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Gauging Management Researchers' Interest in Uncertainty: A Preliminary Assessment from Three Decades of Publications

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Abstract: Among the key factors that researchers in organizations have singled out as the key challenge to managing complex organizations was the ability to cope with uncertainty (for instance Ansoff, 1965; Burns & Stalker, 1961; Thompson, 1967). This study sought to determine the level of interest of strategic management researchers in the topic of uncertainty, and to get an idea about the trends of publications on the topic. A preliminary analysis conducted on 337 articles collected from four journals over 35 years showed the trend to be increasing in two of the journals. Furthermore, while US researchers had authored 80 percent of the research papers through 1999, more recently the number of non-US researchers had grown to almost half of those doing research in this area. The implications of these findings are discussed.

Key words: uncertainty, bibliometric, article authorship, preliminary analysis
JEL codes: B

1. Introduction

Since management emerged as a field of study, researchers of organizations have regarded environmental uncertainty as a critical contingency factor in administrative process whose impact must be managed and reduced (Miles & Snow 1978; Thompson, 1967). Yet some have noted that the interest of organizational scholars on the topic of uncertainty had waned over the years as researchers have shifted their focus to more trendy topics such as knowledge-based view, adsorptive capacity, dynamic capabilities, and others. This observation may be anecdotal, but it is what piqued our interest in this topic, and prompted us to ask a number of questions. This is in spite of the recent reminders from a number of senior management researchers about the growing need by managers to overcome the effects of uncertainty (Galavan, Hodgkinson, Huff, Milliken, & Sund, 2017; Teece, Peteraf, & Leih, 2016). Is there a downward trend in management research focusing on environmental uncertainty that can be empirically demonstrated? Who are the scholars conducting research on environmental uncertainty in terms of their demographics and nationality? We are also interested in finding out more about the authors doing work in the area of uncertainty in terms of their rank, i.e., whether they were doctoral students, assistant-, associate-, or full-professors; and their research affiliation status, i.e., whether they were university-based or non-university based writers. We believe that this information can give clues about the people conducting this research and enable us to gauge the level of interest the topic generates among the next generation of researchers and therefore

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the prospects of its sustainability as an area of research as their more senior mentors contemplate retirement.

To answer these questions we conducted a preliminary bibliometric analysis of articles published in four major research outlets in the field of management, i.e., the *Academy of Management Journal*, the *Academy of Management Review*, the *Administrative Science Quarterly*, and the *Strategic Management Journal* beginning from 1980 to the end of 2012. Our longer-term research agenda is to extend the project to include a bibliometric study of all the scholarly management journals that deal with the construct of uncertainty. Bibliometric studies are useful for gauging the level of research interest, and for providing an indication of publication patterns, trends in any given field of study (Gordon, 1980). Such information may be useful to policy makers and research funding institution seeking to determine the fields for which more research is needed. The reason we chose 1980 as our starting date is because this is the year on which the inaugural edition of the *Strategic Management Journal*, the main outlet for strategy research, was published. We begin the paper with a literature review on uncertainty in management. We next present the research questions to be investigated. This is followed by a description of the methodology used in the research and then a presentation of the preliminary findings. The paper concludes with a discussion of the implications of the findings for the study of management.

2. Literature Review of Uncertainty in Management

Since ancient times the human species has been concerned with explaining the mysteries of the universe. Over time, as better information and new evidence became available, answers to these mysteries began to emerge substituting previously held beliefs with new ones which, in turn, drew out a new set of curiosities. These curiosities have included whether the earth is flat or round; whether the sun revolves around the earth or vice versa (heliocentric vs. geocentric beliefs); questions about the origins of the human species (evolution错误！未定义书签。 vs. intelligent design); the existence of intelligent life on other planets and galaxies. These and many other questions have been asked, each eliciting differing, and very often opposing, answers. The common theme running through these questions is the innate human desire to reduce uncertainty on matters of cause and effect. We begin this section with a discussion of the challenges organizations face from uncertainty, followed by an elaboration of the dimensions and sources of uncertainty, compare the different categorizations of uncertainty, and end it with a working definition of uncertainty.

