Using competitive strategy patterns to determine ideal supply chain management information systems capabilities

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Abstract: Supply chain management information systems (SCM IS) have become vital tools for synchronising information among the customers and suppliers of a supply chain. However, recent advances in inter-enterprise systems and e-business technologies have led to a confusing variety of SCM IS alternatives, each with varying capabilities. This paper demonstrates how a business unit's competitive strategy patterns can be identified and used to determine the levels of support an SCM IS should provide to enable operational efficiency, flexibility, and planning and analysis capabilities. An exploratory pilot study using the emergent model illustrates its utility and assesses various measures of its operationalisation.

Keywords: business strategy; interorganisational information systems; strategic alignment; supply chain management.

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1 Introduction

Organisations have recognised the benefits of using supply chain management information systems (SCM IS) to synchronise information among the customers and suppliers of a supply chain since the early days of Electronic Data Interchange (EDI) [1,2]. SCM IS are enterprise or interorganisational systems used to coordinate information between the buyers, suppliers, distributors, and other partners in a supply chain. Recent innovations in more flexible e-business technologies have led to a confusing variety of SCM IS approaches such as extended Enterprise Resource Planning (ERP) systems, business-to-business electronic marketplaces, Enterprise Application Integration, and web services [9]. Predicting which type of SCM IS will best fit an organisation's strategies is complicated by a lack of a theory for understanding how the various capabilities of SCM IS should be aligned with an organisation's strategies.

Traditionally, information systems (IS) implementation researchers have recommended matching IS capabilities with a firm's functional requirements [4], critical success factors [5], or desired architecture [6]. However, with the complexity of enterprise systems packages such as SCM IS, it has become increasingly unfeasible to select a system that will meet all of a firm's requirements or even to know what those requirements are [5]. As a result, firms may choose an SCM IS solution based on its previous successes in other supply chains, without a detailed analysis of whether it truly fits the requirements for supporting the firm's specific environment and strategies [7]. The fit between SCM IS and the competitive strategies they support remains a critical yet often overlooked factor in the success of SCM IS implementations.

The number of SCM IS alternatives makes it difficult for firms to determine which solution is best for their unique situation. The complexity of cross-enterprise SCM IS requirements analysis, implementation, and integration has resulted in frequent mismatches between the strategic objectives of an organisation and the capabilities of the IS implemented. For example, Nike's troubled SCM IS implementation has been blamed on a mismatch between their specialised requirements for agile distribution and the system's more standardised capabilities [8].

The ultimate goal of our research is to develop models and measures for assessing the fit between SCM IS capabilities and competitive strategy (also known as business strategy). Existing studies of IS alignment or fit deal primarily with high-level IS strategy in general [9,10], whereas this study focuses on the fit of the capabilities enabled by the functional attributes of a specific type of information system with competitive strategy. Focusing specifically on supply chain systems reduces the generalisability of the model to other information systems. However, it provides a richer analysis of the factors that contribute to strategic fit in SCM IS and a research methodology extendable to the analysis of other types of IS.

The specific objective of this paper is to illustrate how the competitive strategy patterns of a business unit (BU) can be identified and used to determine the theoretically ideal SCM IS capabilities for that BU. Section 2 discusses the concepts of strategic fit, strategic archetypes, and SCM IS capabilities using an analysis of previous studies from multiple disciplines. Section 3 analyses several related studies to determine the theoretically ideal SCM IS capabilities for each archetype. We then present a model that proposes how to determine the correspondence of the competitive strategy patterns of a BU with each strategic archetype and the ideal SCM IS capabilities for that BU. Section 4 reports on an exploratory investigation using the emergent model to illustrate the utility of the model and assess alternative measures of competitive strategy patterns. The final section summarises the utility of the proposed model and recommends future studies for measuring and strengthening the strategic fit of SCM IS.

