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The role of returns management orientation, internal collaboration, and information support in reverse logistics

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THE ROLE OF RETURNS MANAGEMENT ORIENTATION, INTERNAL COLLABORATION, AND INFORMATION SUPPORT IN REVERSE LOGISTICS

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ABSTRACT

While reverse logistics has gained significant interest in recent years, the research on its antecedents is still far from comprehensive. The current study utilizes data collected from China to empirically test a conceptual model that is developed based on the resource based view of the firm. It is proposed that returns management orientation, internal collaboration, and information support are important predictors of reverse logistics performance. The structural equation modeling analysis supports these proposed relationships. Furthermore, the current study also confirms the positive relationship between a firm's reverse logistics performance and market performance.

INTRODUCTION

There is an increasing appreciation of the importance of reverse logistics in recent years due to the value related to effective reverse logistics management. Improving reverse logistics can reduce supply chain costs and create revenue and profit at the same time. Reverse logistics has created a growing industry by running returns backwards through the supply chain. Bloomberg Businessweek calls reverse logistics "from trash to cash" (Anonymous, 2008). As an example, when Lenovo outsources its reverse logistics process to GreenDust, the company is able to reap significant value from the refurbished products (CRN Network, 2012).

Reverse logistics is defined as "the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal" (Rogers and Tibben-Lembke, 2001, p. 130). As reverse logistics looks into situations when the resource or material goes at least one step back in the supply chain, return products are processed moving from the typical end destination of customers back to the distributor or to the manufacturer. In other words, all business processes and activities after sale of the product are part of reverse logistics. Every manufacturer, distributor, reseller and retailer is involved in reverse logistics in order to develop efficient solutions. While reverse logistics encompasses a wide range of processes and activities such as recycling and reuse (of both products and materials), repair services, disposal, etc.; returns management is often considered a critical element of reverse logistics. Returns management refers to the management of returned products for the purpose of capturing value or proper disposal. Returns management is the focus on the current study.

Studies in the reverse logistics literature have examined various industries, including automobiles (Daugherty, Richey, Hudgens and Autry, 2003), computer hardware (Ravi, Shankar and Tiwari, 2005), retailing, and third-party logistics (Chen, Tian, Ellinger and Daugherty, 2010; Bernon, Rossi and Cullen, 2011). Several researchers have examined modeling perspectives for reverse logistics (Rogers, Melamed and Lembke, 2012). Empirical work on reverse logistics includes using qualitative discussion data (Ravi, Shankar and Tiwari, 2005; Bernon, Rossi and Cullen, 2011), case

studies (Fleischmann et al., 1997) and quantitative survey data (Daugherty, Richey, Hudgens and Autry, 2003; Richey et al., 2005). An early review of reverse logistics literature is provided by Carter, Craig and Ellram (1998).

While extant research has started to explore the antecedents of reverse logistics, our literature review reveals that the number of factors examined is still very limited compared to the much better studied forward logistics. Therefore, the current study is undertaken to explore more meaningful antecedents of reverse logistics. In particular, our study proposes and examines three important antecedents – returns management orientation, internal collaboration, and information support. In addition to investigating their relationship with reverse logistics performance, we also try to confirm the positive relationship between reverse logistics and a firm's market performance.

The remaining sections of the paper are organized as follows. First, existing supply chain and logistics literature is reviewed to identify some of the key drivers of reverse logistics and a conceptual framework drawing upon relevant theories is proposed. Next, detailed research hypotheses are developed and tested. After discussing the study results, conclusions and implications of this study are discussed.

LITERATURE REVIEW AND CONCEPTUAL DEVELOPMENT

With the growing awareness of reverse logistics (e.g. Autry, Daugherty and Richey, 2001; Daugherty, Myers and Richey, 2002; Ravi, Shankar and Tiwari, 2005; Richey, Genchev and Daugherty, 2005; Bernon, Rossi and Cullen, 2011), and its contribution to firm performance (Lambert and Burduroglo, 2000; Fugate, Mentzer and Stank, 2010); understanding the key drivers of reverse logistics performance, and the relationship to market performance, has become a high priority.