2.1 Facing the Challenge of Uncertainty

The construct of uncertainty seems to have infiltrated the management discourse in the late nineteenth century through the activities of the newly emerging corps of professional engineers who had taken on a more visible management role in the running of post-industrial revolution organizations (Noble, 1979). Subsequently, coping with uncertainty became identified not just as the major challenge that organizations faced, but also as the essence of the administrative process (Thompson, 1967; Starbuck, 1976; Miles, Snow & Pfeffer, 1974; Gifford, Slocum & Bobbitt, 1979). Indeed, the success of organizations rests squarely on the efficacy of its administrative process in eliminating uncertainty and being able to regulate the organization's input-throughput-output process (Miles & Snow, 1978; Thompson, 1967; Williamson, 1985). It is perhaps in this regard that strategic management evolved as a field with one of the goals being to help the firm overcome the challenge of uncertainty by shaping its competitive landscape, hence the coming into being of the various generic strategies and strategic types in the 1960s, 1970s and 1980s (Ansoff, 1965; Hofer & Schendel, 1978; Miles & Snow, 1978; Porter, 1980, 1985; Jauch & Kraft, 1986). It was Pfeffer (1981) who demonstrated the role of uncertainty in organizational politics, which he

defines as the use of power to obtain one's preferred outcomes where there is uncertainty or dissensus about choices. Some organizational subgroups are able to obtain power over others depending on the amount of uncertainty they control and the success they have in controlling it (Hickson et al., 1971). Although there have been many writings on the subject of uncertainty, little is known about the processes whereby managers respond to uncertainty in formulating their corporate strategies (Parnell, Lester & Menefee 2000). A number of writers have suggested various ways of overcoming uncertainty, which include designing organizations in the appropriate mix of organic and mechanistic structures, or providing the appropriate kind of information in terms of its scope, timeliness, and level of aggregation (Burns & Stalker, 1961; Chenhall & Morris, 1985; Lawrence & Lorsch, 1967; Mangaliso, 1995). In his classic work, Thompson (1967) suggested that under norms of rationality organizations respond to uncertainty by using any of five strategies. They seek to either (1) seal off their core technologies from environmental influences, e.g., through patents; (2) buffer environmental influences, e.g., by stockpiling; (3) smooth out input and output transactions, e.g., by offering special prices; (4) anticipate and adapt to environmental changes, e.g., through forecasting; or (5) ration their resources e.g., furloughs, reduced work-week (Thompson, 1967, p. 14). But uncertainty is a multidimensional phenomenon especially if viewed both from the perspective of those who effect it and those who experience it. Managers respond to what they perceive and perception of uncertainty is an individual psychological trait rather than an environmental attribute (Hambrick & Mason, 1984; Miles, Snow & Pfeffer, 1974; Downey & Slocum, 1975; Downey, Hellriegel & Slocum, 1974).

Uncertainty has been subject to study in other fields of scholarly endeavor. In the economics literature the foundational theory for explaining how decision-makers make choices under uncertainty is the subjective expected utility (SEU) theory (Bonoma & Johnston, 1979; Currim & Sarin, 1983, 1984). Even though the SEU is a robust theory, some inadequacies have been identified in its ability to serve as a descriptive model for decision making under risk and ambiguity since the exact probabilities cannot always be assigned to event, in effect rendering the uncertainty itself to be uncertain (Kahn & Sarin, 1988). An alternative explanation comes from the prospect theory, the fundamental tenet of which is that people overweight outcomes that are considered certain relative to outcomes that are merely probable (Kahneman & Tversky, 1979). The tendency to deal with ambiguous situations this way, called the certainty effect, contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses.

2.2 Dimensions of Uncertainty

Uncertainty is not a uni-dimensional construct but one that is decomposable into several underlying dimensions (De Meyer, Loch & Pich, 2002; Milliken, 1987; Sutcliffe & Zaheer, 1998). For instance, Dixit and Pindyck (1994) differentiate between input uncertainty, the origins of which are largely exogenous to the firm, and internal or technical uncertainty, which is endogenous. As McGrath, Ferrier and Mendelow (2004) note, these two kinds of uncertainty often create opposing pressures. Exogenous uncertainty seems to create the "wait and see" condition which affirms the desirability of waiting until a key source of uncertainty is resolved before a decision is made. Endogenous uncertainty creates pressure for the "act and see" condition in which the desire is to speed up the discovery process to resolve the uncertainty. Milliken (1987) proposes three underlying dimensions, which she calls *state uncertainty*, defined as the inability to assign probabilities to states of nature; *effect uncertainty*, defined as a lack of knowledge about cause-effect relationships; and *response uncertainty* defined as the inability to predict outcomes of a decision. De Meyer, Loch and Pich's (2002) proposes four types of uncertainty that managers usually confront, namely, *variation* — defined as minor variations from scheduled values; *foreseen uncertainty* — where alternative contingency plans are necessary for other possible outcome; *unforeseen*

uncertainty — where decision-makers are unaware of an event's possibility and has no Plan B; and *chaos* — in which the project goals are completely invalidated by unforeseen events. Research conducted by Cheng (1987) in an electronics firm seems to corroborate the notion of variation uncertainty, showing that the accuracy of a capacity plan was a quadratic function of the degree of variation in work contents and was significantly affected by product demand. Research reported by Courtney, Kirkland, and Viguerie (1997) and Courtney (2003) distinguishes between four levels of uncertainty, viz., *Type 1* uncertainty which derives from a single forecasted vision of future events; *Type 2* uncertainty which occurs when future events can be described in a few discrete scenarios or outcomes; *Type 3* uncertainty — when a range of potential futures exist and in which actual future events lie in a continuum; and *Type 4* uncertainty which occurs when there are multiple dimensions of uncertainty.

