

Theoretical perspectives in operations management:

An analysis of the literature

1. ABSTRACT

Purpose

It is important to advance operations management (OM) knowledge while being mindful of the theoretical developments of our discipline. This study explores which theoretical perspectives have dominated the OM field. This analysis allows us to identify theory trends and gaps in the literature and to identify fruitful areas for future research. A reflection on theory is also practical, given that it guides research towards important questions and enlightens OM practitioners.

Design/methodology/approach

We provide an analysis of OM theory developments in the last 30 years. Our study encompasses three decades of OM publications across three OM journals and contains an analysis of over 3000 articles so as to identify which theories, over time, have been adopted by authors in order to understand OM topics.

Findings

We find that the majority of studies are atheoretical, empirical, and focused upon theory testing rather than on theory development. Some theories, such as the resource-based view and contingency theory, have an enduring relevance within OM. We also identify theories from psychology, economics, sociology, and organizational behavior that may, in the future, have salience to explain burgeoning OM research areas such as servitization and sustainability.

Research limitations / implications

The study makes a novel contribution by exploring which main theories have been adopted or developed in OM, doing so by systematically analyzing articles from the three main journals in the field (the *Journal of Operations Management*, *Production and Operations Management*, and the *International Journal of Operations and Production Management*), which encompass three decades of OM publications. In order to focus the study, we may have missed important OM articles in other journals.

Practical implications

A reflection on theories is important because theories inform how a researcher or practicing manager interprets and solves OM problems. This study allows us to reflect on our collective OM journey to date, to spot trends and gaps in the literature, and to identify fruitful areas for future research.

Originality / value

As far as we are aware, there has not been an assessment of the main theoretical perspectives in OM. The research also identifies which topics are published in OM journals, and which theories are adopted to investigate them. We also reflect on whether the most cited papers and those winning best paper awards are theoretical. This gives us a richer understanding of the current state of OM research.

Keywords: Operations management, theory, literature review

2. INTRODUCTION

The field of operations management (OM) has developed as an academic discipline in the last thirty years, as can be observed by the growing number of academic journals and articles that focus on it. During this time, some theories have been developed amongst OM researchers to explain aspects of OM. Some theories have been borrowed from other disciplines such as economics, psychology, and sociology, in order to further our understanding of OM. This research explores theoretical developments in the OM discipline by analyzing the theories adopted or developed by authors in three OM journals.

In the first year that the *Journal of Operations Management* launched, it was observed that “OM research does not draw upon management theory to any noticeable degree” (Chase, 1980). Over the years, it seems that OM research has increasingly drawn from management theory and from other sources, given that “...there is increasing recognition of the benefit to be gained from exploring contemporary operations practice through alternative lenses and frameworks” (Taylor & Taylor, 2009). We provide a systematic literature analysis of theory use in the OM field over the past thirty years.

This research attempts to answer three key research questions:

- Which theories have been developed or adopted in OM research?
- Which theories are adopted most widely in OM?
- To which topics have theories been applied in OM research?

This paper makes several contributions. First, the study makes a novel contribution by exploring which main theories have been adopted or developed in OM, doing so by systematically analyzing articles from the three main journals in the field (the *Journal of Operations Management*, *Production and Operations Management*, and the *International Journal of Operations and Production Management*), which encompass over three decades of

OM publications. To date, as far as we are aware, there has not been an assessment of the main theoretical perspectives in OM. Second, the research identifies which topics are published in OM journals, and which theories are adopted to investigate them. This gives us a richer understanding of the current state of OM research.

This paper is structured as follows. The theoretical trends in OM are debated first. The method for the study is described next, including details of the data-collection process. The findings are then presented, including descriptions of the main theories identified and of the pattern of theories over time. A discussion follows that reflects on theoretical contributions in OM. The conclusion explains the implications of the study for future research and for theory development in OM.

3. LITERATURE REVIEW

3.1 What is a theory?

Theory has been described by Gioia and Pitre (1990) as “a coherent description, explanation and representation of observed or experienced phenomena” (p. 587), and by Bacharach (1989) as “a statement of relations among concepts within a set of boundary assumptions and constraints. It is no more than a linguistic device used to organize a complex empirical world” (p. 496).

Theories help us make sense of the world around us. They can serve a function beyond description, in that they allow us to predict the nature of relationships between phenomena. The phenomena of interest in OM might be topics (as we refer to them in this paper) that have a practical relevance, such as production management, inventory control, or supply chain management (SCM). We seek to understand such topics more effectively by viewing them through a theoretical lens. Sometimes theories come from a new idea or metaphor that leads to the development of a conceptual model, which, in turn, helps to better explain the

topic. This is also termed “theory building” (Colquitt & Zapata-Phelan, 2007). Sometimes theories that are already established are applied in a new way or context in order to help understand a topic, which is termed “theory testing.”

TABLE 1: What is theory? Adapted from (Bacharach, 1989)

	Explanation	Examples from OM
What theory is	‘a statement of relationships between units observed or approximated in the empirical world. Approximated units mean constructs, which by their very nature cannot be observed directly (e.g., centralization, satisfaction, or culture). Observed units mean variables, which are operationalized empirically by measurement.’ (p.498) (Bacharach, 1989)	e.g. Resource based view (Barney, 1991a; Wernerfelt, 1984) suggests that a firm’s resources and competencies affect its competitive position and organizational performance
What theory is not	Description of objects or events: Description can be grounds for theory building. Examples of description include:	
	<ul style="list-style-type: none"> categorization (What are the phenomena?) 	e.g. Purchasing portfolio model (Kraljic, 1983) distinguishes between different categories of purchased products and services, depending on their strategic importance and supply risk
	<ul style="list-style-type: none"> typologies (What is the most important aspect of the phenomenon?) 	e.g. Manufacturing strategy (Hayes & Wheelright, 1984; Skinner, 1969) is a typology of competitive priorities including quality, speed, dependability, flexibility and cost
	<ul style="list-style-type: none"> metaphors (How is the phenomenon similar to another, often unrelated, phenomenon?). Can lead to theory building. 	e.g. Metaphor of comparing organizations as a ‘system’, was developed into systems theory (Checkland, 1981)

Distinctions can be made between what theory is and what theory is not (Bacharach, 1989). Table 1 has guided our data collection of theories in OM journals. There is a difference between the primary goal of description, which is to answer “What” research questions, and the primary goal of theory, which is to answer “How,” “Why,” and “When” questions. Bacharach’s distinctions have helped us to assess which theories used in the OM field are theories and which are, instead, descriptions of phenomena and thus might be precursors to theory development. We do, however, acknowledge that it is inherently difficult to define theory. For example, although it is widely agreed that theory has predictive capabilities,

Amundson (1998) argued that it is still possible to devise “predictive models, with strong forecasting abilities that are not viewed as theories” (p. 343).

