An empirical examination on the links of cross-functional integration of production-marketing, BTO competitiveness and performance

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Received 10 June 2021
Revised 2 December 2021
5 April 2022
8 July 2022
Accepted 22 August 2022

Abstract

Purpose – This paper is to explore how cross-functional integration (CFI) of production-marketing can impact the firm's build-to-order (BTO) competitiveness, marketing performance (MP) and financial performance (FP).

Design/methodology/approach – Empirical study with the structural equation modeling approach is applied. Six hypotheses are constructed and tested based on survey data collected from Chinese manufacturing firms.

Findings – The survey data supports that production-marketing integration (PMI) improves BTO competitiveness (BTOC) and MP and that BTOC also positively affects marketing outcome which, in turn, impacts a firm's FP. The results reveal that CFI of production-marketing is an effective approach for achieving the BTO manufacturing strategy and can improve organizational performance.

Originality/value – The paper uncovers the role of CFI of production-marketing in BTO manufacturing strategy and its impacts on a firm's MP and FP and provides important managerial implications for practitioners to improve organizational time-based competitiveness and performance in today's time-based competition era.

Keywords Manufacturing strategy, Production-marketing integration, Build-to-order competitiveness, Performance, Empirical study

Paper type Research paper

1. Introduction

Today, manufacturing organizations are operating in an uncertain and dramatically shifting competitive environment. Customer demand is fast changing, product lifetime is shortening and new technologies and business models are emerging increasingly. The change in the business environment has created a new competitive landscape and has improved business performance (Ahmad and Murray, 2019); the traditional business mode of BTC (business to customer) is being replaced by the CTB (customer to business) is an ongoing shift from product-center to consumer-centric operations (Maynard *et al.*, 2020). The customer has become the source and driver of production. This has largely promoted manufacturers to match their capabilities to the market orientation environment (Dey *et al.*, 2019). Build-to-order (BTO) is a kind of strategy which focuses on customer responsiveness. It aims to fulfill

Funding: This work was supported by the National Natural Science Foundation of China (Award Numbers: 71772191, 70972079).

European Journal of Management Studies
Vol. 27 No. 2, 2022
pp. 173-203
Emerald Publishing Limited
e-ISSN: 2635-2648
p-ISSN: 2183-4172
DOI 10.1108/EJMS-06-2021-0053

customer orders in a short lead time through responsive production and customer participation, and it is hailed as a manufacturing strategy that fits the challenges of the 21st century (Reichhart and Holweg, 2008; Volling and Spengler, 2011). BTO has been increasingly applied in a large variety of industries from car manufacturing to computer accessories (Lalmazoumian *et al.*, 2016). As a time-based competition strategy, BTO has revealed its competitive advantage (CA) for realizing MC (mass customization). Some companies, such as Apple, have successfully implemented a BTO strategy.

Since BTO is a market-driven manufacturing strategy, it needs close collaboration among internal functions and external partners of the organization (Parry and Graves, 2008), especially as it needs cross-functional collaboration between production and marketing. In practice, many firms have recognized the mutual dependency of production and marketing and have begun to manage them jointly. But how does production-marketing integration (PMI) impact BTO competitiveness (BTOC) and organizational performance? Practitioners need academic studies to address this question and offer guidelines.

Cross-functional integration (CFI) has become a means for improving responsiveness and promoting customer value delivery (Oviedo *et al.*, 2021). Many authors have studied the role of CFI in product development, logistics/supply chain, finance, marketing and manufacturing (e.g. Kahn and Mentzer, 1996; Arndt *et al.*, 2011; Song and Swink, 2009; Foerstl *et al.*, 2013); also, some authors have studied the operation mechanism and methods of BTO (e.g. Holweg and Pil, 2004; Lin and Wang, 2011); some authors have also recognized the importance of external integration of supply chain in BTO (Prasad *et al.*, 2005; Parry and Graves, 2008; Gunasekaran and Ngai, 2009; Li *et al.*, 2014). However, academic circles lack systematical research on the role of organizational behavior during the implementation of a BTO strategy. Especially, academics still lack clear recognition of how the CFI behavior of marketing and production impacts BTOC and what relationships exist among PMI, BTOC and performance. Considering this case, we recognized the necessity to do some further investigation on the role of CFI in the implementation of BTO manufacturing strategy. Thus, the following research questions are highlighted: (1) standing on the perspectives of operations strategy, how is a firm's BTOC achieved through CFI of production-marketing in the BTO manufacturing environment? (2) how does CFI of production-marketing affect a firm's marketing and finance performance? and (3) is there any difference between the impacts of BTOC on marketing performance (MP) and on organizational financial performance (FP)? The objective of this paper is to answer these questions through an empirical examination of Chinese manufacturing industry.

The contributions of our research are: (1) Taking account of the special role of CFI of marketing and production in BTO strategy, and the shortcomings of previous studies on the intricate relationships among production-marketing integration, BTOC, MP and FP, our study provides empirical evidence to such multi-path relationships. (2) We are the first to examine the effect of organizational behavior in PMI and its impact on BTOC based on Chinese firms' practice. Previous studies are mostly based on other countries' context; this paper provides some new viewpoints and perspectives about CFI and offers practitioners with valuable guidelines for PMI in implementing BTO strategy for Chinese and other developing counties' firms. (3) Our research finds the intermediating role in the relationship between PMI and FP which can be helpful for explaining the motivation of PMI and marketing-oriented strategy of BTO.

The rest of the paper is organized as follows. In Section 2, a literature review is conducted to examine the research progression of CFI and propose the shortcomings of previous research on CFI application in BTO manufacturing strategy. Section 3 provides the theoretical foundations for this research, including the definition of CFI, marketing-production integration and BTOC. Based on theoretical foundations and literature review, in Section 4, we establish the research model and research hypotheses. Subsequently, the research methodology, including data collection and data processing methods, is discussed in Section 5. Section 6 estimates the model parameters and tests hypotheses, including a

discussion of the results. In Section 7, we summarize the conclusions and provide managerial implications from the data analysis; finally, we point out the limitations and identify future research opportunities.

2. Literature review

Since 1960s, many authors from different disciplines have investigated the issue of CFI with different perspectives. In this study, we review the major progression of CFI research and propose the gap in literature.

Since a supply chain is composed of different internal and external functions of a firm, cross-functional collaboration/coordination is very important; therefore, CFI is one of the prominent research streams in supply chain management literature (Ataseven and Nair, 2017). In this area, many authors have argued that the integration of the supply chain can enhance organizational performance and competitiveness (e.g. Flynn *et al.*, 2010; Moyano-Fuentes *et al.*, 2016). Kahn and Mentzer (1996) studied the integration issue in logistics; they proposed a matrix to classify the integration behavior of logistics based on two dimensions: interdepartmental interaction and interdepartmental collaboration. Pagell (2004) used a case study to analyze the factors that enable and inhibit the CFI across operations, logistics and purchasing in a supply chain. Similarly, Mentzer *et al.* (2008) gave a detailed discussion on the cross-functional relationship between logistics, marketing and production in a supply chain. Foerstl *et al.* (2013) empirically showed that CFI and functional coordination positively impact purchasing performance. Khalaf and Mokadem (2019) studied the relationship between internal integration and manufacturing flexibility in the Egyptian industry using an empirical study. Stahle *et al.* (2019) studied the CFI effect of managing customer information flows in a project-based firm. They developed a categorization consisting of four distinct types of integration mechanisms: meetings, IT systems, personal involvement, processes and rules. Ashenbaum *et al.* (2020) studied the influence of the competitive landscape on CFI between procurement and engineering. Using a case study, they examined the relationships among the external environment, internal functional integration, collaboration and performance. Kanyoma *et al.* (2021) applied a qualitative study method to examine the enablers and inhibitors of supply chain integration; they pointed out that cross-functional information visibility and sharing, joint problem-solving, interdependency and mutual commitment are enablers of supply chain integration.

In the area of new product development (NPD), many authors also studied CFI-related issues. Hauptman and Hirji (1999) showed that cross-functional team integration and coordination have an important effect on concurrent engineering product development. Song and Xie (2000) showed that national culture impacts the CFI in NPD and that product innovativeness significantly moderates the relationship between CFI and product performance in Japanese firms but not in US firms. Similarly, Fain and Wagner (2014) discussed the role of organizational culture in CFI of R&D – marketing in NPD based on two cases from the UK and Slovenia. Sherman *et al.* (2005) studied the combinatory effect of CFI of R&D with marketing and knowledge management in NPD. Troy *et al.* (2008) examined the moderators that affect the link between CFI and NPD success. Nakata and Im (2010) studied the impact factors of CFI in NPD and the effect of CFI on product performance. Song and Swink (2009) studied the CFI between marketing and manufacturing during different stages of NPD; they found that the integration effects are different for different stages of NPD and different innovative products. Similarly, Kong *et al.* (2015) also examined the marketing-manufacturing integration (MMI) during different stages of NPD and they further analyzed the relationship between MMI and organizational performance. Hempelmann and Engelen (2015) studied the CFI of marketing with finance and R&D in NPD. Their results show that R&D-finance integration is most important at the early stage of the project, while the

marketing-finance integration is most critical at a later stage. Kang *et al.* (2021) studied the effect of CFI on NPD and the mediating roles of customer and supplier involvement. It is obvious that all this research examines the role of marketing and manufacturing integration only from a very specific niche of NPD, not from the manufacturing operations strategy perspective as our BTO strategy perspective.

In the area of sales/marketing research, some authors also have studied the issue of CFI. Ruekert and Walker (1987) empirically studied the antecedents and outcomes of marketing's interaction with other functions; they divided the interaction activities into three types: transaction, communication and coordination. Both St. John and Rue (1991) and St. John and Hall (1991) investigated the independency between marketing and manufacturing departments; they empirically examined the impact of the coordination mechanism between marketing and manufacturing on MP. Both Maltz (1997) and Maltz and Kohli (2000) empirically studied how marketing's interaction with other functions (finance, manufacturing and R&D) can reduce marketing's conflict with other functions; six integration mechanisms were proposed to mitigate inter-functional conflict. Mollenkopf *et al.* (2000) empirically studied the factors impacting the cross-functional integration between marketing and logistics with a sample from New Zealand. Ryals and Knox (2001) studied the issues of cross-functional integration in customer relationship management (CRM); their study shows that successful implementation of CRM requires more effective management of functional integration through process teams. Piercy (2007) argued that closely cross-functional cooperation between marketing and operations is vital to ensure the effective fulfilment of organizational aims; however, in practice, people often see there is too much fighting and hostility rather than co-operation or partnership between these two departments. He summarized the main issues resulting in the poor relationship between the two departments. Piercy (2009) qualitatively discussed the imperative for cross-boundary integration with stressing the importance of strategic external relationships being mirrored in strategic internal integration. Ambrose *et al.* (2018) investigated the CFI in sales and operations planning (S&OP); they applied social identity theory to study how CFI can improve the performance of S&OP. Freitas *et al.* (2020) applied the case study method to investigate how CFI supports the execution of the demand-side processes and its effects on both demand and supply-side processes. Oviedo *et al.* (2021) studied how CFI contributes to the development of market-oriented strategies in the context of the food and beverage manufacturing industry using a multi-case study.

In the area of production/operations, CFI is also very important; there are a lot of decisions and operational works requiring the production department to collaborate and cooperate with other functions, especially with the marketing department. In recent decades, many scholars have investigated the cross-functional relationship between production/manufacturing and marketing. Shapiro (1977) discussed the coexistent relationship between marketing and manufacturing, and their need of cooperation and inevitable conflict. Konijnendijk (1994) discussed the independent relationship between marketing and manufacturing departments and the coordination requirements for ETO manufacturing firms. Meijden *et al.* (1994) argued that in industrial firms, conflicts frequently occur between sales and manufacturing when making demand forecasting; coordination is necessary for improving forecasting. Swamidass *et al.* (2001) emphasized the importance of consistency and independence of marketing and production from the perspective of manufacturing/operations strategy. Crittenden *et al.* (1993) discussed conflicts and gaps between marketing and manufacturing. Piercy (2010) studied the relationship between organizational leadership, marketing-operations integration strategy and collaboration culture. It is obvious that, in the past, most articles concerning the relationship between production and marketing were qualitative, lacking deep theoretical grounding and empirical verification. Over the past decade, some authors have further investigated the interaction relationship between production and marketing with empirical study. Bardhan and Pattnaik (2017) investigated

the moderating role of CFI between marketing and operations in reducing negative critical incidents stemming from dissatisfaction with products or services. In recent years, in the production/operations area, most literature has focused on the OR methods to study the integration optimization of production/operation and marketing, whereas empirical study is very scarce.