Scholars have proposed a wide range of factors that might impact reverse logistics. Autry, Daugherty and Richey (2001) have examined six reverse logistics-related goals performance measures and eight satisfaction measures of reverse logistics service, and how they are influenced by industry, firm size, sales volume, and internal or external assignment of responsibility for disposition. They found that performance is significantly impacted by sales volume, while industry characteristics significantly impact satisfaction. A further study with the same data revealed that information system (IS) support does not have an immediate impact on reverse logistics performance. However, commitment between buyer and seller for maintaining the reverse logistics program moderates this IS support to performance linkage (Daugherty, Myers and Richey, 2002). Furthermore, relationship commitment mediates the relationship between trust and reverse logistics performance (Daugherty, Richey, Hudgens and Autry, 2003), and resource commitment makes reverse logistics programs more efficient and more effective (Richey, Genchev and Daugherty, 2005). Recently, some researchers have provided empirical evidence, especially exploratory studies using qualitative research designs, in broad industry categories such as computer hardware (Ravi, Shankar and Tiwari, 2005), retailing and third-party supply chain companies (Bernon, Rossi and Cullen, 2011). A summary of several recent empirical studies examining reverse logistics' antecedents is listed in Table 1.

In the current study, we take the resource-based view of the firm (RBV) to identify other understudied antecedents of reverse logistics. RBV suggests that effective use of a firm's unique resources can lead to sustained competitive advantage (Barney, 1991). *Resources* have generally been defined as the assets, processes, information, skills, knowledge, etc. of a firm which enable the firm to develop and implement strategies to improve efficiency and effectiveness (Barney, 1991; Grant, 1991). As such, resources can be tangible or intangible.

TABLE 1
PREVIOUS EMPIRICAL RESEARCH RELATED TO REVERSE LOGISTICS PERFORMANCE

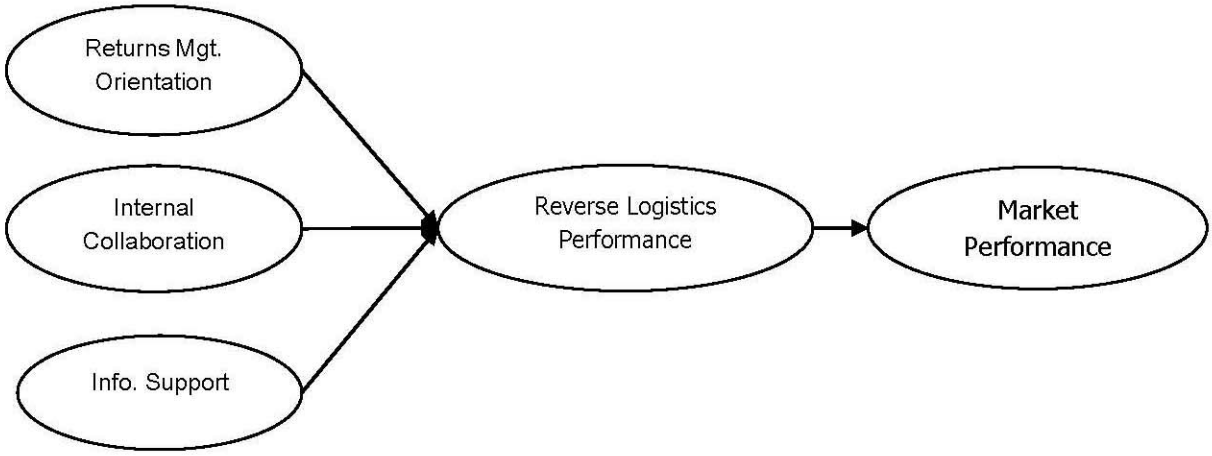
Study	Method	Data	Key Findings
Autry, Daugherty and Richey (2001)	t-test	Telephone interviews and 71 mail surveys	Reverse logistics-related performance is significantly impacted by sales volume, while industry effects significantly impact satisfaction.
Daugherty, Myers and Richey (2002)	Multiple regression	Telephone interviews and 71 mail surveys	The greater the commitment between buyer and supplier for maintaining the reverse logistics program, the greater the value of information system support arrangements to every aspect of performance.
Ravi, Shankar and Tiwari (2005)	Interpretive structural modeling (ISM)	Discussion with six experts	Environmental concern is the primary cause of the initiation of reverse logistics practices in computer hardware supply chains.
Richey, Genchev and Daugherty (2005)	Factor level results followed by between-item results	Pilot interviews and 117 mail surveys in the automotive aftermarket industry	Resource commitment makes reverse logistics programs more efficient and more effective. However, the resources must be used in such a manner as to develop innovative capabilities/approaches to handling returns.
Bernon, Rossi and Cullen (2011)	Qualitative research motivated by a grounded theory approach	Nine group discussions with an average of 18 supply chain managers from different retail sectors and specialist third-party logistics companies	Three overarching management dimensions, i.e. operational performance, organizational integration and management reporting and control, are proposed to manage retail reverse logistics operations.