Our aim in this paper is not to review how theories are developed and tested, which is done excellently elsewhere (Bacharach, 1989; Dubin, 1978; Kaplan, 1964; Van de Ven, 1989; Whetten, 1989). Nor is our aim to conduct a literature review for a single OM topic or theory as has been done previously, such as the strategic role of operations from a resource dependency theory perspective (Lillis & Lane, 2007), a consideration of supply structures (Webster, 2002) or performance measurement (Bitici et al, 2012).

Our aim is to look at the range of theories across the OM field. This study falls into what Bacharach (1989) would describe as a descriptive categorization of OM theories. We are particularly interested in which theories are most commonly adopted, whether some theories have endured for a long time, and whether other theories are more transient.

3.2 The development and adoption of theories in OM

Many authors have reflected on the state of theory in OM. The general view tends to be that theory development is emerging within the discipline (Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990; Melnyk & Handfield, 1998; Schroeder, 2008), although some OM researchers may have “theory envy” of more mature fields of inquiry (Schmenner & Swink, 1998). In 1998, Schmenner and Swink (1998) debated about whether OM had theories of its own. Eleven years later, in 2009, when considering whether theory in the field had advanced, they were “underwhelmed” at the progress made to date (Schmenner, Wassenhove, Ketokivi, Heyl, & Lusch, 2009).

OM as a discipline lacks a strong theoretical base. Westbrook (1994) stated, “OM remains a subject with a poor conceptual base, and theory building through empirical research methods will become an increasingly important strand of OM research activity in future years” (p. 22).

It seems that this view was echoed by Schmenner and Swink (1998) when they wrote, "...operations management suffers in at least some quarters because there is no recognized theory on which it rests or for which it is famous." (p. 97.) It could be argued that OM lacks theoretical foundations because it is an applied discipline that addresses practical problems. However, theories can be quite practical (Van de Ven, 1989), and good theory "advances knowledge in a discipline, guides research towards crucial questions, and enlightens the profession" (p. 486).

Researchers tend to borrow from other theoretical perspectives rather than "reinvent the wheel."

To counter the lack of theoretical development in the field, OM researchers appear to have been theoretical magpies, seeing shiny theories in other disciplines and stealing them for the OM nest. It has been argued that OM researchers have imported theories that are "transplant" (Melnik & Handfield, 1998) or "alien" (Amundson, 1998) from other disciplines, and our study investigates the extent to which this occurs. It has been suggested that the disciplines most commonly drawn on by management academics are economics and sociology (Adner, Pólos, Ryall, & Sorenson, 2009). The importing of theory may be appropriate given the lack of an established base of theory and given the early stage of theory building within the field, which is, in part, due to its relatively new tradition of field-based empirical research (Flynn et al., 1990).

Within the management discipline, other fields influence and are influenced by OM (Schroeder, 2007). OM draws on theories from related fields, including finance, management science, organizational behavior, marketing, and strategy (Melnik & Handfield, 1998; Schroeder, 2007). This makes sense because real-world management problems often do not belong to a single discipline but are inter-disciplinary in nature (Amundson, 1998; Van de Ven, 2007).

Some scholars have argued that it is healthy for a discipline to develop a plurality of theories, all competing to explain a given phenomenon (Van de Ven, 1989). Others have argued against the proliferation of theories (Kaplan, 1964) and state that it is necessary to develop a single strong paradigm in order to speed up the scientific understanding of managerial behavior (Pfeffer, 1993).

We would argue in favor of a plurality of theoretical perspectives in OM and that there is no need to tear down existing OM theories merely to be replaced by others (Schmenner et al., 2009). Instead, the OM community should strive to either develop or import new theoretical perspectives if they provide a more compelling explanation of OM problems.

4. METHODOLOGY

4.1 Journal choice

A review panel of four OM academics was established to design the method for data collection. Three journals were chosen from which we would find evidence to answer the research questions. These were the *Journal of Operations Management* (JOM), *Production and Operations Management* (POM), and the *International Journal of Operations and Production Management* (IJOPM). The review panel chose the three journals for the following reasons:

- (a) *Highly ranked*: These journals are classified in the field of “operations and technology management,” as identified by the Association of Business Schools’ journal-quality list (Harvey, Kelly, Morris, & Rowlinson, 2010). All are ranked as Grade 3 (“highly regarded journals”) and Grade 4 (“top journals in the field”) journals. It has been suggested that top-ranked journals should communicate, diffuse, and archive scholarly knowledge more effectively than other journals (Judge, Cable, Colbert, & Rynes, 2007; Linderman & Chandrasekaran, 2010).

- (b) *Specialist OM journals*: It is acknowledged that other journals (e.g., *Strategic Management Journal*, *Administrative Science Quarterly*, *Academy of Management Journal*, *Management Science*) also feature occasional articles from the field of OM. However, these journals are general management journals more than they are specifically OM journals. A Scopus database search for “operations management” articles confirmed that the top three journals are POM, the IJOPM, and the JOM. Previous research has also analyzed these journals in order to assess contemporary OM research topics (Barman, Tersine, & Buckley, 1991; Pilkington & Meredith, 2009; Wacker, 1998).
- (c) *Practical reasons*: Because we wanted to analyze articles beginning from each journal’s inception, it would only be possible to complete three full-journal reviews, given the time and resource constraints. The JOM commenced in 1980, the IJOPM in 1980, and POM in 1992. Articles were analyzed from 1980 to 2013. Of the 3475 articles analyzed, 948 were from the JOM, 1782 were from the IJOPM, and 745 were from POM.

