Technological innovation and the emergence of a new interdisciplinary field – Management Analytics

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ABSTRACT: The **Introduction** argues that interdisciplinary research relies on shared knowledge. When knowledge is shared, a fundamental shift can occur over time, and a new interdisciplinary field can emerge. For example, nanoscience, quantum computation emerges as interdisciplinary fields that eventually grew to become their own disciplines. **Main part.** The article provides a review of extant papers on management analytics. The field of management analytics is a newly developing interdisciplinary field that is attracting more and more attention. In this study, overall, 201 papers were examined. The results show that that the field of management analytics is emerging. Two main aspects of the field are investigated: application-based research and theory-based research. This study aims at providing a status of the area called Management Analytics for academia and practitioners. **Conclusion.** This paper focuses on the emerging interdisciplinary field called Management Analytics, based on an analysis of 201 published articles on the subject. For the first time, this study provides a comprehensive literature review of the emerging field of management analytics. The developing trends, characteristics, and related applications are introduced.

KEY WORDS: management analytics, big data analytics, business analytics, emerging interdisciplinary field.

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INTRODUCTION

Interdisciplinary research is one of the most predominant research approaches. Interdisciplinary research relies on shared knowledge. When knowledge is shared, a shift may occur over time, and a new interdisciplinary field can emerge. For example, nanoscience, nanotechnology [1–13], quantum computation all emerges as interdisciplinary fields that grow and develop. Management Analytics is an emerging interdisciplinary subject in which analytics interfacing with multiple sub-disciplines. Nanoscience is a subfield of physics dealing with measuring 1–100 nanometers. Nanotechnology requires technology management such as techno-economic management. Management Analytics may have its applications in technology management of nanotechnology.

MAIN PART

The Analysis of the Extant Literature

Source of Publications on Management Analytics

Management analytics-related research is an interdisciplinary study that is not limited to the scope of a specific discipline. This study focuses on management analytics. The papers were retrieved from five major databases as Web of Science (WoS), Ei Compendex, Scopus, IEEExplore, and Inspec. The selected articles were distributed among five academic journals, seven conference proceedings, and one dissertation database. Specifically, the academic journals include the *Journal of Management Analytics*, *European Journal of Information Systems*,

Journal of Business Logistics, *Journal of Applied Research in Higher Education,* and *Indian Journal of Science and Technology*. The conference proceedings include the 2007 Winter Simulation Conference, Proceedings of 2014 IEEE Enterprise Systems Conference, 2009 IFIP/IEEE International Symposium on Integrated Network Management, 2019 IEEE PES Asia-Pacific Power and Energy Engineering Conference, 27th European Conference on Operational Research, 46th Hawaii International Conference on System Sciences, and International Conference on Convergent Cognitive Information Technologies. The dissertation database includes the Walden Dissertations and Doctoral Studies. The keywords "Management Analytics" were used to search for papers from the targeted sources published between 2000 and 2021.

In total, 188 papers were selected. The following figure (Fig. 1) shows the statistics of the papers' distribution among these journals, conference proceedings, and dissertation databases. In which, *Journal of Management Analytics* has published the most articles. *Journal of Management Analytics* is the primary publication outlet for management analytics and attracts attention from readers and authors globally.

Judging from the papers' publication and distribution, the study of management analytics is still in an early phase. Between 2007 and 2021, there are 188 published papers (Fig. 2). Since 2014, the number of documents started to increase. The overall trend shows that the publication number is rising, as Management Analytics is becoming more and more popular.

Among these 188 papers, this study categorizes these papers into two main categories, with reference information. One is management analytics in applications (Table 1). The other category is the theoretical development in management analytics (Table 2).