From the above literature review, we know that, although different literature have studied the issue of CFI, some of them are concerned with the internal cross-functional integration, and none of them is concerned with the nature of BTO; furthermore, they all stand on the general perspective instead of standing on the BTO perspective and they have not explained the construction elements of BTO and its competitiveness. Similarly, in the stream of BTO, although some authors have also recognized the importance of external integration of the supply chain in BTO (Prasad *et al.*, 2005; Parry and Graves, 2008; Gunasekaran and Ngai, 2009; Li *et al.*, 2014), little attention has been paid to the internal CFI of marketing-production for BTO (e.g. Sharma and LaPlaca, 2005). Meanwhile, although the importance of CFI is well understood, the lack of consistent recognition of the CFI construct has serious negative implications for the field (Pellathy *et al.*, 2019); therefore, there is a large gap in the relationship between CFI and BTOC, and this is the motivation of this study.

3. Theoretical foundations

To provide theoretical foundations for developing hypotheses, we first propose theoretical premises for BTO and PMI.

3.1 Cross-functional integration

CFI is a widely studied topic; however, there is no consistent definition of CFI – it is an inter-disciplinary and multi-disciplinary domain (Jeske and Calvard, 2021). Cross-function integration exists at different hierarchical levels within organizations (Frankel and Mollenkopf, 2015). Ferreira *et al.* (2019) think that many factors impact CFI, including formal and informal factors. CFI concerns different facets (elements of CFI), and Pimenta *et al.* (2016) provided a framework that present multidimensional tenets involved in CFI, this framework in fact summarizes the research topics of CFI, including boundary-spanning activities, integrators, formality an informality, integration level and impacts of integration. Ferreira *et al.* (2019) identified 20 types of factors of CFI, including jointing planning mutual understanding, information sharing, etc. Similarly, Freitas *et al.* (2020) and Poberschnigg *et al.* (2020) also summarized the CFI integration factors by extending the factors of Ferreira *et al.* (2019), they argued that integration factors are mechanisms that stimulate cooperation among functions, including joint planning, willingness to work together, trust, cross-functional meetings, information sharing, cross-functional teams, communication, etc. Kahn and Mentzer (1998) divided the CFI into *three perspectives*: the first perspective is "*interactive perspective*," such activities include "meeting with departments" and "documented information exchange"; the second perspective is "*collaborative perspective*," which focuses on the activities like "team" and "resource sharing"; and the third perspective is *composite perspective*, including activities such as "information sharing" and "involvement."

Among all definitions of CFI, two definitions are widely recognized and have representativeness. The first definition was given by Frankel and Mollenkopf (2015), who traced the history of CFI definition and provided its definition as:

> A process of interdepartmental interaction and collaboration in which multiple functions work together in a cooperative manner to arrive at mutually acceptable outcomes for their organizations.

In this definition, there are two important concepts of CFI: "collaboration" and "cooperation." Similarly, by systematical literature review, Pellathy *et al.* (2019) defined the CFI as:

> Cross-functional integration is an ongoing process of collaboration, coordination, and communication, in which the different internal functions that manage a company's supply chain work together to maximize outcomes for their firm and external exchange partners.

Given this definition, they developed a set of scale items that measure three subdimensions: collaboration, coordination and communication.

From the above different definitions and understandings of CFI, we know that although there is inconsistency, CFI can be generally defined as cross-functional collaboration, cooperation and coordination activities; such activities maybe strategic, tactic or operational. For different strategies or objectives, there are different CFI contents; therefore, for the BTO manufacturing strategy, the CFI activities must be adaptable to the characteristics of BTO strategy, and PMI can enhance the BTOC and organizational performance in marketing and finance, ultimately increasing the competitivity of firms.

3.2 Build-to-order (BTO) production and BTO competitiveness

3.2.1 BTO production. Holweg and Pil (2004) first coined the term BTO, which is a time-based and customer-response manufacturing strategy. Later, Reichhart and Holweg (2008) further extended and enriched the connotation of BTO. Parry and Graves (2008) defined BTO as "a demand-driven production approach where a product is scheduled and built in response to a confirmed order received for it from a final customer." Although BTO is similar to the strategy of make-to-order (MTO), since both of them, are order-driven, BTO differs from MTO in several aspects: (1) BTO emphasizes producing products with more personalization (building means more personalization than making); (2) MTO produces components, parts and product assembly, while BTO focuses on assembly and outsources its components and parts (Gunasekaran and Ngai, 2009); that is to say, BTO has more outsourcing decisions than MTO, or MTO has more vertically integration, whereas BTO has more horizontal integration (Li *et al.*, 2014); and (3) BTO directly links production activities to market dynamics (Volling and Spengler, 2011). Molina *et al.* (2007) have made a detailed analysis of the characteristics of BTO and summarized the comparison of BTO with other production modes: MTS (make-to-stock), MTO, ATO (assembly-to-order), ETO (engineering-to-order) and configuration-to-order (CTO) from the level of customization, customer-driven design, volume flexibility, cycle time, inventory, total cost and supply chain integration.

The success of BTO heavily depends on the collaboration and coordination of the supplier, the manufacturer and the distributor (Gunasekaran and Ngai, 2005). It also needs considerable re-organization of prevailing activity structures (Shaprio, 1977). Therefore, BTO operations are unlike the traditional production mode in strategic decisions and tactical implementation. By examining the impact of the adoption of BTO on marketing, Sharma and LaPlaca (2005) argued that the marketing and production interface is one of the main activities of BTO strategy. In fact, most strategies of BTO have relationships with CFI of production and marketing, such as outsourcing, modularity and customer participation in product development, collaborative planning and scheduling (Parry and Graves, 2008). All these BTO activities need the support of PMI. Thus, it is natural and reasonable to take the CFI of production-marketing as the main strategy of BTO.

3.2.2 BTO competitiveness. Like any other production paradigm, as a manufacturing operations strategy, BTO can realize its unique strategic goal and make a firm obtain strong competitiveness. However, there is no consensus on the definition of competitiveness and BTOC. According to Lee and Wilhem (2010), competitiveness is the "ability of a firm to design, produce, and or market products superior to those offered by competitors." Salem (2019) stated that competitiveness refers to that one firm matches its internal capabilities to outside changes by exploring its resources. We can simply argue that BTOC is the combination of competitive capabilities of BTO production. Usually, quality, flexibility, cost

and delivery have long been viewed as the competitiveness of manufacturing (Narasimhan and Schoenherr, 2013). But this is a very general perspective, for different eras and different manufacturing operations strategies, the connotation of competitiveness should be distinct with different priorities. BTO manufacturing strategy is a fast customization manufacturing strategy; it is similar to the concept of instant customization (Tang *et al.*, 2005), and its competition capabilities focus more on responsiveness. The ability to respond to customer demand can be measured using flexibility. Many authors also emphasize that flexibility is one of the most important capabilities of BTO (Engelhardt-Nowitzki, 2012; Fredriksson and Gadde, 2005; Salvado *et al.*, 2007; Engelhardt-Nowitzki, 2012). Other capabilities, such as customer service ability (Sheng *et al.*, 2021) and new product introduction speed (Gunasekaran and Ngai, 2005) also are very important for BTO.

In order to clearly expound the essence of the BTO manufacturing strategy and BTOC, referring to the conclusion of Molina *et al.* (2007), we use Table 1 to compare the metrics of competitiveness of BTO and those of other current manufacturing operations modes: MTS, MTO, ATO, ETO and CTO.

Table 1 shows that all metrics of BTOC center around responsiveness, as well as flexibility; other metrics, such as new product introduction, delivery and customer service, all reflect the idea of customer-orientation.

3.3 The conceptual framework model of production-marketing integration (PMI)

From the above conceptual analysis of BTO strategy and competitiveness, we know that cross-functional resource integration, especially PMI, is a very important approach for realizing BTO strategy and BTOC. PMI was first viewed as strategic by Shapiro (1977). Later, it was extended to the tactical and operational levels by others (e.g. Crittenden, 1992). However, there is no consensus on its definition. Some believe that integration means decisions made by one department will directly impact the actions taken by another (Shapiro, 1977). Others consider it as the joint decision, actions and information sharing between production and marketing departments (e.g. Song and Swink, 2009). Moreover, others (e.g. Kong *et al.*, 2015) argue that integration includes collaboration, cooperation, interaction and mutual agreement/supportive actions.

On the other hand, there are also diverse viewpoints on what elements comprise the PMI. The most mentioned elements are process and product development integration (e.g. Song and Swink, 2009; Kong *et al.*, 2015). This is because, in today's market, customer demand becomes more diverse, whereas product lifecycles have become shorter. In order to quickly respond to market needs, effective NPD requires multi-functional integration (Liu *et al.*, 2012). Another important decision of PMI is plan integration (Karmarkar, 1996). Some of them have demonstrated the economic benefit of such integration and have shown that cooperation can help to solve problems, share information and improve coordination (Lee *et al.*, 2014). Besides the above, information sharing is important for production and marketing integration, too. Through integration, production and marketing functions can join forces to solve problems and improve processes (Kong *et al.*, 2015; Lee *et al.*, 2014).

	MTS	MTO	ATO	ETO	CTO	BTO
New product introduction	Slow	Slow	Medium	Medium	Medium	Fast
Flexibility	None	Low	Medium	Medium	High	High
Delivery time	Short	Medium	Short	Long	Short	Short
Customer service	Low	Medium	Medium	High	High	High

Table 1. Comparison of BTO with other manufacturing operations modes

Referring to the framework proposed by Malhotra and Sharma (2002), and the ideas of Pimenta *et al.* (2016) on cross-functional integration, in this paper, we identify five areas of production-marketing integration from the BTO perspective, which is shown in Table 2.

The detailed descriptions of the five areas are (1) *Information integration*. This means that production and marketing departments can share information by information system integration and interconnection. (2) *Plan integration*. This means that production and marketing departments can join to do planning or coordination when making production and marketing plans. Major activities include collaboratively making demand forecasting, top management support in making plans, etc. (3) *Process integration*. This means that production and marketing departments can align and improve processes from the viewpoint of the value chain. Major activities include physical proximity of workplace, joint process

Integration elements	Research methods Conceptual	Empirical/case and survey
Planning integration (Joint planning)	Shapiro (1977) Vollmann *et al.* (1997) Malhotra and Sharma (2002) Tang (2010)	O'Leary-Kelly and Flores (2002) Pimenta *et al.* (2016) Ferreira *et al.* (2019) Poberschnigg *et al.* (2020) Freitas *et al.* (2020)
Information integration (information sharing)	Gattiker (2007) Tang (2010) Chen and li (2013)	Sawhney and Piper (2002) Gattiker (2007) Lee *et al.* (2014) Bardhan and Pattnaik (2017) Pimenta *et al.* (2016) Ferreira *et al.* (2019) Poberschnigg *et al.* (2020) Freitas *et al.* (2020) Oviedo *et al.* (2021)
Process integration	Malhotra and Sharma (2002)	O'Leary-Kelly and Flores (2002) Emery (2009) Arndt *et al.* (2011) Pimenta *et al.* (2016) Poberschnigg *et al.* (2020) Freitas *et al.* (2020) Oviedo *et al.* (2021)
Product development involvement	Shapiro (1977) Fitzsimmons *et al.* (1991) Wheelwright and Clark (1992) Malhotra and Sharma (2002) Tang (2010)	Maltz and Kohli (2000) O'Leary-Kelly and Flores (2002) Song and Swink (2009) Brettel *et al.* (2011) Lee *et al.* (2014) Eng and Ozdemir (2014) Kong *et al.*, (2015) Bardhan and Pattnaik (2017)
Operational integration	Malhotra and Sharma (2002) Pellathy *et al.* (2019)	Emery (2009) Paiva (2010) Mollenkop *et al.* (2011) Pimenta *et al.* (2016) Ferreira *et al.* (2019) Poberschnigg *et al.* (2020) Freitas *et al.* (2020) Oviedo *et al.* (2021)

Table 2.
Elements of cross-function integration of production and marketing: previous researches

improvement, common goal of functions, close relationships, cross-functional education and training, etc. (4) *Product development involvement*. This means that production and marketing departments can be jointly involved in the process of NPD. (5) *Operational integration*. This means that the production and marketing departments can jointly solve problems in operations. Major activities include communication, mutual evaluation and rewards systems, cross-functional team, etc. Among all these areas, information integration is in the center (Shapiro, 1977), which is surrounded by another four decision areas. Based on this framework, we will develop survey measurement constructs which will be detailed in Section 5.