4.2 Developing the coding structure

First, categories were identified from a review of the literature and from in-depth discussions by the review panel. As highlighted in Table 2, the aim was to collect rich data about every article. Information for each category was recorded in detail, including the method of data collection, whether a conceptual model was developed, the topic (from keywords or title), and the dominant theory.

TABLE 2: Data analysis table (not all categories listed)

Journal	Year	Volume	Issue	Method	Topic	Literature review length in pages	Conceptual model	Dominant theory	If other, what theory?	Country	Sector
JOM	1980	1	1	Survey	Planning and control	2+	Y	Contingency Theory		United States	Manufacturing
JOM	1980	1	1	Conceptual	Productive system performance	2+	Y	Other	Expectancy equity	United States	Manufacturing
JOM	1980	1	1	Lit Review	OM	2+	Y	None		None	None
JOM	1980	1	2	Simulation	MRP	0	Y	None		None	Manufacturing
JOM	1980	1	2	Simulation	Fuel utilization	0	N	None		None	Metals & Minerals

The review panel discussed theories and their likelihood of arising across these OM journals and generated a list of fifteen main theories that could be used to code the articles, guided by the categorization of theory that we developed from Bacharach (Bacharach, 1989). The theories were agency theory, behavioral theories, contingency theory, equity theory, game theory, goal systems theory, industrial organizational theory, property rights theory, queuing theory, RBV, resource dependence theory, systems theory, theory of constraints, theory of swift even flow, and transaction cost theory. If the theory underpinning an article was not on the list, it was added to an “other theory” column and described by the researcher. In this way, we had a dual strategy of categorizing from a list of key theories while also allowing unlisted theories to emerge from the data.

4.3 Coding the articles

Each article was subject to content analysis by visually scanning the entire document for discussions of theory and conceptual frameworks. Data were recorded in an Excel spreadsheet. The panel and an additional four OM researchers coded the papers independently. To ensure inter-rater reliability, researchers went through an initial joint-learning period. Samples of coded papers were swapped and re-coded by members of the research team to see if there was agreement. The lead researcher randomly chose a sample of papers from each researcher, coded them independently, and then discussed any further anomalies with the researchers. After this process, the inter-rater reliability of coding using the categories was found to be 79 percent, which is an acceptable level of agreement (Carey, Morgan, & Oxtoby, 1996).

Articles were scanned for any discussions of theory, usually found in the literature review or front part of the article. If the article was available electronically as a Portable Document Format (PDF) file, an additional search for theory was conducted by typing “theory” and

“theoretical” into Adobe Reader’s “Find” search bar. Instances in which one theory was dominant were recorded, and where several theories were combined in a study, we attempted to identify the dominant theory in the collection, if possible, and recorded the additional theories.

5. FINDINGS

5.1 Which theories have been developed or adopted in OM research?

The majority of early articles across all three journals are atheoretical, focusing on describing practical issues. This is illustrated in Figure 1 and Table 3, which show that as the number of articles containing a dominant theory has increased over time, there have also been more articles that contain a conceptual model and proportionally fewer atheoretical articles.

FIGURE 1: Theoretical content of OM articles in POM, IJOPM and JOM (1980-2013)

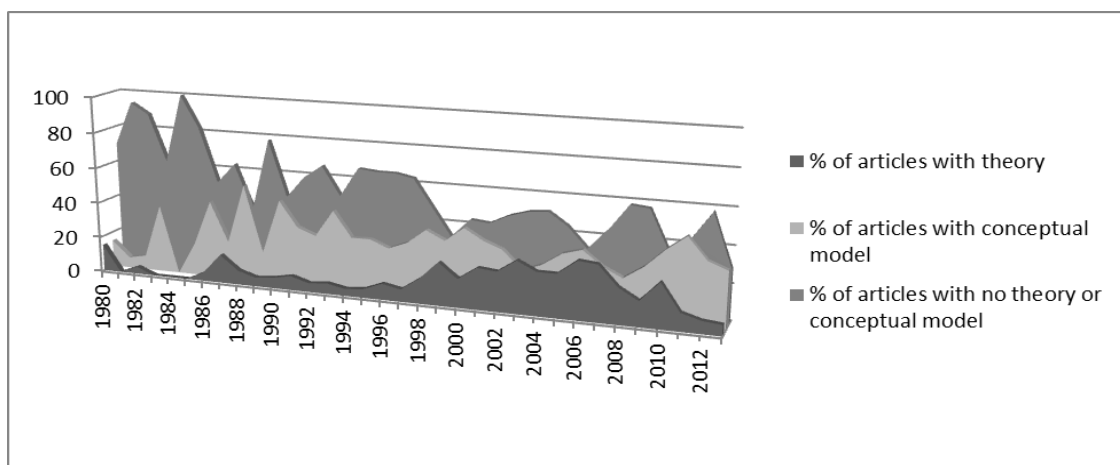


Table 3 gives details of the theoretical analysis. Out of the articles analyzed, 54 percent are not underpinned by one specific theory and do not develop a conceptual model. Some authors develop their own conceptual models from the literature (31 percent). Articles that do develop new conceptual models may be more influential and more likely to be cited (Judge et al., 2007) in the OM field.

TABLE 3: Theoretical content of OM articles in POM, IJOPM and JOM (1980-2013)