In line with Mentzer et al.'s (2001) emphasis on supply chain orientation's importance to supply chain management, we believe that a firm's returns management orientation is also a critical resource that will impact reverse logistics performance. Because of the inherent challenges related to reverse logistics, it can be expected that a high level of internal collaboration within the firm can help better align and allocate necessary resources and transform inputs to outputs. Lastly, although the relationship of information support and reverse logistics has been studied before, because of the critical role of information in effective reverse logistics, we intend to reexamine information support as a type of intangible resource in the current research context. Thus, we propose a conceptual model as shown in Figure 1.

Return Management Orientation

In Mentzer et al.'s (2001) seminal article, the concept of *supply chain orientation* is proposed and defined as the recognition by an organization of the systematic, strategic implications of the tactical activities involved in managing the various flows in a supply chain. It is argued that supply chain orientation is critical to successful supply chain management implementation. Similarly, we believe that as a management philosophy and an intangible resource, a firm's returns management orientation has direct impact on its reverse logistics performance. Here we define *returns management orientation* as the recognition by a firm of the strategic importance of returns management to its overall business operations and performance. The focus here is on a firm's

FIGURE 1
CONCEPTUAL FRAMEWORK



orientation but not necessarily its actual actions and behavior.

Previously, researchers have studied the impact of inter-departmental customer orientation on reverse logistics performance (Voss, Calantone and Keller, 2005). Moore, Williams and Moore (2008) once defined returns management orientation as a proactive internal orientation toward the return of goods and services. But their idea was based on consumer perceptions of the firm rather than from the perspective of the firm. In contrast, we propose and examine returns management orientation from a firm strategic point of view because we believe a firm's orientation directly influences its actual strategy formulation and implementation. For example, a growing number of firms no longer perceive returns as extra burdens and they are placing an emphasis on managing returned products as revenue or profit opportunities (Blumberg, 1999). Recognizing the importance of reverse logistics, firms have worked to develop more efficient distribution and channel systems to handle product returns. The development of these distribution systems is the direct result of the directions and guidelines from a firm's top management on how they view returns management, which is referred as return management orientation.

RBV suggests that unique allocation and use of resources is the source for enhanced capabilities and performance (Barney, 1991; Grant, 1991). In the reverse logistics context, when a firm recognizes the importance of returns management and views it as a high priority, it is more likely to invest sufficient resources in this area. Consequently, we can expect that the firm will have better reverse logistics performance. Therefore we propose that:

H_1. A firm's returns management orientation is positively related to reverse logistics performance.