Building their typology from Williamson (1985), Sutcliffe and Zaheer (1998) propose three types of uncertainty, viz., *primary uncertainty* — defined as the lack of knowledge about the state of nature; *secondary or competitive uncertainty* — which refers to a lack of knowledge about the actions of other economic actors; and *supplier uncertainty* — which arises from the possibility of opportunism on the part of the exchange partner firm. Writers in sociology define uncertainty as the character of situations in which agents can neither anticipate the outcome of a decision nor assign probabilities to the outcome (Beckert, 1996, p. 804). For them the reason for uncertainty can be seen in the complexity of causal relations in the social world, which leads to unintended consequences and prevents the anticipations of outcomes. Table 1 summarizes these dimensions and categorizations of uncertainty.

Table 1 Categories of Uncertainty

Authors	Basis for categorization	Categories of Uncertainty
Early Researchers (c. 1960s)	Locus of uncertainty	Internal, external
Duncan (1972)	Similarity in environment sectors and state of change	Simple-static, complex-static, simple-dynamic, complex-dynamic
Aldrich et al. (1984)	Amount of information on environment	Attribute, population, domain
McCann & Selsky (1984)	Complexity in environment and adaptation to change	Type 1,2,3,4 and 5 (Hyper-turbulence)
Jauch & Kraft (1986)	Effect on goals	Performance, objective
Milliken (1987)	Uncertainty as a flow: understanding, effect, response	State, effect and response
Dixit & Pindyck (1994)	Origins of uncertainty exogenous or endogenous	Input, internal/ technical
Sutcliffe & Zaheer (1998)	Lack of knowledge of nature and stakeholders	primary, secondary, supplier
Courtney et al. (1999)	Amount of information on environment	Level 1, 2, 3 and 4
Mercer (2001)	Internal capabilities to understand uncertainty	Hidden, expected outcomes, random
De Meyer et al. (2002)	Amount of information on environment	Variation, foreseen, unforeseen, and chaos

2.3 Towards a Definition of Uncertainty

In common language, the term uncertainty is used to denote a state of unpredictability or a situation where there is not enough information to formulate an opinion or make a decision. In the management literature, uncertainty is usually related to a lack of knowledge about the organization's environment. As Carpenter and Frederickson (2001) observe, uncertainty is a consequence of environmental factors that generally result in a lack

of information needed to assess means-ends relationships, make decisions, and confidently assign probabilities to their outcomes. It follows therefore, that better information about the environment reduces uncertainty and leads to better strategic choices. Helmer (2003) draws a distinction between conditions of certainty, uncertainty, and risk, noting that these three are usually presented as three mutually exclusive dispositions concerning any given outcome. Certainty occurs when the relevant dimensions of the outcome are completely known. Uncertainty exists when the relevant dimensions are not known and where it is impossible to attribute a meaningful probability function to the outcomes. Risk exists where the relevant dimensions of the outcome are not known, but it is possible to meaningfully attribute a known probability function to the outcomes. Some researchers prefer to fold the terms uncertainty and risk into the term ambiguity defined as, "uncertainty about probability, created by missing information that is relevant and could be known" (Camerer & Weber, 1992, p. 330). Following from the above, we define uncertainty as a dynamic state that occurs when a decision-maker is unable to meaningfully attribute probabilities from which to accurately predict the outcome of an event or action.

This literature review was a helpful starting point to begin our meta-analysis on the research work that has been previously done and in identifying the scholars that have been active on this topic over the past 33 years. In the next section we introduce the main questions of the study, i.e., the trends in interest on the subject of uncertainty as represented in the number of studies published in the management journals, the authorship of these studies, and their demographic profiles.

3. Research Methodology

In the interests of parsimony, we decided to focus our attention on the four leading journals in the field of management: the *Academy of Management Journal*, the *Academy of Management Review*, *Administrative Science Quarterly*, and the *Strategic Management Journal*. From these journals, we searched for articles, published since 1980, that contain a number of key terms to do with uncertainty. We used a combination of terms such as "uncerta*", "volat*", "dynamic environment", "hostility", "dynamism", and "heterogeneity" to identify these articles. The databases we searched from were Business Source Premier, Wiley Online Library, JSTOR, and the Academy of Management database, over a period of three decades extending from1980 to 2014. We divided the 35-year period into half-decadal clusters.