	Total (%)	Total (n)	No theory and no conceptual model (%)	No theory and no conceptual model (n)	No theory but conceptual model (%)	No theory but conceptual model (n)	No theory but conceptual model (n)	Total theory articles (%)	Total theory articles (n)	Other theories (in under 5 articles)	Theory of swift even flow	Agency theory	Equity theory	Network theory	Control theory	Behavioural theory	Social exchange theory	Property rights theory	Systems theory	Institutional theory	Goal systems theory	Theory of constraints	Resource dependency theory	Game theory	Transaction cost theory	Queuing theory	Contingency theory	Industrial organisational theory	Resource based view	Year
1980	100	13	70	9	15	2	15	15	2	1																		1	1980	
1981	100	17	94	16	6	1	6	0	0																				1981	
1982	100	24	88	21	8	2	8	4	1	1																			1982	
1983	100	21	62	13	38	8	38	0	0																				1983	
1984	100	27	100	27	0	0	0	0	0																				1984	
1985	100	38	82	31	18	7	18	0	0																				1985	
1986	100	44	52	23	43	5	19	5	2																				1986	
1987	100	43	63	27	21	9	21	16	7																				1987	
1988	100	52	38	20	54	8	28	8	4																				1988	
1989	100	63	59	49	17	11	54	5	3																				1989	
1990	100	77	47	36	47	6	36	6	5																				1990	
1991	100	90	59	53	33	8	30	8	7																				1991	
1992	100	96	66	63	29	5	28	5	5																				1992	
1993	100	84	50	42	37	6	37	6	5																				1993	
1994	100	108	66	71	30	4	33	4	4																				1994	
1995	100	118	65	76	30	5	36	5	6																				1995	
1996	100	116	65	75	26	9	30	9	11																				1996	
1997	100	123	63	77	30	7	37	7	9																				1997	
1998	100	123	48	62	38	14	44	17	17																				1998	
1999	100	110	33	36	33	24	36	28	4																				1999	
2000	100	127	43	55	41	16	52	20	3																				2000	
2001	100	150	42	63	35	23	53	34	11																				2001	
2002	100	134	47	63	31	22	41	30	4																				2002	
2003	100	127	50	63	27	29	27	29	9																				2003	
2004	100	120	51	61	25	24	30	29	9																				2004	
2005	100	161	44	71	32	24	52	38	17																				2005	
2006	100	139	33	46	35	49	35	44	13																				2006	
2007	100	185	44	77	27	31	51	57	14																				2007	
2008	100	120	58	70	22	20	26	24	4																				2008	
2009	100	112	57	64	29	14	32	16	5																				2009	
2010	100	142	35	50	39	25	56	36	21																				2010	
2011	100	161	43	69	47	10	76	16	8																				2011	
2012	100	194	58	112	35	7	68	14	5																				2012	
2013	100	216	29	136	31	7	66	14	3																				2013	
Total (n)	100	3475	53	1827	32	1113	15	525	142	5	5	1	1	6	8	9	9	9	14	16	17	18	27	28	29	29	42	52	Total (n)	
Total (%)	100	100	53	32	32	32	15	15	4.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.5	0.5	0.5	0.5	0.8	0.8	0.8	0.8	1.2	1.5	Total (%)	

TABLE 4: Most frequently adopted theories in OM articles in POM, IJOPM and JOM (1980-2013)

Main theories	Description	Origin of theory	Top topics to which theory is applied	Key authors
RBV theory	The resource based view suggests that organizations should focus on the firm's strengths through its resources rather than the environmental opportunities and threats. Firms should be considered as portfolios of core competencies rather than portfolio of distinct businesses	Strategic management	SCM (7) Res. allocation (4) Human resources (3)	(Barney, 1991a; Wernerfelt, 1984)
Industrial organizational theory	A firm's main strategic focus should be orientated at locating the best competitive market position relatively to the industrial forces of its operating environment	Organizational economics	SCM (8) Prod development (5) Learning (5)	(Porter, 1980)
Contingency theory	Efficiency of an organization depends on 'fit' of internal organizational structure with environmental contingencies	Organizational sociology	Manuf. flexibility (7) Prod development (5) SCM (5)	(Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Woodward, 1965)
Queuing theory	The issue in queue management is not only the actual amount of time that the customer waits in a queue, but also the customer's perception of that wait and his or her associated level of satisfaction.	Operations research	Service OM (5) Scheduling (4) Staffing (2)	(Erlang, 1909; Larson, 1987)
Transaction cost theory	Focus on the make-or-buy decision and the appropriateness of different governance forms	Economics	SCM (11) Purchasing (4) Outsourcing (3)	(Williamson, 1975; Williamson, 1991)
Game theory	Game theory applies a formal modelling approach to social situations where multiple players attempt to maximise their returns, one such 'game' is the prisoner's dilemma	Mathematical economics	SCM (11) E-business (3) Production mgt (3)	(Von Neumann, Morgenstern, & Kuhn, 1944)
Resource dependency theory	Organizations will respond to demands made by external actors or organizations upon whose resources they are heavily dependent and that organizations will try to minimize that dependence when possible	Organizational studies	SCM (3) Ops strategy (3) NPD (2)	(Pfeffer, 1982; Pfeffer & Salancik, 1978)
Theory of constraints	This is a management philosophy that aims to continually achieve more of the goal of a system. If that system is a for-profit business, then the goal becomes one of making more money. According to TOC, every organization has one key constraint, internal or external, which limits the systems performance relative to its goal. In order to manage the performance of the system, the constraint must be identified and managed correctly.	Operations management	Scheduling (4) Project man (2) Ops management (2)	(Goldratt & Cox, 1984)

Goal systems theory	Goal systems represent stored mental representations capable of being learned, altered or activated which affect individuals' motivations	Social psychology	Goal setting (2) Cellular manuf (2) Capacity utilization (2)	(Bourgeois, 1985; Mitchell & Zhang, 2005)
Institutional theory	Institutional theory considers the processes by which social structures influence social behaviour.	Sociology	SCM (6) TQM (4) Sustainability (1)	(DiMaggio & Powell, 1983)
Systems theory	Systems theory suggests that all phenomena can be viewed as a web of relationships among elements, i.e. a system, and that all such systems have common patterns, behaviours, and properties, such as adaptive capacity and entropy.	Cybernetics	Ops management (3) RFID (1)	(Checkland, 1981)
Property rights theory	Formally modeled the hold-up problem, in the face of incomplete contracts, specificity and opportunistic behavior integration can help promote ex ante (pre-contractual) investment incentives	Organizational economics	SCM (3)	(Grossman & Hart, 1986)
Social exchange theory	Social exchange theory explains social change and stability as a process of negotiated exchanges between parties.	Sociology	SCM (5)	(Autry & Whipple, 2013; Schaltegger & Burritt, 2014)
Behavioral theories	Behavioral theories can be used to address individual human level aspects of OM. This literature and its central theories have been developed and applied in a wide variety of business contexts to understand, for example, consumer behavior, negotiation techniques and management decision-making.	Organizational psychology	SCM (4) Service (2) Leadership (1)	(Payne, Bettman, & Johnson, 1993)
Control theory	Control theory deals with the behaviour of dynamic systems, with a controller manipulating the inputs of a system to have the desired effect on the outputs.	Engineering	Planning (3) SCM (2)	(Chan, He, & Wang, 2012)
Network theory	Network theory considers the relationships between (social) entities in a network	Sociology	SCM (3)	(Granovetter, 1992; Huatuco, Montoya-Torres, Shaw, & Calinescu, 2013)
Equity theory	Equity theory describes the relationship between an employees' motivation to do a job and their perception of being treated fairly. The theory suggests that employees ascribe values to their inputs and outputs. An employee will consider that s/he is treated fairly if he perceives the ratio of his inputs to his outcomes to be equivalent to those around him.	Organizational psychology	Quality (2)	(Adams, 1963; Kabanoff, 1991)
Agency theory	Agency theory looks at the consequences of and managerial implications of a number of forms of information asymmetry	Sociology	SCM (3) Quality (1)	(Eisenhardt, 1989; Jensen & Meckling, 1976)
Theory of swift even flow	The productivity of any process rises with the speed by which materials flow through the process	Operations Management	Manuf history (3)	(Schmenner & Swink, 1998)