2 Strategic fit, archetypes, and SCM IS capabilities

Achieving strategic fit or alignment has been an important goal for most IS executives [11,12]. IS studies have explored different dimensions of the concept resulting in terms used interchangeably such as alignment, fit, linkage, or coordination. In this study, we use the term 'strategic fit' since we are studying the degree to which the capabilities of an SCM IS match the requirements for supporting a business unit's competitive strategies [13]. We avoid the term 'alignment' since it is often unclear whether it refers to the 'process' or 'outcome' of alignment [14]. We focus on the latter (studying the degree of fit achieved or desired), rather than studying how to align the systems and strategies to improve the degree of fit.

It is also important to clarify the dimensions of strategic fit on which this study focuses. Henderson *et al*. (1996) propose that strategic alignment of IS involves achieving fit between competitive strategy, IS strategy, organisational infrastructure and processes, and IS infrastructure and processes [15]. While fit between each of these is important, this study looks only at the impact of fit between competitive strategy and the IS infrastructure used specifically for supply chain management and coordination, which we refer to as the strategic fit of SCM IS (see definitions in Table 1).

Table 1 Definition of research constructs

Construct	*Definition*	*Related studies*
Strategic Fit of SCM IS	How well a SCM IS supports a business unit's competitive strategies and supply chain requirements.	[10,13,15,16]
Competitive Strategy Patterns	The recurring strategic activities and postures undertaken by a business unit in response to their perceived competitive environment.	[17–21]
Competitive Strategy Archetype	An ideal configuration of internally consistent competitive strategy patterns. Examples include Defenders, Prospectors, and Analysers, which are ideal configurations of competitive strategy patterns.	[13,19–21,23–29]
SCM IS Capabilities	The ability of an SCM IS to support a business unit's supply chain requirements. Examples of high-level SCM IS capabilities include support for operational efficiency, flexibility, analysis, and process coordination.	[10,19,30–34]

Several studies have focused on the importance of achieving fit between an organisation's IS strategy and its competitive strategy [10,24,35]. Researchers have also noted that strategic fit is important for SCM IS in particular [16]. Fisher (1997) suggests configuring supply chains and SCM IS for either efficiency or responsiveness depending on whether the products involved were 'functional' or 'innovative' in nature [36]. Fisher's (1997) bivariate conceptualisation of fit is useful for analysing extreme supply chain cases where the product type is homogeneous. However, Reddy and Reddy (2001) note that most supply chains need to optimise both efficiency and agility [7]. This 'efficiency-agility' paradox occurs in supply chains because of the mix of products and services they must support as well the range of processes that occur, some static and some very dynamic [37].

Other studies have proposed SCM IS should fit the degree of communication and collaboration between supply chain partners [38,39]. However, these studies only examined fit with the level of interorganisational information sharing and did not examine fit with other important dimensions such as competitive strategies, the level of process integration, or the level of joint decision-making between firms.

To address the shortcomings of these reductionist bivariate conceptualisations of fit, our research model attempts a more systems-orientated approach by investigating the relationships and interactions of a larger number of factors simultaneously. For example, firms have different requirements for IS depending not only their need for efficiency or agility, but also on the amount of market surveillance, long-term planning, and interorganisational information sharing they perform [10]. Using traditional bivariate or multivariate statistical techniques to analyse fit between two multivariate constructs is often infeasible in organisational studies due to the difficulty in controlling variables and analysing the large number of relationships [13,40]. Instead, we use a configurational

approach to identify consistent patterns and groupings of the research variables and reduce the complexity of the analyses [19,26]. A configuration is 'any multidimensional constellation of conceptually distinct characteristics that commonly occur together' [26, p.1175]. They are more holistic than contingency theories involving discrete variables [41] and support the concept of 'equifinality', which assumes that similar organisational outcomes can arise from diverse paths [42]. Configurational theories 'offer richer insights by focusing on parsimonious and relatively homogenous groups rather than diverse concepts' [18, p.20].

Configurational theories have been widely used in competitive strategy studies such as the idealised typologies developed by Ansoff (1965) [17], Miles and Snow (1978) [20], Mintzberg (1978) [21], or Porter (1985) [22]. Each typology focuses on different aspects of competitive strategy and thus their utility depends on how well they model the research variables of interest to a particular study [43]. For example, Mintzberg's (1978) archetypes of simple, machine, organic, and divisionalised organisations focuses mainly on the structure and process of strategy formulation [21], while Porter's (1985) strategic archetypes of cost leadership, differentiation, and focus is focused mainly on the generic strategies that business units use to compete and does not focus on structural and process-related variables [22]. Similarly, Miles and Snow's Defenders, Prospectors, and Analysers strategic archetypes [20] focuses largely on the processes of innovation and its required structures and strategies [43].