Internal Collaboration

Collaboration can be viewed as an intangible firm resource that can have positive impacts on organizational performance, because collaboration in essence is the type of mechanism embedded in a firm that facilitates the effective alignment of other firm resources. The advantages of collaborations have been discussed by numerous researchers in the supply chain literature (Frohlich and Westbrook, 2001; Christopher, 2005; van Hoek, Ellinger and Johnson, 2008; Daugherty et al., 2009). While supply chain collaborations may occur either internally or externally, the current study focuses on the internal collaboration only due to its exploratory nature. Similar to inter-firm collaboration discussed in previous work (Sanders, 2007; Chen, Daugherty and Landry, 2009; Richey), *internal collaboration* can be defined as a mutually shared process *within* a firm where two or more departments display

mutual understanding and a shared vision, and closely work together to achieve collective goals.

Internal collaboration involves two important aspects of activities: information sharing and process coordination (Chen, Tian, Ellinger and Daugherty, 2010). First, previous research has examined the importance of strong information support to solve planning complexities in the supply chain (Hernández, Poler and Mula, 2011). Due to the nature of information uncertainty of the return products, it is difficult for logistics managers to act proactively and predict upcoming reverse logistics activities. Under these circumstances, decision making information sharing among multiple functional areas becomes crucial.

Second, process coordination is a critical aspect of internal collaboration. Empirical evidence has shown that one of the key drivers of retail reverse logistics volume is poor internal collaboration (Bernon, Rossi and Cullen, 2011). For instance, poor internal coordination between marketing, procurement, and logistics leads to significant levels of returns. Furthermore, returned products are increasingly becoming obsolete. As Fawcett and Magnan (2002) pointed out, many firms are still either working independently or at a low level of cross-functional internal collaboration. As mentioned before, returned products usually engage the issues such as uncertainty, unpredictability, and nonstandard conditions. Thus, it can be expected that effective coordination among relevant internal functional areas can help employees with different expertise address these issues together as a team.

Combining the above discussed two aspects of internal collaboration in the reverse logistics context, we thus propose that:
H_2. Internal collaboration within a firm is positively related to its reverse logistics performance.

Information Support for Returns Management

Information support has gained wide attention in not only management and information system (e.g., Pettinger and Bawden, 1994), but also in other business areas such as product management (e.g., Pehliven and Summers, 2008), human resource management (e.g., Murdick and Schuster, 1983), decision making (e.g., Chorba and New, 1980), and logistics (e.g., Whipple, Frankel and Daugherty, 2002).

In the logistics literature, information support has long been viewed as a critical resource leading to improved firm performance (Mentzer and Firman, 1994; Closs, Goldsby and Clinton, 1997). Information support for returns management plays a particularly important role in the area of reverse logistics. Past research has identified information support's impacts on reverse logistics performance - both economic performance and service quality-related performance (Daugherty, Richey, Genchev and Chen, 2005).

Only with strong information support, can a firm make sound reverse logistics related decisions. By capturing the wealth of information related to the returned products, firms will have the ability to determine the issues and take appropriate actions to address them effectively and efficiently. While the entire process of reuse, repair, refurbishing, recycling, remanufacturing or redesign returns from the end user may create additional value, firms need to recognize the importance of having a sophisticated information support system to facilitate an effective return process management. The lack of an efficient and accurate information support system to authorize, track and handle returns can be a disaster in any firm. Customer relationships could be damaged. A firm's reputation and customer relationships could be seriously jeopardized. Hence, in line with previous research, we propose that:
H_3. A firm's information support for returns management is positively related to its reverse logistics performance.

Reverse Logistics Performance and Market Performance

The connection of logistics performance and firm market performance has been widely recognized in extant literature (Mentzer and Konrad, 1991; Langley and Holcomb, 1992; Lambert and Burduroglo, 2000; Fugate, Mentzer and Stank, 2010). Fugate, Mentzer and Stank (2010) suggested that logistics performance consists of three dimensions: efficiency, effectiveness and differentiation. Here *efficiency* refers to how well the resources expended are utilized (Langley and Holcomb, 1992). *Effectiveness* is the extent to which the logistics functions' goals are accomplished (Mentzer and Konrad, 1991). *Differentiation* means comparing results of logistics activities to competitors (Langley and Holcomb, 1992). When a firm achieves excellent performance on all three dimensions, it can be expected that its market performance will be improved accordingly.