Our initial search yielded over 400 different articles that used one or more of these terms in their titles or abstracts. The reason for focusing on titles and abstracts was to identify articles that did not just use these terms in a spurious manner, but as an important thrust of their research. We then read all of the abstracts, and if needed the full articles, to remove those papers that only had a passing reference to uncertainty. We ended up with a final sample of 337 articles. The key information on each article was then entered in an Excel spreadsheet according to its title, keywords, month, year of publication and journal outlet. We also entered the author information, where for each author we coded the academic title at the time of publication as follows: (1) for a Ph.D. Student or Researcher; (2) for an Assistant Professor; (3) for an Associate Professor; and (4) for a Full Professor.

The rank and position title of authors was challenging to determine. In the case of *AMJ* and *AMR* articles, short author biographical sketches are provided that became useful for determining authors' academic ranks and titles at the time of publication. Unfortunately, for *ASQ* and *SMJ* articles, this information was not available and so we had to search elsewhere to determine the authors' academic ranks and titles. We were fortunate to find most of this information on the authors' web pages through their institutional web sites. For most of them, we were able to

determine their titles at the time of publication of the article through their biographies, CVs, and, in some case, through other authors and academic publications. Still there were 31 papers, most of them published before 1995, for which we were unable to find the authors' rank. In such case authorship information was coded as 0.

Finally, for each article we entered the author's country of origin. To investigate the countries, we looked at the institution of the first author; the data used in the publication; and if there were multiple authors in different countries, the interactions between authors. For example, if the first author was employed in a US institution and the second author was in a European institution we investigated if the first author was at the second author's institution prior to the publication. If this was so, then the article was classified to be of European origin. In cases where we were unable to find information in the study or through author biographies or CVs, the country of origin of the study was taken to be where the first author's institution was based.

To identify trends and significant statistical deviations from the expected values of the respective variables, we used the chi-square tests for goodness of fit. The chi-square test reveals that the greater the difference between the observed and the expected frequencies, the stronger the relationship between the variables. On the other hand smaller chi-square values indicate statistical independence between the variables (Winch & Campbell, 1969). For this study, the chi-square tests were supplemented with trend analyses of the published articles in clusters of five years.

4. Findings

In order to determine whether the number of articles was increasing over the period under consideration we used the chi-square goodness of fit test due to the nature of the data. In this test, the null hypothesis assumes that there is no difference between the observed and expected number of articles published in the years we are interested in (zero change in the number of articles from one interval to the next).

The test results came out as significant with a p-value of 0.003, and reject the null hypothesis. This indicated that there is a difference between the numbers of articles published in the 5-year periods we are interested in with the trend going upward. We also looked at the residual values and found that since they year 2000 the number of articles grew more than expected, between 1995 and 1999 they grew as expected, and before 1994 the growth was less than expected.

Table 2 Chi-Square Test

	Observed	Expected	Obs-Exp	(Obs-Exp)*2/Exp
2010-2014	38	30.6	7.4	1.77
2005-2009	72	51.1	20.9	8.59
2000-2004	59	51.1	7.9	1.23
1995-1999	50	51.1	-1.1	0.02
1990-1994	40	51.1	-11.1	2.40
1985-1989	40	51.1	-11.1	2.40
1980-1984	38	51.1	-13.1	3.34
			χ^2	19.75
			P-Value	0.003

The formula used in the Chi-Square test is:

$$\chi^2 = \Sigma\left[\frac{(O_i - E_i)^2}{E_i}\right]$$

Where:
χ^2 = the Chi-Square statistic
O_i = observed frequency of cell i
E_i = expected frequency of cell i

Figures 1-5 show the trends in the number of articles for each publication. Since the 2010-2012 data are only for a 3-year period, we extrapolated the number to the projected 2014 total for consistency of comparison.