The Miles and Snow competitive strategy typology is one of the most popular strategic typologies used in strategy and information systems studies, due to its comprehensive treatment of strategy, structure, and processes, its support in empirical studies, and its predictive utility [19,23,25,27,29,44–46]. As opposed to the more one-dimensional models of strategic types such as Mintzberg (1978) [21] and Porter (1985) [22], Miles and Snow's (1978) archetypes have good predictive abilities and empirical support [27,32]. It has been widely used and validated in numerous empirical studies of strategic fit [19,25,46] including investigations of the strategic fit of IS organisational structures [24,28] and IS systems capabilities strategies [10,30]. Furthermore, the Miles and Snow competitive strategy typology accounts for many of the high level differences between organisations engaging in supply chain initiatives such as product innovativeness, rate of change of processes, or partnership characteristics [10,32,44]. Although the Ansoff (1965) [17], Porter (1985) [22], and Mintzberg (1978) [21] typologies were initially examined, this study selected the Miles and Snow (1978) [20] competitive strategy archetypes to characterise business units deploying SCM IS for the preceding reasons.

This study characterises business units according to their correspondence with Miles and Snow's ideal normative configurations of Defenders, Prospectors, and Analysers. These archetypes are internally consistent configurations of competitive strategy, structure, and processes, which were found in empirical studies of several industries [20,46]. Miles and Snow described the typical responses each ideal archetype adopts in response to their perceived environment [20]. They studied the marketing, production and distribution, and administrative problems that firms face and determined the responses that each of their archetypes have to these problems. Miles and Snow found that Defenders, Prospectors, and Analysers each displayed unique patterns of responses to 11 dimensions of competitive strategy including product-market breadth, success posture, surveillance, growth, process goals, competency breadth, adaptability, administrative focus, planning, organisational structure, and control [20].

Miles and Snow's description of the various dimensions of the Defender, Prospector, and Analyser archetypes is very detailed (see Table 2). In summary, the archetypes have business strategies focusing on operational efficiency, innovation, and risk minimisation, respectively [20]. Miles and Snow also identified an additional strategic type known as Reactors, but since these organisations do not appear to have a consistent strategy [20], the Reactor archetype is usually omitted from studies using the Miles and Snow typology [19].

Table 2 Competitive strategy archetypes

Competitive strategy archetype [20]	*Typical competitive strategy patterns [20,44]*
Defender (operational efficiency)	– High-quality standardised products and processes – Low prices achieved with economies of scale – Mechanistic organisational structure – High fixed-asset intensity – Highly cost-efficient but relatively few core technologies
Prospector (innovation)	– High research and development and market intelligence investments – Lower level of controls and operational efficiency – Organic organisational structure – Low fixed asset intensity – Flexible technologies, processes, and skills
Analyser (minimise risk with proven opportunities)	– Maintains core products and adopts proven innovations – Large matrix organisational structure – Mix of processes and technologies for efficiency and flexibility
Reactor (quick response to market demands)	– Rapid, opportunistic responses to immediate market demands – Project-orientated processes and organisational structure – Negligible long-term planning – Inconsistent or uncoordinated responses to competitive environment

Any chosen typology has limitations in the selective treatment of the research variables and their theorised relationships. Although studies have supported many of Miles and Snow's (1978) propositions individually, the simplifications used in describing configurational theories often result in ambiguities in interpreting the models and operationalising the constructs. Critics of Miles and Snow (1978) rightfully point out that few organisations are pure Defenders, Prospectors, or Analysers, although many studies assign firms to one of these archetypes and ignore the degree of deviation from the ideal configuration. However, empirical studies by Doty *et al*. [19] have clarified that the Miles and Snow classifications should be interpreted as ideal configurations that are internally aligned and consistent. At a high level, it may be sufficient to classify a firm as a Defender, Prospector, or Analyser, but a more detailed and realistic analysis requires that the degree of deviation from each of these ideal archetypes is measured as well as the individual dimensions that do not correspond with the ideal archetype.