No matter the company size or the industry, reverse logistics could be a key component of logistics activities. While most of today's firms are still struggling with reverse logistics management, those companies that do excel on reverse logistics enjoy a significant advantage. For example, reduced costs, recaptured value, improved customer relationships and customer loyalty can all contribute to the firm's performance in the market. Therefore:

H_4. A firm's reverse logistics performance is positively related to its market performance.

METHODOLOGY

Data Collection

Data were collected in China using Dillman's (1978) approach to survey design and questionnaire administration. Multi-item reflective measures were adapted or developed as necessary to evaluate the proposed constructs (Churchill, 1979). A preliminary questionnaire draft was reviewed by eight US researchers and practitioners who are experts on the topic of interest. Their inputs were used to modify the questionnaire. Then, the English version of the survey was translated to Chinese with the help of five Chinese-native experts (all hold either a PhD in business or an MBA from the USA). The three different versions of the translation were consolidated to into one questionnaire, which was then back-translated into English. This back-translated version was compared with the original version to ensure equivalency of the questionnaires in different languages.

A preliminary list of potential survey participants were randomly selected from the China Enterprises Directory. Executives in supply chain, logistics, and operations were targeted because of their in-depth knowledge of their firms' reverse logistics practices and processes. Each potential respondent was contacted via phone to confirm contact information for mail delivery. Surveys were sent to 500 individuals with follow-up phone calls at two-week intervals. In the designated data collection period, a total of 146 survey responses were received. Nineteen responses were excluded from the analysis because of the following reasons: (1) too much missing data in the response; or (2) the respondent's position within his/her firm was not considered appropriate to respond to the survey questions. Therefore, the data collection resulted in an effective response rate of 25.4% (127/500).

Non-response bias was tested in two ways. First, early responses were compared with late responses for all items using the approach suggested by Armstrong and Overton (1977). Second, all participants were compared with 30 randomly selected non-participants on ten non-demographic questions in the survey using ANOVA (Mentzer and Flint, 1997; Lohr, 1999). Neither method indicated significant differences, suggesting that non-response bias was not a threat in the current study.

Measurement Scale Development

The final questionnaire was comprised of multi-item reflective measures either adapted from existing scales or developed as necessary to evaluate the constructs of interest (Churchill,

TABLE 2
CONSTURCT MEASURMENT AND DESCRIPTIVE STATISTICS

Constructs and Measurement Items	Mean	Std. Dev.
- *Returns Management Orientation* (Cronbach's Alpha = 0.895, Composite reliability = 0.898)		
Please indicate how the returns management is viewed within your company.		
RO1. Returns management is a big burden for our company.	4.89	1.48
RO2. We will try our best to stop customers from initiating a return. (reverse coded)	5.14	1.51
RO3. Returns are inevitable; therefore we need to take a proactive attitude.	5.50	1.36
RO4. Returns are a great source to identify improvement opportunities, therefore we should utilize this source properly.	5.41	1.44
RO5. If effectively managed, returns management will contribute to our company' long-term growth.	5.37	1.35
RO6. Returns management is a great approach to developing superior customer relationships.	5.44	1.18
- *Internal Collaboration* (Cronbach's Alpha = 0.908, Composite reliability = 0.911)		
Source: Stank, Daugherty, and Ellinger (1999)		
Please indicate your level of agreement with the following statements regarding your firm's internal collaboration.		
Within our company, different departments		
IC1. ... work together to achieve goals collectively.	5.62	1.12
IC2. ... develop a mutual understanding of responsibilities.	5.35	1.14
IC3. ... share ideas, information, and/or resources.	5.22	1.14
IC4. ... work together as a team.	5.06	1.31
IC5. ... conduct joint planning to anticipate and resolve operational problems.	5.30	1.21
- *Information Support* (Cronbach's Alpha = 0.902 , Composite reliability = 0.909)		
Source: Whipple, Frankel, and Daugherty (2002)		
Please indicate your level of agreement with the following statements regarding your company's reverse logistics related information support.		
IS1. Our company has relevant information available to support reverse logistics decision-making.	4.09	1.67
IS2. The information regarding reverse logistics in our company is accurate.	3.94	1.54
IS3. The information regarding reverse logistics in our company is provided in a timely manner.	3.93	1.48
- *Reverse Logistics Performance* (Cronbach's Alpha = 0.907, Composite reliability = 0.909)		
Source: Fawcett and Smith (1995)		
Please compare your firm's reverse logistics performance in the last year to major competitors.		
RP1. Overall reverse logistics performance	4.40	1.12
RP2. Reverse logistics productivity	4.64	1.24
RP3. Reverse logistics cost reduction	4.37	1.17
RP4. Reverse logistics timeliness	4.72	1.19
RP5. Reverse logistics reliability and consistency	4.81	1.11
- *Market Performance* (Cronbach's Alpha = 0.893, Composite reliability = 0.896)		
Source: Claycomb et al. (1999) and Jaworski and Kohli (1993)		

