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Analyzing project management research: Perspectives from top management journals

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Abstract

This paper examines project management research from the perspective of its relationship to allied disciplines in the management field and provides a view of the progress of project management as a research-based academic discipline. This study which is partially funded by the Project Management Institute specifically investigates project management research in allied disciplines from 18 top management and business journal publications and categorizes it into eight allied disciplines. The evolution and trends of project management research are analyzed by exploring, identifying, and classifying management journal articles on project management in the allied disciplines. The analysis of project management research in the allied disciplines reveals an explosion of popularity and strong interest in project management research. The ranking of occurrences of the eight allied disciplines from most to the least appeared subjects over the last 50 years are (1) Strategy/Portfolio Management; (2) Operations Research/Decision Sciences; (3) Organizational Behavior/Human Resources Management; (4) Information Technology/Information Systems; (5) Technology Applications/Innovation; (6) Performance Management/Earned Value Management; (7) Engineering and Construction; and (8) Quality Management/Six Sigma. Result of this study help us better understand the evolution of project management as a field of practice and an academic discipline, and allow us to provide suggestions for future project management research opportunities.
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1. Introduction

There has been a long debate in the management education community as to whether "project management" is a practice or an academic discipline. In the R&D field, tools and techniques of project management are applied and implemented to complete complex projects successfully. In the construction engineering and management discipline, people learn and implement planning, managing, and controlling of engineering construction projects to meet the time, budget, and specifications. In the engineering field, production planning, scheduling and quantitative methods are applied to manufacturing systems to achieve higher productivity. However, when it comes to the business and management field, scholars often appear puzzled and unconvinced of the notion "project management". The origin, history, and evolution of project management, and its academic background, foundations, and underlying theory, have been debated and studied only to a limited extent from the management field's academic perspective, and supporting literature is limited. As a result, previous research had limitations to transfer the message outside of the project management field to the broader business and management academic audience.

There have been important efforts among international PM researchers and practitioners to identify and rethink PM [1], and the findings were disseminated widely within the PM community. Several other studies aimed at understanding trends in PM research and publication. Betts and

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Lansley [2] investigated papers published in *International Journal of Project Management* for its first 10 years and found that papers mainly reviewed practical experience and literature, contributed to interesting insights and new tools and techniques. Themistocleous and Wearne [3] reported that cases from the construction industry remained predominant followed by the service sector in PM research, and that in terms of theory building and theoretical basis of PM, there was still a large room for improvement. Their paper concluded that the future development of PM as a discipline should be done by building and testing different research models so that a theory of PM may emerge. Crawford et al. [4] analyzed the trends of emphasis within PM literature by investigating two flagship PM journals, *Project Management Journal* and *International Journal of Project Management*. The paper found a reduction in focus on interpersonal issues and quality management and increased research in project evaluation, improvement, and strategic alignment. Abudayyeh et al. [5] examined engineering and construction research trends by reviewing articles published in *Journal of Construction Engineering and Management* for 18 years and suggested increasing research collaboration between industry and academia.

Kloppenberg and Opfer [6] identified project management research published in articles, papers, dissertations, and government research reports since 1960. They found that emphasis moved from development and use of automated project management software and tools to risk management and earned value management and then to human resource aspects. They also determined that research focus moved from large government defense projects to commercial applications in construction, information systems, and new product development. They concluded that project management has extensive current opportunities and a bright future. Bredillet [7] investigated management journal production on project management as reflected in EBSCO Business Source Premier Database and used co-word analysis to understand the main trends in the field. He found that these trends focus on strategic management issues, creation of value for stakeholders, technical issues, and softer issues. He concluded that project management is becoming more focused on the implementation of organizational strategy.

More recently, Anbari et al. [8] conducted an extensive review of academic research literature on project management and organized the literature into nine major schools of thought on the basis of the key premise that drives each one. These are: optimization, modeling, governance, behavior, success, decision, process, marketing, and contingency schools of thought. They pointed out the overlap in research in project management schools of thought and their inevitable interactions.

This study investigates project management (PM) research from the perspective of its relationship to allied disciplines in the management field. By exploring, identifying, and classifying top management journal articles related to PM research in the allied disciplines, the origin, evolution, and trends of PM research in the management field are revealed. This study specifically investigates PM research in allied disciplines from the management academy's perspective by not observing PM research trends from the viewpoint of the PM community. The goal of this research is to better understand PM from the perspective of the academic management world and the trends of allied disciplines, and to enhance our understanding of PM as a research-based academic discipline. This will help researchers interested in PM focus their efforts on areas of high impact and relevance to contribute to the advancement of knowledge in the field. In turn, this will help improve learning, education, and training programs, and ultimately lead to better performance on projects and in organizations.

2. Research approach

2.1. Project management research in the management field

To thoroughly investigate PM research in allied disciplines, this study reviewed major journal publications from the management and business fields. Respected journals in the management community including the Institute for Operations Research and the Management Sciences (INFORMS) [9], Academy of Management (AOM) [10], Institute of Electrical and Electronics Engineers (IEEE), and others were analyzed in detail. Since the management and business fields are very broad, we identified and defined eight different categories of PM allied disciplines for the purpose of this research. Then, we carefully selected 18 top business and management academic journals that published articles related to PM to review and categorize journal articles into these eight different disciplines.