Similarly, Doty *et al*. [19] note that the Miles and Snow [20] archetypes characterise business unit competitive strategies, rather than corporate or firm-level strategies as assumed by some researchers. They also clarified that a fourth archetype known as Reactors [20] is not an internally consistent or ideal configuration and thus researchers are justified in their traditional exclusion of this archetype from their research models [25,27].

The traditional view of the strategic alignment of IS proposes that various aspects of a firm's IS strategies, processes, infrastructure, and governance mechanisms should be aligned with the firm's competitive strategies or other aspects of the organisation [47–49]. Some researchers have challenged this conceptualisation, suggesting that fit should be viewed as an incremental and mutual process rather than having to start with an understanding of a firm's strategy [50]. Other IS researchers have debated the utility of attempting to align IS with competitive strategy. Ciborra [51] argues that strategic plans are difficult to ascertain and IS capabilities are continually drifting, thus alignment is difficult if not impossible. Knoll and Jarvenpaa [52] highlight the infeasibility of trying to align IS to ever-changing strategies, structures, and environments and suggest that strategic flexibility may be more important than strategic fit, especially in turbulent environments. However, these critiques usually conceptualise strategy as a rational organisational design or plan [17,22], rather than an emergent pattern of competitive behaviour [18,21].

We agree that it is futile to attempt to align IS capabilities with a business unit's stated or intended strategies since these frequently do not correspond with an organisations actual activities or realised strategies [21]. Instead, this study focuses on the alignment of SCM IS capabilities with a business unit's emergent or observable patterns of competitive strategy activities. Furthermore, while strategic fit is difficult to achieve in highly turbulent environments, several studies have found that even in highly turbulent environments, firms tend to exhibit the relatively stable and consistent competitive strategy patterns described in Miles and Snow [22] until a relatively infrequent marketplace upheaval occurs [19,25,29,53].

For each BU, consistent competitive strategy patterns can be observed and compared with the patterns found in Miles and Snow's competitive strategy archetypes. Thus, the degree of correspondence with each archetype can be determined. Following Doty *et al*. [19], rather than ascribe all BUs to a single business strategy type, we analyse how closely a BU matches each of the Defender, Prospector, or Analyser profiles. Knowing the degree of correspondence of the competitive strategy patterns of a business unit with one of the Miles and Snow archetypes, we can then determine which SCM IS capabilities would be ideal for that BU.

3 Ideal SCM IS capabilities

In organisational literature, the 'resource-based view of the firm' makes an important distinction between resources and capabilities. Resources are the basic inputs to production, while capabilities are the ability to do something with the resources. Resources are the source of a firm's capabilities, while capabilities are the source of a

firm's competitive advantage [31]. Similarly, this study makes the distinction between IS functional attributes and IS capabilities. The functional attributes of an IS are the functions that it can provide, such as forecasting or order processing. An IS capability is the ability of an implemented IS to support the firm's activities. For SCM IS capabilities specifically, McLaren (2002) found operational efficiency and flexibility, internal and external planning and analysis, and internal and external business process coordination to be among the most important capabilities following a field study of manufacturers and a review of previous studies [54]. However, since process coordination capabilities are believed to depend more on the degree of integration between the supply chain partners and less on competitive strategy [39,54], they are not included in the scope of this study. Similarly, while it may also be important to align SCM IS capabilities with other facets of an organisation, such as supply chain strategies or human resource strategies, this study looks specifically at the fit of SCM IS with patterns of competitive strategy.

Various researchers have studied the ideal IS capabilities that are associated with each of the Miles and Snow archetypes [10,19,20,30,32,44,46,55]. For example, Simons (1987) studied accounting IS in 76 business units and found that businesses the study classified as Prospectors or Defenders had higher performance when several specific IS capabilities fit the theoretically ideal capabilities for their archetype [55]. Prospectors that had more flexible IS performed better than Prospectors with less flexible IS, suggesting that operational flexibility is an ideal IS capability for Prospectors.

