to the idea of meta-analysis. It is sufficient at this point to say that a meta-analysis is a quantitative review of the scientific literature (more details in Section 3). It is a systematic review as the literature is searched systematically and it is a complete review because all the existing empirical literature goes into the review. By providing a quantitative review of several articles, a meta-analysis can help us to decide how strong certain relationships are, how often a relationship consistently appears across studies, and how much we can trust the methodological rigor of the research. A meta-analysis provides the best available type of

evidence because it goes beyond one methodology, one study, and one researcher.

EBE provides a great opportunity that is relevant for practice and policy while strengthening the empirical and theoretical bases of entrepreneurship research (Rauch and Frese, 2006). Practice can never be fully based on evidence; therefore, we talk about evidence-**informed** practice and evidence-**based** research suggestions. By developing evidence-based entrepreneurship, we also heed recent calls in general management to advance evidence-based management (Pfeffer and Sutton, 2006; Rousseau, 2006; Rynes et al., 2007; Tranfield et al., 2003), and we think of EBE as one part of this emergent development. Both management and entrepreneurship show a gap between knowledge and practice — the knowledge-doing gap (Pfeffer and Sutton, 2000). Managers as well as entrepreneurs or professionals who deal with entrepreneurs (such as bank employees, business angels, analysts, policy makers, etc.) often fail to take note of scientific evidence when making decisions. Empirical research has shown that managers often take actions that are uninformed and sometimes even diametrically opposed to empirical evidence (Rynes et al., 2007). In the area of entrepreneurship, one can often hear open disdain for scholarly work because professors have not yet "made their first million" — the foremost argument seems to be that only experience counts. We suggest that professionals who deal with entrepreneurs can profit from evidence-informed practice. For example, venture capitalists often work with models developed from their individual and idiosyncratic experiences as a base for their funding decisions; meta-analyses show that the efficacy of selection of good entrepreneurs of venture capital providers is often very low (Rosenbusch et al., 2010).

Institutions that are supposed to support entrepreneurship often develop policies that have not been adequately empirically tested. For example, the German government spent millions of Euros in East Germany to develop networks for small businesses. This was done as a result of a few studies showing a relationship between social network size and entrepreneurial success. However, there are no systematic meta-analyses on this issue so that one can compare different

approaches of improving entrepreneurship. Moreover, the studies did not examine whether networks were useful for only those businesses owner who had actively developed their own networks: in these cases, an active approach with high initiative is the variable that causes network size and success (Frese, 2009; Zhao et al., 2010b). This is not an isolated example. Many countries invest many millions of dollars into programs for their small business owners. Most of them do not develop evidence on whether or not these programs (or which part of them) are successful.

Similarly, textbooks do not teach EBE. For example, a cursory look at popular textbooks of entrepreneurship (from the years 2007 to 2011) shows that not one single book we examined even mentioned meta-analyses in its index. This is not surprising because there are still few meta-analyses despite calls for these analyses in the area (Rauch and Frese, 2006) (a simple search for entrepreneurship and meta-analysis in Business Source Premier produced a number of published or in press meta-analyses, cf. Table 1.1; more on this later). Often, meta-analyses have direct effects on how students are educated. For example, there has been a controversial debate on whether or not business plans are useful. Meta-analyses have settled this issue — there is clear evidence for business plans to be useful (Brinckmann et al., 2010; Schwenk and Shrader, 1993). However, the relationships between preparing formal business plans and success are highly variable across studies. Thus, it may be necessary to search for moderators of this relationship (moderators are variables that influence the basic relationship between planning and entrepreneurial success in this case). Thus, students (and educators) should be encouraged to experiment, how to teach and learn business plans, and how to implement business plans and to evaluate these experiments. Moreover, there may be some cases in which plans do have negative consequences; one conclusion from a meta-analysis may be that such negative cases need to be studied and respective theories on positive and negative effects of planning need to be developed.

It is surprising how often recommendations, suggestions, curricula, and policies are developed without recourse to rigorous objective studies and meta-analyses. Most of the recommendations in

Table 1.1. Meta-analyses in entrepreneurship research.