By chronologically analyzing and categorizing more than 500 journal articles from the selected 18 top journals in the management and business fields published from the 1950s to the summer of 2007, this study analyzed publications trends of different domains (OR vs. OB vs. Practice) in different journals. Result of this study help us better understand the evolution of PM as a field of practice and an academic discipline, and allow us to provide suggestions for future PM research opportunities.

2.2. Top management journals

There have been numerous studies to identify, assess, and rank top management journals in the business and management field [83–90]. However, the lists of top management journals varied depending on the specific field and there was no clear consensus among academics on top management journals in the business and management field. Business schools appear to be obsessed with their annual rankings measured by different entities such as Business Week, Wall Street Journal, US News and World Report, and Financial Times. For the Financial Times, one of the criteria to rank the business school is to look

at faculty publications in their pre-defined top 40 journals (FT40). One can argue that the FT40 list is a specific list solely used to rank business schools in the world and may not represent management research properly, and that publication of a paper in a journal on any specific list may not be a strong indicator of relevance and academic quality. However, we thought that reviewing articles published in journals on the FT40 list will give us a firmer ground in studying PM research from the perspective of allied disciplines, rather than us trying to define top journals in their respective fields in management. So, we used the FT40 list as a starting point.

We reviewed the journals on the FT40 list and eliminated 24 journals with very limited relevance to PM, leaving us with 16 journals. We observed that several journals on that list are published by the Institute for Operations Research and the Management Sciences (INFORMS) and the Academy of Management (AOM). So, we added the practice-oriented journal *Interfaces* to enhance representation of journals published by INFORMS. We reviewed *AOM Learning & Education* (AMLE) for possible addition to our list for completeness of journals published by AOM, although it is not on the FT40 list. However, this journal which started in 2002 had no papers related to project management as of the summer of 2007 and we did not add it to our list. We reviewed journals published by the Institute of Electrical and Electronics Engineers (IEEE) and added to our list *IEEE Transactions of Engineering Management* which is one of the most prestigious journals in the engineering management field and has been published since 1954. Thus, we ended up with a list of 18 journals: 16 relevant journals from the FT40 list, one additional journal from INFORMS, and one additional journal from IEEE.

PM is a focused field and there are specific journals dedicated to PM research such as*Project Management Journal*, *International Journal of Project Management*, and the new*International Journal of Managing Projects in Business*, as well as construction management related journals such as *Journal of Construction Engineering and Management* and *Journal of Management in Engineering* published by the American Society of Civil Engineers, *Construction Management and Economics* published in the UK, and technology management related journals such as *Technovation*, *R&D Management*, and *Research Policy*. However, to establish a strong foundation in the management field, we thought that it was essential that we review journal papers that are not published in the PM research domain but rather in key management disciplines and analyze the trends of PM research in the allied disciplines from the management research viewpoint.

As a result, we selected as our primary data set the following 18 top academic mainstream research journals (the 16 journals in the FT40 list are designated with an asterisk (*)):

Academy of Management
1. *AOM Perspectives/Executives (AMP)**
2. *AOM Journal (AMJ)**
3. *AOM Review (AMR)**

INFORMS
4. *Operations Research (OR)**
5. *Management Science (MS)**
6. *Organization Science (OS)**
7. *Information Systems Research (ISR)**
8. *Interfaces (INTFCS)*

Practitioner
9. *Harvard Business Review (HBR)**
10. *California Management Review (CMR)**
11. *Sloan Management Review (SMR)**
12. *Long Range Planning (LRP)**

IEEE Engineering Management Society
13. *IEEE Transactions of Engineering Management (IEEE-TEM)*

Other FT40 Journals
14. *Journal of Operations Management (JOM)**
15. *MIS Quarterly (MISQ)**
16. *Strategic Management Journal (SMJ)**
17. *Administrative Science Quarterly (ASQ)**
18. *Journal of Small Business Management (JSBM)**

2.3. Eight allied disciplines

We reviewed major themes and prior works on project management research [2–4,6,7] and identified eight broad allied disciplines to organize research publications related to the project management field and to gain better understanding of trends in PM related research in these disciplines. Project management researchers categorized the schools of project management research and its allied disciplines [8,91] in different ways and the categorization is continuously evolving. For the purpose of this research, we believe that the following eight categories well represent the allied disciplines where one can find PM research:

1. *Operations Research/Decision Sciences/Operation Management/Supply Chain Management (OR/DS/OM/SCM)* refers to the discipline associated with quantitative decision analysis and management principles including various optimization tools and techniques, network analysis, resource leveling, simulation, etc.
2. *Organizational Behavior/Human Resources Management (OB/HR)* refers to the discipline associated with organizational structure, organizational dynamics, motivation, leadership, conflict management, etc.
3. *Information Technology/Information Systems (IT/IS)* refers to the discipline associated with the use of computers and computer systems to process, transmit, store, and retrieve information for better management decisions.
4. *Technology Applications/Innovation/New Product Development/Research and Development (TECH/INNOV/*

NPD/R&D) refers to the discipline associated with the concepts of making innovative and technological improvements and the research and development of entirely new products, services, and processes.

