Agency theory and supply chain management: a structured literature review

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Abstract
Purpose – The paper aims to explain how agency theory can be used to inform our understanding of the dynamics surrounding supply chain behaviours and relationships.
Design/methodology/approach – A structured review of the literature using a three-stage refinement process is used. The articles were sourced through online databases and keyword classifications, such as "agency theory", "principal-agent relationships" and "supply chain management". The search initially identified over 86 articles. After further screening these were reduced to 19 for final assessment and comparison.
Findings – Despite agency theory's prevailing descriptive and predictive qualities there is scarcity in its application to the SCM discipline. The authors posit that agency theory provides valuable insights for relationship engineering within supply chains where social, political, legal and behavioural dynamics dominate.
Practical implications – It is a critical task for managers to understand and mitigate abnormal behaviours across the supply chain. Agency theory serves this need by providing them with a useful tool to respond to transaction cost dilemmas through contractual and non-contractual remedies.
Originality/value – This is one of the first studies that examines the current state of agency theory application in the SCM literature and suggests potential avenues for future research.

Keywords Agency theory, Supply chain management, Behaviour uncertainty, Relationship management, Collaboration, Literature review, Research results, Uncertainty management

Paper type Literature review

1. Introduction

During the last four decades, agency theory has been widely used across a variety of disciplines, but little work has been undertaken with regard to how agency theory might be used to explain relations between organisations within the supply chain (SC). Agency theory is relevant for the situations wherein one party (the principal) delegates authority – in terms of control and decision-making about certain tasks – to another party (the agent) (Eisenhardt, 1989; Mitnick, 1973; Ross, 1973). Seminal contributions made by scholars such as Ross (1973, 1979), Mitnick (1973, 1975), Jensen and Meckling (1976) and Eisenhardt (1989) have substantially improved our understanding about how agency theory informs economic relations (Stock, 1997). Other scholars have employed agency theory to explain relations in different disciplines such as economics and finance (e.g. Sappington, 1991), information systems (e.g. Mahaney and Lederer, 2003), and management (e.g. Eisenhardt, 1985; Eisenhardt, 1988). More recently, supply chain management (SCM) scholars have shown growing interest in using agency theory to understand how participants within the SC manage risks, align incentives and forge relationships (see, for example, Halldórsson and Skjott-Larsen, 2006; Ritchie *et al.*, 2008; Norrman, 2008; Shook *et al.*, 2009). However, these works, which were largely inspired by Stock's (1997) suggestion on the application of agency theory in logistics, have only partially contributed to our understanding of SC relationships.

A dearth of SCM studies employing agency theory runs counter to the prevailing value that its descriptive and predictive qualities appear to offer in terms of it representing "[...] a natural fit with supply chain management research" (Ketchen and Hult, 2007a, p. 576). To date there is no comprehensive review and examination concerning how agency theory has been used to explain relationship development within supply chains. This study aims to take a step forward in addressing this recognised gap in the SC literature by answering the following question:

> How can agency theory be used to inform our understanding of the dynamics surrounding supply chain behaviours and relationships?

In order to answer this question a structured literature review has been completed by using online databases and keyword classifications, such as, agency theory, agency relationships, principal-agent relationships, incentive systems, supply chain management, and risk management. The search initially identified in excess of 86 articles that were published between 1973 (the start date is from Ross's and Mitnick's original contributions in 1973)[1] and 2011. After further analysis using keyword classifications (see section 4) the number of available articles relevant to this study was reduced to 19.

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The authors provide an explanation of agency theory, in terms of its branches and associated models and frameworks, in the next section. This is followed by a brief discussion on the methodology adopted for the study. Within the analysis section, SCM applications of agency theory have been explained and industry and methodology themes identified. How agency theory can be used to explore supply chain behaviour is reviewed within the discussion section. This is complemented by a brief explanation concerning the limitations of the theory. Included in the final section of the paper are concluding remarks, implications for management and opportunities for further research.

2. Agency theory

2.1 A dichotomous view

From a management perspective, the evolution of agency theory can be dated to the 1960s and 1970s (Eisenhardt, 1989). Nevertheless, its origins can be found in the works on economic risk analysis where it began by addressing a common problem in organisations, individual-group goal incongruence and its impact on risk-sharing behaviour (e.g. Arrow, 1985; Wilson, 1968, cited in Eisenhardt, 1989). This is reflected in the theory's recognition of the broader agency problems as entailing a portfolio of issues that need to be managed under conditions of uncertainty. Agency theory, in its modern form, largely originates from the work of Mitnick (1973) and Ross (1973), and embraces the areas of political science and economics, which broadens its application beyond simple contract relations. Following Mitnick's (1973) and Ross's (1973) lead, agency theory was subsequently adapted and used in a variety of other disciplines such as sociology (by Shapiro, 1987), management (by Eisenhardt, 1989) and in work involving the theory of the firm (by Jensen and Meckling, 1976).

In agency relationships, one party (the principal) delegates work to another party (the agent) (Jensen and Meckling, 1976; Ross, 1973; Eisenhardt, 1989). When the agent is acting for the principal it resembles behaviours such as performing for the benefit of the principal or acting as the principal's representative or employee (Mitnick, 1973). As Eisenhardt (1989, p. 58) points out, while the profit maximisation approach and self-interest persists, "[...] the focus of agency theory [centres] on determining the most efficient contract governing the principal-agent relationship [...]". The notion of the contract is used here as a metaphor to describe the agency relationships (Jensen and Meckling, 1976) and it is designed based on the outcome (e.g. commissions) or behaviour (e.g. salaries) of the agent (Eisenhardt, 1989). In agency relationships, typically, the principal will seek to minimise the agency costs, such as, specifying, rewarding and monitoring, and policing the agent's behaviour, while the agent works towards maximising rewards and reducing principal control (Fleisher, 1991). Efficient management of agency problems such as information acquisition (or communication), preference mismatch (or conflict of interest), effort (or moral hazard) and capability (or adverse selection), mainly associated with the agent (Fleisher, 1991), is also imperative to any principal-agent relationship.