Table 2 Continued

Please compare your firm's market performance in the last year to major competitors.		
Our firm's market performance in last year compared to major competitors		
MP1. Sales volume	5.31	1.05
MP2. Profit margin	5.27	1.01
MP3. Return on investment (ROI)	5.17	1.25
MP4. Customer satisfaction	5.09	1.54
MP5. Overall firm competiveness	5.44	1.38

1979). All survey items used a seven-point Likert-type scale. Table 2 provides detailed information about these measurement items and related basic descriptive statistics.

Since no existing measurement was identified during review of the literature, a returns management orientation scale was developed following the approach suggested by Churchill (1979). First, relevant literature was reviewed and utilized as the foundation to capture the essence of returns management orientation with the new scale. Then, interviews with industry experts provided an additional basis for item generation and modification. The final survey included six items related to returns management orientation. Exploratory factor analysis indicates that they load on one factor. The means for the six items ranged from 4.89 to 5.50 (1 = strongly disagree, 4 = neutral, and 7 = strongly agree), indicating a fairly high level of returns management orientation among responding firms.

The scale for internal collaboration within responding firms was adopted from Stank, Daugherty, and Ellinger (1999). These items were anchored at 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. The range of means for the measurement items of internal collaboration were 5.06-5.62, also reflecting a fairly high level of collaboration across different departments within the responding firms.

Information support for the returns management construct was assessed using items adapted from Whipple, Frankel, and Daugherty (2002). The means for the three items ranged from 3.93 to 4.09 (1 = strongly disagree, 4 = neutral, and 7 = strongly agree), indicating a low level of information support for returns management within the firms. This might be due to the challenges related to collecting and using returns information.

The measure for reverse logistics performance was adapted from Fawcett and Smith (1995). Respondents were asked to evaluate their firms' reverse logistics performance relative to their major competitors. The mean responses of measurement items ranged from 4.37 to 4.81 (1 = much worse, 4 = about the same, and 7 = much better). Compared to respondents' returns management orientation, it appears that respondents are not very positive about their companies' actual reverse logistics performance.

Market performance was measured using items adapted from Jaworski and Kohli (1993) and Claycomb, Droge and Germain (1999). Because accurate performance data were not publicly available for most Chinese companies, subjective measures of performance are considered appropriate in this situation (Dess and Robinson, 1984). Further, in existing literature, Ketokivi and Schroeder (2004) concluded that reliability and validity of perceptual performance measures are satisfactory based on their multitrait multimethod analysis. Respondents were asked to indicate the performance of their firms in the past year compared to the performance of their major competitors in certain areas (1 = much worse, 4 = about the same, 7 = much better). The mean values for the four items ranged from 5.09 to 5.44, indicating a slightly better market

performance for the respondents relative to their major competitors.