5. *Engineering and Construction/Contracts/Legal Aspects/Expert Witness (EC/CONTRACT/LEGAL)* refers to the discipline associated with the use and application of a broad range of professional expertise to resolve issues related to engineering and construction, contracts, expert witness, and their legal implications.
6. *Strategy/Integration/Portfolio Management/Value of Project Management/Marketing (STRATEGY/PPM)* refers to the concepts of organizing and managing resources to maximize profit, minimize cost, and support the overall strategy of the organization.
7. *Performance Management/Earned Value Management/Project Finance and Accounting (PERFORMANCE/EVM)* refers to the concepts and techniques that measure project progress objectively by combining measurements of technical performance, schedule performance, and cost performance.
8. *Quality Management/Six Sigma/Process Improvement (QM/6SIGMA/PI)* refers to the concepts of improving processes, minimizing defects, and reducing cost by implementing continual improvement principles and specific measures and metrics.

3. PM research trend analysis

We thought that it was important to use the broadest definition of "project management" to incorporate papers related to project management research from top management and business journals. We used the definition given by the PMBOK® Guide [11] as a starting point. However, we broadened that definition because scholars, practitioners, and academic and professional societies have different definitions and interpretations of the subject "project management" and it was necessary to take into consideration their viewpoint adequately. For example, in discussing project management, behavioral scientists may think of the matrix organization or emotional intelligence, operational researchers may think of network analysis, queuing theory, or optimal plant design, and strategy scholars may think of strategic alliances among different organizations during project execution. We think that adopting the broadest definition of project management would be essential to better understand and analyze project management research interest to the allied disciplines.

It is important to note that we analyzed and tabulated occurrences of specific disciplines that were identified in each paper, so the total numbers shown in the tables are different from the actual number of journal papers because many articles discuss more than one area of allied disciplines. As an example, if there was a paper dealing with "Identifying critical success factors of implementing Enterprise Resource Planning (ERP) system in a hi-tech manufacturing company", we coded the paper as covering IT/IS (ERP system implementation), OR/DS/MS/SCM (Used advanced statistical analysis to identify critical success factors), and TECH/INNV/NPD/R&D (Hi-tech manufacturing environment). In other cases, papers were coded for only one or two categories. For any given paper, we limited the coding to a maximum of three allied disciplines. One can argue that evaluating and determining proper codes for these papers could be subjective in nature. We appreciate the concern but in most cases, it was quite clear and obvious as to where those papers belonged as they were being categorized. There were a handful of papers to which it could be difficult to assign proper codes. However, since the size of the data set is large, we believe that this did not affect the overall trend analysis.

By analyzing key management journals and revealing the trends of PM research in allied disciplines, we could better understand the trends of PM research in allied disciplines as well as the evolution of project management theory and practice over the last 50 years [82]. It also gives us a view of what areas have matured and what areas have potential opportunities to conduct research in the future. By considering research trends in the allied disciplines, researchers interested in PM may be able to focus their efforts on productive research in areas of high impact and relevance to enhance the knowledge in PM.

3.1. Academy of management

The Academy of Management (the Academy; AOM) is a leading professional association for scholars dedicated to creating and disseminating knowledge about management and organizations. Founded in 1936 by two professors, the Academy of Management is the oldest and largest scholarly management association in the world [12]. AOM publishes four journals: *AOM Perspectives (AMP) (formerly AOM Executive), AOM Journal (AMJ), AOM Review (AMR)*, and *AOM Learning & Education (AMLE)*. We selected *AMP, AMJ*, and *AMR* to analyze the publications related to project management. AMLE was excluded from this analysis because the journal started in 2002 and published no papers related to project management as of the summer of 2007.

3.1.1. AOM Perspectives/Executive

AMP used to be called *AOM Executive* and in 2006 the journal was re-named to *AOM Perspectives* [13]. Project management related research papers in AMP included subjects in virtual teams [14–17], issues in team-based organizational performance [18–20], issues in product development [21–23], aligning projects with objectives [24,25] and others. Over 90% of the papers were from OB/HRM (75%) and STRATEGY/PPM (15%). This analysis shows that AMP publishes project management research that has strong emphasis on organizational and strategic issues. AMP had no project management related papers from OR/DS/OM/SCM, TECH/INNOV/NPD/R&D, EC/CONTRACT/LEGAL, and PERFORMANCE/EVM.

3.1.2. AOM Journal

Overall, there were 50 occurrences of different allied disciplines from 32 AMJ papers. Approximately 60% of them were in the areas of OR/DS/OM/SCM (28%) and OB/HRM (30%) followed by STARTEGY/PPM (16%) and TECH/INNOV/NPD/R&D (14%). IT/IS did not appear in AMJ. It seems that most project management related papers were published during the 1960s and 1970s [26–32]. In the 1980s the number of PM papers published in AOM declined by one-third (there were only three papers in the 1980s) and from the 1990s papers published started to slowly catch up again. It is interesting to note that the 1980s were the time when *International Journal of Project Management* was first published and organizations started to recognize the benefits of applying project management tools and techniques to complex projects; however, AMJ showed little interest in project management research. OR/DS/OM/SCM, OB/HRM, and TECH/INNOV/NPD/R&D are the three disciplines that show steady increase of research publication starting from the 1980s.