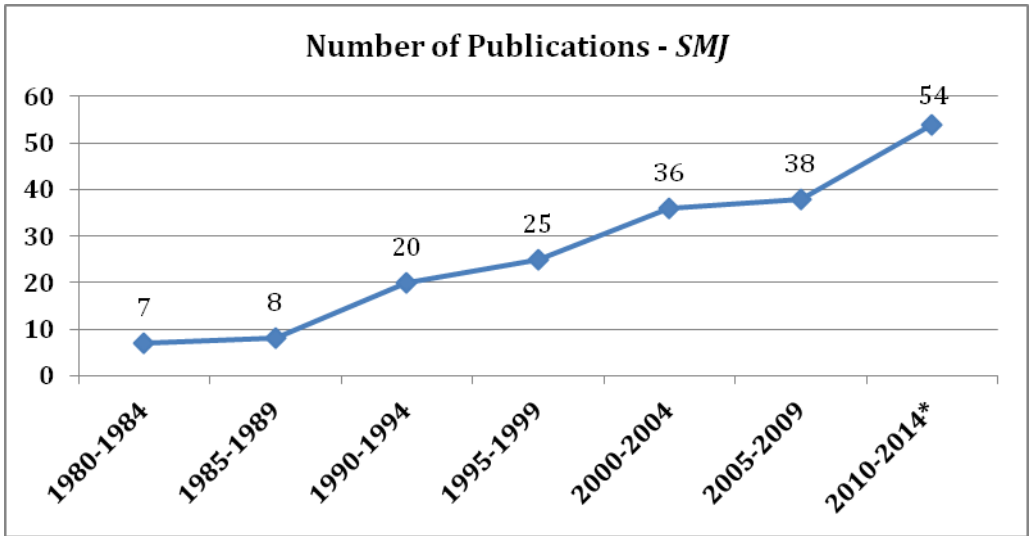

Figure 1 Articles on Uncertainty in *SMJ* (in 5-year Clusters)

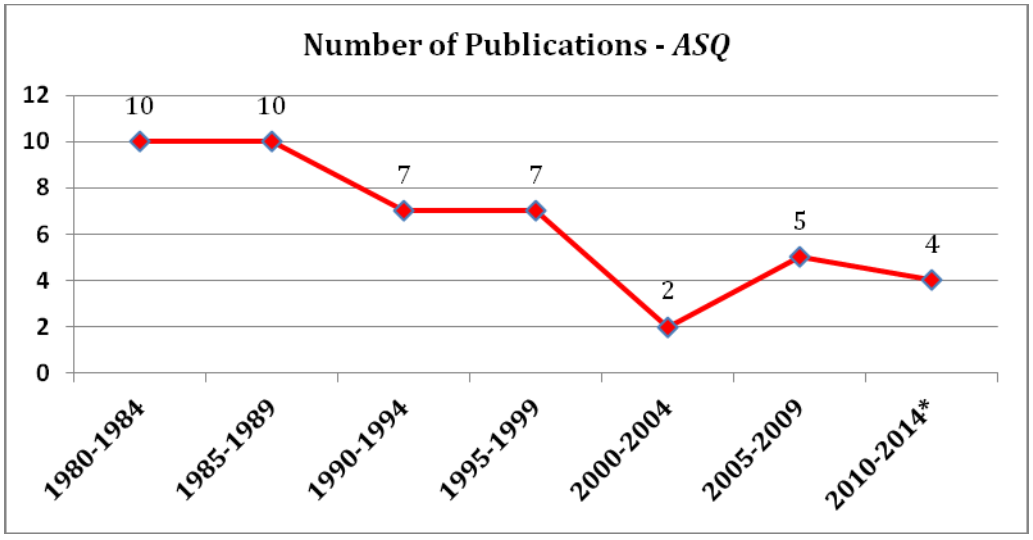

Figure 2 Articles on Uncertainty in *ASQ* (in 5-year Clusters)

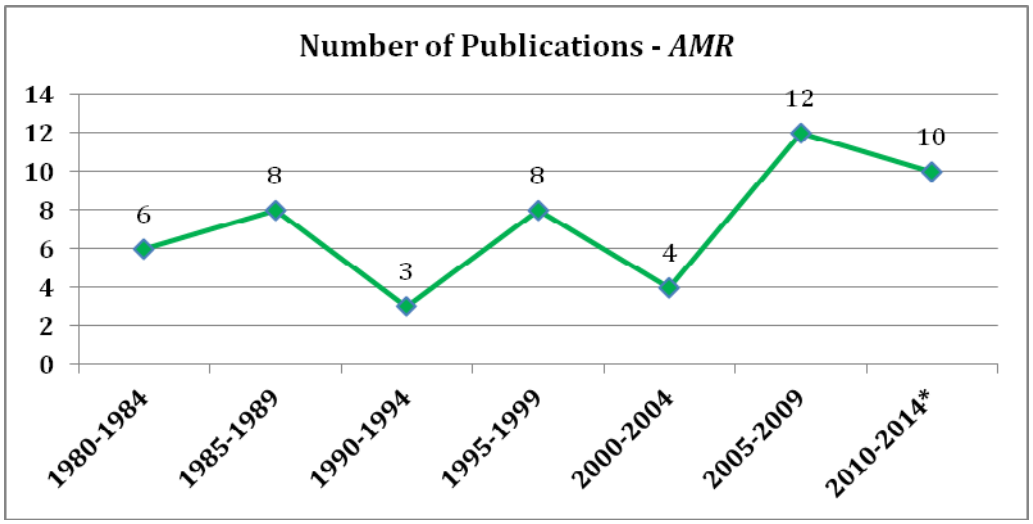

Figure 3 Articles on Uncertainty in *AMR* (in 5-year Clusters)