While no single study focuses on the ideal capabilities specifically for SCM IS, we have reviewed a large number of conceptual and empirical studies that used the Miles and Snow archetypes. After analysing these previous studies, we have proposed the relative level of support (low, medium, or high) an SCM IS should provide for each capability for each competitive strategy archetype. The ideal capabilities ratings were generated from analysis of peer-reviewed studies and a panel of three practitioners in senior supply chain management and consulting roles assessed the credibility of the ratings. After reviewing the descriptions of the constructs and supporting literature, the judges agreed that each of the ideal capabilities ratings appeared to be valid. Table 3 summarises our findings on the theoretically ideal levels of support an SCM IS should provide for each of the competitive strategy archetypes.

To derive the ideal levels of support for each SCM IS capability for a BU, we must first determine the degree of correspondence of the competitive strategy patterns of the BU with each competitive strategy archetype. For example, if a BU corresponds perfectly with the ideal profile of a Defender, then from Table 3, we can expect that its SCM IS should provide a relatively high level of support for operational efficiency and internal planning and analysis capabilities and a relatively low level of support for operational flexibility and external planning and analysis capabilities.

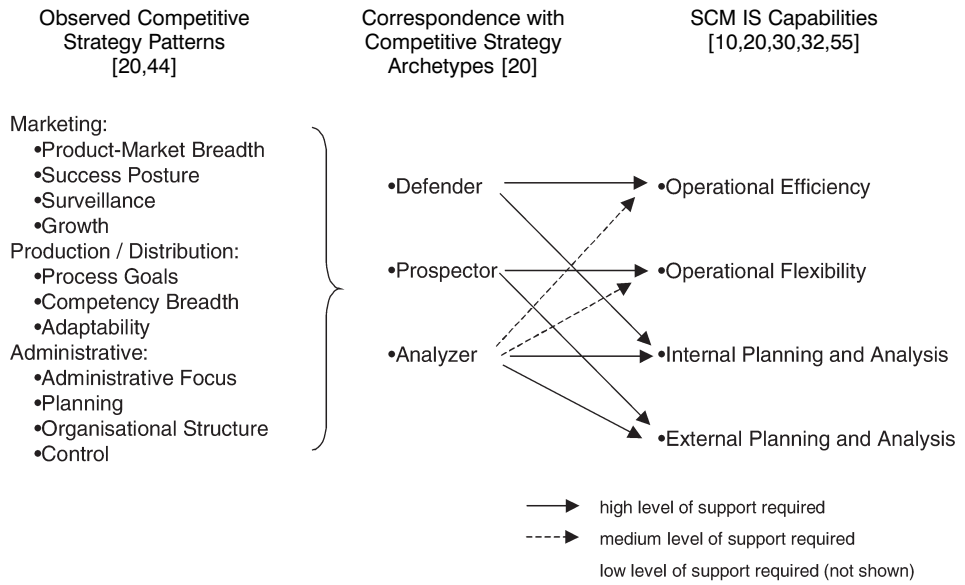
Table 3 Level of support required for each SCM IS capability

