Impact of JIT-selling strategy on organizational structure

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Abstract
Purpose – This study aims to assess the impact of a JIT-selling strategy on organizational structure by generally replicating the previous work of Germain et al.

Design/methodology/approach – In contrast to the sample population of logistics managers surveyed by Germain et al. this research draws on data from manufacturing executives with marketing responsibilities. More importantly, a major limitation of the earlier research, use of a single-item scale measurement of the JIT-selling construct, is overcome. A structural equation modeling approach was used to assess the impact of JIT-selling on the organizational structure dimensions of integration, performance control, specialization, and decentralization.

Findings – Germain et al. found that JIT-selling impacts performance control, specialization, and scheduling decentralization but not integration. While the results of this study support earlier findings that JIT-selling impacts performance control and specialization, the results alternately find support for a relationship between JIT-selling and integration and refute the previous finding that JIT-selling is related to decentralization.

Research limitations/implications – The findings generally support the proposition that adoption of a JIT-selling strategy will result in changes in organizational structure.

Practical implications – Manufacturing managers working to strengthen relationships with customers through a JIT-selling approach should prepare for organizational change in terms of increased integration, performance control, and specialization.

Originality/value – JIT strategies are being used to strengthen the operations/marketing interface within the manufacturing sector. Specifically, this study assesses the impact of the JIT-selling strategy on organizational structure in an effort to verify the work of Germain et al.

Keywords Just in time, Selling, Organizational structures, Marketing, Manufacturing

Introduction
Business organizations must now compete as integral parts of supply chains to achieve competitive advantage (Green and Inman, 2005; Vokurka and Lummus, 2000; Lambert et al., 1998). Frohlich and Westbrook (2001) identify the “arcs” of integration among supply chain members, both suppliers and customers, as leading to improved financial performance. Therefore, internal and external integration of business processes throughout the supply chain are necessary to successfully manage at the supply chain level (Vokurka and Lummus, 2000).
It is conceptually and strategically appealing, but tactically difficult, to successfully manage at the supply chain level. Success depends upon management’s ability to coordinate and integrate the organization’s complex network of relationships (Lambert et al., 1998). The just-in-time (JIT) philosophy and associated strategies, offer coordination and integration methods that support supply chain management efforts, when the strategies are extended outside the organization (Green and Inman, 2005; Vokurka and Lummus, 2000; Claycomb et al., 1999b).

The JIT philosophy is transitioning from application in the internal production functions of manufacturing, purchasing, and design to application in the external marketing function as a means of competitive advantage through differentiation of the product delivery process (Germain et al., 1994). Tightly coupling the buyer-seller linkage is critical to successful execution of this JIT marketing strategy.

Germain et al. (1994) proposed that the adoption of a JIT-selling strategy would impact the levels of integration, performance control, specialization, and decentralization within an organization. They utilized data from logistics managers who primarily represented large manufacturing firms to assess the impact of JIT-selling on organizational structure. Generally, the results of the studies indicate that manufacturers adopting JIT-selling should expect structural changes in their organizations to support these strategies.

Green et al. (2008) expanded the foundation for JIT-selling research by formally defining the term and developing a valid, reliable measure of the JIT-selling construct. The purpose of this study is to utilize the newly developed JIT-selling scale to build on Germain’s et al. (1994) work related to the effect of JIT-selling on organizational structure. Specifically, the unique contribution of this research is the utilization of a six-item JIT-selling measurement scale, in place of the single “percentage of sales made on a JIT basis” question identified in the prior research as a limitation, to assess the hypotheses related to the effect of JIT-selling on organizational structure as specified by Germain et al. (1994) and Claycomb et al. (1999a). In addition, Germain et al. (1994) focused their data collection efforts on manufacturing executives with logistics-related responsibilities. In an effort to improve the generalizability of their work, the data collection focus for this study was shifted to manufacturing executives with marketing- and sales-related responsibilities.