Tables 3 and 4 summarize the nineteen most prevalent theories in OM journals during the period 1980–2013, which represents 15% percent of all articles. Table 3 shows the number of articles published per year for different theories. The resource-based view (52 articles) was the most prevalent theory. Table 4 gives a description of the theories, the origins of the theories, the key authors associated with the theory, and which topics have been investigated utilizing the theories.

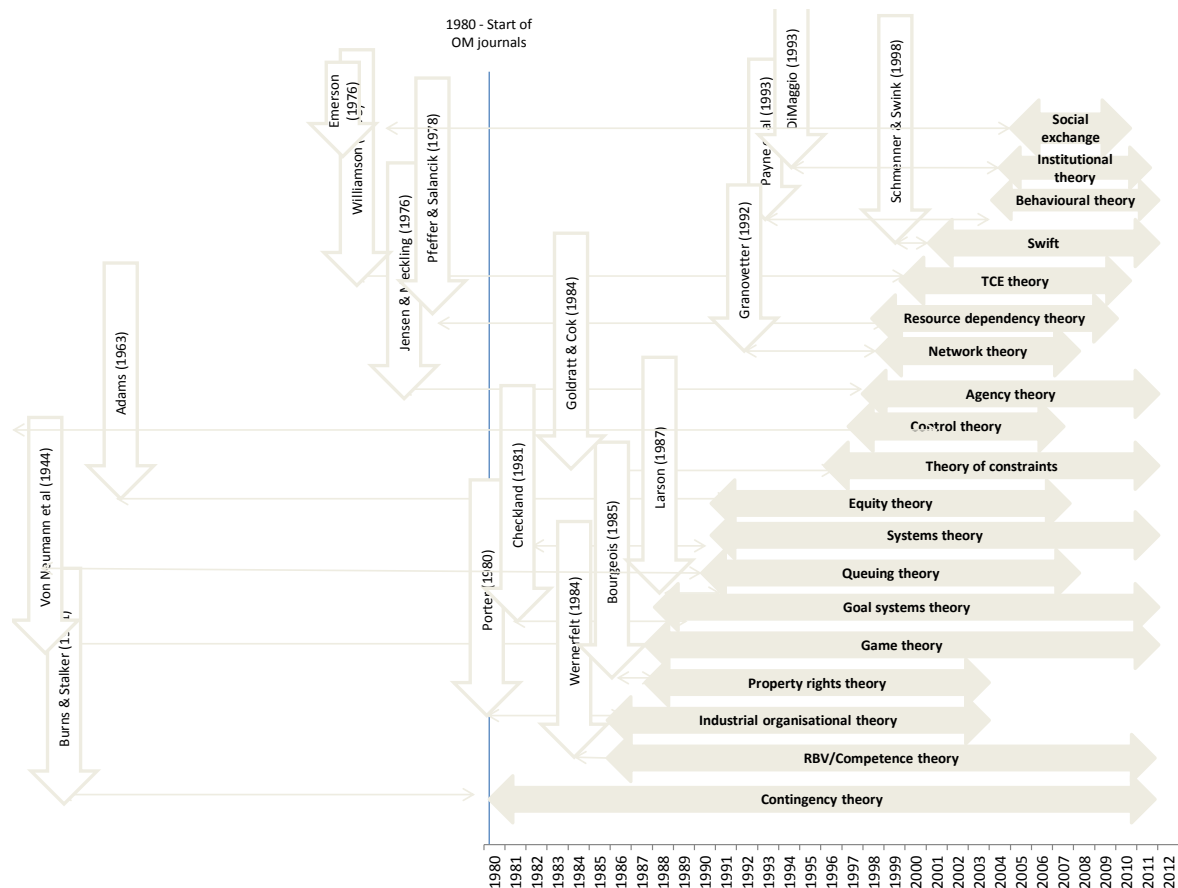
It is clear that the OM academic community has imported theories from other disciplines more than it has developed its own theories. Looking at the origins of the theories employed in OM journals in Table 4, three theories have their origins within operations management and operations research. The other theories have been borrowed from other disciplines: five theories have been borrowed from sociology, four theories from economics, three from psychology, and one each from organizational studies, strategic management, engineering, and cybernetics.

5.2 Which theories are adopted most widely in OM?

Figure 2 shows whether a theory has endured over time in the three OM journals we analyzed. Contingency theory (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Woodward, 1965), for example, has endured since the start of OM journals and still has a saliency today. It is also evident that there is usually a lag between a theory being published in a book or journal, and its first appearance in an OM journal, which is also shown in Figure 2. Prior to 1980, the three journals did not exist, so any lag between the emergence of theories pre-dating the journals and such theories' appearances within the journals is arbitrary. However, it is interesting to note that some theories pre-date the first issues of the journals, and the start of our data set, by decades. Control theory has the biggest lag, with the theory having its origins in the 19th century (Maxwell, 1867), and then emerging in 1995 in OM