History of Management Analytics

The Origin of Management Analytics

Management Analytics is interdisciplinary in which analytics interfacing with multiple sub-disciplines in business and other social science research areas. Sub-disciplines in business include accounting, finance, management, marketing, production/operations management, supply chain management; social science research areas
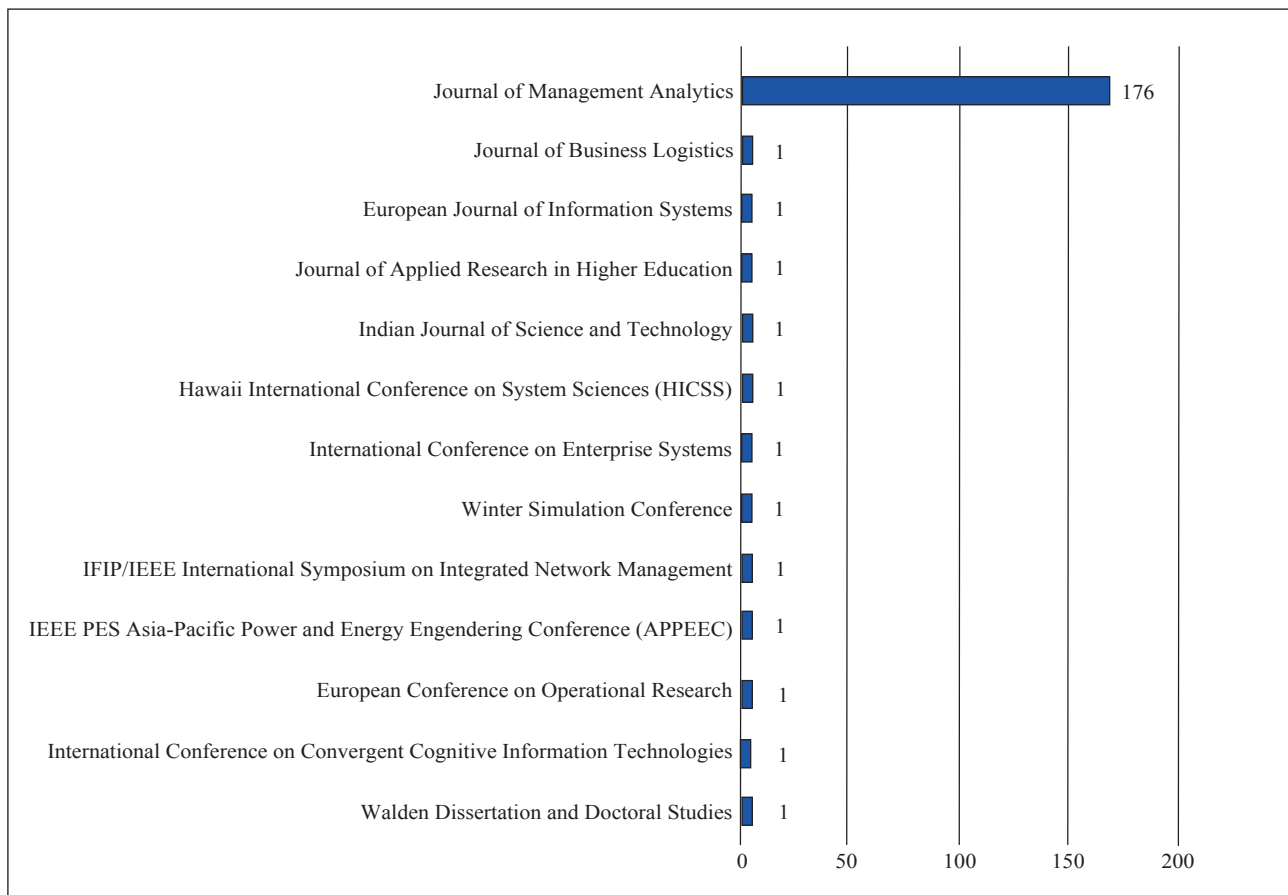