References	Meta-analysis or systematic review	Content
Mwasalwiba (2010)	Systematic review, vote counting	$K = 108$, semi-systematic literature review. The study addresses educational objectives, target audience, teaching methods, and impact indicators.
Henrekson and Johansson (2010)	Systematic review, vote counting	$K = 20$, semi-systematic literature review; although different definitions of gazelles exist, segments of all industries have fast growing firms that are usually young.
Westlund and Adam (2010)	Systematic review, vote counting	$K = 65$; study investigates relationship between social capital and economic performance for different levels: on firm level (including households) strong evidence for positive relationship, contradictory results of studies on national and regional levels; results based on narrative review and vote counting only.
Personality and entrepreneurship:		
Stewart and Roth (2001)	Meta-analysis	$K = 14$ samples, the difference between managers and entrepreneurs is $d_c = 0.36$. Moderators identified include type of entrepreneur and type of risk assessment. (Note: d is used here.)
Miner and Raju (2004)	Meta-analysis	$K = 28$ studies, $d = 0.12$, ns. This article opened a meta-analytical dispute with Stewart & Roth (2001/2004) about the risk propensity differences between entrepreneurs and managers. (Note: d is used here.)
Stewart and Roth (2004)	Meta-analysis	This study is a response to Miner and Raju (2004). The combined results of $K = 18$ samples revealed an effect size of $d_c = 0.23$. Notably, projective measures of risk-taking produced negative effects, while objective instruments produced positive effects. (Note: d is used in this study.)
Collins et al. (2004)	Meta-analysis	$K = 41$, need for achievement correlated with career choice $r_c = 21$ and performance $r_c = 0.31$.

(*Continued*)

Table 1.1. (*Continued*)

References	Meta-analysis or systematic review	Content
Stewart and Roth (2007)	Meta-analysis	$K = 17$, analysis indicates that entrepreneurs are higher in achievement motivation than are managers; differences are influenced by the entrepreneur's venture goals, by the use of U.S. or foreign samples, and, to a less clear extent, by projective or objective instrumentation; when analysis is restricted to venture founders, difference between entrepreneurs and managers on achievement motivation is substantially larger.
Zhao and Seibert (2006)	Meta-analysis	$K = 23$, classified studies along the Big Five Personality traits. Effect sizes ranged from $d_c = 45$ (conscientiousness) to $d_c = -0.37$ (neuroticism). Some facets of the Big Five Traits produced higher effect sizes (achievement). (Note: d is used in this study.)
Rauch and Frese (2007)	Meta-analysis	$K = 62$ for business creation and $K = 54$ for business success. Effect sizes were stronger for traits matched to the tasks of entrepreneurs (e.g., $r_c = 0.238$ for matched traits and business success and $r_c = 0.027$ for nonmatched traits). The traits matched to entrepreneurship correlated well with entrepreneurial behavior (business creation, business success), such as need for achievement, generalized self-efficacy, innovativeness, stress tolerance, need for autonomy, and proactive personality.
Zhao et al. (2010a)	Meta-analysis	$K = 66$; discusses intention to entrepreneurship and performance of entrepreneurial unit; some overlap with Rauch and Frese, 2007; however, constructs are coded as to where they would fall to the Big Five Factors.
Planning and entrepreneurial success:		
Schwenk and Shrader (1993)	Meta-analysis	$K = 14$, strategic planning correlates positively with growth and return, $d = 0.20$. Further, the results indicate the presence of moderators. However, the authors did not attempt to identify such moderator variables.

(*Continued*)

Table 1.1. (*Continued*)

References	Meta-analysis or systematic review	Content
Boyd (1991)	Meta-analysis	$K = 29$; moderate correlations between planning and nine performance measures; the overall effect of planning on performance is $r = 0.151$; largest effect sizes are produced for earnings per share growth ($r = 0.282$) and sales growth ($r = 0.246$); smaller effect sizes are found for return on investment ($r = 0.105$) and return on equity ($r = 0.081$); growth measures revealed very wide ranges of estimates across studies, profitability measures generally yielded smaller, but more consistent effect size measures.
Miller and Cardinal (1994)	Meta-analysis	$K = 26$; planning positively related to growth ($r = 0.17$) and profitability ($r = 0.12$); results suggest that methods factors are primarily responsible for the inconsistent planning-performance findings reported in the literature.
Brinckmann et al. (2010)	Meta-analysis	$K = 51$. Average $d_c = 0.20$ between business planning and firm performance; moderator analyses show that established firms have higher effect sizes $d_c = 0.24$ ($k = 36$) than new firms $d_c = 0.13$ ($k = 15$); there is no difference in effect sizes between business planning outcome (having a business plan) and business planning process (doing planning along the way).
Resources, primarily human resources and success:		
Crook et al. (2008)	Meta-analysis unclear how large SMEs or entrepreneurial companies	$K = 125$, Overall for resources with firm performance $r_c = 0.22$; human resources $r_c = 0.30$, tangible resources $r_c = 0.08$, and intangible resources $r_c = 0.24$.
van der Sluis et al. (2005)	Meta-analysis unusual methods used, combining vote counting with regression-analysis	$K = 203$; results cannot be compared to the usually used corrected correlations. One year additional education in developing countries increases enterprise income by 5.5%.