In order to more clearly illustrate the relationships among the five areas, we have drawn up a diagram to describe the principle of PMI, as shown in Figure 1. In this figure, the principle of PMI is divided into two parts. The upper part is to describe the strategies and activities involved in PMI integration, and the lower part is to describe the five integration areas. In the upper part, the left and right sides are the integration activities of production and marketing; in the center are the strategies of integration, which include coordinating, collaboration, problem-solving, joint action, involvement and information sharing. In the lower part of Figure 1, five areas make up the body of PMI in which information integration is at the center.

The idea of this framework is similar to Ferreira *et al.* (2019) and Pellathy *et al.* (2019). For example, Ferreira *et al.* (2019) also refer to some important factors of CFI, such as joint planning, information sharing, cross-functional meeting and mutual understanding; Pellathy *et al.* (2019) also divide CFI activities into three types: collaboration, coordination and communication.

4. Research hypotheses

The conceptual framework that reflects the logic relationships of production-marketing integration, BTOC and performance is shown in Figure 2. Following this framework, six hypotheses will be presented in the following subsections.

4.1 Production-marketing integration and BTO competitiveness (BTOC)

To achieve business success, Hayes and Pisano (1996) think that firms have to balance various competencies, e.g. quality, cost, delivery and flexibility (Hallgren *et al.*, 2011; Narasimhan and Schoenherr, 2013). The resource-based view (RBV) believes that every organization aims to create true competency using a firm's resources (Wernerfelt, 1984). Thus, competitiveness can be enhanced by integrating and making use of internal and external resources (Liu *et al.*, 2011). In manufacturing firms, both production and marketing have key resources such as information, expertise and knowledge; integrating these two departments can facilitate resource exchange, reconfiguration and utilization. Therefore, competitiveness will be enhanced.

BTO requires responsiveness to demand changes (Miemczyk and Howard, 2008). It emphasizes delivery speed (short lead time) (Sharma and LaPlaca, 2005), flexibility (Engelhardt-Nowitzki, 2012) and customer service (Engelhardt-Nowitzki, 2012). To obtain these capabilities, it is necessary to enhance cooperation and integration across functions and the supply chain. Theoretical (e.g. Crittenden, 1992) and empirical studies (e.g. Rosenzweig *et al.*, 2003; Boyer and Hult, 2005) suggest that integrating production and marketing functions in forecasting, S&OP, NPD, process design and problem-solving can lead to higher CAs.

Although production and marketing cooperation and collaboration can improve firm competitiveness, only a few empirical studies have been done to support this conclusion. Paiva (2010) showed that manufacturing and marketing integration can lead to a positive

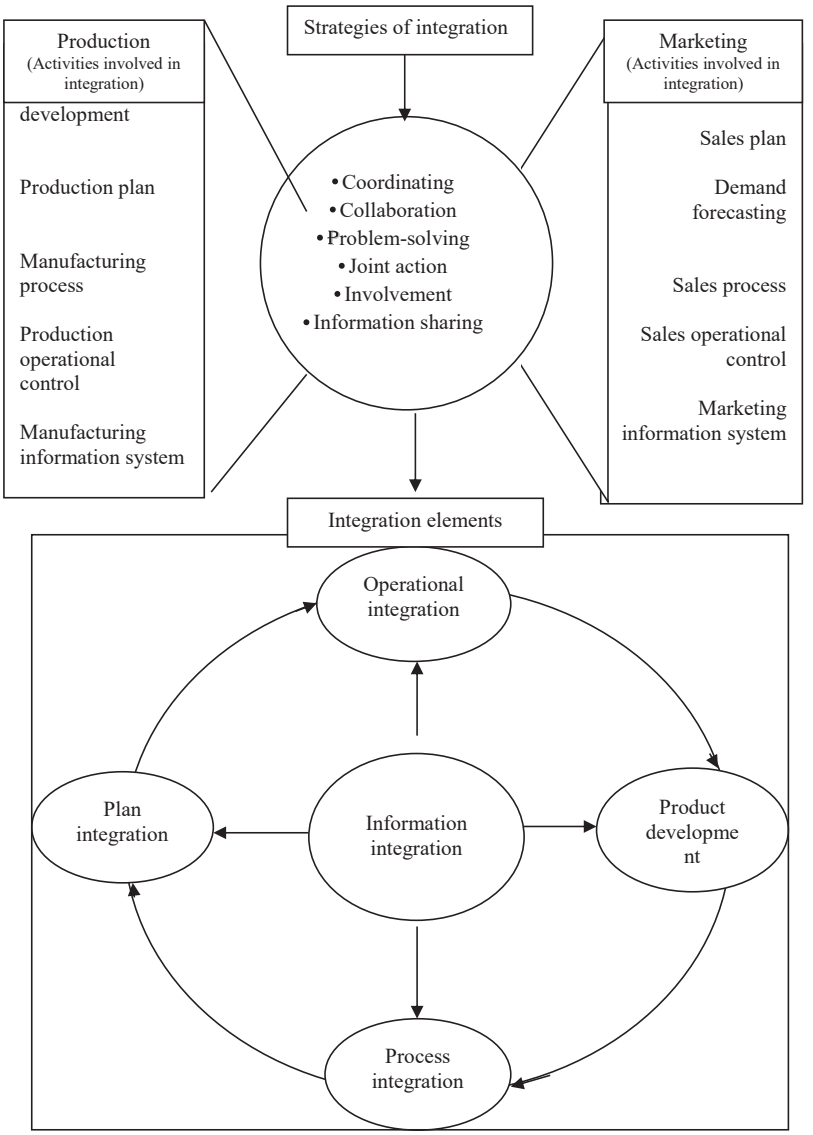


Figure 1.
Production and marketing integration for BTO

effect on cumulative capabilities measured by cost, quality, new product introduction capability and lead time. Tukulainen and Ketokivi (2012) showed that CFI has beneficial effects on flexibility and lead *time*. Similarly, Khalaf and Mokadem (2019) also showed that internal integration can improve manufacturing flexibility. Nonetheless, all this research reveals the effects of CFI on the general capabilities or competitiveness; the real relationship between PMI and the BTOC is still an open question waiting to be tested.

Combing with the viewpoints of the present literature, we expect that firms with a higher level of PMI will achieve greater BTOC. Therefore, we have the following hypothesis.

H1. PMI positively influences firms' BTOC, i.e. the higher the implementation degree of PMI, the higher the BTOC.

4.2 PMI and marketing performance (MP)

Fast response is an important objective of PMI, while fast responding to the market will lead to better MP, such as market share, sales growth, customer satisfaction and customer retention (Khan and Khan, 2021).

From the resource perspective, PMI can fully utilize both departments' resources, such as process resource, information resource and knowledge resource; enhance the responsiveness of a company by harmonious decisions and actions in responding to customers; and enhance the value-creation ability (Enz and Lambert, 2015). This is especially important in the manufacturing paradigm of BTO since the BTO is more market-oriented and customer-driven; this resource integration will largely improve the MP of BTO.

The literature has revealed some positive relationships between PMI and MP. For example, Boyer and Hult (2005) found that PMI increases customers' intent to repurchase. Paiva (2010) showed that PMI can benefit sales improvement. Mollenkopf *et al.* (2011) showed that PMI can create more customer value. Lee *et al.* (2014) showed that PMI leads to organizational improvement (e.g. sales growth). However, empirical results do not always support a positive relationship. For instance, Kong *et al.* (2015) found that the effects of PMI on MP across various stages of R&D are different; some stages reveal a positive effect, while some other stages reveal a negative effect. This shows that the relationship between PMI and MP is an open question to be investigated.

Thus, in order to add more rigorous evidence to the relationship between PMI and MP, it is necessary to further empirically test the hypothesis as H2.

H2. PMI positively influences a firm's MP, i.e. the higher the implementation degree of PMI, the higher the MP.

4.3 PMI and financial performance (FP)

Many researchers argued that CFI can improve functional or organizational performance (O'Leary-Kelly and Flores, 2002; Paiva, 2010). However, most of them are from the perspective of a comprehensive performance system rather than the perspective of FP. Little attention has been paid to examining how CFI impacts FP. Hausman *et al.* (2002) showed that the PMI can improve a firm's profit performance. Lee *et al.* (2014) found a positive relationship between PMI and plant performance. Paiva (2010) also empirically showed that PMI can improve firm profitability. Swink and Schoenherr (2015) showed that internal integration is positively associated with firm profitability such as return on sales (ROS) and asset turnover.

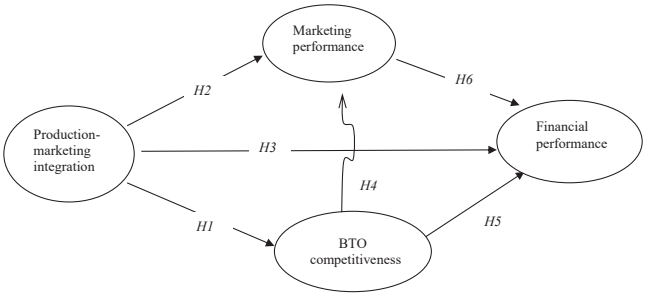


Figure 2.
Framework of the research model

Nonetheless, is CFI always beneficial to financial improvement? There is no consistent or even ambiguous conclusion yet. Zhao *et al.* (2015) empirically indicated that supply chain integration (including supplier integration, internal integration and customer integration) can be both favorable and adverse to FP by showing an inverted U-shaped relationship between supply chain integration and FP. Chang *et al.* (2016) empirically showed that supply chain integration (internal and external integration) increases FP through the mediating role of operations strategic performance. These different viewpoints reveal "the integration-performance link remains elusive, requiring further theorizing and empirical assessment" (Turkulainen and Ketokivi, 2012).

Furthermore, since there is no consensus on the metrics of FP in the literature, this leads to diversified conclusions. Some use multiple measures, while others use only one profit indicator. In this research, we adopt the return of investment (ROI) and profitability as the FP measures. Therefore, further verification of the relationship between PMI and FP is needed; therefore, we establish the following hypothesis to test the impact of PMI on FP.

H3. PMI positively influences business FP, i.e. the higher the implementation degree of PMI, the higher the business FP.

4.4 BTO competitiveness and marketing performance (MP)

As discussed in Section 3.2, BTO is a market-oriented manufacturing paradigm, and BTOC reflects the requirement of marketing responsiveness. Meanwhile, MP reflects the market competition capabilities of a firm, such as growth in market share (Kong *et al.*, 2015). Empirical study shows that market-oriented competitiveness is positively associated with market performance (Julian *et al.*, 2014).

Some other researchers have examined the relationship between manufacturing capabilities or competitiveness and MP. Rosenzweig *et al.* (2003) showed that the capabilities in quality, reliability, flexibility and cost can improve MP in new product sales growth. Swink (2005) empirically showed that manufacturing capabilities, such as cost and flexibility, have positive associations with market-based performance (e.g. profitability, market share of product and unit growth rate in sales). Finally, Rodriguez *et al.* (2013) and Hsiao and Chen (2013) empirically showed that production flexibility and production capability can significantly impact sales growth and market share.

However, as far as we know, little attention has been paid to the impact of BTOC on MP (Miemczyk and Howard. 2008). Christensen *et al.* (2005) derived by survey study that the adoption of BTO strategy indirectly has a significant and positive association with MP, but the relationship between BTOC and MP is still an open problem. Sharma and LaPlaca (2005) investigated the impact of BTO on marketing, they believed that BTO processes allow marketers to better understand and satisfy customer needs.

Therefore, we establish the following hypothesis H4 claiming that the BTOC could benefit MP.

H4. BTOC positively influences the MP; i.e. the higher the BTOC, the better the MP.

4.5 BTO competitiveness (BTOC) and financial performance (FP)

Many research have shown that a firm's competitiveness has a relationship with profitability (Voulgaris and Lemonkis, 2014), while profitability is usually measured using FP. Therefore, BTOC has a relationship with FP.

The literature has shown that BTO strategy can improve non-FP, such as inventory and lead time (Gunasekaran and Ngai, 2009); however, no empirical study provides evidence to verify the relationship between BTO capabilities and FP. Nonetheless, generally speaking, firms with higher capabilities have better business and FP. Some authors (e.g. Rosenzweig

et al., 2003; Hsiao and Chen, 2013; Chen and Tan, 2013) have showed that operational competencies positively influence business performance. However, those positive linkages of operations capabilities with performance are supported by comprehensive indicators of business performance rather than by specific FP.