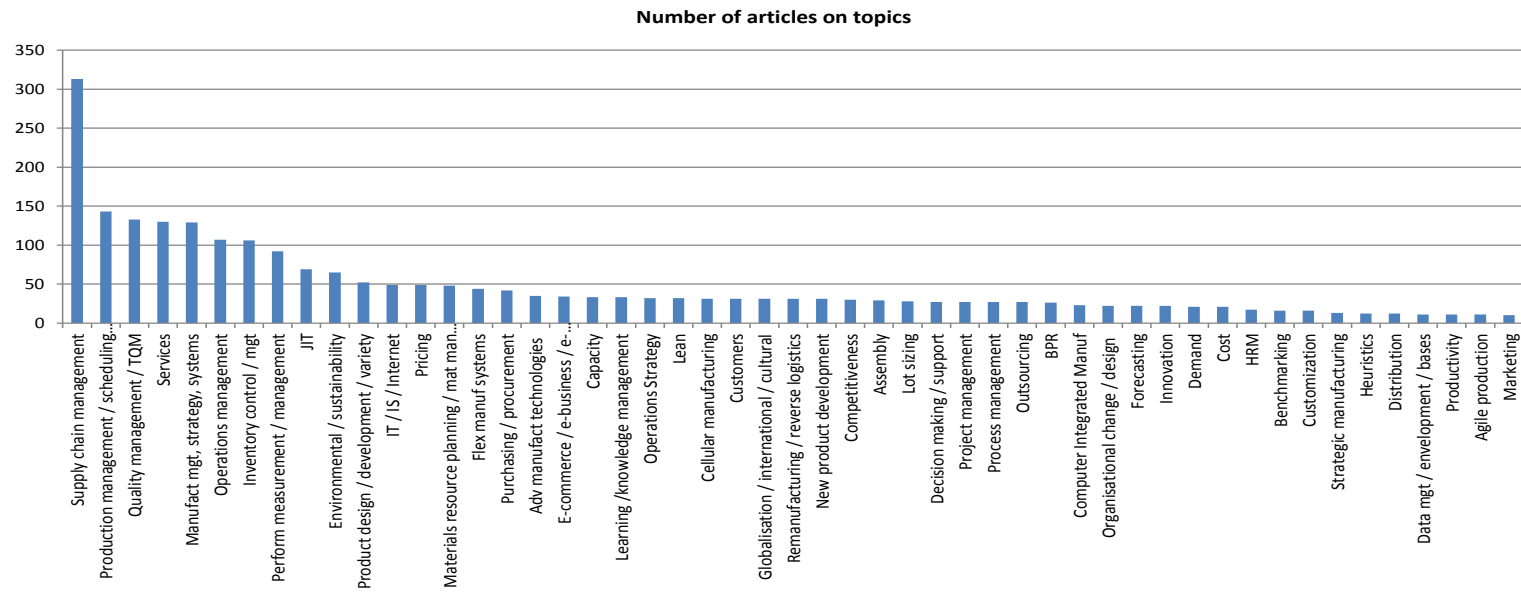
articles within the journals we analyzed. Other theories have a short gap between their emergence and application in OM, such as the resource-based view, which was first articulated in 1984 (Wernerfelt, 1984) and then was referred to two years later in the OM journals we studied (Goodridge, 1986). The average lag between theory emergence and its subsequent application in the three OM journals we determined to be 17.5 years.

FIGURE 2 Emergence of theories in articles in POM, IJOPM and JOM (1980-2013)



Some theories, such as property rights theory, exhibit popularity for a time and then seem to be adopted less, at least in the three journals that we analyzed. Further, Figure 2 does not represent the myriad of theories that are developed or tested in fewer than five articles in the OM journals that we studied.

FIGURE 3 Topics addressed in articles in POM, IJOPM and JOM (1980-2013)



5.3 To which topics have theories been applied in OM research?

Figure 3 shows the number of articles published on different topics across the three journals, showing only topics that turn up in at least ten articles. SCM as a topic is in the majority, with 313 articles, followed by production management, with 143 articles published. Some topics have been popular for several decades, such as lot sizing and materials planning, with their first articles both being published in 1980. Other topics have understandably emerged more recently, such as e-commerce, with the first article being published in 2001.

We also scrutinized which theories were adopted to investigate the most popular topics, shown in Table 4. SCM is the topic addressed most frequently, with SCM having been investigated using thirteen of the nineteen theories identified. It is also interesting to note that theories in OM are tested in a variety of contexts to address different topics, which may contribute to their generalizability.

6. DISCUSSION AND CONCLUSIONS

Recent OM research has reflected on those topics that have been represented in the main OM journals over the last twenty years or so, as well as on co-citation amongst OM authors (Craighead & Meredith, 2008; Pilkington & Fitzgerald, 2006; Pilkington & Meredith, 2009; Taylor & Taylor, 2009). While these articles reflect on the changing topics in OM, to our knowledge there has been no research that has focused on identifying theoretical trends in OM.

Our research aimed to answer several research questions concerning theoretical development and research patterns in OM. In considering which theories have been utilized in OM research, it appears that the most commonly adopted theory in OM articles is RBV theory (Barney, 1991b; Wernerfelt, 1984). We also investigated which topics have been researched in OM and identified a range of topics, such as SCM, manufacturing strategy, OM, quality

management, services, production management, planning, inventory management, just in time, performance measurement, and product development.

It is interesting to consider which theories are most relevant across the major streams of OM literature (see Table 4). Supply chain management is the most prevalent topic across the journals, and has been investigated through the theoretical lenses of RBV, TCE, game theory, industrial organizational theory and social exchange theory. Product development has been explored utilizing industrial organizational theory, contingency theory and resource dependency theory. Service operations has benefited from queuing theory and behavioural theories. Scheduling has been examined through the theory of constraints and queuing theory. TQM has benefited from studies adopting an institutional theory perspective. Such theory adoption suggests that there is a plurality of theoretical perspectives being adopted by OM researchers to investigate the major streams of OM literature, and we hope that this continues and diversifies over time.

Why do OM theories and topics change over time?

Theoretical perspectives in OM have changed over time, and our analysis enables us to identify enduring, classic theories and to trace fashions in OM theory (Abrahamson, 1991; Carson, Lanier, Carson, & Guidry, 2000; Gibson & Tesone, 2001). There may be a variety of explanations for the apparent popularity or waning of theories and topics in OM. Theories may be influenced at the level of the OM community, such as journals dedicating special issues to a topic, or influential OM writers adopting a particular theory. Journal editors may have preferences for certain theories over others, or changes in OM practice may influence which topics are the subject of OM research. The fact that a special issue of a journal addresses a particular topic may also indicate the practical need for the editors to look for fresh theoretical approaches and topics for their audience that are more interesting.