Developments in agency theory are largely based on two important streams of inquiry, namely, principal-agent research and positivist agency theory. The classical approach to understanding agency theory has historically followed the principal-agent relationships route, which assumes that the principal and agent will attempt to maximise their positions through individual interpretation of the contract, as highlighted earlier. The principal-agent research owes much of its development to the work of economists, who have used self-interest, bounded rationality and agent risk aversion as the principal determinants for mathematically modelling relationship building (Eisenhardt, 1989). This work has also been influential in development of the normative account of the agency theory (i.e. design of optimal contract-based incentives to align principal and agent interests). The latter approach (i.e. positivist agency theory) has contributed to our understanding of real world behaviours in terms of agency logic (descriptive agency theory) (Mitnick, 2006). According to Mitnick (2006), both approaches are helpful in assisting researchers and managers to grasp the complexity of agency theory and its attributes. However, the mathematical and non-empirical orientation of the principal-agent research, along with its lack of real world application (Jensen, 1983), have been the primary causes of this stream of research stagnating academically, particularly in organisational research.

Positivist agency theory (PAT) has largely evolved in order to overcome many of the shortcomings found in principal-agent research, in particular, the issue of complexity surrounding real world relationship dilemmas (Eisenhardt, 1989). PAT seeks to synthesise political science, expert agency, the law of agency and sociology into a single framework, which in turn attempts to explain how relationships in business and government develop, and offers suggestions as to how they might be managed more effectively (Shapiro, 2005). PAT also provides a useful framework for explaining how problems surrounding the issue of the separation of control (for example, agents acting independently) from ownership (the principal's desire to manage and maximise their resources, see Berle and Means, 1932) can be minimised (Fama and Jensen, 1983; Nilakant and Rao, 1994; Halldórsson and Skjott-Larsen, 2006). PAT is thus useful for explaining non-rational behaviour of agents (and principals) when, for instance, an expert agent might be unwilling to share sensitive information with its principal because of lack of trust which underpins SC relationships.

2.2 Hidden information/action model

Two important challenges in agency relationships are misrepresentation of ability (adverse selection) and lack of effort (moral hazard), both of which are attributed to the agent. Focusing on these, hidden information and hidden action models, respectively, have been specifically developed to assist in designing an appropriate contract (Arrow, 1985; Bergen *et al.*, 1992). These models work on the assumption that principals are aware of the nature of the task and the capabilities required (by the agent) to successfully accomplish that task (Bergen *et al.*, 1992). Hidden information models focus on the problem of agent selection, specifically, the potential for falsification of skills and abilities of the agent (either at the time of hiring or during the activity). According to Holmstrom and Milgrom (1987), the main benefit of hidden information models is that they can assist in designing a contract which can be used to motivate the agent to take appropriate observable action, for example, a requirement for periodic reports on the condition of a rented asset to inform

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the owner about any faults. Furthermore, hidden information models focus on making agent capabilities explicit through the use of various management processes, such as, screening (e.g. personal interview), signalling (e.g. agents' signal on their capabilities) or providing opportunities for self-selection (e.g. training programmes for new recruits) (Bergen *et al.*, 1992).

In situations where an agent's action is difficult to observe (largely due to the complex nature of the task), the principal is exposed to a heightened risk of opportunism by its agent. In essence, there is an opportunity for the agent to both evade control and misrepresent its capabilities (Bergen *et al.*, 1992). Hidden action models deal with the design of the contract, which can be used to mitigate the moral hazard problem and motivate the agent to take appropriate action (Holmstrom and Milgrom, 1987). According to Bergen *et al.* (1992), principals are assumed to be risk-neutral whereas agents are typically risk-averse, which they believe is a mistake because of the fundamental differences in risk calculation strategies. The rationale underpinning this approach is that because principals have more power to diversify their investments, agents are highly dependent on the principal and are less likely to engage in inappropriate behaviour (Eisenhardt, 1989; Bergen *et al.*, 1992). This assumes that capabilities and contractual power exist in a uniform manner across relationships, and that agent choice is limited. Evidence suggests, however, that agents are often prepared to accept greater risks, precisely because power and choice options do not exist as constants, and are often prone to dramatic change as industrial sectors and economies evolve (see, for example, Basov and Bardsley, 2005; Holmstrom and Milgrom, 1987). These arguments serve to raise questions about the extent to which the principal-agent relationship might be conditioned by factors other than contractual obligations and limited capability risk assessments (Eisenhardt, 1989). This becomes increasingly important when applied to supply chain operations, where factors relating to knowledge, commitment and trust often outweigh contractual relationships (O'Loughlin and Clements, 2007).

3. SCM theory and practice

Many SCM researchers have highlighted the need for greater practical application of organisational theories (see, for example, Shook *et al.*, 2009; Stock, 1997; Ketchen and Hult, 2007b; Halldórsson *et al.*, 2007; Ketchen and Hult, 2007a), and in doing so have recognised organisational theory's pivotal role in explaining, describing, and predicting complex organisational behaviours (Flynn *et al.*, 1990). These researchers have also been instrumental in identifying the significant bias towards transaction-cost economics (TCE) in the literature (Burgess *et al.*, 2006). TCE argues that during any economic exchange, the cost of the product or service should also include all hidden costs (Williamson, 1981, 2002). For example, when establishing a relationship between a buyer and supplier, hidden costs might include time spent on developing the relationship, the drawing up of contracts by a lawyer, or travel between various locations. The explicit focus for TCE is the reduction of transaction exposure by accounting for all organisational costs (i.e. transaction and production costs) (Williamson, 2002). Alternatively, SC relationships are often intangible and TCE does not provide a sufficient explanation of social, political, legal and behavioural dynamics. TCE exclusively translates the many trade-offs within a make or buy decision into *cost,* which mainly implies tangibility.

