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Abstract

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SUPPLY CHAIN INTEGRATION AND PATHWAYS OF LEAST RESISTANCE

by

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ABSTRACT

Exploratory, site-centred research used a systems theory lens to investigate real-world pathways to supply chain integration. The longitudinal studies involved four New Zealand-based case companies and utilised a rigorous, multi-method supply chain integration benchmarking procedure. Findings indicate that, regardless of best practice recommendations, supply chain managers adopt the integration pathway favoured by senior management in order to secure the level of authority they need for often cross-functional projects. Similarly when seeking to improve external relationships, integration pathways that would have the company negotiating from a position of strength are favoured, even though more effective negotiation strategies may be possible. In short, supply chain managers appear to be risk averse and favour pursuing integration pathways which they perceive will be less problematic for them.

KEYWORDS
Supply Chain Management, Supply Chain Integration, Longitudinal Case Study, Contingency Theory, Supply Chain Change

INTRODUCTION

The ultimate goal in supply chain management is to create value for end customers and other organisations in the supply chain network (Christopher 1998). While it is generally accepted that supply chain players must integrate process activities (e.g., Lambert, Cooper, and Pagh, 1998), the situation remains chaotic in many organisations (Böhme, 2009). This state of affairs is not helped by a lack of knowledge about specific pathway(s) to improve internal process integration and linkages with external suppliers and customers (Pagell, 2004; van Donk & van der Vaart, 2005). This article reports an early attempt to address this shortcoming.

Following a review of the relevant literature a rigorous multi-method approach termed the 'Quick Scan Audit Methodology' is introduced. Four comparative longitudinal case studies then provide insights into actual pathways to successful supply chain integration, findings are discussed, and potential research avenues highlighted.

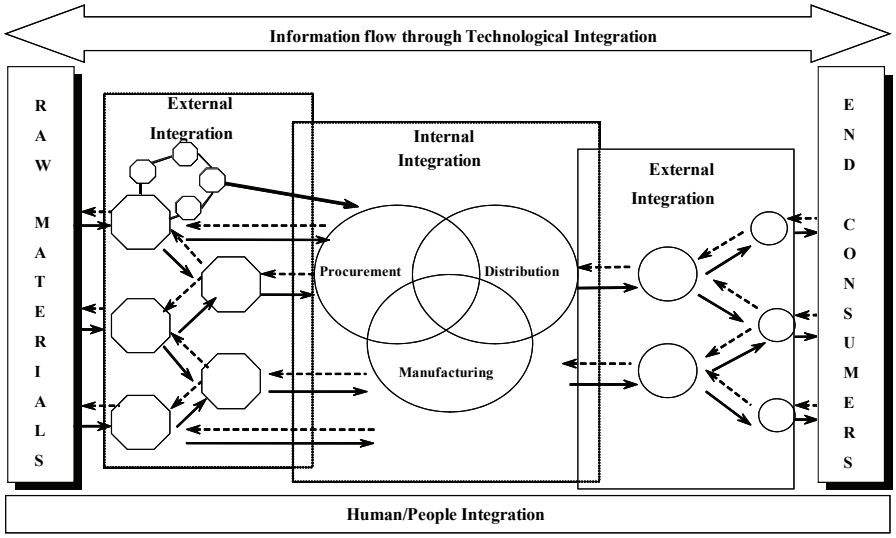
LITERATURE REVIEW

Supply chain integration

The concept of integration originates from a systems perspective whereby optimisation of the whole is held to achieve better performance than a string of optimised sub-systems; because trade-offs and wider ranging decisions can be made based on shared information and co-ordination (Christopher, 1998). Integration of supply chains continues to be a subject of significant discussion and debate within the academe (Flynn et al., 2010; Frohlich & Westbrook, 2001; Swink et al., 2007; Towill et al., 2002; Zhao et al., 2011).

