Global Business and Management Research: An International Journal
Vol. 14, No. 3s (2022)

A Review and Conceptualisation of an Integrated Framework: Maritime Shipping

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Abstract
Purpose: In the maritime shipping industry, it is vital to understand the role of organisational memory, knowledge sharing, knowledge absorption and knowledge receptivity collectively known as knowledge management orientation in fostering supply chain integration to improve the performance of container shipping firms. The aim of this study is to review and establish a complete integration framework that synergises the industry with knowledge management and integration among the supply chain partners.
Design/methodology/approach: This study explored the possibility of knowledge management orientation and supply chain integration in enhancing the performance of the container shipping firms through systematic literature review.
Findings: A new integrated conceptual framework of knowledge management orientation, supply chain integration and performance of container shipping firms is developed.
Research limitations/implications: The limitation of the study is mainly ascribed to the niche attribute of the maritime shipping industry.
Practical implications: The container shipping firms shall recognise the role of supply chain integration for internal and external collaboration. New knowledge could be included to coordinate supply chain integration.
Originality/value: This study introduced and probed the unprecedented mediation function of supply chain integration between knowledge management orientation and firm performance in the niched maritime industry which was confronting the global shipping supply chain vulnerabilities.

Keywords: knowledge management, maritime shipping, performance management, supply chain integration, sustainability

Introduction

Since the introduction of container shipping which made this mode of transportation cost-effective and efficient, maritime shipping has grown significantly and gained prevalence (Gonzalez-Torre, 2013). Maritime shipping is the primary transport means of global commerce, accounting for over 90% of the goods traded. Maritime trade volumes are expected to increase by 2050 as global freight demand grows (OCED, 2021). Furthermore, the importance of this mode of transportation has grown as supply networks have become more globalised (Trapp et al., 2020).

Due to turbulence and upheavals, container shipping firms experience volatile container freight rates in an unforeseen environment (Bathke et al., 2022). Over the last five years, a wave of marine industry mergers has exacerbated supply-chain vulnerabilities caused by the Covid-19 outbreak causing significant delays in cargo movement across oceans. According to shippers and freight forwarding business which secure sailing space to deliver cargo, industry consolidation controls most containers through mega vessels causing fewer routes, fewer feeder vessels and fewer ports that could keep the cargo movement going when the pandemic struck the container shipping operations (Paris, 2021). In addition, the impact of digitalization technologies like big data, internet of things and distributed ledger is becoming more prominent in container shipping industry (Nguyen, et al., 2020) and cyber security threats are gaining traction as a key disruptor of transportation systems in recent years (Nguyen et al., 2020).

Researchers conceived the concept of supply chain integration, emphasizing the significance impact of strategic collaborative activities with supply chain partners considering the maritime shipping industry in facilitating the supply chain. The supply chain partners work together to handle intra-organisational and inter-organisational processes in order to establish an effective and efficient flow of products, services, information, money, and decisions with the purpose of delivering optimal value to customers at a low cost and low latency (Flynn et al., 2010).

Innovation is an important avenue to preserve competitiveness (Acciaro & Sys, 2020). Although innovation is important in the container shipping industry, the role of innovation in the maritime industry has received relatively little attention. In the maritime industry, firm sizes, barriers to collaboration, and lack of knowledge sharing are recognised as barriers to innovation (Doloreux & Melançon, 2008). Firms are powerful inventors despite low levels of interfirm collaboration and restricted access to subsidies. Even though internationalisation appears to be linked to innovation, the degree of vertical integration of a maritime industry is irrelevant to the level of innovative activity (Bass & Ernst-Siebert, 2007).

It is vital to develop competency within the industry in moving forward to meet current and future challenges. In the container shipping context, knowledge management orientation study of this research is also proposed and expected to uncover the factors for the way forward to foster supply chain integration.