Consequently, a fundamental problem with TCE is that it makes assumptions about how relationships are structured and the ensuing forms of leverage that develop. It is the authors' contention that TCE overlooks two key considerations; the first involves contractual obligations and the way in which transaction costs are often dissipated throughout the SC. The second problem centres on the locus of control within SCs and, in particular, how often minor players are able to exert considerable leverage through structural manipulation. For example, it has been widely noted that within some of the "[…] best value supply chains […]" issues such as time, quality, risk and flexibility can be easily manipulated by second tier agents (Ketchen and Hult, 2007a, p. 573). Arguably, shortcomings of TCE with respect to explaining SC relationship dynamics can be largely offset through the application of agency theory. Essentially, the authors posit that agency theory provides a mechanism that may be used to explain how players (both independently and as a collective) within the SC respond to transaction cost dilemmas where rational and non-rational behaviour occurs (Ketchen and Hult, 2007a). In addition, Stock (1997) posits that agency theory may also assist managers in understanding SC behaviour by focusing attention on the following issues:

- the development of inter- and intra-organisational relationships;
- the maintenance of complex relationships between suppliers and customers (e.g. vendors and third-party logistics providers);
- the dynamics of risk sharing, capital outlay, power and conflict between channel intermediaries; and
- identifying the costs and benefits of SC integration.

In spite of its recognised explanatory power, within the SCM literature only a limited number of studies have used agency theory as their primary theoretical foundation, as listed in Table I. There have been arguments outside the SCM research that combined application of TCE and agency theory can be more promising (e.g. Williamson, 1988). Conversely, concerns have also been shown in treating them as complementary theories (e.g. Krafft *et al.*, 2004). This debate while important is out of scope of this paper. Further deliberation on the significance of agency theory and how it can be used within SCM is presented in the analysis and discussion sections of this paper. Prior to that the methodology used for this paper is explained next.

4. Research methodology

4.1 Selection of articles

The methodology used in this study is documentary research using electronic databases and data reduction procedures to collect information about a specific phenomenon (Platt, 1981), in this case, agency theory and its application to the SCM. Following similar review studies (see, for example, Burgess *et al.*, 2006; Giunipero *et al.*, 2008; Vanany *et al.*, 2009), the authors have designed a structured process for selection of the appropriate literature. The strategy employed seeks to identify the relevant information through coded reviews and was undertaken as a separate process (to the references used throughout this paper) in order to identify the

Table I Summary of key SCM studies using agency theory

Author	Area	Industry	Methodology	Key independent variable(s)	Key dependent variable(s)	Objective of study	Stream of agency theory
1 Lassar and Kerr (1996)	Strategic management	Electronics	Interview (40) + Survey (sample: 209, responses: 85)	Three strategies of cost leadership, differentiation, focus	Manufacturer-distributor relationship	"To answer how competitive strategies influence inter-organisational relationships"	PAT
2 Celly and Frazier (1996)	Marketing	Manufacturing	Interview (20) + Survey (sample: 1031, responses: 254)	Environmental uncertainty, supplier/ distributor characteristics	Coordination-efforts	"To enhance the understanding of outcome- and behaviour-based coordination efforts through developing and testing a conceptual framework"	PAT
3 Logan (2000)	Logistics	Transportation	Conceptual	Information technologies, understanding about norms and values, monitoring, stock ownership, long-term relationships, incentive alignment, trust	Outsourcing (user-provider)	"To answer how both the outsourcing user and provider can choose the appropriate partner for their outsourcing relationship and how can those relationships can best be maintained"	PAT
4 Simatupang and Sridharan (2002)	SCM	n/a	Conceptual	Mutual objectives, integrated policies, appropriate performance measures, information sharing, incentive alignment	Collaboration	"To examine reasons for conflict in SC and explicate collaborative SC for mitigating these conflicts"	PAT
5 Zsidisin and Ellram (2003)	Purchasing (procurement)	n/a	Survey (sample:1000, responses: 261)	Information asymmetry, organizational objectives, and programmability of supplier activities	Risk in the purchasing organisation-supplier relationship	"To understand how purchasing organisations address risk and to test the relationship between supply risk sources and efforts to manage that risk"	PAT
6 Zsidisin *et al.* (2004)	Purchasing (procurement)	Manufacturing	Multiple case studies	Information systems, outcome uncertainty, goal conflict, relationship length, adverse selection, moral hazard	Assessment of risk in the purchasing organisation-supplier relationship	"To explore, analyse, and derive common themes on tools and techniques that purchasing organizations implement for assessing supply risk"	PAT
7 Agrell *et al.* (2004)	SCM	Telecom	Modelling	Incongruent business logic, asymmetric information, incentive structure	Risk sharing and joint coordination (2nd tier supplier-1st tier supplier-OEM)	"To critically analyse two key coordination challenges in the telecom industry, in order to find theoretical as well as practical arguments for the development of new coordination mechanisms"	P-A research
8 Zsidisin and Smith (2005)	Purchasing (procurement)	Aerospace	Single case study	Outcome uncertainty, goal conflict, task programmability, adverse selection, moral hazard, performance monitoring	Disruption risk in the purchasing organisation-supplier relationship	"To investigate the role of early supplier involvement in managing supply risk"	PAT

(continued)