Internal integration aims to overcome functional silo boundaries that obstruct seamless material and information flows; thus inter-departmental collaborations aim to bring functional units closer together into a cohesive organisation (Kahn & Mentzer, 1998). Similarly, external collaborations aim to soften company boundaries and advance integration toward a wider supply network. Figure 1 depicts the authors' view of supply chain integration, which is one shared by many authors (e.g., Bowersox et al., 2002; Fawcett and Magnan, 2002; Lee, 2000; Stevens, 1989). In such a simplified supply chain network structure diagram the 'focal company' is shown at the centre. In general terms, both internal and external integration is aimed at making more effective use of the combined resource base, together with better-integrated information and material flows. External integration is often viewed as partnerships and strategic alliances (e.g., Droge et al., 2004; Kim, 2006; Maloni & Benton, 1997; Spekman et al., 1998), which appears to run counter to the aim of optimising material and information flows (Frohlich and Westbrook, 2001; Gimenez, 2004). In any event, key supply chain business processes (comprising information and material flows) are perceived to piercing the functional silos within the focal company and the corporate silos existing across the wider supply chain (Bowersox et al., 2002; Lambert et al., 1998).

FIGURE 1
INTEGRATED SUPPLY CHAIN MODEL



Source: Adapted from Handfield and Nichols, 2002

Pathways to integration

Many researchers have highlighted the continuing lack of understanding and knowledge about actual pathways to supply chain integration (e.g., Cigolini et al., 2004; Frohlich & Westbrook, 2001; Pagell, 2004; van Donk & van der Vaart, 2005) and note that much of the research on integration has been predicated on the assumption that integration occurs in distinct stages (e.g., Narasimhan and Kim, 2001). Possibly the most influential work is by Stevens (1989) who proposes a four stage evolutionary model of supply chain integration and argues that organisations 'need to get their in-house processes in order first' before attempting to integrate with external suppliers and customers. However, this view is contested by others who have shown that even similar companies may progress through quite different stages in pursuit of supply chain integration (e.g., Gimenez, 2004; Lambert et al., 1998; Lee, 2000). Halldorsson et al. (2008) also report that managers appear to more readily achieve successful integration with their external suppliers and customers than is

achieved internally. This study aims to shed further light on these issues by investigating how companies have chosen to improve their level of supply chain integration.

METHODOLOGY

Site-based longitudinal case studies were undertaken with four New Zealand-based companies, Table 1. All the companies were selected on the basis that they maintain a global supply chain, represent a range of industry sectors, and all had undertaken a supply chain integration change initiative following the first data collection. The average time period between data collections was 25 months.

TABLE 1
DATA COLLECTION OVERVIEW

Company	1st data collection	2nd data collection	Time frame (months)	Researcher Days
Manufacturer	Dec. 2006	Mar. 2008	16	41
Pulp/Paper	Mar. 2006	April 2008	25	32
Dairy	Jan. 2004	Dec. 2006	35	34
Food	May 2006	May 2008	24	27

Each case study involved a site-based audit methodology known as the 'Quick Scan Audit Methodology' (QSAM), which is explained in considerable detail in Naim et al., (2002). QSAM utilises several forms of triangulation to improve researcher judgment by providing several sources of verification (Flynn et al., 1990). A research team approach is employed, which enables the case situation to be viewed from different perspectives to achieve in-depth understanding of the supply chain and its state of maturity/sophistication. Data is collected from four distinct sources to facilitate methodological triangulation and increase internal validity: process maps; attitudinal and quantitative questionnaires; semi-structured interviews; and archive information. Summary data and tentative conclusions are formally presented to management and staff for review and agreement. The follow-up audits also included interviews backed by collection of confirmatory archive data to comprehend the reasons for the choice of pathway and the nature of the change improvement activities. A total of some 134 researcher-days was spent auditing the four organisations.

FINDINGS

Individual case findings

A focal company's process integration initiative typically focuses on improving the internal material and information flows and/or the external supply-demand linkages. Figure 2 summarises the changes in supply chain integration achieved by each case company during the time period between the audits. At the time of the follow-up audit all four companies were at different stages of supply chain maturity, and although none had achieved complete internal integration the projects were deemed a success by the managers concerned.

