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Assessing the exchange of knowledge between operations management and other fields: Some challenges and opportunities

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ABSTRACT

Addressing a suspicion that the field of Operations Management (OM) draws substantially more knowledge from non-OM journals than those journals draw from OM journals in return, we studied the citations of the top 30 research journals of interest to our field. We conducted citation analyses of the three oldest OM journals over three decades in comparison to the 27 other journals representing the fields of Management, Operations Research/Management Science (OR/MS), Marketing, Practice, and Engineering. We examined both the entire 30-year period and then each decade separately. Our suspicions were confirmed—although citations from these 27 journals to these three OM journals have increased by a factor of 7 over the three decades, we in OM still cite these journals about twenty-five times more often than they cite our journals, giving an indication of the knowledge development and flows among these fields. We then describe some challenges for the field of OM in providing more research knowledge to other fields but also some opportunities that OM should be able to capitalize on, such as our historic ties to practice and our escalating research in strategic and organizational issues.

1. Introduction

The field of Operations Management (OM) has substantially developed its research strength over the last four decades: At least five research journals include “operations management” in their title, and three of those are included in the FT50 list of premier journals. Other OM journals include some specific element of the field in their title such as supply chain, production, logistics, manufacturing, quality, distribution, scheduling, purchasing, materials, inventory, and so on. Although the OM field's history dates back to Fred Taylor's “factory management” in the late 1800s, the founding of peer-reviewed academic journals in OM only began in 1980.

More than a quarter century later, the OM field now can be considered as “mature,” according to the guidelines suggested by Nerur et al. (2016, p. 1068) in presenting their citation study of the *Strategic Management Journal* covering a similar period of time: “As an academic field reaches maturity, it is common for scholars to undertake detailed analyses of the field itself in order to delineate its domain, explain its evolutionary patterns, identify significant intellectual influences, assess its contributions, and plan its future.” Here we hope to analyze the flows of knowledge between OM and its sister fields in both academia and practice, since it informs our reflection on how the field has been developing.

The OM field has historically been strongly focused on practice, which in early years yielded research that aimed to solve practical problems. Recently, however, we have joined our sister business disciplines in seeking to develop generalizable theories by borrowing theory from other disciplines—management, management science/operations research, marketing, engineering, practice—and using it for developing insights and knowledge specific to OM. As Abbott (2001) suggested, the process by which disciplines become established is a social one where groups stake claims for tools, solutions, and concerns as “experts.”

We begin by exploring how the knowledge transfer process between OM and its sister fields has evolved over recent decades. Specifically, we identify which fields, as represented by their journals, OM has borrowed knowledge from over the last three decades and given knowledge back to. As we observe these flows of knowledge, it informs our reflection on how the field has been developing. This then gives insight into the threats and opportunities that lie before us.

In contrast to Linderman's and Chandrasekaran's (2010) analysis of the exchange of knowledge during the period 1998–2007 between OM journals and our sister fields of management, marketing, and finance, we examine all the references made in three base OM journals from the

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beginning of peer-reviewed research in the field in 1980 and identify the major journals referenced *regardless* of their field. We capture the relative citation flows between the OM journals as a group and the other fields to which the OM journals are connected via citations, and how these flows have evolved over the three decades of the 1980s, the 1990s, and the 2000s. Based on these flows and their evolution, we draw conclusions about the challenges and opportunities that peer-reviewed research in the OM field is facing. We conclude by sharing thoughts about the way forward.

2. Literature review

As Linderman and Chandrasekaran (2010, p. 357-8) noted, cutting-edge science increasingly involves collaboration across disciplinary boundaries (Rinia et al., 2002). Since a narrow disciplinary focus can hinder the development of a field, it is very positive that scholars in the OM field are actively exchanging ideas with other disciplines to enhance learning and create knowledge. For most fields, journals provide the main mechanism for distributing and archiving scholarly research and ideas (Cole and Cole, 1973), and thus provide a longitudinal lens for discerning the evolution and trends of a discipline (Barman et al., 1991; Baumgartner and Pieters, 2003; Franke et al., 1990).

As Agarwal and Hoetker (2007, p. 1305) noted: "Researchers have found that the knowledge imported from related industries helps a new industry to leverage established distribution networks, develop new knowledge, and increase in legitimacy, all of which enable it to take off and grow." Amundson (1998, p. 347) agreed: "OM borrows from other fields for understanding the nature and purpose of theory. In addition, OM may examine theories from other fields while working on interdisciplinary research problems, or OM may study theories from other fields for ideas and insights for OM theory building." However, Agarwal and Hoetker (2007, p. 1306) also noted that "… the relative importance of knowledge from outside an industry's boundaries decreases as the industry matures."