The next section is devoted to a review of the relevant literature followed by the development of the research hypotheses and the methodology designed to test the hypotheses. The paper will conclude with a section that incorporates a general discussion of the results and conclusions based on the results, limitations of the study, recommended future research, and implications for practitioners.

**Literature review**

Stevenson (2009) notes that the three major functions of business organizations are operations, marketing, and finance. Operations and sales are the two line functions in a business organization with all other functions supporting the two line functions (Stevenson, 2009; Sawhney and Piper, 2002). Obviously, there is some overlap among the functions, resulting in the need for significant interfacing and collaboration among the functions, involving information exchange and cooperative decision making. Specifically, there have been numerous suggestions that JIT, along with other advanced manufacturing concepts, provide effective integration mechanisms between marketing and operations (Sawhney and Piper, 2002). The study of these interfaces should, then, be of major interest to researchers and businesses alike.
As early as 1982, Schonberger noted that JIT manufacturing was changing the way firms looked at logistics/distribution (marketing). Rather than looking for ways to optimize utilization of drivers, truck space, etc. JIT suppliers would need to assure steady and reliable deliveries. Truckload deliveries would no longer be acceptable. Suppliers would become responsible for deliveries, with buyers specifying delivery date rather than ship date. Since 1982, a number of papers have been published which specifically address the sales/marketing and operations/JIT interface (Zelbst et al., 2010; Calantone et al., 2002; Hausman et al., 2002; Narasimhan and Kim, 2002; O’Leary-Kelly and Flores, 2002; Sawhney and Piper, 2002; Singhal and Singhal, 2002; Spencer and Cox, 1994; Whybark, 1994; Ghose and Mukhopadhyay, 1993; Morris and Morris, 1992; Blois, 1991; Deane et al., 1991; Fitzsimmons et al., 1991; Gilbert et al., 1994; Roth and van der Velde, 1991; St John and Hall, 1991; Dion et al., 1990; Natarajan and Weinrauch, 1990; O’Neal, 1984, 1989) with key findings being that interdependent marketing and operations actions are superior to independent ones (Abad and Sweeney, 1982), integration of marketing and manufacturing decisions impacts organizational performance (O’Leary-Kelly and Flores, 2002) and collaboration and coordination of the two is a strategic imperative (Hausman et al., 2002). There have even been special issues of academic journals dedicated to the interactions between JIT/operations and sales/marketing: “Linking strategy formulation in marketing and operations: empirical research,” Journal of Operations Management (Berry et al., 1991); “Manufacturing-Sales Coordination,” International Journal of Production Economics (Whybark and Wijngaard, 1994); and “Managing the interface between marketing and operations,” Journal of Operations Management (Malhotra and Sharma, 2002).

The following is a limited list of important findings regarding the relationship between sales and JIT:

- Shift from an adversarial relationship to a cooperative relationship (O’Neal, 1989).
- JIT environment will influence sales-force selection, training, compensation, and motivation (Dion et al., 1990; Natarajan and Weinrauch, 1990).
- Marketing can emphasize JIT characteristics (Natarajan and Weinrauch, 1990).
- JIT service to a buyer described in terms of a higher level marketing service (Dion et al., 1990).
- Suppliers may have to become more selective of JIT partners (Dion et al., 1990).
- JIT appears to significantly alter the way in which a company can deploy its marketing strategies (Spencer and Cox, 1994).
- Market orientation directly and positively impacts JIT (Zelbst et al., 2010).

As one may see from the 2010 paper, the JIT/selling interface remains a viable area of interest.

**JIT-selling defined**

Although Germain et al. (1994) do not provide a specific definition of JIT-selling, they do offer a relatively rich description of the construct. They describe JIT as the “ultimate time-based pull marketing strategy married to total process minimization” (Germain et al., 1994, p. 472). The objective of this strategy is the delivery of zero-defect products and services in the exact quantities at the precise times and places desired by customers while minimizing all types of waste (Germain et al., 1994). Implementation of
the strategy requires fundamental changes in the way the selling function is performed requiring that sellers work to develop strong alliances with customers (Germain et al., 1994). The following definition of JIT-selling was later offered by Green et al. (2008, p. 132) and will guide the perspective of this current research:

A JIT-seller exhibits the ability to build value throughout the selling process based on organizational capabilities to deliver zero-defect quality, zero variance quantity, precise on-time delivery and the ability to minimize total waste and total cost throughout the production and marketing processes.