Notwithstanding the efforts made in improving the maritime shipping industry, there exists limited studies that discuss the coalescence of container shipping firms with supply chain integration and knowledge management. The authors have set out the following objectives to fill this gap:

- comprehensive analysis and identification of the knowledge management orientation that interconnect supply chain integration in prior studies;
- examination of gaps in the existing literature regarding supply chain integration in container shipping firms; and
- integration of the knowledge management with the supply chain integration to develop a conceptual implementation framework.

Literature Review

Knowledge Management Orientation

Knowledge management study of this research is expected to uncover the factors for the way forward to improve the supply chain integration. Wang et al. (2009) constructed knowledge management orientation to the extent that firms engage the internally focused behaviours by involving structured and organised wisdom accumulation and implementation. Knowledge management orientation is defined based on four dimensions such as the comparative disposition of the firm with its achieved wisdom (organisational memory), propensity to share knowledge (knowledge sharing), absorption of knowledge (knowledge absorption) and receptivity to new wisdom (knowledge receptivity). The implementation of knowledge management is an order of knowledge-based behaviour that improves firm problem-solving capabilities in a most effective and efficient way. Consequently, it encourages a firm to be more productive than the competitors (Stankosky, 2005). Lin (2015) suggests that the successful implementation of knowledge management orientation has an impact on both financial and non-financial performances in manufacturing firms, retail distributions and financial service firms.

Organisational memory is defined as events organisation encodes, stores and retrieves the lessons of past events of personnel turnover over the passage of time (Levitt & March, 1988). Organisational memory not only acts as a mechanism to keep the record of the past but also determines which memory is maintained and referred to for the future path of organisation (Levitt & March, 1988). Besides, it also serves as a method to achieve the organisation objectives (Walsh & Ungson, 1991). In the study of marketing field, organisational memory is perceived to offer a mechanism for collective insights of policy, procedures, routines and rules that could respond to ongoing inquiries in the market (Day,1994). As the internet is generally applicable in the 21st century, scholars view organisational memory as a knowledge repository comprising shared database, knowledge and an intranet to capture individual knowledge for easy access (Handzic, 2004; Wang et al., 2009). The advantage of organisational memory is generally recognised as the ease of access to a centralised and structured approach than for disseminating knowledge (Wang et al., 2009). Organisational memory adheres to the principles of the ease of the information, the ease of formalisation of knowledge, the application of automation in knowledge acquisition, encouragement of feedback and consistency in updating the new knowledge (Yin et al., 2016).

The exchange of knowledge between individuals and transformation into firm practices is critical for firms' competitiveness (Nonaka & Takeuchi, 1995). Knowledge sharing is also defined as the mobility of knowledge with a consistency of wisdom flow (Holtshouse, 1998). This definition is further elaborated by Huysman and de Wit (2001) and Yang (2004) that individual knowledge could be transformed into organisational knowledge by the sharing of knowledge that includes operational thoughts, behaviours, standard operating procedures, organisational routines, competition and customer knowledge. When technology was widely implemented in the 20th century, knowledge sharing involved the transfer of wisdom, skills and also technology among the organisational subunits (Tsai, 2002). The involvement of subunits is further emphasised when the organisation could avoid redundancy in knowledge creation and recognise the best practices engaging the employees in knowledge sharing (Husted & Michailova, 2002). The importance of knowledge sharing is also highlighted in organisational learning where the gap between individual and organisational knowledge widens when knowledge sharing is absent (Ford & Chan, 2003). Promotion of knowledge not only is able to bridge knowledge gaps but also encourage interdepartmental research collaboration (Fullwood & Rowley, 2017). Knowledge sharing within supply chain members is key to developing internal competency and bettering supply chain performance (Dhaigude

et al., 2021). However, the knowledge sharing could differ by authority of the entity depending on the openness of the structure (Wulf & Butel, 2017).