Measurement Scale Assessment

As shown in Table 2, Cronbach's alpha values were calculated for each scale and all values exceeded the suggested 0.7, demonstrating a high level of reliability (Nunnally, 1978). The constructs' reliability was further tested with the approach recommended by Fornell and Larcker (1981), which does not assume all loadings are the same. Again, all composite reliability values were well above the suggested 0.7 level. A confirmatory factor analysis (CFA) using maximum likelihood estimation was also conducted with AMOS 20.0 to assess and validate the constructs (Gerbing and Anderson, 1988). All latent variables were allowed to correlate with each other. Results of the CFA measurement model are shown in Table 3. Important fit indices examined include chi-square/degree of freedom ratio (CMIN/DF), comparative fit index (CFI), and root mean square error of approximation (RMSEA). The relative chi-square value (CMIN/DF) of 1.683 falls into the recommended range of 3-1 (Bollen and Long, 1993). The current model has a CFI value of 0.923, above the suggested 0.9 threshold value (Bentler, 1990). The RMSEA value of 0.074 is also within the suggested range (less than 0.08) for good model fit (Browne and Cudeck, 1993). The critical indices demonstrate good fit between the measurement model and the data.

TABLE 3
MEASUREMENT MODEL TEST RESULTS

Measurement Items	Standardized Weight	Critical Ratio
RO1	0.762	(Fixed)
RO2	0.708	8.067
RO3	0.715	8.160
RO4	0.796	9.220
RO5	0.828	9.643
RO6	0.811	9.413
IC1	0.801	(Fixed)
IC2	0.849	10.887
IC3	0.905	11.844
IC4	0.814	10.289
IC5	0.723	8.812
IS1	0.794	(Fixed)
IS2	0.950	12.101
IS3	0.880	11.420
RP1	0.728	(Fixed)
RP2	0.794	8.858
RP3	0.749	8.329
RP4	0.878	9.836
RP5	0.921	10.297
MP1	0.853	(Fixed)
MP2	0.805	10.892
MP3	0.849	11.840
MP4	0.820	11.218
MP5	0.642	7.898

Fit statistics: Chi-square = 407.321 ($df = 242$, $p < 0.001$), CMIN/DF = 1.683, CFI = 0.923, RMSEA = 0.074.

Convergent validity is supported when factor loadings demonstrate that the measurement items load significantly on their designated latent variables (Anderson, 1987). The standardized regression estimates in Table 3 provide evidence of construct validity. All item loadings for each of the constructs are significant at 0.05 level with critical ratio (CR) values larger than 1.96.

According to Hair et al. (1998), factor loadings of 0.50 or greater are considered practically important, and factor loadings of 0.50 for a sample size of 120 are considered statistically significant. Therefore, all five constructs thus have met the convergent validity requirements (Gerbing and Anderson, 1988).

Discriminant validity assesses whether two or more constructs are the result of a single underlying construct (Devellis, 1991). Anderson and Gerbing's (1988) approach was taken and this test was performed for one pair of factors at a time because a non-significant value for one pair of factors can be obfuscated by being tested with several pairs that have significant values. All unconstrained models had significant lower chi-square values than the constrained models, suggesting that all five constructs of interest possess discriminant validity. In addition, average variance extracted (AVE) of all the constructs exceeded the shared variances (squared correlations) between each pair of the constructs, further supporting the discriminant validity of the constructs (Fornell and Larcker, 1981).