On the other hand, some other researchers have shown a significant influence relationship between manufacturing competitiveness and FP. Vickery *et al.* (1993) showed that a firm's production competence has a significant impact on FP. Kristal *et al.* (2010) showed that combinative capabilities positively influence profit level. Nath *et al.* (2010) used RBV as a theoretical backdrop to find out the relationship between a firm's functional capabilities (marketing and operations) and FP; they believed that operations capabilities have strong impact on business performance (profitability). Chavez *et al.* (2017) showed that manufacturing capabilities in flexibility, cost, quality and delivery positively impact organizational performance including FP, such as ROI and ROS. Through empirical study, Karadag (2018) showed that FP is positively associated with competitiveness in small- and medium-sized companies in Turkey. Markus and Rideg (2021) argued that the direction of causality between competitiveness and FP is an open problem. Based on an empirical study sample from Hungary, they investigated the interconnection between the firm-level competitive performance (competitiveness) and the FP of the firms. It is shown that higher cash flows indicate higher competitiveness.

Meanwhile, there are also some different viewpoints. Newbert (2008) pointed out that performance is commercialization of CAs. Capabilities influence performance positively, but how certain capabilities impact performance (Schoenherr *et al.*, 2012; Jiao *et al.*, 2013) is unknown due to the lack of a holistic perspective (Rungi, 2014). Ho *et al.* (2016), based on a sample of small- and medium-sized manufacturing enterprises in Malaysia, showed that competitive capabilities, such as delivery and flexibility of new product introduction, do not lead to satisfactory FP. Song *et al.* (2007) showed that the relationship between capabilities and FP is moderated by a firm's strategic type.

Consequently, we can expect that BTOC can benefit the FP. However, from the current literature, this is still an open problem, the empirical evidence for the relationship between BTOC and FP is not enough, thus we propose hypothesis as H5 to test the relationship between BTOC and FP.

H5. There is a positive relationship between BTOC and FP, i.e. the higher the BTOC, the better a firm's FP.

4.6 Marketing performance (MP) and financial performance (FP)

When a firm implements CFI, the MP can be improved, such as market share and sales growth, leading to improvement of the firm's FP. However, for the relationship between MP and FP, empirical evidence is still scarce. Marketing literature has empirically shown that a firm's MP is closely associated with FP (Morgan, 2012).

White *et al.* (2001) offered a conceptual exploration of the interrelationship between marketing productivity and FP. Increasing marketing productivity can create a financial asset. Based on RBV theory, Yu *et al.* (2014) empirically showed that although marketing capabilities have no direct significant impact on FP, through the mediating effect of operations capabilities, the marketing capabilities reveal a significant impact on FP. Gok and Peker (2017) showed that MP is positively related to a firm's FP; also, MP places a mediating role between innovation and FP. Zhou *et al.* (2019) argued that MP has a relationship with FP; they empirically showed that marketing agility is positively associated with FP.

However, there are also some other different viewpoints. Recently, Nouri *et al.* (2015), by meta-analysis, revealed that in many academic fields the relationship between marketing capabilities and FP is usually contrasting. This reveals that the relationship between MP and FP is an open problem, more evidence is needed.

The above literature review reveals the importance of verifying the relationship between MP and FP. Based on these studies, we can derive that under the business environment of BTO, integration of marketing and production can enhance the impact of MP on FP, but this has not empirically been verified. Therefore, in order to further confirm this viewpoint, we thus have the following hypothesis.

H6. When a firm implements PMI, MP positively impacts the business FP, i.e. the higher the MP, the higher the business FP.

5. Research methodology

In this section, we discuss the research methodology, including questionnaire design, data collection, sample characteristics, reliability and validity analysis.

5.1 Questionnaire design and data collection

After an extensive literature review, we designed the questionnaire and developed constructs. Initially, we gave the original questionnaires to several managers of production and marketing who were part-time MBA students working in various manufacturing firms. They returned the completed questionnaires with comments, based on which we revised the questionnaire design. There are three main parts in the questionnaire: (1) the information about respondent's company, including employee numbers, industry, ownership, production type and demand characteristics; (2) the items of measured variables, including PMI, BTOC, MP and FP; and (3) the information about the respondent, e.g. position, working years and age.

The formal survey began by selecting companies randomly based on industry sectors. The data was collected from manufacturing firms in China. Since industrial development is not uniform across different regions of China, to make respondents have representativeness, we randomly investigated firms from four regions of China: Eastern China, Southern China, Western China and Northern China. We first contacted managers working in the production and marketing departments and emailed or mailed our questionnaires to them. The initial data collection took two months. Thereafter, we made follow-up calls and personal contacts via telephone and email. During the three months, we initially distributed 220 questionnaires. Finally, we collected 199 completed questionnaires; the effective response rate is 90.5%. Table 3 shows the characteristics of the firms studied, which are heterogeneous, covering a broad range of industry sectors, revenue, ownership, employee numbers and firm age. Among all the surveyed companies, more than 60% of firms are over 10 years old. A long organizational history usually is associated with firm stability, and the firms are likely to form a cross-functional relationship.

To check the presence of response bias, a multivariate analysis of variance (MANOVA) for comparing early respondents with late respondents on all items was performed (Kong *et al.*, 2015; OLeary-Kelly and Flores, 2002). There is no significant difference between the early respondents (in the first two months, 101 questionnaires were returned) and the late respondents (after two months, by follow-up calls and email contacts, 98 questionnaires were collected) on all items in our model. In addition, we used χ^2 to test sample distribution bias (Lee *et al.*, 2014) with respect to (1) industry type and (2) firm size (employee number). The result finds that no significant difference between the two groups exists. So, there is no non-response bias in the sample.

During data collection, common method variance (CMV) is a concern but usually, it is not a serious problem. In order to minimize the potential effects of CMV, we employed several measures in survey design and data collection. For example, we ensured respondent

Item	No	Description	Frequency	%
Sales revenue yearly (Million RMB)	1	≤50	23	11.6
	2	(50, 100]	14	7.0
	3	(100, 500]	56	28.1
	4	(500, 1000]	20	10.1
	5	>1,000	86	43.2
Ownership	1	Foreign owned	92	46.2
	2	Joint venture	32	16.1
	3	Privately owned	36	18.1
	4	State owned	39	19.6
Industry	1	Family apparatus industry	12	6.0
	2	Petrochemical industry	11	5.5
	3	Pharmaceutical industry	9	4.5
	4	Textile industry	7	3.5
	5	Metallurgy industry	10	5.0
	6	IT and electronic industry	38	19.1
	7	Automobile industry	22	11.1
	8	Mechanical industry	11	5.5
	9	Food industry	9	4.5
	10	Tobacco Industry	4	2.0
	11	Glass products industry	6	3.0
	12	Paper and printing industry	5	2.5
	13	Instrument and meter industry	3	1.5
	14	Rubber, plastic and leather industry	2	1.0
	15	Stone material, cement industry	5	2.5
	16	Furniture industry	45	22.6
	17	Others		
Firm size (employee number)	1	Not more than 200	33	17.6
	2	Between 201 and 500	33	17.6
	3	Between 501 and 1,000	23	11.6
	4	Between 1,001 and 5,000	52	26.1
	5	More than 5,000	54	27.1
Firm age	1	Less than 3 years	7	3.5
	2	Between 3 and 5 years	19	9.5
	3	Between 6 and 10 years	38	19.1
	4	Between 11 and 20 years	57	28.6
	5	More than 20 years	79	39.2

Table 3. Characteristics of surveyed companies

anonymity and placed the dependent and independent variables in varying sections (Kong *et al.*, 2015). To detect the presence of common method bias, we adopted Harmon's single-factor test by conducting confirmatory factor analysis (CFA) (Sanchez and Brock, 1996). In Harmon's single factor test, all the first-order measurements are modeled as the indicators of a single latent factor, if a substantial CMV is present, either a single factor will emerge from the factor analysis or one general factor will account for the majority of the covariance among the variables (Podsakoff *et al.*, 2003). On the contrary, if the single-factor model is worse than the proposed multi-factor model, CMV does not exist.

The single-factor model fit indices are $\chi^2 = 427.964$, Adjusted Goodness-of-G-Fit (AGFI) = 0.608, Comparative Fit Index (CFI) = 0.685, root mean square error of approximation (RMSEA) = 0.152 and Root Mean Square Residual (RMR) = 0.092, which are unacceptable and considerably worse than those of the measurement model with six factors ($\chi^2 = 87.566$, RMSEA = 0.034, AGFI = 0.914, CFI = 0.985 and RMR = 0.041). The single-factor model is thus unacceptable, signifying that there is more than one factor and the linear combination of multiple latent factors is needed to explain the correlation between

various measurement variables (Lee *et al.*, 2014). Therefore, there is no strong CMV in the sample.

5.2 Construct measurement

5.2.1 Measures for integration of production-marketing. In similarity to the discussion in Section 3.2, considering the unique characteristics of the BTO strategy, the scales used to measure the integration of production and marketing are based on previous literature such as Parent (1998), Hausman *et al.* (2002) and Lee *et al.* (2014). We extend the areas of PMI from only considering integrations of NPD and process integration to including other operational integration activities, i.e. five areas including seven elements of production-marketing integration. Referring to previous research (see Table 2 in Section 3), we identify seven elements to assess the degree of PMI for realizing BTO strategy in a company. They are (1) *joint process improvement between the production and marketing departments* (Malhtra and Sharma, 2002; O'Leary-Kelly and Flores, 2002); (2) *NPD involvement* (Lee *et al.*, 2014; Bardhan and Pattnaik, 2017); (3) *production department consulting with marketing department when making production plan* (O'Leary-Kelly and Flores, 2002; Pimenta *et al.*, 2016); (4) *marketing department consulting with production department when making sales plan* (Malhtra and Sharma, 2002; Pimenta *et al.*, 2016); (5) *joint demand forecasting* (Malhotra and Sharma, 2002); (6) *coordinating to solve daily problems (joint problem solving)* (Pimenta *et al.*, 2016); and (7) *information sharing through ERP system* (Lee *et al.*, 2014; Pimenta *et al.*, 2016).

Respondents were asked to answer the above seven questions with a five-point Likert scale to describe their companies, the scale is "1 = never happens," "2 = seldom," "3 = a little," "4 = often" and "5 = very often."

5.2.2 Measures for BTO competitiveness. In the OM area, there is extensive research on the measurement of competitiveness or competitive capabilities of manufacturing (Rosenzweig *et al.*, 2003; Narasiman and Schoengerra, 2013). However, most measurements adopted by previous researchers are based on a very general perspective of manufacturing strategy, not based on BTO strategy. Referring to the theoretical analysis in Section 3, and other literature viewpoints, such as Hayes and Pisano (1996), Molina *et al.* (2007), Hallgren *et al.* (2011), Engelhardt-Nowitzki (2012) and Narasimhan and Schoenherr (2013), we use four items to measure the BTOC. They are (1) *product delivery capability* (Molina *et al.*, 2007), (2) *flexibility of responding to customer demand* (Engelhardt-Nowitzki, 2012), (3) *capability of customer service* (Sharma and LaPlaca, 2005) and (4) *new product introduction speed* (Gunasekaran and Ngai, 2005). All of those metrics reflect the BTOC characteristics, i.e. market-driven and customer responsiveness.

Respondents were asked to answer the above questions based on comparing their own company with the competitors in the industry. The five-point Likert scale for these questions is "1 = well below the industry average level," "2 = a little lower than the industry average level," "3 = at the industry average level," "4 = a little higher than the industry average level" and "5 = well above the industry average level."

5.2.3 Measures for marketing and financial performances. In reality, measuring MP is still a daunting task (Low *et al.*, 2016). In academics, for the construct instrument of MP, diverse measures are found in the literature, such as brand value, market value, customer perceived value and customer satisfaction (Morgan, 2012; Gok and Peker, 2017). However, from the perspective of the interactive relationship of marketing and operations, in terms of the direct output of marketing, two important indicators are (1) *sales growth rate* and (2) *market share growth rate* (Morgan, 2012; Kong *et al.*, 2015; Katsikeas *et al.*, 2016). Thus, in this paper, we adopt these two items as MP.

Respondents were asked to answer the level of their companies in sales growth rate and market share growth rate during the past three years. The sales growth rate and market

share growth rate are rated on five-point Likert scale: (1) less than −20%, (2) between −20% and 0%, (3) relative stable (≈0%), (4) between 0% and 20% and (5) higher than +20%.