Knowledge absorption is also known as absorptive capacity (Cohen & Levinthal, 1990). Knowledge absorption is the ability of firm to distinguish the value of new wisdom, assimilate and apply it during knowledge exploration and exploitation (van den Bosch et al., 1999). In the exploration process, knowledge absorption transforms generated information and embeds it in the firm. This knowledge transformation incorporates the evaluation and filtration of information for its value. In the exploitation process, knowledge is differentiated and retained according to its nature and its importance (Wang et al., 2009). The organization need to employ an information processing capability to absorb and leverage the knowledge gained from external integration through the mechanism of a timely and reliable information acquisition. Derived from internal integration, the internal information processing capability is anticipated for the absorption and application of knowledge acquired from the external environment (Munir, et al., 2020). According to Reynolds and Vince (2017), there are several aspects of the knowledge absorption process which comprises training and assessment, monitors the accomplishment of knowledge absorption processes and plans knowledge absorption efforts. Absorption ability of organisational units is perceived as having positive influence towards organisational performance through the interaction within the network (Tsai, 2001).

Knowledge receptivity is perceived as the ease of new ideas taken up inside a firm. It refers to the extent a new idea is judged based on its value and detached from the identity and status of the idea contributors (Popper & Lipshitz, 1998). This is further illustrated on the role of knowledge receptivity to encourage the acceptance and accommodation of organisation towards new ideas, systems, structures and modes of operations which are closely associated with administration and technical innovation (Wang, 2013). Research findings from Davenport et al. (1998) and Wang and Lin (2013) recommend that individuals could effectively integrate new knowledge into the operations of a firm with positive perception and internal acceptance. Besides individuals, the role of managers is also underlined. Managers encourage employees develop new ideas without fear of repercussions and with an optimistic attitude to be intellectually curious, keen to discover new ideas and see the potential in the adoption of new ideas (Lin, 2015).

Supply Chain Integration

The supply chain refers to the collective activity involving planning, coordination and control of raw materials and finished goods to end users. These activities involve the systematic management of sourcing and procurement, inventory and warehousing management, transportation and customer service (Stevens, 1989). Supply chain management also integrates the main organisation processes that deliver products, services and information. These generate value add to the end users and stakeholders (Cooper et al., 1997; Lambert et al., 1998). The supply chain integration should not be overlooked by firms as Tseng and Liao (2015) and Thai and Jie (2018) show supply chain integration practices could significantly influence the performance in the shipping industry. Therefore, it is essential to evaluate the important role of supply chain integration performance in the context of container shipping performance.

The integration of organisational process is highlighted when the organisation reacts to the changes of external environment by way of developing, selecting and implementing strategy which involve not only internal structure but also customer integration and supplier integration (Hambrick, 1983; Kotha & Nair, 1995). The formation of networks which integrate customers, suppliers and the firms in the supply chain form supply chain integration. The supply chain integration is modelled based on the three principled features such as information systems, management of inventory and the relationships of supply chain. The main drivers of supply chain integration are derived from the emergence of partnership across the organisation and the

global competition that creates more demanding customers and demanding markets (Handfield et al., 1999).

The supply chain integration could enhance the performance of an organisation such as its profit and competitive position (Guan & Rehme, 2012). As highlighted in the Introduction section, Zhao et al. (2008) further explain that when supply chain integration is introduced as the collaboration with the supply chain partner in managing intra-organisation and inter-organisation processes. Integration across internal and external supply chain partners contribute to improving working relationships, which can contribute greatly to efficiency and supply chain performance (Dhaigude et al., 2021). The collaboration is to attain effectiveness and efficiency of the flow of products, services, information, money and decisions (Zhao et al., 2008). Meanwhile, supply chain integration also helps generate maximum value to the organisation, shareholders and its supply chain partners (Lee, 2000). Supply chain integration has proven to have constructive effect on the non-financial performance such as customer service performance and innovation performance (Zhu et al., 2018). These performances contribute to the customer satisfaction, retention of customer and acquirement of new customer. Innovative technology, greater transparency and congruence of mutual benefits for collaboration, visible information flow, technological developments, adaptability training for staff, and improved process flexibility can all serve to strengthen supply chain integration (Dhaigude et al., 2021).