SCM IS capability and level of support	*Justification from previous studies*
Operational Efficiency Defenders – High; Prospectors – Low; Analysers – Medium	– Defenders invest heavily in cost and technological efficiency while Prospectors have inherent inefficiency. Analysers require efficiency for their mature product lines but not to the level of Defenders overall [46]. Supported by empirical studies [19,20,44]. – Segev (1989) arrived at same rankings for operational efficiency after surveying a panel of judges [32]. – Camillus and Lederer (1985) [30] and Sabherwal and Chan (2001) [10] suggested Defenders should have IS that support efficiency although the latter study of 226 firms failed to find empirical support for the proposition. – In a study of 76 firms, Simons (1987) found Prospectors should have a relatively low focus on operational efficiencies and cost controls although support for Defenders focusing on operational efficiency not found [55].
Operational Flexibility Defenders – Low; Prospectors – High; Analysers – Medium	– Defenders are less focused on responding to shifts in market environment while Prospectors require a large degree of technological and operational flexibility. Analysers require flexibility for their immature product lines but not to the level of Prospectors overall [46]. Supported by several empirical studies [19,20,44]. – Camillus and Lederer (1985) suggested Prospectors should have IS that support flexibility [30], which was empirically supported by studies of Sabherwal and Chan (2001) [10]. – Simons (1987) found Prospectors required more flexible accounting IS while Defenders required more stable accounting IS [55].
Internal Planning and Analysis Defenders – High; Prospectors – Low; Analysers – High	– Defenders invest heavily in internal monitoring and controls for efficiency, while Analysers invest heavily to coordinate complex matrix administrative structures. Prospectors have low levels of internal controls, formalisation, and routinisation [46]. Supported by several empirical studies [19,20,44]. – Segev's (1989) study arrived at same rankings for internal analysis [32].
External Planning and Analysis Defenders – Low; Prospectors – High; Analysers – High	– Prospectors invest heavily in scanning the environment for potential opportunities while Defenders tend to ignore external changes. Analysers must heavily monitor marketplace to adopt successful innovations [46]. Supported by several empirical studies [19,20,44]. – Segev's (1989) study arrived at same rankings for external analysis [32]. – Simons (1987) found Prospectors ideally scanned competitor activities more aggressively than Defenders and used more external forecasting [55].

Once the theoretically ideal capabilities for a BU are known, the strategic fit of the SCM IS capabilities could be determined by comparing the theoretically ideal level of support required for each capability with the observed level of support provided by the SCM IS. However, the measurement of strategic fit will require further study outside the scope of this paper.

In summary, our theoretical model proposes that the competitive strategy patterns of a business unit can be used to determine the degree of correspondence with each competitive strategy archetype. This in turn can be used to determine the theoretically ideal levels of support a SCM IS should provide for each of the SCM IS capabilities for the business unit, as shown in Figure 1.

Figure 1 Deriving the theoretically ideal levels of support for a SCM IS capability



Several measures have been proposed for determining the correspondence of the competitive strategy patterns of a BU with each of the Miles and Snow competitive strategy archetypes. The most commonly used operationalisation involves having an informant select the paragraph description that most closely describes the competitive strategy patterns of their BU. This usually involves using Miles and Snow's (1978) paragraph descriptions of each of the archetypes [20]. However, this 'paragraph-type' approach has been criticised for failing to operationalise all of the 11 dimensions in the Miles and Snow (1978) model [44]. It also forces the classification of the BUs into one of the ideal archetypes, rather allowing for hybrid configurations or measuring the degree of correspondence with each of the ideal types [19].

To determine the most appropriate methods of operationalising our research constructs a pilot study was conducted as described in the following section.

4 Pilot study

The goal of the pilot study was to determine the feasibility of using a BU's competitive strategy patterns to derive their ideal SCM IS capabilities. We developed the initial conceptual model and measures by synthesising concepts from published studies described in the previous section. As this study involves a newly emerging theory, we iteratively reviewed and refined the conceptual model using evidence from an exploratory field study of six BUs in three Canadian manufacturers, following Eisenhardt's recommendations for building theory from case studies [56]. We also pre-tested and revised the wording of the measures repeatedly using a panel of judges with academic and practitioner expertise in SCM IS. The six BUs in the pilot study were each selected purposively so that their competitive strategies were expected to be representative of each of Miles and Snow's (1978) Defender, Prospector, and Analyser strategic types. This 'theoretical sampling' strategy followed recommendations for ensuring that all aspects of the proposed theory are included in the evidence gathered from the informants [57]. For each of the BUs, two informants in senior management positions were interviewed and given pilot surveys to assess the BU's competitive strategy patterns and correspondence with the Miles and Snow archetypes.

The pilot study tested four alternative methods for determining a BU's correspondence with the Miles and Snow archetypes. Miles and Snow's (1978) measure [20] asked respondents to select the paragraph that best describes their firm's competitive strategy patterns. The measure was chosen as it is widely used in empirical studies and enables a quick self-typing to be done. The measure has been found to have good predictive utility and generally agrees with other measures of competitive strategy patterns [25]. However, other studies have uncovered limitations in its operationalisation [29,44].