FIGURE 2
EFFECTS OF INDIVIDUAL CHANGE MANAGEMENT PROGRAMMES ON SUPPLY CHAIN INTEGRATION

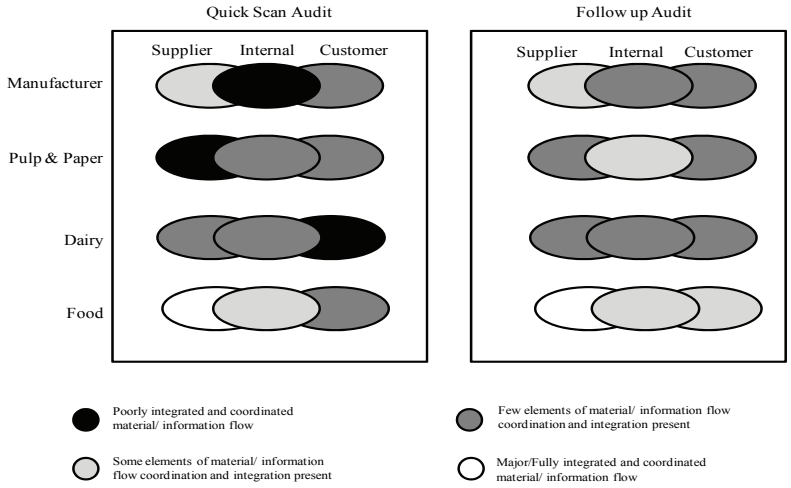


Table 2 provides an overview of the change programmes implemented by each focal company. Only changes occurring since the first QSAM audit are noted, which are arranged in chronological order (top-bottom). The table clearly indicates that each case company had its own particular focus when attempting to improve integration of its supply chain. For example, case company 'Manufacturer' chose to focus on improving internal coordination, whereas the others had an external and an internal focus. While none of the four case companies has managed to completely get its own house in order, which would be evidenced by high levels of integrated and coordinated information and material flows, the case company 'Food' has achieved high levels of information and material flow coordination on the supplier side. The company now has in place mature vendor managed inventory agreements with key suppliers, monitors a high performing small supplier base, and shares information intensively with its suppliers via the internet.

TABLE 2
CHANGE INITIATIVES OVERVIEW

Manufacturer	Pulp/Paper	Dairy	Food
• Daily cross-functional production meetings • Three new SC professionals hired • Empowered staff • Shop floor staff training • New ICT communication platform • A 'no blame' culture • Increased SC measures (efficiency/effectiveness) • Cross-functional KPIs • Implementation of 2-Bin System leading towards Kanban • Update of current ERP system including MRPII	• New SCM-related employees • Combined management of four closely related plants • A new procurement manager • Track & trace system • Non-compulsory training • Intra-net web site to enhance cross-functional visibility • Consolidation of supplier base • Standardisation of S&OP for four plants	• A new CEO • Flattened organisational structure • Training through job rotation • Appointment of purchasing manager • Fortnightly S&OP meetings • Increased SC measures (efficiency/ effectiveness) • SC strategy aligned to product type • Outbound information system sets desired stock levels	• New logistics manager • Improved 3PL relationship • New S&OP software package integrated into current ERP • Updated warehouse management system • Up-skilling & empowerment of warehouse staff • Restructuring of order information flows

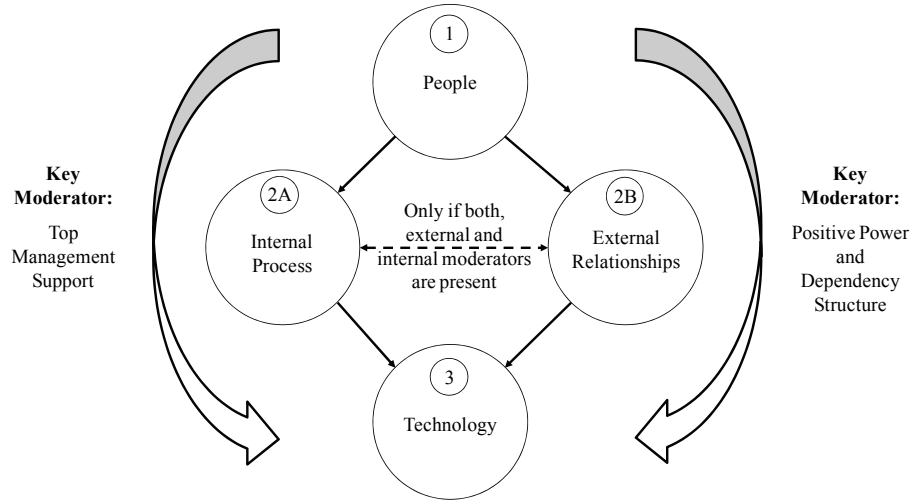
Cross-Case Comparison

From a cross-case analysis of the longitudinal case studies two main patterns emerged; the first concerning reasons for supply chain managers' choice of change pathway, and the second concerning the order of the change initiative activities. Findings indicate that, regardless of best practice recommendations, supply chain managers adopt the

integration pathway favoured by senior management in order to secure the level of authority they need for such projects. Similarly when seeking to improve external relationships, integration pathways that would have the company negotiating from a position of strength are favoured, even though more effective negotiation strategies may be possible.