The nexus among a large network of agents, ports, suppliers like bunker and parts suppliers, and freight forwarders (Stopford, 2009) is entangled in supply networks and crucial for the effective performance in container shipping industry (Thai & Jie, 2018). The container shipping firm alliances and cooperation continue to play a fundamental role in the operation and long-term viability for horizontal integration. The shipping firm alliances foster the interchange of operational knowledge and information such as statistics, research, and consultancy reports of the operations on various trade lanes (Ghorbani et al., 2022).

In the meantime, many container shipping firms take part in vertical integration through diversification of operations and services for various components and a multimodal supply chain system (Heaver, 2002; Panayides & Cullinane, 2002). Table 1 elaborates the supply chain integration research in recent 10 years.

Table 1 Supply chain integration research in recent 10 years

Author (Year)	Dimensions of Supply Chain Integration	Performance
Flynn et al. (2010)	Supplier Integration, Internal Integration, Customer Integration	Business and Operational Performance
Danese and Romano (2011)	Supplier Integration, Customer Integration	Efficiency Performance
Schoenherr and Swink (2012)	Supplier Integration, Internal Integration, Customer Integration	Quality, Delivery, Flexibility and Cost
Danese et al. (2013)	Supplier Integration, Internal Integration, Customer Integration	Responsiveness

Liu et al. (2013)	Internal integration	Information sharing and Operational Coordination
Huo et al. (2014)	Supplier Integration, Internal Integration, Customer Integration	Operational and Financial Performance
Zhao et al. (2015)	Supplier Integration, Internal Integration, Customer Integration	Financial Performance
Huo et al. (2016)	Supplier Integration, Internal Integration, Customer Integration	Firm Performance
Kumar et al. (2017)	Supplier Integration, Internal Integration, Customer Integration, Information Integration	Supply Chain Performance
Mao et al. (2017)	Supplier Integration, Internal Integration, Customer Integration, Information Integration	Environmental and Firm Performance
Thai and Jie (2018)	Supplier Integration, Internal Integration, Customer Integration	Service Quality and Firm Performance
Zhang et al. (2018)	Supplier Knowledge Integration	Product Innovation Performance
Khan and Wisner (2019)	Supply Chain Integration	Firm Performance
Wiengarten et al. (2019)	Supplier Integration, Customer Integration	Firm Performance
Ganbold et al. (2020)	Supplier Integration, Internal Integration, Customer Integration	Product-mix Flexibility, Delivery, Production Cost, Quality, Inventory Level, Customer Service
Novais et al. (2020)	Physical Integration, Information Integration, Financial Integration	Business Performance (Operational and Financial Performance)
Yu et al. (2021)	Supplier System Integration, Supplier Process Integration, Customer System Integration, Customer Process Integration	Operational and Financial Performance

Performance

Performance of freight particularly in shipping industry could be enhanced to continuously support international trade. As the shipping industry involves many players, it is crucial to study how knowledge management orientation is included to determine its role in supply chain integration for performance. Traditional work on performance measurement reflects two main concepts which are the subjective and objective perspectives. Performance measurement is proposed to include the subjective perspective which involves the comparison of the business performance to the competitors (Golden, 1992) whereas objective perspective is the complete evaluation of performance (Chakravarthy, 1986). Efficiency as a financial performance indicator embraces the accounting view by outlining the relationship between actual cost and

standard cost (Brehmer, 1999). In a broader sense, Bowersox et al. (2013) proposes comprehensive performance measurement which is inclusive of asset management, cost, customer service, productivity and quality. However, Leuschner et al. (2013) find that supply chain integration is not positively related to financial performance when it is measured purely on the direct relationship between the two variables. In this context, the financial performance relates to short and long run business performance (Beheshti et al., 2014).