For the measurement of FP, there are two types of measurements: perceptual and objective self-report FP. Since objective FP usually is private information, and most respondents are not willing to respond, and previous studies have shown that perceptual measures are reliable and strongly correlate with objective measures (Venkatraman and Ramanujam, 1987), so most studies now adopt perceptual measures. Therefore, in this study, we also adopt perceptual measures for FP. Nonetheless, they are also very different in the literature for perceptual measures. Lappalainen and Niskanen (2012) used two items: growth and profitability as FP; similarly, Liu and Lai (2016) also adopted a two-item scale: QoQ (quarter to quarter growth) and operating profit margin as FP. Other authors adopt more items, such as Birou *et al.* (2011) adopted three items: ROI, profit and profit growth as FP. Referring to Birou *et al.* (2011), we selected two-items: (1) ROI and (2) *profitability* as the FP measures. Respondents are asked to reply based on the FP of the past three years.

Respondents were asked to answer the level of their companies in the ROI level and profitability level based on comparing their own companies with the competitors in the industry. The five-point Likert scale is "1 = well below the industry average level," "2 = a little lower than the industry average level," "3 = at the industry average level," "4 = a little higher than the industry average level" and "5 = well above the industry average level."

5.3 Reliability and validity analysis

To effectively test the model and the associated hypotheses, we first demonstrated the instruments' reliability and validity from three aspects: reliability, convergent validity and discriminant validity.

5.3.1 Reliability analysis. The reliability analysis of constructs and scales was conducted using three metrics (Fornell and Larcker, 1981), i.e. Cronbach's α, composite reliability and corrected item-total correlation (CITC). Usually, the criterion for judging the reliability of the constructs is that, if the three metrics satisfy the following requirements, then the constructs are considered reliable (Nunally, 1978): scales with $\alpha \geq 0.70$, composite reliability ≥ 0.5 and CITC ≥ 0.4, Table 4 is the result of reliability analysis.

In testing the reliability of the BTOC construct, we found that BTOC4 (i.e. new product introduction speed) has lower factor loading (= 0.437 < 0.50 and CITC = 0.3647 < 0.4) and $\alpha = 0.695 < 0.7$, does not reach the required level of reliability. We hence deleted BTOC4 and kept BTCO1, BTOC2 and BTOC3. We retested the construct and found the new α reaches 0.70, the factor loading of each item and CITC satisfy the required level. We thus retained only three items for BTOC construct (Table 4). The factor analysis and the reliability test for all other constructs (i.e. PMI, MP and FP) show that all α's values are greater than 0.7, the composite reliability > 0.70 and CITC > 0.4. We thus conclude that the final constructs are reliable.

5.3.2 Convergent validity analysis. We employed a CFA to check convergent validity. To assess model fit, several statistics are employed. The recommended maximum value for RMSEA is 0.10. For Goodness-of-Fit Index (GFI), CFI and AGFI, a common recommended minimum value is 0.9 (Hu and Bentler, 1999), while RMR should be < 0.05 (Stevens, 1996). The ratio χ^2/df is recommended to be > 3.0 for a reasonable fit (Segards and Grover, 1993).

Checking the goodness-of-fit in CFA, we find the model is acceptable and demonstrates the convergent validity with RMR = 0.041 < 0.05; GFI = 0.942 > 0.9; AGFI = 0.914 > 0.9; CFI = 0.985 > 0.9; $\chi^2 = 87.556$; and RMSEA = 0.032 < 0.05.

5.3.3 Discriminant validity analysis. Discriminant validity refers to the extent to which different measures are unique (O'Leary-Kelly and Flores, 2002). Several methods can be used to test discriminant validity. The conservative test of convergent validity requires that the

Latent variables constructs		Measure items	Cronbach's α	Composite reliability	Standardized item loading	CITC
Production-marketing integration (PMI)			0.851	0.853		
	1	Joint activities in new product development (PMI1)			0.683	0.6235
	2	Coordinating to solve daily problem (PMI2)			0.683	0.6141
	3	Information sharing through ERP system (PMI3)			0.587	0.5428
	4	Collaboration in demand forecasting (PMI4)			0.701	0.6451
	5	Marketing department consulting with production department when making sales plan (PMI5)			0.709	0.6396
	6	Production department consulting with marketing department when making production plan (PMI6)			0.611	0.5640
	7	Joint activities in process improvement (PMI7)			0.737	0.6657
BTO competitiveness (BTOC)			0.7008	0.704		
	1	Product delivery capability (BTOC1)			0.574	0.4688
	2	Flexibility of responding to customer demand (BTOC2)			0.676	0.5264
	3	Capability of customer service (BTOC3)			0.741	0.5579
Marketing performance (MP)			0.776	0.767		
	1	Sales growth rate during last three years (MP1)			0.806	0.6218
	2	Market share growth rate during last three years (MP2)			0.771	0.6218
financial performance (FP)			0.894	0.895		
	1	Return of Investment in the last three years (FP1)			0.927	0.8094
	2	Profitability in the last three years (FP2)			0.873	0.8094

Note(s): The item BTOC4 was deleted since its low factor loading (0.437 < 0.5) and CITC value (0.365 < 0.4)

Table 4.
Construct reliability analysis

average variance extracted (AVE) for each construct exceeds the squared correlation between the construct and all others in the model (Fornell and Lacker, 1981). Another method is to adopt χ^2 difference test (Anderson and Gerbing, 1998). Using this method, a significantly

lower χ^2 value for the unconstrained model provides support for discriminant validity (O'Leary-Kelly and Flores, 2002; Anderson and Gerbing, 1998).

In the first test, we compared the AVE with the amount of shared variance between any two constructs (Kong *et al.*, 2015). Table 5 shows the squared collections between different constructs on the lower left-diagonal and the AVE are located along the diagonal. This result shows that the AVE value of each construct is greater than the shared variances between all pairs of constructs. This reveals that the measures' constructs satisfy the criteria of discriminant validity.

In the χ^2 test, the correlation between each pair of measurement instruments is constrained to be one, and the χ^2 of this constrained model is compared to the χ^2 of the unconstrained model. If the difference in the χ^2 of the two models is significant ($p < 0.05$), then it meets the discriminant validity criterion. Table 6 shows the six paired-assessments. All the χ^2 differences are significant at 0.01 level. This further indicates that the discriminant validity is satisfactory.

6. Results

In this paper, we employed structural equation modeling (SEM) to study the relationships among PMI, BTOC, marketing performance and FP so as to understand the general impacts of PMI implementation.

6.1 Modeling and testing hypotheses H1–H6

The SEM estimates are given in Table 7.

The model fitness is good with $\chi^2/df = 1.233 < 3.0$, RMSEA = 0.034 < 0.1, RMR = 0.041 < 0.05, GFI = 0.942 > 0.9, AGFI = 0.914 > 0.9 and CFI = 0.985 > 0.9. All these indicate that the model meets the fitness criteria. Table 7 shows that the path coefficients of four paths are significant with a very low p-value. But the other two paths (PMI to FP and BTOC to FP) do not show a significant relationship. The result is shown in Figure 3.

	Mean	S.D.	PMI	BTOC	MP	FP
PMI	3.495	0.776	*0.675*			
BTOC	3.963	0.643	0.407	*0.667*		
MP	3.731	0.767	0.227	0.269	*0.789*	
FP	3.696	0.880	0.216	0.247	0.662	*0.901*

Note(s): Italic-faced numbers on the diagonal line of the table are AVE

Table 5. Discriminant validity test

Construct scale pairs		Unconstrained χ^2	Df	Constrained χ^2	Df	χ^2 difference
PMI	BTOC	51.427	34	128.923	35	77.496*
PMI	MP	24.932	26	86.199	27	61.267*
PMI	FP	30.157	26	78.215	27	48.058*
BTOC	MP	1.858	4	100.556	5	98.698*
BTOC	FP	3.592	4	80.788	5	77.196*
MP	FP	0.006	1	27.988	2	27.982*

Note(s): *Significant at $p < 0.001$

Table 6. The χ^2 difference test

A modified model by deleting the insignificant path (PMI → FP, BTOC → FP) was further conducted. The revised model fit is also good with all indices meeting the recommended criteria (χ^2/df = 1.2226 < 3.0, RMSEA = 0.034 < 0.1, RMR = 0.042 < 0.05, GFI = 0.941 > 0.9, AGFI = 0.916 > 0.9 and CFI = 0.985 > 0.9), showing the result is consistent with the original model. The result is shown in Figure 4.

Table 8 summarizes the direct, indirect and total effects of variables in the tested model. The results of Table 8 show that the paths of PMI → MP, PMI → FP and BTOC → FP have both direct and indirect effects, while other paths have only a direct effect. This means that PMI not only has a direct effect on MP, but also has an indirect effect on marketing performance, the indirect effect is transferred through BTOC; also, production and marketing integration not only has a direct effect on FP but also has an indirect effect on FP, the indirect effect is transferred through BTOC and marketing performance. These relationships reveal the important mediating effect of BTOC in the impacts of PMI on MP and FP.

Table 7.
Summary of the initial SEM estimates

Path	Unstandardized coefficient	S.E.	*t*-value	*p*-value	Standardized coefficient
PMI → BTOC	0.513	0.082	6.257	***	0.638
PMI → MP	0.238	0.118	2.023	0.043*	0.244
PMI → FP	0.070	0.107	0.655	0.512	0.060
BTOC → FP	0.102	0.151	0.675	0.500	0.070
BTOC → MP	0.070	0.160	2.751	0.006**	0.363
MP → FP	0.896	0.120	7.495	***	0.749

Note(s): *p < 0.05, **p < 0.01, ***p < 0.001

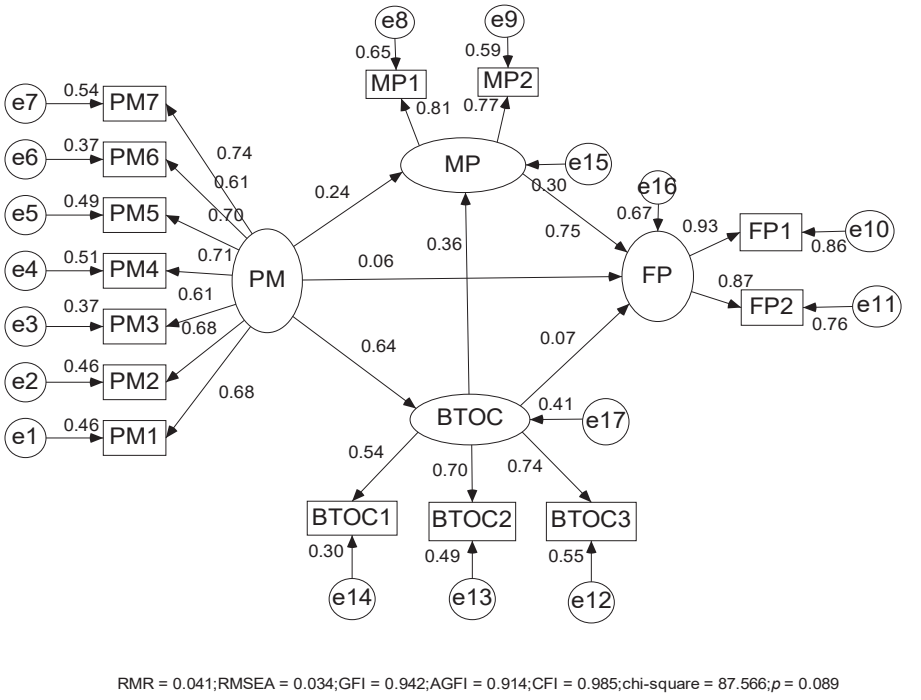
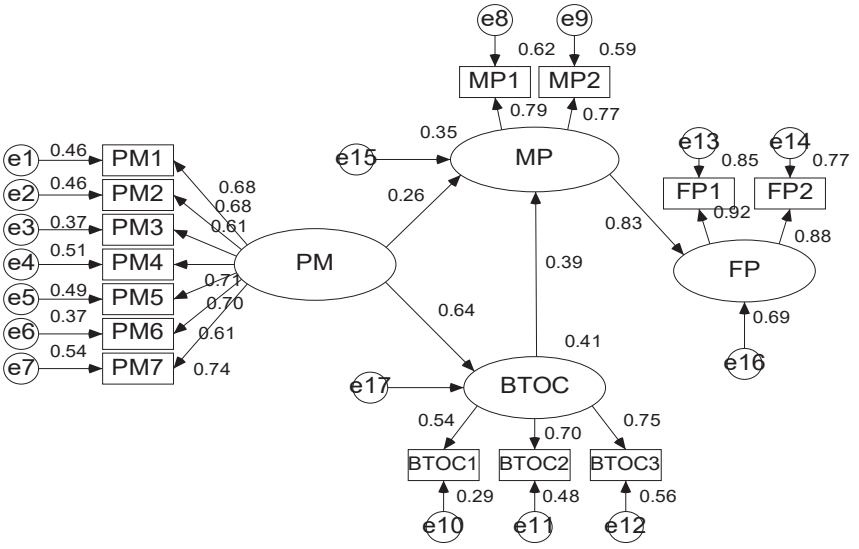