3.1.3. AOM Review

There were 24 occurrences from 11 papers in AMR. AMR started to publish more project management related papers from the 2000s. Similar to AMJ, subjects related to OR/DS/OM/SCM (29%), OB/HR (25%) and STRATEGY/PPM (21%) were the three allied disciplines that encompassed 75% of the occurrences. There were no papers related to EC/CONTRACT/LEGAL and QM/6SIGMA/PI. Most papers dealt with two or more allied disciplines that are discussed together. There papers covered three different areas: organizational alignment and strategy [33], NPD and strategic alliances [34], and cost and resource allocation [35].

3.2. Informs

The Institute for Operations Research and the Management Sciences (INFORMS) is "*the largest professional society in the world for professionals in the field of Operations Research (OR). It was established in 1995 with the merger of the Operations Research Society of America (ORSA) and The Institute of Management Sciences (TIMS). The Institute serves as a focal point for OR professionals, permitting them to communicate with each other and reach out to other professional societies, as well as the varied clientele of the profession's research and practice*" [36]. From the 12 scholarly journals published by INFORMS, we selected five journals to analyze project management research trends in their representative fields. They are *Interfaces (practice-oriented), Operations Research, Management Science, Organization Science*, and *Information Systems Research*.

3.2.1. Interfaces

Most papers related to project management in *INTERFACES* were published in the 1980s, particularly related to computer applications [37–40], then publication of papers declined during the 1990s and is starting to slowly catch up again in terms of project management research. OR/DS/OM/SCM (38%) and STATEGY/PPM (37%) were the two main areas that project management related research was most published. This can be explained by the fact that the goals and objectives of *INTERFACES* are providing practical applications to practitioners and educators and the fact that *INTERFACES* is part of INFOMRS journals where the focus is on OR/MS issues [41]. There was no article related to EC/CONTRACT/LEGAL.

3.2.2. Operations Research

Project management research was most active during the 1990s then declined sharply in the 2000s. This can be explained by the phenomenon that project management research evolved from the traditional OR/MS applications in the 1980s and 1990s to managerial, organizational, behavioral, and philosophical aspects in the 2000s. In fact, 70% of the occurrences came from two areas: OR/DS/OM/SCM (40%) and STARTEGY/PPM (30%). In contrast, IT/IS (7%), QM/6SIGMA/PI (5%), PERFORMANCE/EVM (5%), and TECH/INNOV/NPD/R&D (2%) combined make up only 19% of the paper subject occurrences. It is also interesting to note that quite a few articles from the 2000s dealt with risk and uncertainty management highlighting that the topic and importance of risk management is starting to gain strong interest from academia and practice[42–44]. There were no occurrences of OB/HRM probably because *OPERATIONS RESEARCH* publishes papers with mainly strong quantitative analysis emphasis.

3.2.3. Management Science

MANAGEMENT SCIENCE had the most occurrences of project management allied disciplines in its published papers among the 18 top management journals. Project management research in *MANAGEMENT SCIENCE* reached a peak during the 1970s (24%), then started to decline during the 1980s (20%), and 1990s (18%) and is showing renewal of interest in the 2000s (29%). Many papers published in the 2000s discussed three different categories of allied disciplines which shows increasing trends in interdisciplinary research in project management [45–48] [49–53]. Similar to *OPERATIONS RESEARCH*, OR/DS/OM/SCM (29%) and STRATEGY/PPM (34%) were the areas that made up more than 60% of the publications subject occurrences while OB/HRM (6%) and EC/CONTRACT/LEGAL (3%) were the areas that had the lowest interest. There were no occurrences in papers in the area of QM/6SIGMA/PI.

3.2.4. Organization Science

There were only 5 project management related papers (13 occurrences) in *ORGANIZATION SCIENCE* since the journal started its first edition in the early 1990s [54]. Because of the unique goals and characteristics of *ORGA-*

NIZATION SCIENCE, OB/HRM (38%) and STRATEGY/PPM (23%) were the two areas that had most occurrences. Two papers addressed New Product Development Projects [55,56], one paper looked at the Sydney Olympics [57] and others looked at research oriented organizations [58] and systems development teams [59]. There were no occurrences of EC/CONTRACT/LEGAL, PERFORMANCE/EVM, and QM/6SIGMA/PI.

3.2.5. Information Systems Research

INFORMATION SYSTEMS RESEARCH started to be published in the 1990s. There were 17 articles (32 occurrences) published in *INFORMATION SYSTEMS RESEARCH* and all 17 focused on IT/IS. Unlike other INFORMS journal, PERFORMANCE/EVM (16%) [60–64] was the second most popular subject after IT/IS (47%). OR/DS/OM/SCM (9%) was not a popular subject for this journal compared to *MANAGEMENT SCIENCE* and *OPERATIONS RESEARCH* journals.