Macro changes also influence the topics on which the OM community focuses, and it follows that the theories explored to help explain those topics will vary. Such macro factors include economic trends of expansion and recession, globalization and increased transportation, changes in consumer expectations, advances in technology, and shifts in the world's manufacturing base. The advent of new processes, as well as new information and communication technologies, has changed the nature of OM practices over time, and theoretical developments have needed to respond accordingly. The world is a very different place from what it was thirty years ago, when these OM journals began. Against that changing background, some theories appear to be timeless (e.g., the RBV). Given the continuing interest of the OM community in efficient and effective resource allocation, the enduring appeal of such theories is understandable. However, the OM community continues to address quite practical, physical issues in research, which may present challenges to theorizing, compared to disciplines that focus on less tangible aspects of business and management such as business strategy or organizational behaviour.

On importing theories from other disciplines

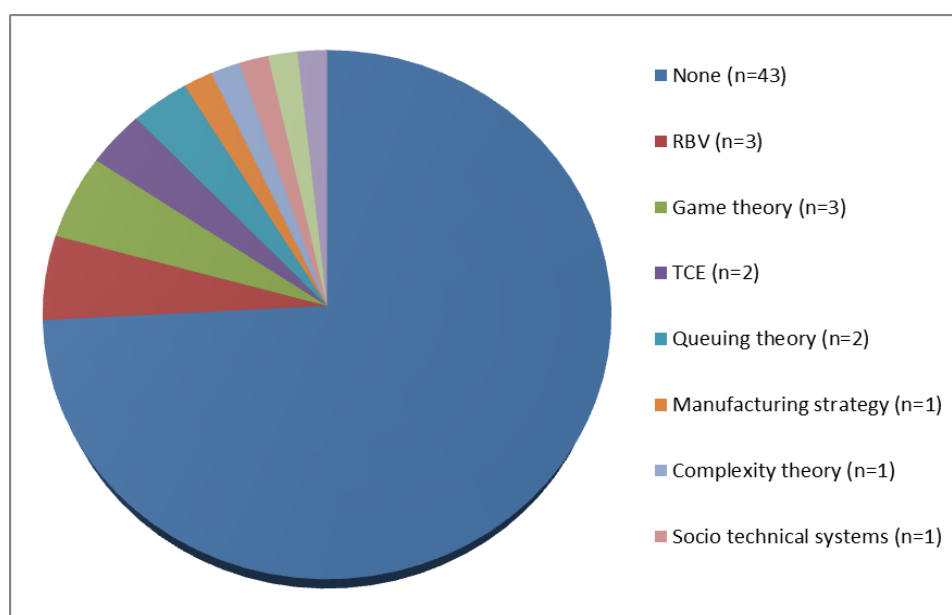
Our research indicates that most of the top theories utilized to conduct OM research have been borrowed from other disciplines, rather than being developed within the field. Disciplines such as economics, sociology, and psychology have proved rich sources of theories applied to OM problems. Such disciplines have a longer history than OM and greater maturity in terms of theoretical development, so it seems sensible to borrow from them. This should be done when the theory coalesces with the OM topic under investigation. Using theories from other fields to investigate OM problems entails challenges, including ensuring a match between the phenomena of interest, the concepts being examined, and the underlying assumptions of the theory and those of OM (Amundson, 1998).

However, the successful importing of theories to OM does not negate the importance of the OM community's need to develop its own theories. It has been argued that OM needs to improve its theory-building capabilities if it is to progress as a discipline (Binder & Edwards, 2010a; Colquitt & Zapata-Phelan, 2007; Eisenhardt, 2007; Flynn, Flynn, & Shrader, 1998; Lynham, 2002; Mario & John, 2010; Storberg-Walker, 2006; Swamidass, 1991; Torraco, 2002; Zahra & Newey, 2009).

Does theoretical research get recognition?

In order to further reflect on our findings, we have considered whether the most cited or best papers are theoretical or atheoretical. We performed a SCOPUS analysis of the top 20 cited articles from JOM, IJOPM and POM (N=60). Figure 4 shows that the majority of top cited articles are atheoretical (72%). Of the remaining 28% of most cited articles that do include theory, the most prevalent theories are the RBV, game theory, TCE and queuing theory. However, the most cited articles often date from the 1990s, when arguably the requirement for a manuscript's theoretical contribution had less emphasis amongst journal editors.

Figure 4: Theories in the top 20 cited papers in each of IJOPM, POM and JOM (N=60)



We also investigated the best papers, honorable mention papers and highly commended papers for each journal, being mindful that each started their awards in different years (JOM in 2002, IJOPM in 2007, and POM in 2009). Within JOM, best papers are clearly theoretical, with 77% adopting a specific theoretical perspective such as RBV, industrial organizational theory, and TCE. With IJOPM, just over half the best papers tend to have a conceptual framework (53%) but none adopt a specific theory. With POM, the best paper awards are relatively new so it is premature to attempt to identify a pattern for the years covered in our dataset.

Finally, we need to consider whether theoretical articles are influential upon practitioners. It is very hard to judge the extent to which theory is put into practice, although JOM, IJOPM and POM are meant to be for academic AND practitioner audiences, so the most highly cited papers may be influential for practitioners as well. However, future research could usefully explore which theories and papers are most influential on practitioners, and actually make a difference to their day to day operations management.

The future of theory in the OM field

In terms of theory development, it is encouraging to see that an increasing number of articles develop a conceptual model (31 percent). This is especially true amongst the most popular articles. Our analysis of the top 20 cited articles from each of the journals (POM, IJOPM and JOM) revealed that 62% contain conceptual frameworks. It would seem therefore that the most cited authors aim to make conceptual advances, which is something for aspiring authors to be mindful of as they submit their research to these journals.

So how can we make progress in developing theory in OM? Conceptual models, such as those in the most highly cited articles, may be the forerunners to more formally articulated theories, and may contribute towards theory building in the future (see Table 3 and Figure 1).