Figure 3.
Initial structural model result (standardized estimates)



RMR = 0.042, RMSEA = 0.034, GFI = 0.941, AGFI = 0.916, CFI = 0.985, Chi-square = 89.465, p = 0.092

Figure 4.
Modified structural model (standardized estimates)

Route	Direct effect	Indirect effect	Total effect
PMI → BTOC	0.64	0	0.64
PMI → MP	0.24	0.2304	0.4704
PMI → FP	0.06	0.3976	0.4576
BTOC → FP	0.07	0.27	0.34
BTOC → MP	0.36	0	0.36
MP → FM	0.75	0	0.75

Table 8.
The direct and indirect effect analysis of variables

6.2 Discussion

The result suggests that PMI can significantly impact the BTOC and MP, while marketing performance also has a positive relationship with FP. This validates the correctness of the theoretical statements in hypotheses H1, H2, and H6. This empirical evidence reveals the role of production and marketing integration in the BTO manufacturing strategy. Our results support the viewpoint that production and marketing integration can lead to higher BTOC and marketing performance by internal cross-functional resource integration. According to the viewpoint of Poberschnigg *et al.* (2020), CFI can help to generate capabilities such as visibility, agility and flexibility, so production and marketing integration can lead to firms obtaining BTOC due to quick product delivery and flexibility in responding to customer demand. This study further provides important empirical evidence that BTO production is a marketing-oriented manufacturing strategy. The results also show that BTOC can significantly impact marketing performance; this validates the conclusion of hypothesis H4, that is, if a firm has higher BTOC, it will have a higher marketing performance. It can effectively enhance the marketing competition ability of a firm, leading to higher customer responsiveness.

The result differing from our expectation is that this empirical study could not provide evidence to support significant direct connections described in hypotheses H3 and H5. That is to say, based on our sample, PMI and BTOC do not have significant direct impacts on FP

although the impacts are positive. Interpretations of such findings we think maybe lie in the following aspects: (1) FP is the comprehensive outcome of an organization, while production and marketing integration is an operations strategy; its direct effect is non-financially oriented instead of financially oriented, its effect on the business performance usually is through the mediating effect of operations performance (Turkulainen and Ketokivi, 2012). (2) The measures of BTOC are dynamic competition capabilities; Simon *et al.* (2015) have found that dynamic capabilities such as flexibility and innovative responsiveness are associated with non-financial indicators rather than financial indicators. Similarly, the study of Paiva (2010) also shows that operations priorities do not significantly impact business performance, his empirical evidence also does not support the theoretical hypothesis of his research. (3) FP is affected by many other factors, such as firm size, ownership structure and environmental uncertainty, so the effects of integration strategy and manufacturing capabilities on organizational performance are contingent (Rosenzweig *et al.*, 2003; Chavez *et al.*, 2017).

Although the direct effects of BTO and BTOC on FP are not significant, the *z*-statistic reveals that the intermediating effect of variable MP between PMI and FP is significant. That is, PMI positively impacts a firm's FP, but it is through the mediating effect of marketing performance. Similarly, BTOC also indirectly impacts FP through the mediating effect of marketing performance. Accordingly, marketing performance plays an intermediating role between PMI and FP and between BTOC and FP. Thus, four of the six hypotheses are supported (H1, H2, H4 and H6), whereas H3 and H5 are indirectly supported.

7. Conclusions and future research

7.1 Conclusions

By empirical study, this paper has examined in depth the effects of CFI in the production and marketing functions on BTOC and organizational performance, with some important findings and contributions being obtained.

The main important findings of this paper are summarized as follows.

(1) The effect of PMI on BTOC

We find that the PMI can positively impact BTOC. This result is consistent with the view of RBV and the BTO strategy (Hayes, 2002). BTO competition strategy emphasizes PMI, as well as joint process reengineering and cross-functional cooperation (Piercy, 2010). Our conclusion is in line with the perspective of Hausman *et al.* (2002), that is, PMI can improve firms' competitive position.

(2) The direct/indirect effect of PMI on business FP

Our study finds that the direct effect of PMI on a firm's FP is not significant (*p-value* = 0.512 > 0.05 in Figure 3), but PMI directly improves marketing performance. This finding is consistent with the BTO notion, that is, in order to improve sales growth and market share, the marketing department needs to collaborate and coordinate with the production department in order to optimize customer responsiveness.

(3) Intermediation role of marketing performance

Our study reveals the intermediation role of marketing performance between PMI and business FP. This is different from other studies since most previous studies usually took the organizational performance as an entity and did not divide the organizational performance into marketing performance and FP; therefore, they could not explain the motivation of PMI from the perspective of BTO strategy.

Our work contributes to the field of CFI in which some open questions have not been answered.

First, we tested the relationship between CFI and the FP; this relationship has not been studied in prior literature. Most literature stood on the perspective of departmental performance or the entire organizational performance to examine the relationship between CFI and performance, with little attention being paid to the perspective of FP; we separated the FP from the organizational performance, taking it as an independent variable to examine the effect of CFI on the FP. Second, we first examined CFI from the operations strategy perspective. We took the perspective of BTO manufacturing strategy to examine the effect of CFI on BTOC, providing an important guideline for practitioners in making a BTO strategy.

7.2 Managerial implications

Our study shows that integrating the production and marketing functions can effectively enhance the outcome of marketing performance and improve BTOC. Three important managerial implications can be derived for practitioners:

(1) Since our study has shown the PMI can enhance the BTOC, therefore, in order to improve the market responsiveness of the BTO production system, PMI is a powerful mechanism. Marketing and production managers should increase collaboration in a BTO manufacturing environment.

(2) Since PMI covers various activities and conflicts and contradictions between the two departments are omnipresent, managers need to resolve the conflicting goals and resources, enhance inter-functional coordination and cross-functional team ability (Mentzer *et al.*, 2008) and take multiple viewpoints of different departments to carry out production-marketing integration.

(3) Information sharing is an important integration factor of CFI (Kahn and Mentzer, 1996; Pimenta *et al.*, 2016; Yang and Tsia, 2019; Ferreira *et al.*, 2019); without information sharing, there is no essential PMI. As a customer-driven manufacturing strategy, BTO needs more information sharing between marketing and production departments. Therefore, in practice, managers should pay more attention to the information linkage between the two departments.

7.3 Limitations and future research directions

There are limitations in this study that afford opportunities for future research. First, the results rely on a single observation from each firm in the sample. More complete information on PMI can be obtained if multiple respondents in a firm participate; simultaneously obtaining both the production and the marketing departments' viewpoints will help to catch their interactions. Second, our study is based on a sample from China. It is not clear whether our conclusions can be generalized to adapt to other countries or economic environments. It should be tested in other countries. Third, our sample is also a little small, if we can enlarge the sample size, then the conclusions will be more reliable and robust. Fourth, our model may be extended to include more moderators; for example, competition strategy impacts an organization's operations, whereas environmental uncertainty impacts competition strategy. Therefore, in the future, it is valuable to examine the effects of competition strategy and environmental uncertainty on the PMI and BTOC.

Finally, organizational CFI; different organizational cultures have different integration motivations and outcomes. Therefore, future research can be conducted to examine the relationship between production-marketing integration and organizational culture. This kind of research will enrich the concept of CFI and can provide more valuable managerial implications for practitioners.

References

Ahmad, M.U. and Murray, J. (2019), "Understanding the connect between digitalisation, sustainability and performance of an organisation", *International Journal of Business Excellent*, Vol. 17 No. 1, pp. 83-96.

Ambrose, S.C., Matthews, L.M. and Rutherford, B.N. (2018), "Cross-functional teams and social identity theory: a study of sales and operations planning (SOP)", *Journal of Business Research*, Vol. 92, pp. 270-278.

Anderson, J.C. and Gerbing, D.W. (1998), "Structure equation modeling in practice: a review and recmemoned two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423.

Arndt, A.D., Karande, K. and Landry, T.D. (2011), "An examination of frontline cross-functional integration during retail transactions", *Journal of Retailing*, Vol. 87 No. 2, pp. 225-241.

Ashenbaum, B., Blair, C.W. and Brewer, B. (2020), "The influence of the competitive landscape on cross-functional interactions between procurement and engineering", *Journal of Purchasing and Supply Management*, Vol. 26, 100595.

Ataseven, C. and Nair, A. (2017), "Assessment of supply chain integration and performance relationships: a meta-analytic investigation of the literature", *International Journal of Production Economics*, Vol. 185, pp. 252-265.

Bardhan, A.K. and Pattnaik, S. (2017), "Effect of cross-functional integration between operations and marketing on negative critical incidents", *Total Quality Management and Business Excellence*, Vol. 28 Nos 11-12, pp. 1357-1377.

Birou, L., Germain, R.N. and Christensen, W.J. (2011), "Applied logistics knowledge impact on financial performance", *International Journal of Operations and Production Management*, Vol. 31 No. 8, pp. 816-834.

Boyer, K.H. and Hult, G.T. (2005), "Extending the supply chain: integrating operations and marketing in the online grocery industry", *Journal of Operations Management*, Vol. 23 No. 6, pp. 642-661.

Brettel, M., Heinemann, F., Engelen, A. and Neubauer, S. (2011), "Cross-functional integration of R&D, marketing, and manufacturing in radical and incremental product innovations", *Journal of Product Innovation Management*, Vol. 28 No. 2, pp. 251-269.

Chang, W., Ellinger, A.E., Kim, K. and Franke, G.R. (2016), "Supply chain integration and firm financial performance: a meta-analysis of positional advantage mediation and moderating factors", *European Management Journal*, Vol. 34, pp. 282-295.

Chavez, R., Yu, W., Jacobs, M.A. and Feng, M. (2017), "Manufacturing capability and organizational performance: the role of entrepreneurial orientation", *International Journal of Production Economics*, Vol. 184, pp. 33-46.

Chen, Z. and Li, L. (2013), "Information support technologies of integrated production planning and control for OEM driven networked manufacturing framework, technologies and case", *Journal of Enterprise Information Management*, Vol. 26 No. 4, pp. 400-426.

Chen, Z. and Tan, K.H. (2013), "The impact of organization ownership structure on JIT implementation and production operations performance", *International Journal of Operations and Production Management*, Vol. 33 No. 9, pp. 1202-1229.

Christensen, W., Germain, R. and Birou, L. (2005), "Build-to-order and just-in-time as predictors of applied supply chain knowledge and marketing performance", *Journal of Operations Management*, Vol. 23 No. 5, pp. 470-481.

Crittenden, V.L. (1992), "Close the marketing/manufacturing gap", *Sloan Management Review*, Vol. 33, pp. 41-52.

Crittenden, V.L., Gardiner, L.R. and Stam, A. (1993), "Reducing conflict between marketing and manufacturing", *Industrial Marketing Management*, Vol. 22 No. 4, pp. 229-309.

Dey, S., Sharma, R.R.K. and Pandey, B.K. (2019), "Relationship of manufacturing flexibility with organizational strategy", *Global Journal of Flexible Systems Management*, Vol. 20 No. 3, pp. 237-256.

Emery, C.R. (2009), "A cause-effect-cause model for sustaining cross-functional integration", *Business Process Management*, Vol. 15 No. 1, pp. 93-108.

Eng, T.-Y. and Ozdemir, S. (2014), "International R&D partnerships and intrafirm R&D-marketing-production integration of manufacturing firms in emerging economics", *Industrial Marketing Management*, Vol. 43 No. 1, pp. 32-44.

Engelhardt-Nowitzki, C. (2012), "Improving value chain flexibility and adaptability in build-to-order environments", *International Journal of Physical Distribution and Logistics Management*, Vol. 42 No. 4, pp. 318-337.

Enz, M.G. and Lambert, D.M. (2015), "Measurement the financial benefits of cross-functional integration influences management's behavior", *Journal of Business Logistics*, Vol. 36 No. 1, pp. 25-48.

Fain, N. and Wagner, B. (2014), "R&D-marketing integration in innovation-does culture matter?", *European Business Review*, Vol. 26 No. 2, pp. 169-187.

Ferreira, A.C., Pimenta, M.L. and Wlazlak, P. (2019), "Antecedents of cross-functional integration level and their organizational impact", *Journal of Business and Industrial Marketing*, Vol. 34 No. 8, pp. 1706-1723.