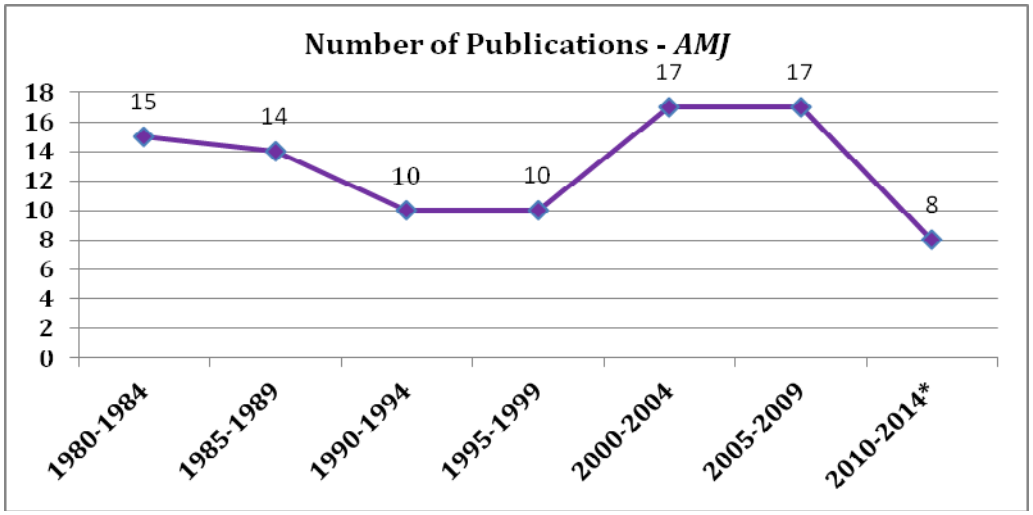

Figure 4 Articles on Uncertainty in *AMJ* (in 5-year Clusters)

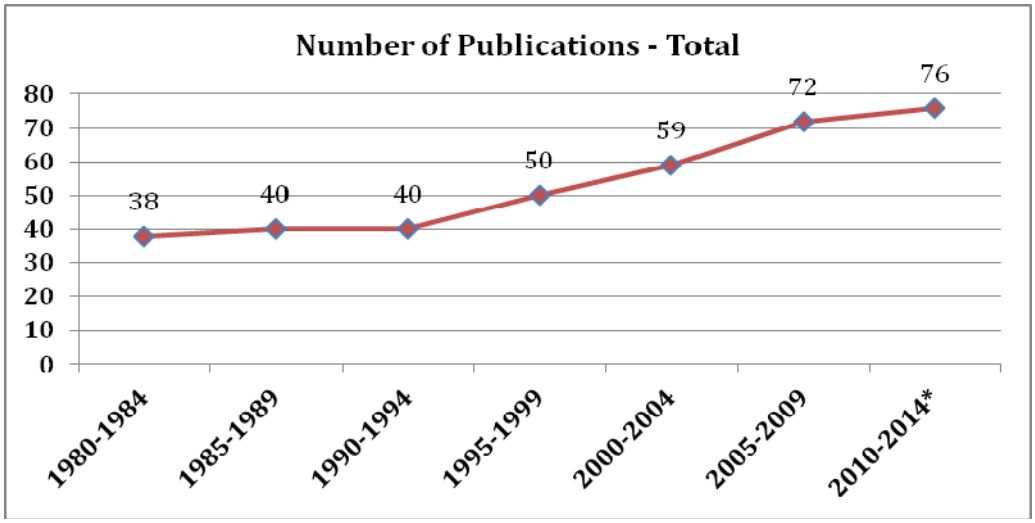

Figure 5 Articles on Uncertainty in All 4 Journals (in 5-year Clusters)

It is interesting to see that *ASQ* has a downward slope in the number of articles published over this period, whereas *AMJ* and *AMR* are somewhat steady in their numbers. The number of articles published in the *SMJ,* on the other hand, shows a steep increasing trend. This is probably because of the emergence in 1980 of the *SMJ* as a major research journal for strategic management studies and the authors turning to the *SMJ* as an outlet for their research. Figure 5 represents the total number of publications in the four journals combined. The upward trend observed in this graph, provides support for the results of the chi-square test performed above.

Table 3 Articles Published in All Journals with Author Rank

		(A) First Author Academic Rank					(B) Highest Ranking Author Academic Rank				
Years	# Articles	0	1	2	3	4	0	1	2	3	4
1980-84	38	7	0	20	11	0	7	0	10	13	8
1985-89	40	1	3	13	12	11	1	0	11	14	14
1990-94	40	13	1	13	10	3	12	0	6	13	9
1995-99	50	6	2	24	9	9	4	0	15	13	18
2000-04	59	2	0	20	21	16	1	0	9	19	30
2005-09	72	2	1	32	20	17	1	0	14	16	41
2010-14	38	0	0	13	13	12	0	0	4	8	26