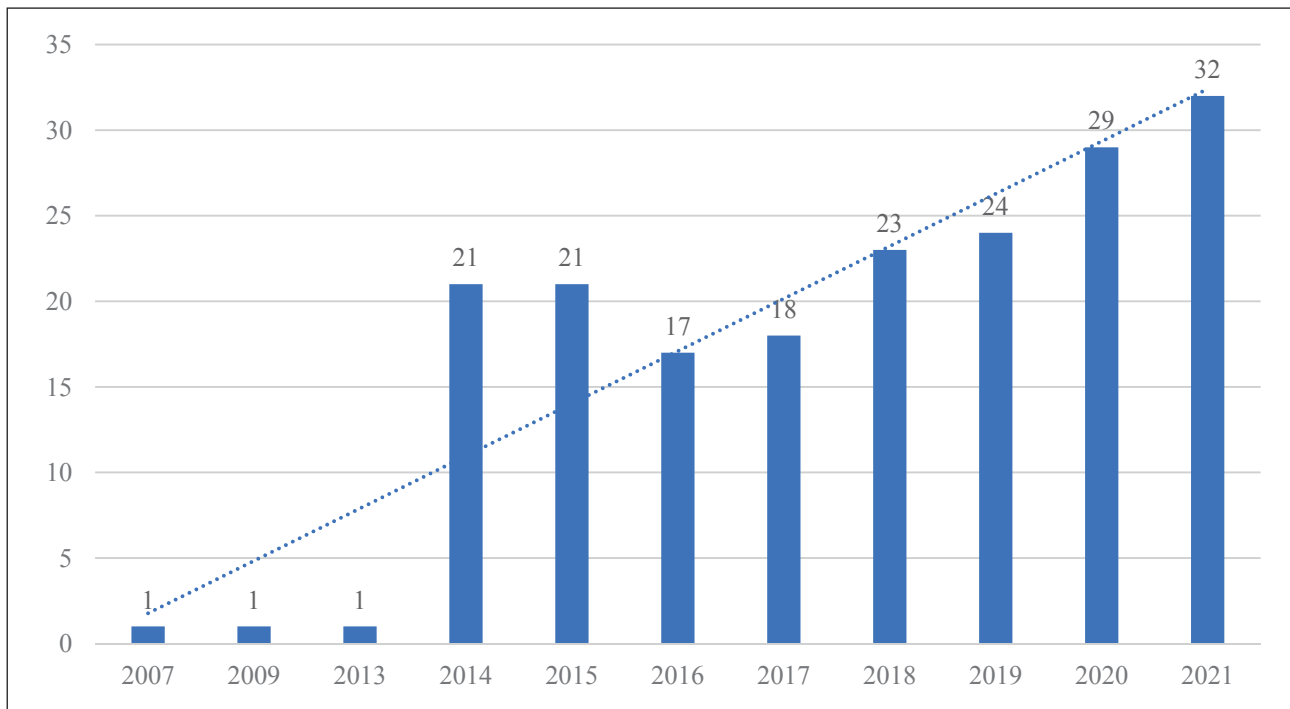Fig. 1. **The Distribution of Publications**

Fig. 2. **Publication Trend by Year**

Table 1

Publications in the application of Management Analytics

Publications
15, 17, 18, 19, 21, 22, 24, 25, 26, 28, 29, 31, 32, 33, 34, 35, 9, 40, 42, 44, 45, 49, 50, 51, 52, 53, 54, 57, 69, 70, 71, 73, 74, 75, 77, 79, 80, 83, 88, 90, 91, 93, 106, 112, 114, 115, 116, 117, 118, 119, 123, 124, 125, 126, 131, 132, 133, 136, 138, 139, 142, 143, 144, 145, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 162, 165, 167, 168, 169, 170, 171, 172, 173, 174, 176, 177, 178, 179, 180, 181, 182, 183, 187, 189, 190, 191, 192, 193, 194, 195, 200, 201

Table 2

Publications in theoretical development in Management Analytics

Publications
14, 16, 19, 20, 23, 27, 30, 36, 37, 38, 41, 43, 46, 47, 48, 55, 56, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 72, 76, 78, 81, 82, 84, 85, 86, 87, 89, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 120, 121, 122, 127, 128, 129, 130, 134, 135, 137, 140, 141, 146, 158, 159, 160, 161, 163, 164, 166, 175, 184, 185, 186, 188, 196, 197, 198, 199

include energy policy research, healthcare cost analysis, healthcare policy making, IoT information security policy study, etc. In 2019, Haenlein et al. [68] wrote, "business and management analytics as a field is rapidly evolving."