(*Continued*)

Table 1.1. (*Continued*)

References	Meta-analysis or systematic review	Content
Unger et al. (2011)	Meta-analysis	$K = 70$, overall relationship between human capital and success $r_c = 0.098$. Effect sizes were higher for human capital outcomes, for task related human capital, for young businesses.
Read et al. (2009)	Meta-analysis, search restricted to JBV 1985–2007	Tests four predictions of effectuation. Means based, better resources lead to better outcomes (tested in what I know, who I am, whom I know) with effect sizes of $r_c = 0.11$ ($k = 24$) to 0.23 ($k = 10$); partnership: $r_c = 0.17$ ($k = 14$); affordable loss: nonsignificant; leverage contingency $r_c = 0.07$ ($k = 5$).
Daily et al. (2003)	Meta-analysis; however, strategy of selecting articles not described and unclear whether and how independence of samples was assured	$K = 241$. Average $r_c = 0.022$ with a high variance; this means that direct relationships of various predictors of underpricing of IPOs are zero (e.g., risk factors and underpricing or prestige of underwriter and underpricing).
Martin et al. (2012)	Meta-analysis	$K = 42$. Average $r_c = 0.217$ for education and training with entrepreneurship-related human capital assets. Education and training with entrepreneurship outcomes $r_c = 0.159$. Nonrandom assignment $r_c = 0.212$ and random assignment $r_c = 0.156$ with entrepreneurship outcomes; thus methodological rigor leads to lower correlations.
Various strategy topics:		
Combs and Ketchen Jr. (2003)	Meta-analysis unclear how large SMEs or entrepreneurial companies	$K = 44$, 10 hypotheses, general support for agency theory; no relationship between franchising and growth; no relationship between resource scarcity and franchising.
Bausch and Krist (2007)	Meta-analysis	$K = 41$, overall relationship between internationalization and performance was low $r_c = 0.059$; US-American companies were more successful ($r_c = 0.128$) than European ($r_c = 0.081$) and Japanese firms ($r_c = 0.009$) to reap benefits from internationalization.

(*Continued*)

Table 1.1. (*Continued*)

References	Meta-analysis or systematic review	Content
Song et al. (2008)	Meta-analysis new technology ventures	$K = 31$, 4 years survival rate: 36%; frequently factor meta-analyses are based on very few studies and therefore, confidence interval includes 0; clearest positive results for market scope, financial resources, firm age, patent protection, size of founding team, supply chain partnering ($k < 5$ results not listed here.)
Rauch et al. (2009)	Meta-analysis	$K = 53$ samples, overall relationship between entrepreneurial orientation and performance $r_c = 0.242$. Effect sizes are highest for micro-businesses and for high tech businesses. Additional moderators are suggested.
Rosenbusch, Brinckmann & Bausch (2011)	Meta-analysis	$K = 42$, innovation has a positive effect on the performance of SMEs ($r_c = 0.13$); innovation-performance relationship positively influenced for new ventures (compared to mature firms) and cultures with low/medium individualism. Further moderators are related to type and measurement of innovation: internal/external, innovation process input/innovation process output.
Rosenbusch et al. (2010)	Meta-analysis	$K = 65$, overall a very low but significant correlation of $r_c = 0.075$ of VC money in the firm vs not and returns for these companies. When industry is controlled, this correlation becomes 0 which means that VC firms are not able to predict returns for the firms but are able to predict industry returns.
O'Boyle et al. (2011, in press)	Meta-analytic path model	$K = 95$, there is not relationship between family involvement the firms' financial performance ($r_c = 0.006$) — none of the moderator effects tested by the authors was significant; thus family involvement per se does not produce competitive advantages or disadvantages.
Rosenbusch, Rauch & Bausch (2011, on-line)	Meta-analytic path analysis	$K = 8-73$, this is a meta-analytic path model showing that the effects of the environment (munificence, dynamism, and complexity) on success are mediated by entrepreneurial orientation.

entrepreneurship are either based on individual studies (often completed by the person recommending the policy) or they are based on so-called narrative reviews — reviews that present the considered opinion of somebody who has studied the literature. The narrative reviews often draw conflicting conclusions about the evidence making it difficult for practitioners to rely on scientific evidence.

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