Ranking Code: 0 = Unknown; 1 = PhD Student/Researcher; 2 = Assistant Professor; 3 = Associate Professor; 4 = Full Professor

Table 4 Articles Published in All Journals with % of Authorship by Rank

		(A) First Author Academic Rank					(B) Highest Ranking Author Academic Rank				
Years	# Articles	0	1	2	3	4	0	1	2	3	4
1980-84	38	18.4	0.0	52.6	29.0	0.00	18.4	0.0	26.3	34.2	21.0
1985-89	40	2.50	7.5	32.5	30.0	27.5	2.50	0.0	27.5	35.0	35.0
1990-94	40	32.5	2.5	32.5	25.0	7.5	30.0	0.0	15.0	32.5	22.5
1995-99	50	12.0	4.0	48.0	18.0	18.0	8.00	0.0	30.0	26.0	36.0
2000-04	59	3.4	0.0	33.9	35.6	27.1	1.7	0.0	15.2	32.2	50.8
2005-09	72	2.8	1.4	44.4	27.8	23.6	1.4	0.0	19.4	22.2	56.9
2010-14	38	0.00	0.0	34.2	34.2	31.6	0.00	0.0	10.5	21.0	68.4

Ranking Code: 0 = Unknown; 1 = PhD Student/Researcher; 2 = Assistant Professor; 3 = Associate Professor; 4 = Full Professor

In our data analysis, for each article we noted the authors' academic ranks. In our coding, we were interested in identifying the rank of the first author and the academic rank of the most senior among the authors. For example, in a paper where the first author is an assistant professor and the second author an associate professor, the first author code (Box A in Table 3) would be "2" and the author with the highest academic rank will be coded as "3" (Box B in Table 3).

Table 4 shows as percentages the raw numbers seen in Table 3 for each of the intervals. For example, between 1995 and 1999, the nine of all the first authors identified as associate professors in Table 3, are represented as 18% in Table 4. Unfortunately it was much harder to deduce conclusions from these data since there were many authors whose ranks we could not identify, especially authors of articles from earlier issues of the journals. We investigated the authorship using two tests: one for the first authors and one for the highest ranked authors (labeled A and B respectively in Table 3). We specifically looked at the period since 1995 when more information about authors was available. We excluded the unknown authors and the Ph.D. Student/Researcher because they constituted a very small minority compared to the rest of the authorship.

The results of the chi-square analysis for the first authors that compared the observed and the expected authorship did not show statistical significance (p-value: 0.345). The results of the chi-square analysis for the highest ranked author also did not show any statistical significance but this time the p-value was much smaller (p-value: 0.077). Although the chi-square tests did not show statistical significance, the trend analysis, on the other hand, showed an upward slope in the number of full professors in authorship as we entered 2012. For assistant or associate professors the trend was relatively constant over this period. Overall this indicates that scholars who have been publishing in uncertainty were continuing their publications and the area was also attracting younger researchers.

We investigated the country of origin of the authorship of the articles as well. As can be seen in Figure 6, for the first four periods through the year 1999, US authorship remained relatively constant and dominant at about 80 percent. We focused on US authorship because the journals we are looking at are all US based. But since 2000, there has been a steady increase in the international authors' publications in the four journals we have looked at. Notably, for the latest interval — 2010-2012 — we see that 47 percent of the publications either came from outside the United States, or were collaborative studies, i.e., studies conducted by researchers at both US and elsewhere." The Chi-Square test was conducted for this data as well, but the results did not yield significant p-levels.

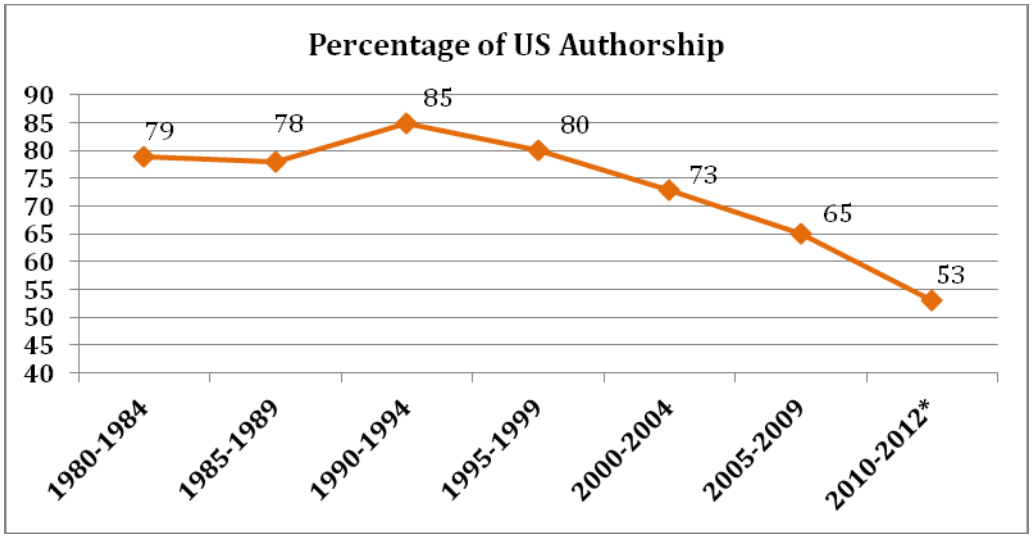

Figure 6 US Authorship of Articles in All 4 Journals (in 5 Year Clusters)