Examining the order of the change activities reveals that no clear staging is evident. However, every case company chose to improve its knowledge and skills base before addressing inefficient internal processes and/or external relationships. Furthermore, every case company addressed its information technology requirements towards the end of the initiative. Figure 3 summarises the overall implementation process.

FIGURE 3
THE SUPPLY CHAIN IMPROVEMENT IMPLEMENTATION PROCESS



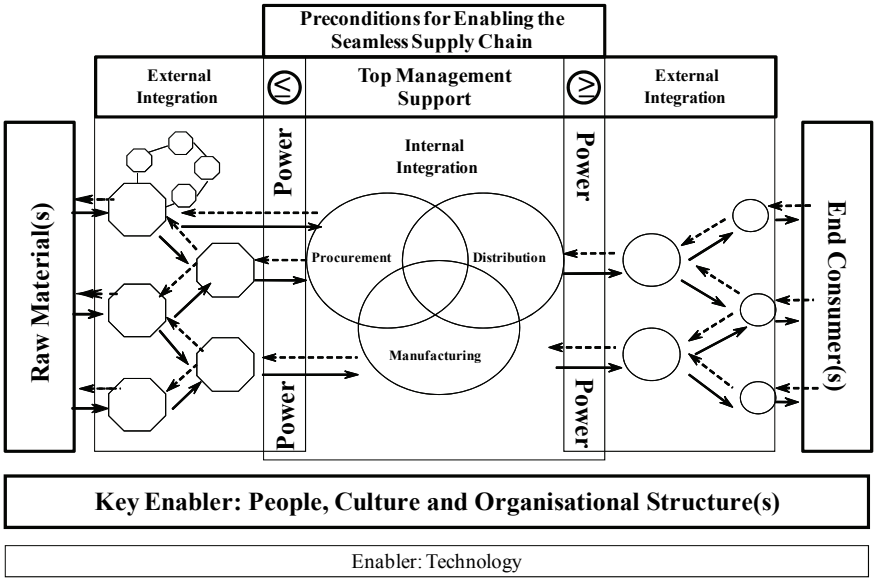
DISCUSSION AND CONCLUSION

This study indicates that current supply chain integration models are deficient because they fail to acknowledge two preconditions that determine the change pathway likely to be pursued in practice: (i) top management support for the initiative; and, (ii) a strong negotiating position (in the case of initiatives involving external power/dependency relationships). This situation is depicted in Figure 4, which adapts the Handfield and Nichols (2002) supply chain integration model by inclusion of the preconditions. Also, highlighted are the people and cultural change factors that tend to be tackled first; since integration is arguably a function of how well people work together both internally and externally with key entities. In contrast, although technology is a powerful enabler it is not the key to supply chain integration; people are (Mentzer et al., 2000). This was borne out by the case companies when the technology requirements received attention towards the end of the initiatives.

This paper aimed to answer the research question “How do companies try to achieve supply chain integration in practice?” To this end the original QSAM was extended to enable longitudinal case study data collection and four case companies were studied. The research demonstrated that there is no single identifiable route to successful supply chain integration. Simply put, the 'best' pathway to supply chain integration appears to be organisation-specific and is dependent on two preconditions being met: top management support (internally) and a favourable power and dependency structure (externally). In short, the findings indicate that supply chain managers tend to pursue integration pathways which they perceive will experience least problems during implementation.

In addition to the need to confirm these exploratory findings there are a many avenues for further research. A most intriguing question is whether supply chain integration improvements should be attempted at all when there is a lack of top management support or when balances of power are held by the external entity. A related question concerns suitable procedures for evaluating and championing those change paths which are perceived to be more effective for achieving supply chain integration, yet have a higher perceived risk of being problematical.

FIGURE 4
MODIFIED SUPPLY CHAIN INTEGRATION MODEL



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