Table I

Author		Area	Industry	Methodology	Key independent variable(s)	Key dependent variable(s)	Objective of study	Stream of agency theory
9	Halldórsson and Skjott-Larsen (2006)	Logistics	Fast-moving consumer goods	Single case study	Goal congruence, risk preference, relationships length	Contract dynamics between buyer and provider of logistics services	"To complement the static view of the transaction cost approach and the agency theory on governance structures and contracts by showing how relationship governance emerges and develops over time"	PAT
10	Camuffo *et al.* (2007)	Strategic management	Air-conditioning	Survey + interview	Environmental uncertainty, Risk averseness, moral hazard	Vertical inter-firm relationships and risk sharing (1st tier supplier-manufacturer)	"To what extent buyers and suppliers share risk and whether and how the degree of risk sharing relates to supplier's financial, structural, and technological characteristics"	PAT
11	Morgan *et al.* (2007)	Operations management	Grocery	Discussion (7) + interview (49)	Supplier opportunism, influence level, dependency, monitoring ability, punitive capacity, performance outcome, militant behaviour	Category management relationships (retailer-supplier)	"To answer why retailers are either unconvinced or have failed to make focal supplier category management relationships work"	PAT
12	Ritchie *et al.* (2008)	SCM	Manufacturing	Longitudinal case study	n/a	Risk, performance	"To evolve a holistic conceptual framework of SC risk management encompassing the twin dimensions of risk and performance"	PAT
13	Norrman (2008)	SCM	High-tech	Multiple case studies	Contract and relational governance, incentive alignment. Asymmetric and hidden information, trust	Risk sharing (buyer-supplier)	"To extend the knowledge of how risk and gain sharing (incentive alignment) in supply chains could be applied in practice"	PAT
14	Cheng and Kam (2008)	SCM	n/a	Conceptual	Structure of network relationships, incentives, supply performance	Dynamics of risk in network collaboration	"To develop a conceptual framework for analysing the differential risks in alternative supply network structures"	PAT
15	Manatsa and McLaren (2008)	SCM	n/a	Conceptual	Information sharing, incentive alignment	n/a	"To help explain the reasons firms are reluctant to share information and guide the design of incentives to redistribute risk and encourage information sharing in a SC"	PAT
16	Villena *et al.* (2009)	SCM	Manufacturing	Survey (sample: 932, responses: 133)	Compensation and employment risk, environmental volatility	Integration	"To develop guidelines for designing an employment and compensation system for the SC executives in order to encourage SC integration through the development of SC partnerships"	PAT

(continued)

Table I

	Author	Area	Industry	Methodology	Key independent variable(s)	Key dependent variable(s)	Objective of study	Stream of agency theory
17	Tate *et al.* (2010)	Purchasing (procurement)	Manufacturing	Multiple case studies + Focus group	Internal alignment	Relationships, creativity	"To investigate how marketing and supply management (two principals) can achieve internal alignment in working with the supplier (agent) and to gain an understanding of how contractual agreements influence the alignment between the buying company and the service provider"	PAT
18	Whipple and Roh (2010)	SCM	Manufacturing	Conceptual	Contractual mechanisms	Vulnerability	"To propose using agency theory for assessing the likelihood of quality fade in buyer-supplier relationships and prescribing contractual mechanisms for reducing quality fade"	PAT
19	Ciliberti *et al.* (2011)	Corporate social responsibility (CSR) and SCM	Manufacturing	Multiple case studies	Code of conduct (SA8000), moral hazard, adverse selection	Power imbalance in chain directors-partners (i.e. SMEs) relationship	"To examine how a specific code of conduct (i.e. SA8000) can address the principal-agent problem, for SMEs, between chain directors and partners"	PAT

Notes: n/a: not applicable; PAT: positivist agency theory; P-A research: Principal-Agent research

required articles. The literature survey has been undertaken using online databases, such as, Emerald, ScienceDirect, Inderscience and ABI/Inform Global Proquest. In this regard, a three-stage refinement process using data reduction procedures (e.g. keywords, title, abstract and conclusion) has been utilised.

In the first stage codification of keywords and sentence strings, such as agency theory, agency relationships, principal-agent relationships, incentive systems, supply chain management, and risk management were used to facilitate the search. Results obtained through each database (using different combinations of the keywords) were then cross-compared, compiled and checked for possible duplications. This yielded 86 articles published between 1973 and 2011. This stage was limited to refereed journal articles to ensure the quality of the documents and that they had gone through a strict review process.

Title and keywords of the identified articles were screened in the second stage. If the authors were unsure about the suitability and relevance of particular articles they were included in the sample as a precautionary measure. A total of 54 articles (out of initial 86) were selected through this process. After a further round of coding 19 articles (out of 54) published between 1996 and 2011 in various journals (see Figure 1) were identified. This third stage was accomplished after reviewing the abstract and conclusion of all 54 articles.

To ensure that most of the specific SCM articles which employed agency theory were selected the authors also checked the full bibliography list of the final 19 papers. While no journal article was found to be missing from the results a few number of conference and working papers (see Appendix) were identified. These have been used in the general discussion part of the paper but not included in the main analysis, as the authors could not be certain of each paper's credentials and whether a peer review process had been undertaken. The inclusion criteria used in stage three centred on whether SCM (and related aspects such as procurement, manufacturing and logistics) and agency theory applications discussed within the abstract and/or conclusion of the respective article (for example, articles by Ritchie and Brindley, 2007; Narayanan and Raman, 2004, were discarded). Stages 1-3 were performed manually and a spreadsheet database was built with a search and check function to ensure criteria compliance was met.

4.2 Review process

To aid the content analysis, an instrument for collecting the main facts within each of the 19 articles was also designed. These facts included, but were not limited to, author(s), area, industry, methodology, independent/dependent variables and objective (see Table I). This information was then used to identify the main themes for agency theory and SCM research, discuss the findings and finally draw the conclusions.