Fitzsimmons, J.A., Kouvelis, P. and Mallick, D.N. (1991), "Design strategy and its interface with manufacturing and marketing: a conceptual framework", *Journal of Operations Management*, Vol. 10 No. 3, pp. 398-415.

Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: an contingency and configuration approach", *Journal of Operations Management*, Vol. 28, pp. 58-71.

Foerstl, K., Hartmann, E., Wynstra, F. and Moser, R. (2013), "Cross-functional integration and functional coordination in purchasing and supply management", *International Journal of Operations and Production Management*, Vol. 33 No. 6, pp. 689-721.

Fornell, C. and Lacker, D.F. (1981), "Evaluation structure equation models with unobservable and measurement error", *Journal of Marketing Research*, Vol. 18, pp. 39-50.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structure equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 137-152.

Frankel, R. and Mollenkopf, D.A. (2015), "Cross-functional integration revised: exploring the conceptual elephant", *Journal of Business Logistics*, Vol. 36 No. 1, pp. 18-24.

Fredriksson, P. and Gadde, L.E. (2005), "Flexibility and rigidity in customization and build-to-order", *Industrial Marketing Management*, Vol. 34 No. 7, pp. 695-705.

Freitas, M.R., Pimenta, M.L., Hilletofth, P., Jugend, D. and Oprime, P.C. (2020), "Demand management: the role of cross-functional integration in a context of political turbulence", *Asia Pacific Journal of Marketing and Logistics*, Vol. 32 No. 3, pp. 817-839.

Gattiker, T.F. (2007), "Enterprise resource planning (ERP) systems and the manufacturing–marketing interface: an information-processing theory view", *International Journal of Production Research*, Vol. 45 No. 13, pp. 2895-2917.

Gok, O. and Peker, S. (2017), "Understanding the links among innovation performance, market performance and financial performance", *Review of Management Science*, Vol. 11 No. 3, pp. 605-631.

Gunasekaran, A. and Ngai, E.W.T. (2005), "Build-to-order supply chain management: a literature review and framework for development", *Journal of Operations Management*, Vol. 23 No. 5, pp. 423-451.

Gunasekaran, A. and Ngai, E.W.T. (2009), "Modeling and analysis of build-to-order supply chains", *European Journal of Operational Research*, Vol. 195 No. 2, pp. 319-334.

Hallgren, M., Olhager, J. and Schroeder, R.G. (2011), "A hybrid model of competitive capabilities", *International Journal of Operations and Production Management*, Vol. 31 No. 5, pp. 511-526.

Hauptman, O. and Hirji, K.K. (1999), "Managing integration and coordination in cross-functional teams: an international study of concurrent engineering product development", *R&D Management*, Vol. 29 No. 2, pp. 179-191.

Hausman, W.H., Montgomery, D.B. and Roth, A.V. (2002), "Why should marketing and production work together? Some exploratory empirical results", *Journal of Operations Management*, Vol. 20 No. 3, pp. 241-257.

Hayes, R.H. (2002), "Challenges posted to operations management by the new economy", *Production and Operations Management*, Vol. 11 No. 1, pp. 21-32.

Hayes, R.H. and Pisano, G.P. (1996), "Manufacturing strategy: at the intersection of two paradigm shifts", *Production and Operations Management*, Vol. 5 No. 1, pp. 25-41.

Hempelmann, F. and Engelen, A. (2015), "Integration of finance with marketing and R&D in new product development: the role of project stage", *Journal of Product Innovation Management*, Vol. 32 No. 4, pp. 636-654.

Ho, T.C.F., Ahmad, N.H. and Ramayah, T. (2016), "Competitive capabilities and business performance among manufacturing SMEs: evidence from an emerging economy, Malaysia", *Journal of Asia-Pacific Business*, Vol. 17 No. 1, pp. 37-58.

Holweg, M. and Pil, F.K. (2004), *The Second Century: Reconnecting Customer and Value Chain through Build-To-Order*, MIT Press, Cambridge.

Hsiao, Y.C. and Chen, C.J. (2013), "Branding vs contract production: capability, strategy, and performance", *Journal of Business and Industrial Marketing*, Vol. 28 No. 4, pp. 317-334.

Hu, L.T. and Bentler, P.M. (1999), "Cutoff criteria for fit indexes in covariance", *Structure Equation Modeling*, Vol. 6 No. 1, pp. 1-55.

Jeske, D. and Calvard, T.S. (2021), "A review of the literature on cross-functional integration (2010-2020): trends and recommendations", *International Journal of Organizational Analysis*, Vol. 29 No. 2, pp. 401-414.

Jiao, H., Alon, I., Koo, C.K. and Cui, Y. (2013), "When should organizational change be implemented? The moderating effect of environmental dynamism between dynamic capabilities and new venture performance", *Journal of Engineering and Technology Management*, Vol. 30 No. 2, pp. 188-205.

Julian, C.C., Mohamad, O., Ahmed, Z.U. and Sefnedi, S. (2014), "The market orientation–performance relationship: the empirical link in export ventures", *Thunderbird International Business Review*, Vol. 56 No. 1, pp. 97-110.

Kahn, K.B. and Mentzer, J.T. (1996), "Logistics and interdepartmental integration", *International Journal of Physical Distribution and Logistics Management*, Vol. 26 No. 8, pp. 6-14.

Kahn, K.B. and Mentzer, J.T. (1998), "Marketing's integration with other departments", *Journal of Business Research*, Vol. 42 No. 1, pp. 53-62.

Kang, M., Lee, G., Hwang, D.W., Jiang, W. and Huo, B. (2021), "Effects of cross-functional integration on NPD success: mediating roles of customer and supplier involvement", *Total Quality Management and Business Excellence*, Vol. 32 Nos 13/14, pp. pp1515-1531.

Kanyoma, K.E., Agnola, F.W. and Oloruntoba, R. (2021), "Inhibitors and enablers of supply chain integration across multiple supply chain tiers: evidence from Malawi", *The International Journal of Logistics Management*, Vol. 32 No. 2, pp. 618-649.

Karadag, H. (2018), "Cash, receivables and inventory management practices in small enterprises: their associations with financial performance and competitiveness", *Small Enterprise Research*, Vol. 25 No. 1, pp. 69-89.

Karmarkar, U.S. (1996), "Integrative research in marketing and operations management", *Journal of Marketing Research*, Vol. 33 No. 2, pp. 125-133.

Katsikeas, C.S., Morgan, N.A., Leonidou, L.C. and Hult, G.T.M. (2016), "Assessing performance outcomes in marketing", *Journal of Marketing*, Vol. 80 No. 2, pp. 1-20.

Khalaf, M. and Mokadem, M.Y.E.I. (2019), "The relationship between internal integration and manufacturing flexibility in Egyptian industry", *International Journal of Quality and Service Sciences*, Vol. 11 No. 1, pp. 16-33.

Khan, H. and Khan, Z. (2021), "The efficacy and marketing skills and market responsiveness in marketing performance of emerging market exporting firms in advanced markets: the moderating role of competitive intensity", *International Business Review*, Vol. 30, 101860.

Kong, T., Li, G., Feng, T. and Sun, L. (2015), "Effects of marketing-manufacturing integration across stages of new product development on performance", *International Journal of Production Research*, Vol. 53 No. 8, pp. 2269-2284.

Konijnendijk, P.A. (1994), "Coordinating marketing and manufacturing in ETO companies", *International Journal of Production Economics*, Vol. 37 No. 1, pp. 19-26.

Kristal, M.M., Huang, X. and Roth, A.V. (2010), "The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance", *Journal of Operations Management*, Vol. 28 No. 5, pp. 415-429.

Lalmazloumian, M., Wong, K.Y., Govindan, K. and Kannan, D. (2016), "A robust optimization model for agile and build-to-order supply chain planning under uncertainties", *Annals of Operations Research*, Vol. 240, pp. 435-470.

Lappalainen, J. and Niskanen, M. (2012), "Financial performance of SMEs: impact of ownership structure and board composition", *Management Research Review*, Vol. 35 No. 11, pp. 1088-1108.

Lee, C. and Wilhelm, W. (2010), "On integrating theories of international economics in the strategies planning of global supply chains and facility location", *International Journal of Production Economics*, Vol. 124 No. 1, pp. 125-135.

Lee, W., Rhee, S.K. and Oh, J. (2014), "The relationships between manufacturing strategy process, manufacturing-marketing integration, and plant performance: an empirical study of Korean manufacturers", *Operations Management Research*, Vol. 7, pp. 117-133.

Li, L., Zhang, L. and Willamowska-Korsak, M. (2014), "The effect of collaboration on build-to-order supply chains: with a comparison of BTO, MTO, and MTS", *Information Technology Management*, Vol. 15, pp. 69-79.

Lin, C.C. and Wang, T.H. (2011), "Build-to-order supply chain network design under supply and demand uncertainties", *Transportation Research Part B*, Vol. 45 No. 8, pp. 1162-1176.

Liu, C.L. and Lai, P.Y. (2016), "Impact of external integration capabilities of third-party logistics providers on their financial performance", *The International Journal of Logistics Management*, Vol. 27 No. 2, pp. 263-283.

Liu, N., Roth, A.V. and Rabinovich, E. (2011), "Antecedents and consequences of combinative competitive capabilities in manufacturing", *International Journal of Operations and Production Management*, Vol. 31 No. 12, pp. 1250-1286.

Liu, G., Shah, R. and Schroeder, R.G. (2012), "The relationships among functional integration, mass customization, and firm performance", *International Journal of Production Research*, Vol. 50 No. 3, pp. 677-690.

Low, S.P., Gao, S. and Mohdari, M.M. (2016), "Marketing importance and marketing performance measurement of architeture firms in Singapore: an exploratory study", *Construction Management and Economics*, Vol. 34, pp. 739-750.

Malhotra, M.K. and Sharma, S. (2002), "Spanning the continuum between marketing and operations", *Journal of Operations Management*, Vol. 20 No. 3, pp. 221-240.

Maltz, E. (1997), "An enhanced framework for improving cooperation between marketing and other functions: the differential role of integrating mechanisms", *Journal of Market Focused Management*, Vol. 2 No. 1, pp. 83-98.

Maltz, E. and Kohli, A. (2000), "Reducing marketing's conflict with other functions; the differential effects of integrating mechanisms", *Journal of the Academy of Marketing Science*, Vol. 28 No. 4, pp. 479-492.

Markus, G. and Rideg, A. (2021), "Understanding the connection between SMEs' competitiveness and cash flow generation: an empirical analysis from Hungary", *Competitiveness Review: An International Business Journal*, Vol. 31 No. 3, pp. 397-419.

Maynard, M.T., Falcone, E.C., Petersen, K.J., Fugate, B.S. and Bonney, L. (2020), "Conflicting paradigms in manufacturing and marketing decisions: the effects of situational awareness on team performance", *International Journal of Production Economics*, Vol. 230, 107801.

Meijden, L.H.V.D., Numen, J.A.E.E.V. and Ramondt, A. (1994), "Forecasting-bridging the gap between sales and manufacturing", *International Journal of Production Economics*, Vol. 37 No. 1, pp. 101-114.

Mentzer, J.T., Stank, T.P. and Esper, T.L. (2008), "Supply chain management and its relationship to logistics, marketing, production and operations management", *Journal of Business Logistics*, Vol. 29 No. 1, pp. 31-45.

Miemczyk, J. and Howard, M. (2008), "Supply strategies for build-to-order: managing global auto operations", *Supply Chain Management: An International Journal*, Vol. 13 No. 1, pp. 3-8.

Molina, A., Velandia, M. and Galeano, N. (2007), "Virtual enterprise brokerage: a structure-driven strategy to achieve build to order supply chains", *International Journal of Production Research*, Vol. 45 No. 17, pp. 3853-3880.

Mollenkopf, D., Gibson, A. and Ozanne, L. (2000), "The integration of marketing and logistics functions: an empirical examination of New Zealand firms", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 89-112.

Mollenkopf, D.A., Frankel, R. and Russo, I. (2011), "Creating value through returns management: exploring the marketing–operations interface", *Journal of Operations Management*, Vol. 29 No. 5, pp. 391-403.

Morgan, M.A. (2012), "Marketing and business performance", *Journal of the Academy of Marketing Science*, Vol. 40 No. 1, pp. 102-119.

Moyano-Fuentes, J., Saristan-Diaz, M. and Garrido-Vega, P. (2016), "Improving supply chain responsiveness through advanced manufacturing technology: the mediating role of internal and external integration", *Production Planning and Control*, Vol. 27 No. 9, pp. 686-697.