3.3. Practitioner journals

Project management as a practice comes from engineering-construction, defense, and lately the IT/IS sector from the 1980s. It is important to note that there are many important key journals dedicated to these specific areas. For the purpose of our study, we focused only on top management journals and excluded other respected journals in their relevant fields. We believe that project management evolved from three major roots from the management school's perspective. They are organizational management theory, operations research and management science applications, and real business practices and their applications. It is important to note that *Academy of Management Perspectives* and *Interfaces* were categorized into the appropriate academic/professional societies even though these journals are targeted for practitioners. This was done to analyze the trends of their societies even though the goals and objectives of these journals are business and practice oriented.

We identified and selected four journals that are practice oriented: *Harvard Business Review (HBR)*, *California Management Review (CMR)*, *Sloan Management Review (SMR)*, and *Long Range Planning (LPR)*. The following sections analyze project management research and publication trends of these journals in detail.

3.3.1. Harvard Business Review

Harvard Business Review (HBR) is a general management magazine published since 1922 by Harvard Business School Publishing, owned by the Harvard Business School [65]. A monthly research-based magazine written for business practitioners, it claims a high ranking in business readership and enjoys the reverence of academics, executives, and management consultants. STRATEGY/PPM (30%) had the most occurrences in its articles, which aligns well with the publication's objectives, followed by OR/DS/OM/SCM (20%), OB/HRM (19%), and PERFORMANCE/EVM (16%) [66–68]. The trend of publishing project management research in HBR was down in the 1970s (14%) and the 1990s (16%) and up during the 1960s (19%), 1980s (25%), and 2000s (22%). It seems that publication of project management research went up and down over the last 40 years in HBR. One explanation might be that during the 1960s (19%) and 1980s (25%) project management practitioners had more interest in project management while during the 1970s (14%) and 1990s (16%), academic scholars seemed to have more interest in project management.

3.3.2. California Management Review

California Management Review (CMR) started to show strong interest in project management in the 1990s (22%) and beyond. More that 60% of the occurrences in its papers were published during the 1990s (22%) and 2000s (42%). OB/HRM (20%), IT/IS (18%), and TECH/INNOV/NPD/R&D (16%) were the three areas that were addressed in more than 50% of its occurrences of project management research. QM/6SIGMA/PI (2%) was the least addressed subject [69]. Currently, CMR is planning to publish a special issue on "Infrastructure Privatization: Frameworks and Tools for a Regulated Setting" with emphasis on project evaluation, policy making, design and development, project management, and sustainability, which shows a continuing interest in project management research and applications. CMR also published quite a few articles related to high-technology management, information systems technology, and practices in the Silicon Valley area which portrays a specific trait of this journal.

3.3.3. Sloan Management Review

Similar to *Harvard Business Review*, STRATEGY/PPM (38%), and OB/HRM (27%) were the two areas that had most occurrences of project management research in papers in *Sloan Management Review (SMR)* followed by OR/DS/OM/SCM (12%) and TECH/INNOV/NPD/R&D (12%). No occurrences in its papers came from EC/CONTRACT/LEGAL and QM/6SIGMA/PI. Also, it is interesting to note that there is a strong upward trend in publication of project management research in SMR starting from the 1970s (27%), and continuing into the 1980s (38%), and 1990s (35%).

3.3.4. Long Range Planning

Long Range Planning (LRP) is one of the leading international journals in the field of strategic management and it is published six times a year [70]. LRP had 56 papers (83 occurrences) related to project management during the last 40 years. Many of the papers related to project management were published during the 1980s (31%) and 1990s (34%). Since the new editorial direction of the journal in the early 2000s, far fewer papers related to project management appeared in recent years. Because of the "strategic nature" of the journal, STRATEGY/PPM accounts for over 50% of

the occurrences followed by TECH/INNOV/NPD/R&D (20%) and OR/DS/OM/SCM (10%). There were no papers from the QM/6SIGMA/PI area.

3.4. IEEE Transactions on Engineering Management (From 1988)

IEEE Transactions on Engineering Management (IEEE TEM) is one of the most prestigious journals in the engineering management field and has been published since 1954 [71]. Since IEEE Explore allows users to search papers for the last twenty years only, we were able to analyze project management trends starting from 1988. STRATEGY/PPM (25%) and TECH/INNOV/NPD/R&D (23%) were the two major areas that made up half of the research subject occurrences. EC/CONTRACT/LEGAL (2%) and QM/6SIGMA/PI (2%) are the two areas that had the least appearance in IEEE TEM. From the 1990s (41%) and into the 2000s (56%), there has been increasing occurrences of publication of research in the areas of IT/IS (15%) and TECH/INNOV/NPD/R&D (23%). In contrast, STRATEGY/PPM (25%), OB/HRM (13%), and OR/DS/OM/SCM (16%) have reached a plateau with no substantial changes in the number of occurrences of publications.

3.5. Other journals

In the *Journal of Operations Management*, OR/DS/OM/SVM (43%) and STRATEGY/PPM (25%) were the two areas that had most occurrences followed by TECH/INNOV/NPD/R&D (12%) and PERFORMANCE/EVM (10%). The other disciplines had very few occurrences in papers in their respected areas. Occurrences of publications show overall increasing trends. More detailed analysis reveals that OR/DS/OM/SCM decreased by about 50% and STRATEGY/PPM increased by about 75% between the 1990s and the 2000s.