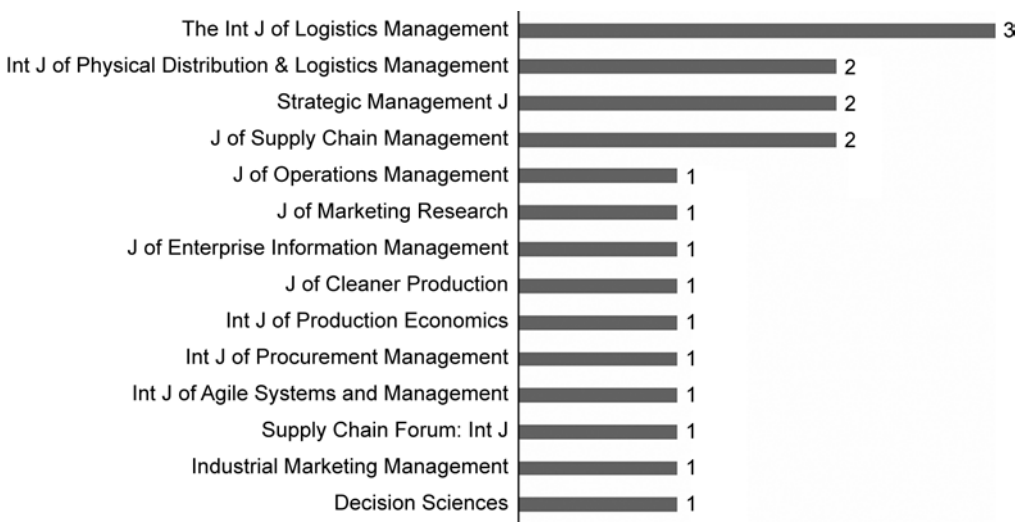
5. Analysis

5.1 SCM agency theory applications

From the analysis conducted, a number of important research issues and themes were identified. Table I shows the content analysis framework that was also used to elicit relevant information from each of the 19 specific SCM papers. This section presents a cross-comparison of this information across broader themes, such as, level and context of application and relationship factors (i.e. relations, information, risk and objectives).

The analysis showed that agency theory has been used across various areas (e.g. procurement, manufacturing and logistics) relating to SCM. What is evident from Table I is that, positivist agency theory (PAT) plays a dominant role in SCM research. This is clearly an indicator of PAT's utility for SC investigations. Moreover, the identified pattern follows the idea which views PAT as being more accessible to organisational researchers mainly due to its non-mathematical, real-world oriented nature (Jensen, 1983). Table I also shows that the majority of SCM studies using agency theory are concerned with general buyer-supplier (principal-agent) relationships. This approach is in line with historical applications of agency theory within other disciplines, and can be broadly classified as intra- (e.g. employer-employee) and inter-organisational (e.g. supplier-retailer) categories. However, as supply chains often consist of multiple actors, by adopting a parsimonious

Figure 1 Journals with agency theory application within SCM



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approach to SC relationships, many researchers have tended to overlook some of the more important dynamics taking place within the SC. In order to counter this weakness, scholars have attempted to address it by discussing SC agency relationships in the form of triadic and tetradic relationships (see Agrell and Norrman, 2004; Agrell *et al.*, 2004; Cheng and Kam, 2008; Hornibrook, 2007). These intricate network perspectives are instrumental in helping managers and researchers understand the realities of SC behaviour, as they illustrate just how complex SCs can be, particularly where there are multiple principals and agents (Wilding, 1998; Choi and Krause, 2006; Surana *et al.*, 2005).

The SCM literature that does use agency theory has focused on Eisenhardt's (1989, p. 70) conceptualisation of "theory-relevant contexts"; specifically when:

- there is substantial goal conflict between principals and agents (e.g. suppliers and buyers);
- there is sufficient outcome uncertainty to trigger the risk (e.g. new product development); and
- evaluation of behaviours is difficult (e.g. high-tech intensive agents) (see, for example, Simatupang and Sridharan, 2002; Morgan *et al.*, 2007; Whipple and Roh, 2010).

Zsidisin and Ellram (2003) have pointed towards a greater tendency amongst purchasing organisations to mitigate risks by deliberately manipulating a supplier's behaviour to achieve greater compliance (e.g. supplier development, certification and co-developing of target costing), rather than managing agent activity through the implementation of buffers (e.g. safety stock and multiple sourcing). Zsidisin *et al.* (2004, p. 399) note that "[e]ach of the agency theory variables may have an influence on the extent to which purchasing organizations need to assess supply risk". For example, Zsidisin and Smith (2005) show how in the aerospace industry, compliance strategies (such as early supplier involvement) have not only been used as a means of gathering information about behaviours of suppliers in order to mitigate risks and strengthen the principal and agent relationship, but also to lock suppliers into the SC.

Norrman (2008) extended Zsidisin and Smith's (2005) work by examining how Agilent and Hewlett Packard have implemented supplier buffers, and concluded that agency relationships are likely to be more effective if both contractual and relational concerns are factored into relationship structures. Norrman (2008) further identified that problems associated with a shift in organisational culture are most likely to be the major barriers toward successful implementation of risk sharing contracts. Underpinning the cultural shift was also a problem of trust and how this either impinges on, or exacerbates, the risk-taking attitudes and activities of the agents. Norrman (2008) goes on to raise questions about whether contract incentivisation and reward strategies are sufficient to produce more compliant agent behaviour within the supply chain, and instil a greater sense of what is identified as purchased trust, where risk and reward appear to be equally balanced. Focusing on incentives and goals for mitigating the risk of agent opportunism, Hornibrook (2007) has suggested that there is a need to distinguish between short-term financial and long-term social incentives, as well as understanding how shared and independent goals might impact potential opportunism. Evidence suggests that both principals and agents might be inclined to moderate opportunistic behaviour where the trade-off between financial and social incentives is more clearly defined (O'Loughlin and Clements, 2007).

Tiered SC networks are explored by Cheng and Kam (2008), who have proposed a conceptual framework for the analysis of risk in alternative network structures – ranging from the classical single agent and single principal through to the highly complex, tiered, multiple agent and multiple principal relationships. Cheng and Kam (2008) use agency theory to predict how participants respond to risks, which are outside of their control. They concluded that network collaboration is largely contingent upon the structure of the network, the functional role of each collaborator and, in particular, how principals and agents structure agreements, organise incentives, embrace trust and commitment, visualise short- and long-term opportunities. Agency theory hence can offer the opportunity to understand the contextual factors and their implication for managing network collaboration (Danese, 2011). In addition, how supply performance is assessed needs to be taken into consideration, especially in tiered-multiple SC networks (see also Ritchie *et al.*, 2008).