Nakata, C. and Im, S. (2010), "Spurring cross-functional integration for higher new product performance: a group effectiveness perspective", *Journal of Product Innovation Management*, Vol. 27, pp. 554-571.

Narasimhan, R. and Schoenherr, T. (2013), "Revisiting the progression of competitive capabilities: results from a repeated cross-sectional", *International Journal of Production Research*, Vol. 51 No. 22, pp. 6631-6650.

Nath, P., Nachiappan, S. and Ramanathan, R. (2010), "The impact of marketing capability, operations capability and diversification strategy on performance: a resource based view", *Industrial Marketing Management*, Vol. 39, pp. 317-329.

Newbert, S.L. (2008), "Value, rareness, competitive advantage, and performance: a conceptual-level empirical investigation of the resource-based view of the firm", *Strategy Management Journal*, Vol. 29, pp. 745-768.

Nouri, B.A., Sanayei, A., Fathi, S. and Kazemi, A. (2015), "The effect of marketing tactical capabilities on the financial performance of the firms: meta-analysis approach", *Iranian Journal of Management Studies*, Vol. 8 No. 1, pp. 73-96.

Nunally, L.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.

Oviedo, A.B.M., Pimenta, M.L., Piato, E.L. and Hilletofth, P. (2021), "Development of market-oriented strategies through cross-functional integration in the context of the food and beverage industry", *Business Process Management*, Vol. 27 No. 3, pp. 901-921.

O'Leary-Kelly, S.W. and Flores, B.E. (2002), "The integration of manufacturing and marketing/sales decisions: impact on organizational performance", *Journal of Operations Management*, Vol. 20 No. 3, pp. 221-240.

Pagell, M. (2004), "Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics", *Journal of Operations Management*, Vol. 22 No. 5, pp. 459-487.

Paiva, E.L. (2010), "Manufacturing and marketing integration from a cumulative capabilities perspective", *International Journal of Production Economics*, Vol. 126, pp. 379-386.

Parent, D.H. (1998), "Across the manufacturing-marketing interface: classification of significant research", *International Journal of Operations and Production Management*, Vol. 18 No. 2, pp. 1205-1222.

Parry, G. and Graves, A. (Eds) (2008), *Build-to-Order: The Road to 5 Days Car*, Spring-Verlag, London, e-ISBN: 978-1-84800-225-8, doi: 10.1007/978-1-84800-225-8.

Pellathy, A.D., Mollenkopf, D.A., Stank, T.P. and Autry, C.W. (2019), "Cross-functional integration: concept clarification and scale development", *Journal of Business Logistics*, Vol. 40 No. 2, pp. 81-104.

Piercy, N. (2007), "Framing the problematic relationship between marketing and operations functions", *Journal of Strategic Marketing*, Vol. 15 Nos 2/3, pp. 185-207.

Piercy, N.F. (2009), "Strategic relationships between boundary-spanning functions: aligning customer relationship management with supplier relationship management", *Industrial Marketing Management*, Vol. 38, pp. 857-864.

Piercy, N. (2010), "Improving marketing-operations cross-functional relationships", *Journal of Strategic Marketing*, Vol. 18 No. 4, pp. 337-356.

Pimenta, M.L., Silva, A.L.D. and Tate, W.L. (2016), "Characteristics of cross-functional integration processes", *International Journal of Logistics Management*, Vol. 27 No. 2, pp. 570-594.

Poberschnigg, T.F.D.S., Pimenta, M.L. and Hilletofth, P. (2020), "How can cross-functional integration support the development of resilience capabilities? The case of collaboration in automotive industry", *Supply Chain Management: An International Journal*, Vols 25/26, pp. 789-801.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.

Prasad, S., Tata, J. and Madan, M. (2005), "Build to order supply chains in developed and developing countries", *Journal of Operations Management*, Vol. 23, pp. 551-568.

Reichhart, A. and Holweg, M. (2008), "Build-to-Order: impacts, trends and open issues", in Parry, G. and Graves, A. (Eds), *Build to Order, the Road to 5-Day Car*, Springer-Verlag London, London.

Rodriguez, C.M., Wise, J.A. and Martinez, C.R. (2013), "Strategic capabilities in exporting: an examination of the performance of Mexican firms", *Management Decisions*, Vol. 51 No. 8, pp. 1643-1663.

Rosenzweig, E.D., Roth, A.V. and Dean, J.W. Jr (2003), "The influence of an integration strategy on competitive capabilities and business performance: an exploratory study of consumer products manufacturers", *Journal of Operations Management*, Vol. 21 No. 4, pp. 437-456.

Ruekert, R.W. and Walker, O.C. Jr (1987), "Marketing's interaction with other functional units: a conceptual framework and empirical evidence", *Journal of Marketing*, Vol. 51, January, pp. 1-19.

Rungi, M. (2014), "The impact of capabilities on performance", *Industrial Management and Data Systems*, Vol. 114 No. 2, pp. 241-257.

Ryals, L. and Knox, S. (2001), "Cross-functional issues in the implementation of relationship marketing through customer relationship management", *European Journal of Journal*, Vol. 19 No. 5, pp. 534-542.

Salem, M.A. (2019), "Structural equation modeling of the impact of environmental capabilities on Competitiveness", *International Journal of Productivity and Performance Management*, Vol. 68 No. 1, pp. 127-147.

Salvador, F., Rungtusanatham, M., Forza, C. and Trentin, A. (2007), "Mixed flexibility and volume flexibility in build-to-order environment", *International Journal of Operations and Production Management*, Vol. 27 No. 11, pp. 1173-1191.

Sanchez, J.I. and Brock, P. (1996), "Outcomes of perceived discrimination Hispanic employees: is diversity management a luxury or necessity?", *Academy of Management Journal*, Vol. 39 No. 3, pp. 704-719.

Sawhney, R. and Piper, C. (2002), "Value creation through enriched marketing-operations interfaces: an empirical study in the printed circuit board industry", *Journal of Operations Management*, Vol. 20 No. 3, pp. 259-272.

Schoenherr, T., Power, D., Narasimhan, R. and Samson, D. (2012), "Competitive capabilities among manufacturing plants in developing, emerging, and industrialized countries: a comparative analysis", *Decision Sciences*, Vol. 43 No. 1, pp. 37-71.

Segards, A.H. and Grover, V. (1993), "Re-examining perceived ease of use and usefulness: a confirmatory factor analysis", *MIS Quarterly*, Vol. 17 No. 4, pp. 17-25.

Shapiro, B.P. (1977), "Can marketing and manufacturing coexist?", *Harvard Business Review*, Vol. 55 No. 2, pp. 104-114.

Sharma, A. and LaPlaca, P. (2005), "Marketing in the emerging era of build-to-order manufacturing", *Industrial Marketing Management*, Vol. 34, pp. 476-486.

Sheng, H., Feng, T., Chen, L., Chu, D. and Zhang, W. (2021), "Motives and performance outcomes of mass customization capability: evidence from Chinese manufacturers", *Journal of Manufacturing Technology Management*, Vol. 32 No. 2, pp. 313-336.

Sherman, J.D., Berkowitz, D. and Souder, W.E. (2005), "New product development performance and the interaction of cross-functional integration and knowledge management", *Journal of Innovation Management*, Vol. 22, pp. 399-411.

Simon, A., Bartle, C., Stockport, G., Smith, B., Klobas, J.E. and Sohal, A. (2015), "Business leaders' views on the importance of strategic and dynamic capabilities for successful financial and non-financial performance", *International Journal of Productivity and Performance Management*, Vol. 64 No. 7, pp. 908-931.

Song, M. and Swink, M. (2009), "Marketing-manufacturing integration across stages of new product development: effects on the success of high- and low-innovativeness products", *IEEE Transactions on Engineering Management*, Vol. 56 No. 1, pp. 31-44.

Song, M. and Xie, J. (2000), "Does innovativeness moderate the relationship between cross-functional integration and product performance?", *Journal of International Marketing*, Vol. 8 No. 4, pp. 61-89.

Song, M., Benedetto, C.A.D. and Nason, R.W. (2007), "Capabilities and financial performance: the moderating effect of strategic type", *Journal of Academic Marketing Science*, Vol. 35, pp. 18-33.

St. John, C.H.S. and Hall, E.H. Jr (1991), "The interdependency between marketing and manufacturing", *Industrial Marketing Management*, Vol. 20 No. 3, pp. 223-229.

St. John, C.H. and Rue, L.W. (1991), "Co-ordinating mechanisms, consensus between marketing and manufacturing groups and marketplace performance", *Strategic Management Journal*, Vol. 12 No. 7, pp. 549-555.

Stahle, M., Ahola, T. and Martinsuo, M. (2019), "Cross-functional integration for managing customer information flows in a project-based firm", *International Journal of Project Management*, Vol. 37, pp. 145-160.

Stevens, J. (1996), *Applied Multivariate Statistics for the Social Science*, Lawrence Erlbaum, Mahwah, NJ.

Swamidass, P.M., Baines, T. and Darlow, N. (2001), "The role of manufacturing and marketing managers in strategy development", *International Journal of Operations and Production Management*, Vol. 21, pp. 933-948.

Swink, M. (2005), "Manufacturing practices and strategy integration: effects on cost efficiency, flexibility and market-based performance", *Decision Science*, Vol. 36 No. 3, pp. 427-457.

Swink, M. and Schoenherr, T. (2015), "The effect of cross-function integration on profitability, process efficiency, and Asset productivity", *Journal of Business Logistics*, Vol. 36 No. 1, pp. 69-87.

Tang, C.S. (2010), "A review of marketing–operations interface models: from co-existence to coordination and collaboration", *International Journal of Production Economics*, Vol. 25 No. 1, pp. 22-40.

Tang, Z., Chen, R. and Ji, X. (2005), "Operational tactics and tenets of a new manufacturing paradigm 'instant customization'", *International Journal of Production Research*, Vol. 43 No. 14, pp. 2873-2894.

Troy, L.C., Hirunyawipada, T. and Paswan, A.K. (2008), "Cross-functional integration and new product success: an empirical investigation of the findings", *Journal of Marketing*, Vol. 72, pp. 132-146.

Turkulainen, V. and Ketokivi, M. (2012), "Cross-functional integration and performance: what are the real benefits?", *International Journal of Operations and Production Management*, Vol. 32 No. 4, pp. 447-467.

Venkatraman, N. and Ramanujia, V. (1987), "Measurement of business economic performance: an examination of method convergence", *Journal of Management*, Vol. 13 No. 1, pp. 109-122.

Vickery, S.K., Droge, C. and Markland, R.E. (1993), "Production competence and business strategy: do they affect business performance?", *Decision Sciences*, Vol. 24 No. 2, pp. 435-455.

Volling, T. and Spengler, T.S. (2011), "Modeling and simulation of order-driven planning policies in build-to-order automobile production", *International, Journal of Production Economics*, Vol. 131 No. 1, pp. 183-193.

Vollmann, T.E., Berry, W.L. and Whybark, D.C. (1997), *Manufacturing Planning and Control Systems*, McGraw-Hill, New York, NY.

Voulgaris, F. and Lemonakis, C. (2014), "Competitiveness and profitability: the case of chemicals, pharmaceuticals and plastics", *The Journal of Economic Asymmetries*, Vol. 11, pp. 46-57.

Wernerfelt, B. (1984), "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5, pp. 171-180.

Wheelwright, S.C. and Clark, K.B. (1992), *Revolutionizing Product Development*, Free Press, New York, NY.

White, J.B., Miles, M.P. and Smith, M.F. (2001), "The interrelationship of marketing productivity and financial performance for global SMEs", *Irish Marketing Review*, Vol. 14 No. 1, pp. 55-60.

Yang, S.Y. and Tsai, K.H. (2019), "Lifting the veil on the link between absorptive capacity and innovation: the roles of cross-functional integration and customer orientation", *Industrial Marketing Management*, Vol. 82, pp. 117-130.

Yu, W., Ramanathan, R. and Nath, P. (2014), "The impacts of marketing and operations capabilities on financial performance in the UK retail sector: a resource-based perspective", *Industrial Marketing Management*, Vol. 43 No. 1, pp. 25-31.

Zhao, G., Feng, T. and Wang, D. (2015), "Is more supply chain integration always beneficial to financial performance", *Industrial Marketing Management*, Vol. 45, pp. 162-172.

Zhou, J., Mavondo, F.T. and Saunders, S. G. (2019), "The relationship between marketing agility and financial performance under different levels of market turbulence", *Industrial Marketing Management*, Vol. 83, pp. 31-41.

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