Effectiveness which focusses on non-financial measure could be derived as the product flow and information flow, customer service performance and quality performance (Bowersox et al, 2013; Rhea & Schrock, 1987). Other than the study of effectiveness, Brooks (2000) proposes non-financial performance which includes the review and evaluation of customer satisfaction and degree of customer complaint. In marketing, Chen and Quester (2006) applied customer satisfaction and market performance as the performance indicators. Also, there are some scholars who view supply chain performance as the measurement of performance (Akyuz & Erkan, 2010; Gopal & Thakkar, 2012). In the study of supply chain management, the non-financial performance also refers to operations performance such as customer service, market performance and customer satisfaction (Beheshti et al., 2014; Tseng & Liao, 2015; Wang & Dai, 2018, Zhu et al., 2018). Cuthbertson and Piotrowicz (2011) recommend the performance dimension as a context-dependent process which should fit to specific supply chain necessities. Therefore, shipping firm performance in this study consists of financial and non-finance performance.

Framework Development

The authors inspired by Wang et al. (2009) and Tseng and Liao (2015) create a coherent search and selection criteria that supported executing literature review to achieve the research objectives. This resulted in the creation of a comprehensive search and selection criteria which looked into concepts such as knowledge management orientation, supply chain integration, and the integration of any of the aforementioned.

Data on supply chain integration was available but there was a scarcity of data on the concept of knowledge management orientation in the context of marine shipping. Knowledge-based Theory which derived from Recourses Based View is used this research to investigate the relationships between knowledge management orientation (i.e. organisational memory, knowledge sharing, knowledge absorption and knowledge receptivity) and supply chain integration (i.e. supplier integration, internal integration, customer integration) with firm performance (i.e. market performance, financial performance and customer service). Although extensive data on supply chain integration was available in the supply chain context, the maritime transportation paradigm remained comparatively unexplored. As a result, the search and selection criteria served a dual purpose: it proved the presence of a research gap while also contributing to the development of an integrated implementation framework.

A manual and citation-based search was initiated for this purpose. The articles were finally chosen in their clarity for ease of understanding, novelty for comprehensive coverage, research objectives and limitations for distinguishing their unique contributions. Figure 1 demonstrates the relationship of knowledge management orientation, supply chain integration and shipping firm performance. It also augmented the selection of the most relevant research articles aligned with the study question.