Table II maps out the 19 papers used in the analysis along the both research themes discussed earlier (i.e. level/context of application and relationship factors). The numbers shown in Table II correspond to the numbers assigned to each paper within Table I. The four relationship factors have been extended in order to accommodate the eight relationship variables that are mostly discussed within the literature (see, for example, Clements and Wilson, 2009; Fawcett *et al.*, 2008; Lambert *et al.*, 1996; Min *et al.*, 2005; Simatupang and Sridharan, 2005). Partial and full gaps have also been shown using differen colours.

It is important to note that relationship variables, such as, information sharing and incentive alignment, which are often considered as the foundations of the agency theory, have been extensively researched. Conflict resolution and goal congruence between SC participants have also been investigated with the aim of paving the way towards a more synchronised SC. Extending the conflict dynamic further, understanding how trust evolves in the SC has become a central focus for many researchers as it holds the key to how relationships are managed and maintained within the SC.

While Table II provides a more comprehensive view of agency theory's current status within the discipline it also identifies gaps within the research. For example, as the level of application ascends (from dyadic to tetradic) the number of articles investigating the identified relationship variables descends. This indicates an obvious gap in the literature which might limit management's understanding of the challenges and choices within complex SCs where an actor's behaviour is prone to uncertainty. In addition, the authors analysis identified that little research has been undertaken involving agency theory and its implications for effective supply chain communications.

5.2 Industries and methodologies used

As mentioned in the research methodology section, 19 articles were reviewed which have been summarised using a number of categories, such as, industry, methods used, and purpose of theory. The findings show that in SCM, investigations have taken place across a wide range of industry sectors, from electronics, manufacturing, and telecommunication to high-tech, aerospace, food, and groceries (see Table I). The broad

Table II Overview of the analysis across the research themes

	Relationship factors							
	Relations		Information		Risk ***		Objectives	
Level of application	Trust	Commitment	Communication	Information sharing	Incentives	Investments	Conflict	Congruence
Dyadic	1p, 3, 9p, 11p, 13	1p*	–**	2, 3, 4, 5, 6, 11, 13, 18	3, 4, 13, 14	1, 11*	3, 4, 6, 8, 18	2, 3, 4, 5, 9, 11
Triadic	15p, 17p*	–**	–**	7, 15*	14, 15, 17p	–**	17*	7, 17*
Tetradic	19p*	19*	–**	19*	14*	–**	19*	–**

Notes: *Partial gap; **Full gap; ***2, 5, 6, 8, 9, 10, 12, 13, 14, 16, 17, 19 (in these papers the term risk is used in general without any specification); p=partially, e.g.: 1p means that paper 1 has partially addressed its corresponding relationship factor

spectrum of industry application highlights the utility of agency theory for use within different industrial settings.

The majority of research that uses agency theory to explain relationships in the SC is empirical (approximately 73 per cent) (see Table I and Figure 2). The literature also highlights a number of important conceptual frameworks (see, for example, McMillan, 1990; Logan, 2000; McCue and Prier, 2008; Shook *et al.*, 2009). The small number of SC papers that use agency theory to assist with modelling (see Figure 2) might be attributed to the fact that the discipline largely sees itself as practitioner driven, and that SCs have historically been conceived of as dynamic entities that cannot be easily modelled (Agrell and Norrman, 2004). It is also important to note that the literature review revealed a gap in understanding of the relationship that exists between SC and agency theory.

SCM has sought legitimacy through a variety of different disciplines, such as, third-party logistics as well as process-driven management methods and techniques, which are largely based on pragmatism (Golicic *et al.*, 2005). Conversely, agency theory has adopted a more populist following, centring on organisational sensitivity and inductive reasoning (Heracleous and Lan, 2011). While not polar opposites, their differing epistemologies do present a challenge for researchers, who wish to explain relationship behaviour in supply chains. This does not invalidate their utility, far from it, but it does provide one possible explanation for the paucity of research.

6. Discussion of the findings

In addition to the findings obtained through the analysis, the extant body of knowledge around agency theory has been used to augment, support and critique (where deemed appropriate) the identified SCM agency theory applications. Analysis of SCM agency theory applications shows that agency theory provides a useful basis for understanding the diverse range of relationship activities within SCM (Agrell *et al.*, 2004; Norrman, 2008; Agrell and Norrman, 2004). Based on the literature, mutual information, risk and reward sharing (Cooper *et al.*, 1997; Lee and Whang, 2000), integrated relations and processes (Cooper *et al.*, 1997; Bowersox and Closs, 1996; Clements and Wilson, 2009), goal congruence across the chain (La Londe and Masters, 1994), and establishment and maintenance of long-term business relationships (Cousins, 2002) are areas where agency theory has proved most useful. Therefore:

P1. Agency theory can be used to inform contractual responses to outcome/behaviour uncertainty of agents (or principals) within the SC relationships.

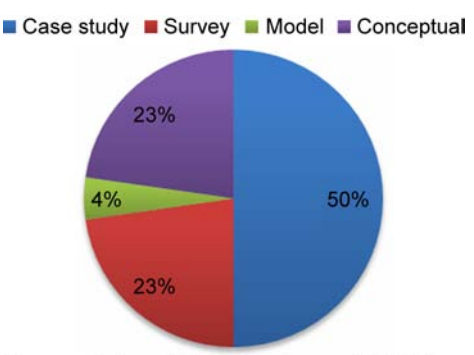
The authors' review of the specific SCM articles which used positivist agency theory (PAT) reveals its usefulness as a tool to understand, diagnose and mitigate abnormal behaviours within the SC relationships – from both a reactive and proactive perspective. This however should not be interpreted as trivializing principal-agent research and its application within the SC. Agency theory identifies behavioural change by SC actors and sheds light on activities involving principal and agent, self-interest, risk aversion, lack of trust, goal conflict and imperfect policy implementation (Simatupang and Sridharan, 2002). More importantly, it identifies how contractual responses might attenuate the tensions through, for example, information sharing, incentive alignment, and behaviour/outcome-based coordination (Knoppen and Christiaanse, 2007). Accordingly:

P2. PAT provides a holistic view of the potential causes of (and remedies for) the abnormal behaviour of agents (or principals) within the SC relationships.