IT/IS (46%), STRATEGY/PPM (22%), and OB/HRM (12%) were the three areas that had most occurrences in paper publications in *MIS Quarterly*. Perhaps IT/IS (46%) because of the nature of this journal, STRATEGY/PPM (22%) because of the managerial and strategic implications, and OB/HRM (12%) because of a strong interest in organizational implications. Occurrences in paper publications reached its peak in the 1980s (68%), then declined sharply in the 1990s and 2000s. This is an interesting trend but probably applies only to *MIS Quarterly*. In fact, there are many papers published in IT project management in other IS/IT related journals, but we believe that because of the editorial direction of *MIS Quarterly*, there were not many papers dealing with project management research.

Strategic Management Journal publishes original material concerned with all aspects of strategic management [72]. STRATEGY/PPM (57%) and TECH/INNOV/NPD/R&D (14%) had over 70% of the occurrences and were the two major topics that integrated project management applications with their research interests. There were no occurrences in the areas of EC/CONTRACT/LEGAL and QM/6SIGMA/PI. Occurrences have decreased from the 1990s to the 2000s. It seems that interest in publishing project management related papers has not increased over the last twenty years indicating that SMJ might not be a proper venue to publish papers related to project management.

There was a total of three papers that were published each in the 1960s [73], 1970s [74], and 1980s [75] in *Administrative Science Quarterly*. Probably this journal is not an appropriate outlet for publishing papers related to project management. Finally, there was only one paper ever published in the *Journal of Small Business Management* discussing the applications of project management by small business to develop new products and services [76].

4. Project management allied disciplines trend analysis

We also wanted to learn more about trends of allied disciplines that covered PM research and further analyze occurrences of allied disciplines in top management journals using the eight categories discussed earlier. Based on the 537 papers that we investigated, we coded each and every paper in up to three categories. As another example, let us say that there is a paper dealing with "Information Technology implementation project measuring performance using earned value management in an R&D organization". Then, we coded the paper as covering IT/IS (IT implementation issues), PERFORMANCE/EVM (project effectiveness measurement using EVM) and TECH/INNV/NPD/R&D (new product development projects). In other cases, papers were coded for only one or two combined categories. Based on this coding scheme, we identified 980 total occurrences using the eight disciplines/categories from the 537 papers as shown in Table 1.

Overall, more papers are being published in different disciplines starting from the 1980s (19%), 1990s (30%) and continuing in the 2000s (31%) showing a greater interest in PM research in allied disciplines. STRATEGY/PPM (30%) and OR/DS/OM/SCM (23%) were the two primary disciplines that appeared most among allied disciplines. In particular, STRATEGY/PPM category was always the most popular subject starting from the 1970s with a strong and continued upward trend in research interest from the 1950s. Scholars and practitioners have keen interest in applying PM principles, tools, techniques, and concepts to organize and manage resources for maximizing profit, minimizing cost, and supporting the overall strategy of the organization. Regarding OR/DS/OM/SCM, it is only natural that OR/DS/OM/SCM was ranked highly (second) since PM has strong roots in OR/DS/OM/SCM. The appearance and research interest in OR/DS/OM/SCM seem to be slowing down in the 2000s and recently flattened out. STRATEGY/PPM, TECH/INNOV/NPD/R&D, IT/IS, and PERFORMANCE/EVM are the four disciplines that show large increases in occurrences in publications

Table 1
Journal publications trends based on eight allied disciplines

Allied disciplines	50–59	60–69	70–79	80–89	90–99	00–07	Total	%
OR/DS/OM/SCM	3	20	37	49	65	54	228	23
OB/HRM	1	5	18	14	46	43	127	13
IT/IS	2	2	7	22	35	37	105	11
TECH/INNOV/NPD/R&D	0	1	12	13	39	46	111	11
EC/CONTRACT/LEGAL	1	4	2	4	10	7	28	3
STRATEGY/PPM	2	10	48	74	78	83	295	30
PERFORMANCE/EVM	1	6	10	11	12	28	68	7
QM/6SIGMA/PI	0	1	2	1	7	7	18	2
Total	10	49	136	188	292	305	980	100
Percentage	1%	5%	14%	19%	30%	31%	100	

and are expected to continue to have strong upward trends in publication of project management related research in the foreseeable future. These four areas represent the disciplines in which scholars' research interests are currently focused and appear to have great research potential in the future.

In OB/HRM, another major field that has strong theoretical foundation related to PM, research interests peaked in the 1990s and started to flatten out as well. IT/IS and TECH/INNOV/NPR/R&D showed a steady increase of interest in terms of the number of papers categorized from the 1990s. PERFORMANCE/EVM is the area that research interest spiked more than 100% in the 2000s. However, in terms of overall research interest the proportion was very small (7%). This could be interpreted as researchers are beginning to realize the benefits of applying and implementing PM concepts and techniques that measure project progress objectively by combining measurements of technical performance, schedule performance, and cost performance.