We also followed Sabherwal and Chan's (2001) [10] approach of mapping Venkatraman's (1989) Strategic Orientation of Business Enterprises (STROBE) measure [58] to the competitive strategy type. For example, Sabherwal and Chan (2001) found that the current theory suggests that Defenders are expected to score relatively high in the Defensiveness, Risk Aversion, and Futurity attributes, and low in the Proactiveness attribute [10]. Therefore, the responses of the STROBE attributes could be used to determine if a firm matched the Defender, Analyser, or Prospector profiles the closest [10].

The third measure of the Miles and Snow archetype used was adapted from a measure developed by Conant *et al*. (1990) [44]. As the Miles and Snow (1978) paragraph descriptions do not fully cover all 11 dimensions of their archetype construct, Conant *et al*. (1990) developed an 11-item measure that operationalises each of these dimensions individually [44]. By analysing the patterns exhibited by a BU for each of Miles and Snow's 11 dimensions, Conant *et al*.'s (1990) measure can be used to determine the relative correspondence of a BU with each of the competitive strategy archetypes.

Finally, an exploratory case study was conducted for each of the six business units involving the interpretation of semi-structured interview transcripts and archival documents. This evidence was used to assess the plausibility of the findings from the three survey questionnaires described above. A panel of three judges reviewed the results from each of the measures and the case reports to assess the apparent validity of the measures and findings.

5 Results

The Miles and Snow (1978) paragraph-type measure [20] had the fastest response time, as the one page questionnaire was considerably shorter than the other measures used. For five of the six BUs, the archetype selected by each respondent was consistent and was corroborated by the three judges who reviewed additional case study evidence on the business units. One of the 12 respondents selected an archetype that was not corroborated by the additional evidence. However, they indicated they had difficulty deciding between two paragraphs and their second choice did agree with the other ratings.

Results of the pilot study using the STROBE measure could not be corroborated with other measures of competitive strategy patterns for three of six BUs. Further examination of the STROBE measure revealed that the items and constructs did not adequately address the differences between the Miles and Snow archetypes. For example, the Analysis construct did not distinguish between external (market scanning) and internal (company performance) analysis, which is a key differentiator between Analysers and Defenders.

Results from the 11-item measure adapted from Conant *et al*. (1990) [44] were corroborated by evidence from the case studies for all six BUs and were deemed sufficiently plausible by the panel of judges.

Although the Miles and Snow (1978) measure appeared to have acceptable validity for a quick and economical measure, the single mistyping that occurred supported Conant *et al*.'s (1990) criticism that that the paragraph descriptions do not cover all 11 dimensions of the Miles and Snow competitive strategy construct [44]. Of the three questionnaires, the Conant *et al*. (1990) measure and results was judged to have the highest apparent or face validity. As suggested by Doty *et al*. (1993) [19], the measure allowed for a finer-grained analysis and highlighted the degree of correspondence with the archetypes, rather than classifying each BU as a pure archetype. Since none of the BUs corresponded fully with an archetype for all 11 dimensions, the levels of support required for each of the SCM IS capabilities were weighted according to the percentage of dimensions that corresponded with each of the archetypes.

Finally, the ideal levels of support for each SCM IS capabilities were generated from the theoretical model shown in Figure 1 and were reviewed with the pilot study participants and panel of judges. In each case, the study participants judged the theoretical model and the results for their BU to be plausible, interesting, and informative. Several noted that although the findings were largely intuitive, the analysis of their competitive strategy patterns will be particularly useful in future decisions regarding their SCM IS.

6 Conclusions and discussion

This study demonstrates how a business unit's competitive strategy patterns can be identified and used to determine the ideal capabilities, as shown in Figure 1. The pilot study found the emergent theoretical model could be used to generate useful and plausible analyses of a business unit's competitive strategy patterns and ideal SCM IS capabilities.

From an analysis of previous studies, we found the high-level SCM IS capabilities that are impacted by competitive strategy include operational efficiency, flexibility, internal planning and analysis, and external planning and analysis. Our model proposes the ideal

level of support for each of these capabilities depends on how closely a business unit corresponds to each of the Miles and Snow (1978) Defender, Prospector, and Analyser archetypes [20], as shown in Table 3.