The central tenets of agency theory have been used to partially show that where zones of tolerance (Wilson, 2006) and relationship elasticity (Zomorrodi and Fayezi, 2011) dominate supply chain relationship development, behavioural abnormalities are less likely to occur because the principal-agent relationship is more clearly defined. Why is this useful? In short, it is because agency theory is able to deal with some of the more complex elements of SC relationship intangibility, as well as co-exist with the more pragmatic approaches associated with complicated networks. Consequently:

P3. PAT extends views centred on task and transaction by attending to specific attributes of agents (or principals) operating within the SC.

Figure 2 Research design in SCM studies



Sources: Adapted from Seuring *et al.* (2005); methodology differentiation

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The three propositions discussed above refer to the potential ways that agency theory may be employed to understand and control behaviour across SC relationships. From the analysis it was found that information sharing and incentivisation have received considerable attention in agency theory-based explanations of relationship/behaviour-contract alignment. More importantly, communication as an aspect of relationship development within the SC has received less attention by scholars. This is in contrast to the potential influence of inter-organisational communication on the mitigation of behavioural uncertainty across the SC. It is therefore suggested that more work needs to be undertaken in this area to fully understand how agency theory might better explain SC relationships and behaviours.

In light of the above discussion, in order for researchers to effectively employ agency theory in their SC investigations, some important points need to be further considered. First, many authors have reduced SC interactions to a simple dyadic relationship (e.g. Zsidisin and Ellram, 2003; Whipple and Roh, 2010). Part of the problem stems from the fact that some SCs are now so complicated that to be modelled efficiently requires many years' work; see the F-35's Global Supply Chain, which has over 1,300 suppliers from nine countries and 48 US states. It is also regarded as the most expensive and complex project in US defence history (Levinson, 2011). Nevertheless, an argument that is also widely used in the literature is that whatever happens in single relationships needs only to be multiplied in order to understand the whole of the SC. As O'Loughlin and Clements (2007) have pointed out, this reduces SCs to a very simplistic level of sophistication. Furthermore, within the literature, researchers have tended to approach these relationships as being almost linear by design, and have promoted the principal's viewpoint as being that of the dominant partner (see, for example, McMillan, 1990; Lassar and Kerr, 1996; Zsidisin *et al.*, 2004). Conversely, evidence suggests that in many SCs dominance depends on channel primacy, and not whether an organisation acts as principal or agent (O'Loughlin and Clements, 2007).

6.1 What are the limitations for agency theory in SCM research?

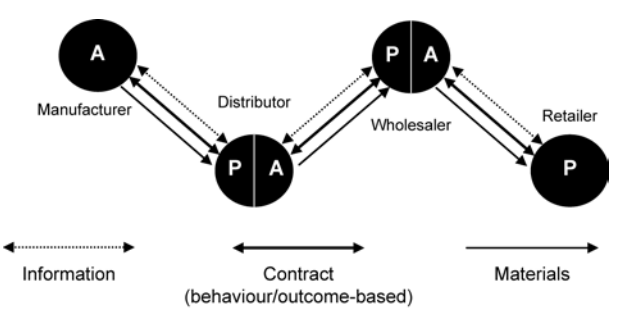
Whilst not invalidating the agency theory's value in terms of explaining SC relationship behaviour, the limitations of this theory need to be acknowledged. For example, an over-emphasis towards economic drivers has become an important area of weakness in agency theory use (Heracleous and Lan, 2011). This is in part an historical legacy, and also occurs because many SCs have traditionally been conceptualised as economic exchange mechanisms, rather than being comprised of complex social and economic relationships (Bergen *et al.*, 1992; Hirsch *et al.*, 1987). Further within SCM research, the so-called "economist blinders" (Shapiro, 2005, p. 268) act to limit the explanatory power of agency theory by directly obscuring it from an organisation's behaviour, which is both complex and not easily reduced to numbers.

Agency theory's view of the flawless principal and imperfect agent relationship is also questionable. As Perrow (1986) has commented, agency problems (i.e. adverse selection, moral hazard) are not restricted solely to the agency side of the relationship, but also exist on the principal side. This becomes vital within the context of SCM as the inter-dependency that makes up the SC means that principals and agents often swap roles. Figure 3 illustrates how the dynamic principal-agent relationship might function in a traditional SC, for instance, a particular distributor who is acting as the principal of a manufacturer (agent) while at the same time playing the role of agent for the wholesaler (principal). The link between principals and agents is through information and material flow pipelines, which are in turn moderated by contract mechanisms.

Increased complexity (i.e. extended networks of principals and agents) is another issue which is not articulated well within classical agency theory. The "hydra factor", as Adams (1996, p. 16) had termed it, is a feature of the multiple agency relationship and has come to dominate many SCM environments. In short, the existence of multiple principals and agents makes information balancing and the monitoring of behaviour more challenging. Particularly, when agents have competing interests over the delegated task, and the portfolio of heterogeneous agents makes the governance of these dynamic relationships more complex and problematic (Cheng and Kam, 2008). At best, the supply chain literature points toward incorporating partner-specific characteristics in tailoring supply chain initiatives with an agent or a cluster of – more homogeneous – agents (see, for example, Zu and Kaynak, 2012 in the context of supply chain quality management).

The measurement tools employed by agency theory also need to be considered. Evidence from the literature suggests that measurement design problems are mainly a result of the lack of rigorous testing, as opposed to the limitations of agency theory itself. This was highlighted by Bergen *et al.* (1992) who suggested that researchers must pay more attention to the dynamic nature of the relationships and questions, such as, how agency problem mitigation, through incentive mechanisms, might alter along the tenure of principal-agent relationships. This is important because, for example, growing concerns with environmental uncertainty, as an agency variable, should not only be seen as an objective measure (e.g. a purely financial measure) but also through subjective dimensions (i.e. as perceived uncertainty by the agent(s) and principals) (Bergen *et al.*, 1992). This is becoming very important where principal-agent SC relationships are increasingly being influenced by third party regulation. For example, the growing acceptance and inevitability of carbon tax measures and policies mean that both the principal and agent have to engage in even more complex negotiations in order to maintain a consistent working relationship (Mason-Jones and Towill, 1998; Commonwealth of Australia, 2011; Department of Energy and Climate Change, 2011; Sanchez-Rodrigues *et al.*, 2008).