According to Peruzzini & Stjepandić [134], "The term 'Management Analytics' was coined at the beginning of 2014 when *Journal of Management Analytics* was initially launched. Management analytics are increasingly being embedded within key business processes. In the leading

companies, business is heavily dependent on analytics in the underlying technology and process infrastructure. In regard to enterprise diagnostics, the procedure and methodology have been developed to evaluate the performance of enterprise business processes, and main factors for the assessment include consumed resources, cost, durations of business processes, and information constraints (Kataev, Bulysheva, Emelyanenko, & Bi, 2016). Convinced through the benefits of the management ana-

REVIEW OF TECHNOLOGICAL INNOVATION

lytics, the only problem with this broad-scale consensus is that many managers and organizations still lack the skills and understanding to make analytics work for them (Chen et al., 2016). Therefore, this is a tremendous driver for research and education. We observe a broad move in education. Educational institutions extend their offering in management analytics and provide corresponding studies (Lin, 2015). University of Toronto (2017) and Queens University (2017) have recently launched Master Program in Management Analytics."

In 2021, Gurusinghe et al. wrote [66]: "Management analytics is a rapidly evolving field that can be used to achieve competitive differentiation in the market. The management analytics applications in different areas such as marketing, finance, accounting, supply chain management make a better impact on a firm's business. To gain better accurate insights, management analytics is required to closely link with business strategies and embedded within key business processes. Human Resource Management (HRM) is a part of the management discipline and HR analytics is part of management analytics. However, HRM is a latecomer to the management analytics bandwagon."

Worldwide Educational Response about Management Analytics

Educational institutions have started offering programs in Management Analytics. The University of Toronto in Canada offers a Master of Management Analytics Program (https://www.sgs.utoronto.ca/programs/management-analytics/). This program's overview is that Management Analytics involves understanding the factors influencing managerial decisions. It encompasses the skills needed to extract insights from business data. The University of Mannheim in Germany offers a Master's program in Management Analytics (Full-Time) (https://www.mannheim-business-school.com/en/mba-master/master-in-management-analytics/). Queens University in Canada offers a program called Master of Management Analytics (https://smith.queensu.ca/grad_studies/mma/index.php).

MIT Sloan School of Management offers a course entitled Management Analytics: Decision-Making Lessons from the Sports Industry (https://executive.mit.edu/course/management-analytics/a056g00000URaaKAAT.html).

In the future, more education institutions are likely to offer more programs on Management Analytics at both the undergraduate and graduate levels.

SUMMARY

It is evident that, since the launch of the *Journal of Management Analytics*, Management Analytics has been developed into a new subject for business and interdisciplinary study. Currently, master's level education programs on Management Analytics have been launched by the leading universities worldwide, and job titles such as Management Analytics specialist have appeared on job markets. Furthermore, Management Analytics has penetrated other social science research areas.

This paper focuses on the emerging new interdisciplinary field of Management Analytics, based on an analysis of 188 published articles on the subject. The study, for the first time, provides a literature review on Management Analytics. The relevant publication outlets, the history of the subject, and the developing trends are introduced.

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REVIEW OF TECHNOLOGICAL INNOVATION

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Нанотехнологии в строительстве

2021; 13 (3):
181–192

Nanobuild.ru

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2021; 13 (3):
181–192

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2021; 13 (3):
181–192

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Author declare the absence of any competing interests.