There are increasing signs of theory building in OM through grounded theory (Binder & Edwards, 2010b; Hanson, Melnyk, & Calantone, 2011; Schoenherr, Hilpert, Soni, Venkataramanan, & Mabert, 2010), building theory from observations in the field and from the ground up. Rich qualitative research and field research can also contribute to theory building that draws on management practice (DeHoratius & Rabinovich, 2011).

OM academics might benefit from learning more about theory development and testing, from influential social scientists, and scholars in the management field (Bacharach, 1989; Dubin, 1978; Kaplan, 1964; Van de Ven, 1989; Whetten, 1989). Bacharach (1989) suggested that metaphors can lead to theory development, and metaphors are being developed in operations and supply chain management (Chen, Rungtusanatham, Goldstein, & Koerner, 2013; Foropon & McLachlin, 2013). Cross-disciplinary collaborations can also contribute to the importing of new theoretical lenses to OM, and to the development of new theory. Attending theory sessions at conferences could be helpful, both within OM and across different management disciplines. Such efforts will inform the OM scholarly community as we seek to increase the theoretical diversity in our field.

It has been suggested by Pfeffer (1993) that theory proliferation leads to “a weed-patch, rather than a well tended garden” (p. 197), and that theoretical diversity is only useful if it can be resolved. Similarly, authors have argued over whether paradigms within a discipline should unite, whether there should be a plurality of views (Kuhn, 1970; Poole & Van de Ven, 1989), or whether there should be a continuous flux of expansion and contraction of views within a discipline (Abbott, 2001). It seems the OM field has a growing collection of conceptual frameworks, and in the future, replication studies and meta-analyses may help to rigorously test and refine existing theories (Eden, 2002).

In order to develop as a discipline, it seems sensible to adopt a dual strategy of appropriately importing and testing established theories from other disciplines while also developing

theories that draw on observation of OM practice. This research found that theories are being applied and tested across a variety of OM topics, which adds to a theory's generalizability.

In order to inform future OM-theory development, it is helpful to reflect on where the gaps are in current theoretical perspectives and to contemplate what sorts of theories might be suitable to import for different topics. The following discussion is not meant to be an exhaustive list; rather, it is more a consideration of potential theories that may have saliency for OM and that have doubtless already been applied but which our analysis reveals have yet to become widespread.

There seems to be a lack of theories identified to date that help to explain certain aspects of OM practices. For example, behavioral theories have recently been adopted to investigate the human aspects of OM practices. This interest in behavioral theories could be extended by borrowing from theories about organizational behavior and psychology, such as sense-making theory (Weick, 1979) and Argyris's theories of personality and organization (Argyris, 1957). Sense-making theory might assist researchers to conceptualize how people within and across organizations develop a shared understanding of OM practices, and Argyris's theories may help to tease out the individual, team, organizational, and external factors that influence behavior in OM practices, contributing to research concerning the behavioral aspects of OM.

In service sector OM research, where customer perceptions are important, it may be useful to borrow theories from cognitive and social psychology, such as motivation theory (McClelland, 1987) and attributional theory (Heider, 1958). Such theories may be of benefit for studies that straddle the boundary between marketing research and OM research. These theories may help researchers to understand what motivates customers and how customers perceive quality and attribute meaning to the services that organizations provide.

The burgeoning interest in how OM can contribute to sustainability may benefit from psychological theories, such as Maslow's hierarchy of needs (Maslow, 1954), from

organizational-change theories for corporate sustainability (Dunphy, Griffiths, & Benn, 2003), and from extensions of economics theories, such as natural capitalism (Hawken, Lovins, & Lovins, 1999).

Given that the RBV was found to be a commonly adopted theory in our research, there is potential for related literature from the management-practice field to be drawn upon more extensively, including dynamic capabilities (Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997), routines (Feldman & Pentland, 2003), and absorptive capacity (Levinthal & March, 1993).

Understanding the external pressures put upon organizations to change might be helpful for understanding the operations strategy of firms, drawing on theories from sociology and organizational behavior, such as social construct theory (Berger & Luckmann, 1966), structuration theory (Giddens, 1984), and stakeholder theory (Freeman, 1984). Other economic theories may also be of use for understanding the economic interactions between organizations, such as evolutionary economics theory (Hodgson, 1993). The field of OM is so broad that it is appropriate to seek out multiple theories to understand different phenomena.

Next steps

In the preceeding discussion we have considered the implications of our research, and we acknowledge that the study has several limitations, that could be improved upon in future research on theory in the OM field. There is an intrinsic limitation in content analysis whenever there are multiple topics from which to choose (Taylor & Taylor, 2009), and our study suffers from including a plethora of topics and theories, as well as multiple researchers, which cannot be avoided in such a large study concerning literature-content analysis.

We identified those articles that adopt an existing theory, develop a conceptual model, or are atheoretical. It would be helpful to develop a more nuanced way of classifying theory in

articles (Colquitt & Zapata-Phelan, 2007; Judge et al., 2007; Newman & Cooper, 1993). However, because the coding task already consumed a significant amount of time and resources, a more extensive approach to coding theory was not viable in this study.

In terms of future research, it would be insightful to explore the factors affecting theoretical popularity in more depth by conducting interviews with OM scholars. This study was limited to three OM journals, and it would be interesting to see if the same trends in OM theory are observed across a wider range of OM articles both from other OM journals and from general management journals. It would also be helpful to conduct an investigation of which theoretical articles have influenced practitioners, which theories are perceived as most relevant to real OM problems, and whether theoretical or atheoretical research has more impact amongst OM practitioners. More broadly, future OM research would benefit from increased theory development and from continuing to draw on the wealth of theories in other fields that have yet to been brought to bear on OM problems. We need to ensure that any advances in OM theories lead to research that is both scholarly and relevant.

For the OM community, it is useful to consider the future of the OM discipline while being mindful of our OM past. Prior to this study, as far as we are aware, there has not been an analysis of the main theoretical trends in OM. A reflection on theories is important because theories inform how a researcher or practicing manager interprets and solves OM problems (Amundson, 1998). This study allows us to reflect on our collective OM journey to date, to spot trends and gaps in the literature, and to identify fruitful areas for future research and OM theory development.

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