EC/CONTRACT/LEGAL (3%) and QM/6SIGMA/PI (2%) were the two categories that had the least appearance of related publications. It is important to note that if we broaden the journals that we analyzed and investigated additional specialized journals, the result could be totally different for these two categories. EC/CONTRACT/LEGAL is probably the most published area in PM among all the allied disciplines if we included the construction engineering and management related journals as well as PM focused journals. The same assumption applies also to QM/6SIGMA/PI category as PM and QM/6SIGMA/PI share many of the key principles, tools, and techniques, and there are plenty of QM dedicated journals. EC/CONTRACT/LEGAL and QM/6SIGMA/PI did not really gain any momentum in occurrences of research output from the management research community. It is important to note that these two areas are having great success in publication in relevant journals in their fields but appear to struggle when it comes to publication in the top management journals. Because of the practical nature of these two disciplines, it seems that the management scholars' community is strongly resisting acceptance of these two areas as a mainstream management research.

Ranking of occurrences of the eight disciplines from most to the least appeared subjects over the last 50 years is (1) STRTEGY/PPM (30%); (2) OR/DS/OM/SCM (23%); (3) OB/HRM (13%); (4) IT/IS (11%); (5) TECH/INNOV/NPD/R&D (11%); (6) PERFORMANCE/EVM (7%); (7) EC/CONTRACT/LEGAL (3%); and (8) QM/6SIGMA/PI (2%).

5. Discussion

STRATEGY/PPM is the most important project management research subject among the eight allied disciplines in the top management and business journals. It seems that the strong upward trend of STRATEGY/PPM (30%) will continue in the future. It is interesting to note that TECH/INNOV/NPD/R&D (11%), IT/IS (11%), and even PERFORMANCE/EVM (7%) are all starting to have substantial shares of project management research which is a very positive sign for project management scholars. OR/DS/OM/SCM (23%) and OB/HRM (13%) still have very substantial shares of project management research, although their prominent proportion relative to other disciplines has subsided somewhat in the 2000s. QM/6SIGMA/PI and EC/CONTRACT/LEGAL are the two allied disciplines struggling to position themselves in the top management and business journals and it is likely that this trend will continue in the future. It is interesting to note that occurrences in publication of project management related research in the area of OR/DS/OM/SCM and OB/HRM peaked during the 1990s and have slowed down in the 2000s. These two disciplines are two of the three origins of project management and it seems that research output in these areas has matured with a possible continuing downward trend for OR/DS/OM/SCM in the future. QM/6SIGMA/PI, EC/CONTRACT/LEGAL, and to some extent PERFORMANCE/EVM were not able to penetrate mainstream management research. Research in IT/IS started to be very active in the 1980s, reached a high level in the 1990s, and flattened out in the 2000s. Research in OB/HRM was strong up to the 1970s then slowed down during the 1980s when project management research focused more on processes, tools, and techniques, then re-gained interest in the 1990s and slowed down again in

the 2000s. TECH/INNOV/NPD/R&D is one of the three areas that showed sustained upward interest since the 1960s; the other two areas are STRATEGY/PPM and PERFORMANCE/EVM. The research proportion of OR/DS/OM/SCM peaked during the 1960s, and from the 1970s its relative proportion in the allied disciplines has been getting smaller and smaller. STRATEGY/PPM was most popular in the 1980s and became somewhat flat in the 1990s. It is important to note that in the 2000s, STRATEGY/PPM was still the most popular subject. However, research in other disciplines has increased proportionally more rapidly. Fig. 1 represents occurrences of project management research in the eight allied disciplines analyzed by decade using the eighteen management and business journal publications.

PM is one of the youngest, most vibrant, and dynamic fields among various management disciplines along with other established business fields such as operations research, organizational behavior, strategy, etc. The roots of modern PM have come from quantitative research in planning-oriented techniques as well as an application of engineering sciences and optimization theory [77]. In recent years, research interests in cross-disciplinary studies between PM and allied disciplines have become more popular evidenced by increased publications on these integrated subjects in mainstream business and management journals. We have seen an explosion of popularity and strong interest in PM research starting from the 1980s and the trends are likely to continue in the future. It is important to note that PM is no longer merely a practice to plan, schedule, and execute projects effectively, but it is an academic field and one of the key management disciplines that consist of both practical/empirical research and theoretical research-based on solid academic theories and foundations.

Sir George Sayers Bain [78], past principal of the London Business School (1989–1997) and past President of Queen's University, Belfast (1998–2004), described how the position of management in Britain has changed over the second half of the twentieth century, identified the qual-