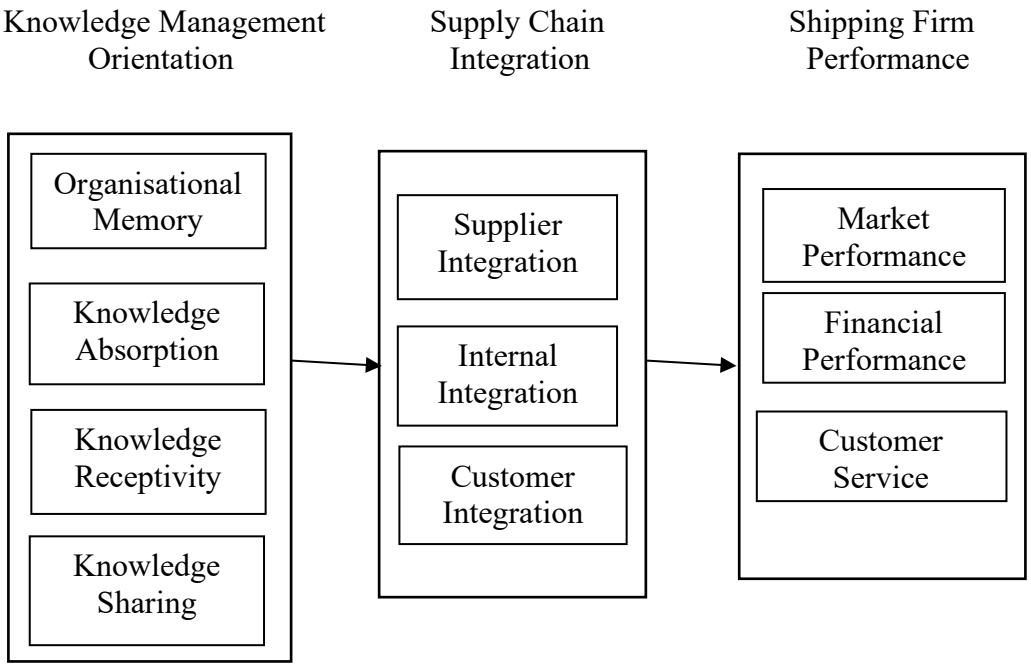

Figure 1 A Newly Proposed Framework

Discussion and Conclusion

The implementation of knowledge management orientation assists the integration among the supply chain partners like suppliers, internal and external customers. Increased performance in container shipping firm necessitates a synergised mechanism. Understanding the nature of maritime logistics industry gathered from the many players, both knowledge on the external environment and knowledge within an organisation are both crucial in integrating external players. Knowledge should be exploited to realise the value. Wisdom is perceived as a necessity and be put into practice in the collaboration among the supply chain partners because managing the wisdom in silo is not enough. The following is a summary of how these facets are used:

- Within the container shipping firm context, broad dimensions, namely organisational memory, knowledge sharing, knowledge absorption and knowledge receptivity contribute to higher levels of supply chain integration through the adoption of the knowledge management orientation.
- Supply chain integration is vital in container shipping firms and associated with better collaboration and information exchange among suppliers, internal and external customers. The integration among the supply chain partners endows container shipping firms with competitiveness to improve performance.
- The supply chain integration relies on the knowledge management orientation in managing performance of container shipping firms. The firms with integrated supply chain made effort to utilise the knowledge management orientation (for example, information technology dimension) in decision making. Thus, the shipping firm performance is improved because business processes are coordinated efficiently with supply chain partners.

Theoretical Implications

The proposed integrated conceptual framework meets the demands of container shipping firms in the maritime industry to promote supply chain integration while also facilitating

knowledge management. Previous research (Sinnandavar et al., 2018; Wong et al., 2021; Zhang et al., 2016) investigated the feasibility of supply chain integration within the supply chain. However, this study includes knowledge management paradigms as well. This study developed a new framework to examine the influence of four dimensions of knowledge management orientation (organisational memory, knowledge sharing, knowledge absorption and knowledge receptivity) and supply chain integration namely supplier integration, internal integration and customer integration on the performance of shipping firms. This study contributes to the existing literature in terms of new framework and possible explanation with the introduction of knowledge management to enhance the supply chain integration.

Wang et al. (2009) suggested the possible reasons some firms could outperform others from the knowledge management literature in the manufacturing context. To improve the container shipping firms, the study of knowledge management orientation alone without the involvement of external partnership is insufficient. A mechanism is required to utilise the knowledge management orientation. Tseng and Liao (2015) pointed out the role of supply chain integration in container shipping firms. However, it does not go into the details about how supply chain partners will interact with knowledge management.

Practical and Social Implications

This study shares several practical perspectives for the container shipping firms on the role of knowledge management orientation on supply chain integration. Specifically, the framework infers that knowledge management orientation should be fully utilised to support the supply chain integration in managing performance of the container shipping firms. Knowledge management orientation and supply chain integration are equally important. The influence generated from knowledge management orientation must fully be utilised among members in supply chain integration to achieve competitiveness (Carlile, 2004; Foray, 2004). For example, container shipping firms should support supply chain integration by establishing standard operating procedures for organizational memory, knowledge absorption, knowledge receptivity and knowledge sharing in knowledge management orientation to yield performance. Dissemination of knowledge within supply chain should be undertaken to integrate the supply chain members. This effectively addresses the neglected role of knowledge management orientation and supply chain integration in the performance of maritime industry.

Limitations and Suggestions for Future Research

To further develop the framework, a survey-based approach is recommended in the future to explore the most relevant knowledge management application for integration across supply chain partners. The concept of integrating knowledge management antecedents with supply chain partner collaboration could be further adapted to sustainable container shipping operations and management by incorporating a social dimension to generate intriguing results.

Acknowledgement

This research is funded by Tunku Abdul Rahman University College (TAR UC) and supported by Universiti Sains Malaysia (USM).

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