Figure 3 The principal (P)-agent (A) model of traditional supply chain



Source: Adapted from Hornibrook (2007) and Norrman (2008)

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In spite of these limitations, it is important to note that agency theory's explanatory power, especially with regard to relationship dynamics, still provides robust basis for understanding the behaviour surrounding contractual relationships, whether implied or legal and rational or irrational, that are found within the SC. However, some of the deficiencies of the theory might be mitigated by integrating other relational theories such as TCE (Williamson, 1981), game theory (Nagarajan and Sosic, 2008), resource-dependence (Pfeffer and Alison, 1987) and relational exchange (Heide and John, 1992).

7. Conclusion

The aim of this paper was to highlight the status of the application of agency theory and to address the question of how can agency theory be used to inform our understanding of the dynamics surrounding supply chain behaviours and relationships? Documentary research was undertaken to extract the level of current understanding around the topic. In doing so, the analysis was performed using electronic databases and a three-stage refinement process which resulted in identification of 19 papers that have employed agency theory for explaining SCM issues. It was observed that within the SCM domain, the researchers have used a variety of industry settings. Managerial implications and avenues for future research are discussed in the next sections.

7.1 Implications for management

Multi-disciplinary analysis of agency theory studies has shown that the managerial implications of this theory can range from relationship establishment and development to relationship maintenance and even termination within the SC environments. This could entail both downstream and upstream processes as well as the internal operations of the primary supply chain partners. In holistic terms, agency theory is a useful tool for managers to diagnose and segregate their portfolio of relationships. Regardless of the fact that the organisation has a transactional or partnership relationship with its partners, it is a critical task for managers to understand and mitigate behavioural uncertainty across the SC. Several anecdotal cases can be identified in the literature where the sources of operational problems have been related to ineffective management of inter-organisational relationships, and/or where the distrustful atmosphere has triggered the opportunistic behaviour of the partners (Cousins, 2002; Ritchie *et al.*, 2008; Richey *et al.*, 2010).

In essence, agency theory can explain how players (both independently and as a collective) within the SC respond to transaction cost dilemmas where rational and non-rational behaviour occurs (Ketchen and Hult, 2007a). Hence, abnormal behaviours of network partners can be analysed and, subsequently, counterbalancing remedies can be devised. This process, in turn, might contribute to the development and maintenance of a trusting atmosphere in business relationships. Moreover, it is invaluable in either increasing or decreasing the tolerance threshold of managers (with respect to re-engineering their supplier/customer relationships) who are constantly dealing with complex organisational behaviours within their SC.

As noted above the implications are applicable to various outbound and inbound processes and practices such as vendor-managed inventory (VMI), just-in-time (JIT), collaborative planning, forecasting and replenishment (CPFR), enterprise resource planning (ERP) and efficient consumer response (ECR). All these practices are relationship-intensive and their implementation requires a high level of task or authority delegation across principals and agents participating in a SC. The successful implementation of SC processes and activities could be provisioned by catering for agent-specific conditions through dynamic contractual relationship. Agency theory may help managers to factor social, economic, political and behavioural aspects into their contract decision-making, by undertaking adaptive measures around incentivisation, information sharing and goal congruence. Researchers could also use agency theory to assess the implementation, success or failure of the above-mentioned practices from the SC relationships perspective.

7.2 Suggestions for future research

The authors posited that agency theory is suitable for studying SCM. Conversely, it was found that the extant literature is subject to many gaps and this highlights the need for further research. Future studies should explicitly recognise the application of agency theory for studying issues such as information sharing, risk/reward sharing, and establishment/maintenance of inter-organisational relationship at the SC level of analysis (as opposed to the prevailing dyadic investigations in the literature). Further attention also needs to be paid to the assumptions underlying agency relationships within SC environments. This is significant as supply chains that span country borders and even continents, might be affected by cultural variation (Brown Johnson and Droege, 2004). The theoretical lens that agency theory provides can support managerial decision-making and strategy formulation, specifically with respect to supplier and customer relationships. Supply chain communications is another area where agency theory might help to explain the influence of effective inter-organisational communication on the mitigation of behavioural uncertainty across principals and agents transactions.

The authors also recommend application of agency theory in the study of collaboration and uncertainty/change across the SC (see, for example, Plambeck and Gibson, 2010). Collaboration can be seen as relational integration between multiple principals and agents based on the efforts in information exchange, goal congruence, and incentive alignment which have the potential to induce trust and reduce uncertainty for the effective management of supply chains. Future research can investigate how agency variables such as goal conflict, information asymmetry, and risk aversion can be altered to achieve positive outcomes through effective collaboration. This research also has implications for the uncertainty mitigation between principals and agents that might ultimately result in reduced uncertainty along the SC. Conceptual in nature but drawing on both theoretical and empirical agency theory studies, this paper discussed a tool for managing complex SC behaviours and relationships. As noted previously, integrating agency theory with other organisational theories, such as, TCE and relational exchange offers promise in potentially offsetting its limitations. Perhaps, as the complexity of SC relationships necessitates, case study investigation in industry-specific supply chains can augment the conceptual discussion of this paper.

Note

1 It is important to note that agency theory has a long and varied history (from property-rights theories, through organisation economics, contract law and political philosophy, and has been associated historically with the work of Locke and Hobbes), but official recognition of agency theory as a formal theory has been dated to the early 1970s, and the work of Ross (1973) and Mitnick (1973).

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Appendix. List of conference and working papers related to agency theory and SCM

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