Hypothesis Testing Results

The proposed conceptual model was tested with structural equation modeling (SEM) by using AMOS 20.0 software. Results are presented in Table 4, and key indices suggested satisfactory model fit with CMIN/DF = 1.853, CFI = 0.902, and RMSEA = 0.076. Path coefficients, standardized regression weights with relevant CRs and p-values were then examined to test the hypotheses. H1 examines the relationship between returns management orientation and reverse logistics performance. The results supported the hypothesized positive linkage with standardized regression weight = 0.316, CR = 3.161, and $p = 0.002$. H2 evaluates the relationship between internal collaboration and reverse logistics performance, and the analysis supports this hypothesized relationship (standardized regression weight = 0.446, CR = 4.272, and $p < 0.001$). The SEM analysis also yielded significant results for H3, which confirms the positive relationship between information support and reverse logistics performance (standardized regression weight = 0.334, CR = 3.369, and $p < 0.001$). Finally, the

TABLE 4
STRUCTURAL MODEL RESULTS

Path	St. Weight	CR	*p*	Note
H1: Returns Management Orientation → Reverse logistics Performance	0.316	3.161	=0.002	Supported
H2: Internal Collaboration → Reverse Logistics Performance	0.446	4.272	<0.001	Supported
H3: Information Support → Reverse Logistics Performance	0.334	3.369	<0.001	Supported
H4: Reverse Logistics Performance → Market Performance	0.469	4.722	<0.001	Supported

Fit statistics: Chi-square = 453.928 ($df = 245$, $p < 0.001$), CMIN/DF = 1.853, CFI = 0.902, RMSEA = 0.076.

positive relationship between reverse logistics performance and market performance is supported by H4 test results (standardized regression weight = 0.469, CR = 4.722, and $p < 0.001$).

DISCUSSION AND IMPLICATIONS

The above discussed hypothesis testing suggest that all proposed relationships are supported with the empirical data collected from China. Building upon existing research, our study does make several important contributions regarding the antecedents of reverse logistics.

First, we conceptualized and operationalized a new concept related to reverse logistics: returns management orientation. While Mentzer et al. (2001) proposed a similar concept – supply chain orientation – in the general supply chain management context, the new returns management orientation is specific for the reverse logistics context. Our empirical test suggests that the newly developed measurement scale is reliable and valid. Furthermore, the hypothesis testing indicates that returns management is a significant predictor of reverse logistics performance. This result has important implications for both researchers and practitioners. The newly conceptualized construct provides a new avenue for scholars to explore the factors that may influence reverse logistics. The result also suggests that establishing an organizational level of recognition of the importance of returns management can help firms achieve better reverse logistics performance.

Second, we propose that internal collaboration is helpful for improving reverse logistics performance and this is supported by our empirical testing. It is widely recognized that reverse logistics is more challenging than forward logistics due to the uncertainties involved. However, extant literature has not examined cross-functional collaboration's impact on reverse logistics. Our study made the first attempt to empirically investigate this relationship, and the result shows that by fostering collaborative relationships across functional areas within a firm, it is more likely to achieve better reverse logistics performance. The reason could be that collaboration helps relevant departments to more effectively align the firm's resources, jointly develop unique capabilities, and share the responsibilities in tackling reverse logistics related challenges.

Third, reliable and accurate information is critical to effective reverse logistics management. Although our responding firms demonstrated a relatively low level of information support for returns management, the study results do confirm that the firms that have better information support can achieve improved reverse logistics performance. Therefore, our study not only confirmed this positive relationship in the China context, it also reemphasizes the importance of information support.

Lastly, the positive relationship between a firm's reverse logistics performance and market performance is confirmed in our empirical study. This should be encouraging news for managers, because the effort put into reverse logistics improvement is likely to result in enhanced overall firm market performance, which is the ultimate goal of any firm.

CONCLUSIONS AND LIMITATIONS

Our research contributes to the body of knowledge on reverse logistics by examining several key antecedents of reverse logistics performance. Our study brings these factors to researchers and managers' attention and they present great opportunities to improve a firm's reverse logistics management. However, some limitations of the current study should also be discussed. First, we only examined the impact of internal collaboration due to the exploratory nature of the study, but external collaboration may also be a key factor for reverse logistics. Because today's logistics (including reverse logistics) activities often occur across firms, the collaborative relationships between supply chain partners should also be a relevant factor. Second, our study only used survey data that are based on

managers' perceptions. While we have made efforts to ensure reliability and validity, it is still worthwhile for future research to incorporate other methods and triangulate the current study.

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