Findings from the pilot study suggest the correspondence of a BU to each of Miles and Snow archetypes should be determined using a measure developed by Conant *et al*. (1990) [44]. Additional evidence from field studies and Miles and Snow's (1978) measure [20] should also be gathered as a check for corroboration. From the competitive strategy archetypes, the theoretically ideal levels of support that a BU's SCM IS should provide for each capability can be determined. Using this information on their competitive strategy patterns and ideal SCM IS capabilities, businesses can make better-informed decisions regarding their SCM IS initiatives.

6.1 Contributions

Several studies have suggested that the success of an IS is in part dependent on achieving strategic alignment between competitive strategies and IS strategies [10,24,35]. However, this study is one of the few to examine how success can be influenced by aligning competitive strategy patterns with the capabilities of an IS as suggested by Henderson *et al*. (1996) [15].

Similarly, in a classic study of fit in supply chain management, Fisher (1997) explored the bivariate relationships of innovative versus mature products requiring efficient or flexible supply chains [36]. While it is useful for firms supply chains with homogeneous products, it provided little guidance to firms that required both efficient and flexible supply chains. A major strength of our conceptualisation is that it enables the appropriateness of an SCM IS to be determined based on a number of capabilities simultaneously rather than focusing on single bivariate dimensions. Thus, firms can develop more holistic or systems-based analyses that include multidimensional profiles rather than being limited to studying various dimensions individually and ignoring their interrelationships.

For researchers, the model described in this paper provides an interdisciplinary systems approach to determining the ideal capabilities provided by an SCM IS. The model clarifies, synthesises, and extends research on Miles and Snow's (1978) strategic archetypes. It could also be adapted for use in strategic IS domains other than SCM IS. Practitioners will gain a better understanding of how to identify their competitive strategy patterns. Through an analysis of the capabilities that can be enabled by an SCM IS, practitioners will be better able to reduce risks and maximise the success of their SCM IS implementations.

In summary, this study provides a much-needed framework for investigating the fit between competitive strategy patterns and SCM IS capabilities. We describe an approach for identifying the theoretically ideal level of support for SCM IS capabilities required for a business unit. The model was developed from an analysis of the literature and examined through an exploratory pilot study of three manufacturers. However, given the emergent nature of model proposed, further empirical studies are clearly required.

6.2 Limitations and ideas for future research

The pilot study sample was selected purposively to explore preliminary theories of strategic fit of SCM IS capabilities, rather than to decisively test any hypotheses. While the evidence gathered was useful in developing preliminary models, the small sample size did not allow any sophisticated statistical or qualitative analyses to be performed. However, feedback from the participants involved was extremely positive, and there are indications that further investigations will yield many important insights to help guide decisions in this important area.

In future studies, the theoretically ideal capabilities for a BU could be used to explore the strategic fit of the capabilities of a SCM IS by comparing the theoretically ideal level of support required for each capability with the observed level of support provided by the SCM IS. Such studies would need to resolve the question of whether it is better or worse to have an SCM IS whose level of support for the capabilities described in our model exceed the theoretically ideal levels. One possibility is that such an SCM IS would be 'overkill' and would not perform as effectively since it would be overly complex, costly, or difficult to use compared to a system that met the exact level of capability required. However, it is also possible that it is slightly better to have a system that exceeds the required level of support rather than one that fails to meet it.

Similarly, future studies should address methods of determining the relative importance of each of the SCM IS capabilities in our model. For some firms, the operational efficiency and flexibility dimensions may be more important in determining fit than in others. We also acknowledge that there may be interrelationships between the capabilities, which require further investigation. Some researchers might be inclined to see efficiency and flexibility as contradictory requirements, although at a business unit or firm level, this is not necessarily true. For example, some businesses may require high operational efficiency for some processes and high operational flexibility for others [37]. At the business unit level, it would appear to have requirements for a high level of support for both efficiency and agility. While the model described in this paper has not yet been used to probe the inconsistencies that are found within and between business units, it should provide a significant foundation for future investigations.

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