This paper conducts its investigation using the bibliometric method of citation analysis, a widely used approach in many fields such as inventions (e.g., Lee et al., 2010) and innovations (Fox et al., 2013), engineering technology (Pilkington, 2008), and extensively in business. Some examples in business include strategy (Nerur et al., 2016; Ramos-Rodriguez and Ruiz-Navarro, 2004; Franke et al., 1990), marketing (Baumgartner and Pieters, 2003; Stremersch et al., 2007; Zinkhan et al., 1992), information systems (Holsapple et al., 1993, 1994; Wade et al., 2006), and OM. In OM, citation analysis has been used most recently to identify the leading European OM researchers (Behara and Babbar, 2014), to investigate supply chains (Kim et al., 2011), to determine scholarly exchanges of knowledge (Linderman and Chandrasekaran, 2010), to analyze the major articles and subfields within OM (Pilkington and Meredith, 2009; Pilkington and Fitzgerald, 2006), to evaluate the differences in the research agenda between OM scholars in Europe and America (Pilkington and Liston-Hayes, 1999), and to rank the top journals in the field (Goh et al., 1997; Vokurka, 1996).

3. Data and methodology

The analysis presented builds on a database of references in the oldest journals *totally dedicated* to the field of OM, which we refer to as our "base" journals: *Journal of Operations Management* (JOM, initiated in 1980), *International Journal of Operations and Production Management* (IJOPM, also initiated in 1980), and *Production and Operations Management* (POM, initiated in 1992), extending through the decades of the 1980s, the 1990s, and the 2000s. We assumed that all the articles in these three journals were purely OM articles, thereby avoiding having to decide whether articles from multi-discipline journals like *Management Science* and *Decision Sciences* were OM articles or not. We also wanted to be sure to include all forms of OM articles, so we selected JOM for its empirical articles, POM for its more quantitative articles, and IJOPM for its international and practice-oriented articles. As long as we covered all forms of OM articles, and *only* OM articles, we felt it was unnecessary to include other journals in the base to reveal the flows of knowledge over the three decades.

We primarily relied upon the ISI's Social Science Citation Index (SSCI) for our data but supplemented with other sources when particular issues of our base journals were not listed. Since we were only interested in research journals, we excluded books and any other non-journal references. We employed MATLAB (MATLAB, 2012), Bibexcel (Persson et al., 2009), UCINET/NetDraw (Borgatti, 1999; Borgatti et al., 2002), and Excel for text manipulation, data preparation/manipulation, and visualization of the networks.

As noted earlier, we use citation analysis of the set of journals identified as most important to the field of OM over the three decades 1980–2009 to conduct our study. As Nerur et al. (2016, p. 1066) stated: "… a study of citation relationships across journals can provide valuable insights about the intellectual evolution and knowledge structure of a field as well as the pattern of idea migration across disciplines." Nerur et al. went on to explain that a citation analysis "… can provide an assessment of the contribution of the field … to other intellectual niches within the field … and beyond, thus demonstrating its legitimacy or lack thereof as a vibrant discipline." And, it "… can establish the centrality or peripherality of specific journals within a network."

4. Analysis and results

4.1. The top-30 journals

Table 1 lists the 30 top journals of major importance to operations management between 1980 and 2009 (Pilkington and Meredith, 2018) *based on the number of citations in the three base OM journals*. The youngest journal in the list is POM, having started publication in 1992. The journals are listed in order of their percentage of the 298,217 citations by the 30 journals to the other 29 (no self-citations), followed by their abbreviations. The values in the % Cites column exclude self-citations, with MS garnering over 15 percent of all citations in the group followed in order by ASQ, OR, and AMJ. It should be noted that some of the journals are very broad and appeal to all areas of business (e.g., MS, DS, and most of the Practice journals like HBR) so they will naturally tend to have more citations than journals from narrowly-oriented journals like IEEETEM.

In the last column are our designations for each journal in terms of its knowledge flows between the journals. There are three categories based on Biehl et al. (2006): whether a journal is considered a "source" of knowledge that other journals depend upon, a "sink" that mostly depends on other journals' knowledge, or something between the two, called a "transmitter." The ratio of the number of citations to a journal (excluding self-citations) divided by the number of citations made by the journal allowed us to differentiate between the categories, with a ratio greater than 1.5 indicating that this journal is a source and, for symmetry, less than 0.5 indicating a sink, with all in-between ratios indicating the journals as transmitters.

4.2. Grouping the journals

Our focus in this analysis is on the journals OM relies upon for research knowledge and the fields those journals represent, and the fields that in turn utilize the knowledge in our OM journals. That is, our interest is on the interchange of knowledge between the fields (represented by those journals) most important to OM, not the individual journals themselves. To better see the citation flows between OM and its sister disciplines, we have grouped the journals into the following five fields based on Harzing (2017) and ABS (2015): Management, Operations Research/Management Science, Practice, Engineering, and Marketing. Engineering and Practice were included because OM's beginnings were very technical and practice-oriented.