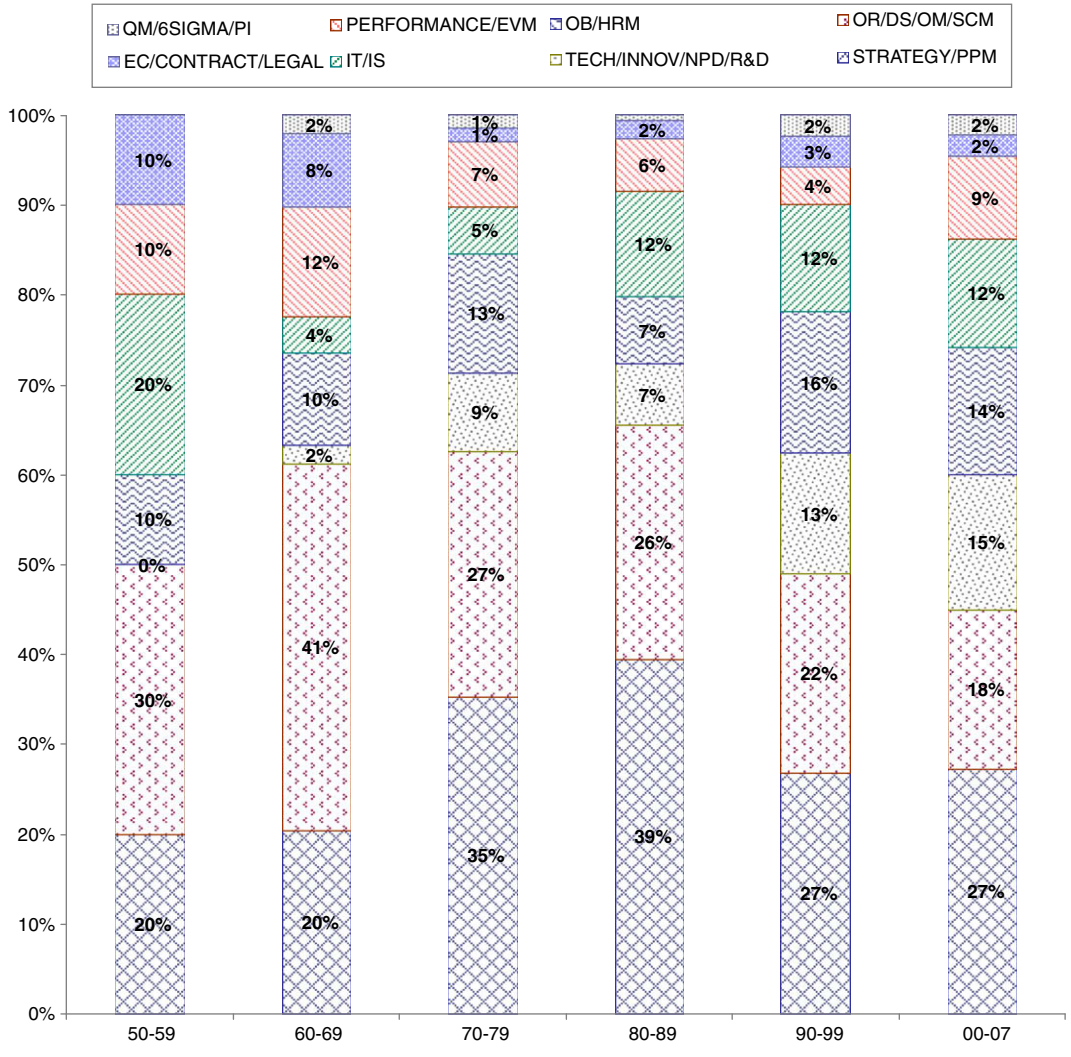

Fig. 1. Research trends of PM allied disciplines by decade.

ities required for successful managers in the 1990s and beyond, discussed the ways in which managers might acquire these qualities, and the role of business schools, companies and the wider society in this process, and made comments about the role of operational research in the future of management education. He stated:

> *Business schools are too functionally fragmented. Too much of their teaching and learning is compartmentalized into distinct disciplines. Students leave business schools thinking that there are accounting problems, finance problems, marketing problems, production problems, and so on. What they find, however, are business problems which involve several of these functional areas-and which require managers to manage the interfaces between them... business schools concentrated mainly on problem-solving. They did so because problem-solving, to a greater extent than path breaking or implementation, lent itself to quantification and rigorous analysis. In short, it was more 'scientific' or at least more congenial to the academic mind. More recently, business schools have begun to put more emphasis on implementation, but still pay little attention to path breaking. What is now needed is more inter-disciplinary, issue-based, and project-based teaching, a greater stress on learning and less on teaching, and more emphasis on path breaking and implementation, including such process skills as negotiation and team building. In short, business schools need to develop a more balanced relationship between analysis and the more subjective aspects of management.* (p. 560).

In the case of PM, the field is more applied and interdisciplinary than other management disciplines so naturally it is more difficult to justify the field as a distinguishable academic discipline within the academic management community and more obstacles lie ahead. Benbasat and Weber [79] noted that in the early days of IS as a discipline, legitimacy and pressure to prove to colleagues in other disciplines was a challenge because of the nature and perceptions of IS research in the management academic community. However, there are some positive signs: More publications of PM research in allied disciplines, more papers are being recognized and published in mainstream management journals, and the trends of future research related to PM are strong and healthy based on our analysis.

6. Conclusions

Scholars and practitioners in the PM community may need to further promote PM as an academic discipline by being more vigilant of other allied disciplines and continue to spread understanding of PM not only within the PM domain but more to other management fields. Vermeulen [80] suggested the importance of practitioners' involvement in management research and proposed the addition of a second loop which interacts with practitioners directly to share research insights and results. Walker et al. [81] stressed "the value of reflection in learning by understanding theory through challenging it and testing it in practical ways – both reflection on action and reflection in action".

The analysis of PM research in the allied disciplines shows strong evidence that this phenomenon is happening now and we are witnessing that the future has arrived. Result of this study will help us better understand the evolution of project management as a field of practice and an academic discipline, and allow us to provide suggestions for future project management research opportunities.

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