5. Discussion and Conclusion

It is noteworthy that, according to our data, the number of articles containing the keyword "uncerta*" by itself kept relatively constant over the 30 year period. However, this does not necessarily mean that the research focusing on uncertainty remained constant or decreased over the same period. In the 1980s the focus of the research was uncertainty itself, but over time the focus began to gradually change, albeit somehow still related to uncertainty. Related topics such as dynamic capabilities (Teece, 1997; Winter, 2003), environmental dynamism (Garg, Walters & Priem, 2003), and heterogeneity (DeSarbo, Jedidi & Sinha, 2001) receive more investigative attention today than 30 years ago. For example, the keyword "dynamic environment" was found in 15 articles between 1980 and 2000, but there have been 22 articles in the ten years since then. Similarly the keyword

"heterogeneity", in the context of uncertainty, was not used much before 1990. Since 1990 there have been 55 articles that included 'heterogeneity' as a construct, and 65% of those have emerged since 2002.

The reason that we see uncertainty research increasing in the literature is because researchers are now more interested in identifying the antecedent factors that create uncertainty. Studies that do research on dynamic capabilities, multinational firm adaptation, cross-cultural studies, and competing in different markets, are in effect investigating the antecedent conditions of uncertain even though uncertainty per se may not be mentioned as a variable. This issue notwithstanding, most of this research is likely to assist businesses to better cope with uncertainty in the global business economy.

The original intent of this preliminary research was to investigate and gauge the interest that management researchers had in the phenomenon of uncertainty. Our findings seem to indicate a continuation of interest on the topic with more scholars including uncertainty as a focus of their research. But more importantly, the findings show the growth in interest in the four journals we studied to be coming mostly from international scholars. As it becomes easier to communicate ideas and knowledge around the world we foresee international authors being able to increase their publication frequencies even further. This research has been a study of the interests in uncertainty focusing three decades of publications in selected top management journals. Our future work will both extend this research to a more comprehensive list of journals in management and also investigate the treatment of the construct of uncertainty in research articles.

Because of the rapidly increasing speed of globalization, contemporary organizations will operate in a world that is becoming riskier, more volatile, uncertain, complex, and ambiguous, a phenomenon that Schoemaker (2015) has characterizes as the "VUCA" world.

This will undoubtedly create Type 5 turbulent environments, which mandate companies to either cope on their own or through collaboration with others (McCann & Selsky, 1984; Mangaliso, Mir, & Knipes, 1998; Schneider, Wickert, & Marti, 2017). As more companies operate in multiple countries, affected by local customs, laws, market conditions and human resources, they will need to increase the uncertainty coping capabilities. It will therefore be important for scholars to continue their research to determine and explain the causes of uncertainty with the goal of providing ideas for mitigating the problems that emanate from the anticipated increases in level uncertainty. For example, even though there has been an abundance of research that ties uncertainty with market and technological factors, some scholars have lamented the lack of ties in the extant literature between organizational and resource uncertainty and innovation (O'Connor & Rice, 2013). It is encouraging to see evidence that international authorship and curiosity in this subject is growing, as more the time and effort put in to this stream of research. Multi-country research partnerships are the most appropriate approach to conducting research on this topic because the increased international authorship brings diverse perspectives and viewpoints into the literature, pointing to factors that would otherwise not have been identified.

In every field of scientific endeavor, the key concepts that set the base for theoretical developments must undergo scrutiny and verification. Thus, as international authors increasingly assert themselves in terms of having their scholarly works published in top-tier scholarly journals, the new insights they bring will stretch our understanding of the concept of uncertainty in different ways. For instance, what new and unrelated aspects of uncertainty will these researchers investigate? What new current themes emerge from uncertainty research? Can uncertainty be reduced across temporal and spatial confines? What are the emergent epistemic and ontological implications of uncertainty across the cultural divide? Are decision-makers justified in using subjective certainty under conditions of uncertainty? Does the existence of uncertainty create loopholes in which executives can

introduce their subjective political agendas? As business gets increasingly conducted across national borders, what role will ethical relativism and fiduciary responsibility play in an increasingly uncertain environment? Research that can answer these questions will go a long way toward advancing our understanding of the concept of uncertainty in managing in the global economy.

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