It is important to distinguish JIT-selling from other JIT strategies such as JIT-manufacturing (Inman et al., 2010) and JIT-delivery (Wee and Chung, 2009). JIT-sellers increase sales by building value in the eyes of customers related to the selling organization’s existing abilities to deliver quality products in the quantities and at the times demanded by their customers. As manufacturers develop JIT-manufacturing and JIT-delivery capabilities, JIT-selling follows to inform customers of these capabilities and to leverage those capabilities into increased sales and market share. JIT-selling is, therefore, a marketing capability built upon an organization’s existing JIT-manufacturing and JIT-delivery capabilities. As previously indicated, research in the area of JIT-selling is limited.

**JIT-selling in the literature**

While the literature related to JIT is extensive, the research devoted specifically to the JIT-selling construct is scant (Germain et al., 1994; Claycomb et al., 1999b, Green et al., 2008, Green and Inman, 2005). The research foundation established by Germain et al. (1994) measured the effect of JIT-selling on organizational structure, while Claycomb et al. (1999b) incorporated JIT-selling as one of the dimensions of total-system-JIT as they investigated its effect on inventory, organizational structure, and financial performance outcomes. A third study by Claycomb et al. (1999a) assessed the effects of a similar construct, JIT-with-customers, on organizational structure and performance. The JIT-selling construct was defined and scale measurements enhanced by Green et al. (2008). Supporting studies conducted by Green and Inman (2006, 2007) assessed the impact of JIT-with-customers and JIT-II-selling strategies on organizational structure and performance.

Germain et al. (1994) sampled members of the Council of Logistics Management to investigate the relationships among JIT-selling and the organizational structure constructs of integration, performance control, specialization, and decentralization. They hypothesized positive relationships between JIT-selling and integration, performance control, specialization, and scheduling. They also hypothesized that JIT-selling has no impact on operations decentralization and a negative impact on scheduling decentralization. With one exception, all hypotheses were supported. They did not find support for the relationship between JIT-selling and integration. Germain et al. (1994) provide a general description of JIT as a strategic marketing initiative but do not provide a specific definition of JIT-selling. They describe their measure of JIT-selling as “an open-ended percentage scale, [that] is relatively crude and may not tap the depth and intensity of JIT relationships” (Germain et al., 1994, p. 480), as a limitation. Claycomb et al. (1999b) also used data from a sample of logistics managers to investigate the impact total-system-JIT on inventory, organization, and financial outcomes. They describe total-system-JIT as incorporating JIT-purchasing, JIT-production, and
JIT-sales dimensions. They found that total-system-JIT is inversely related to inventory levels and the number of hierarchical layers in the organization, and positively related to financial results. They did not find total-system-JIT to be related to executive spans of control, however. A review of the correlation matrix provided by Claycomb et al. (1999b) indicates similar results when JIT-selling is considered separately. Claycomb et al. (1999b) also do not provide a specific definition of JIT-selling. They operationalize it, as did Germain et al. (1994), with a single, open-ended “percentage of sales made on a JIT basis” question and identified this single-item measurement as a limitation of their study stating “nonetheless, further research should concentrate on developing valid and reliable measures of JIT” (Germain et al., 1994, p. 627). Green et al. (2008) develop a multi-dimensional, scale that exhibits reliability and validity for measuring the JIT-selling construct and provide a formal definition to facilitate future research.

Hypotheses
The section is devoted to a thorough development of the hypotheses in this replication of prior research in the area of JIT-selling. The JIT-selling model tested in this study was derived from the theoretical frameworks presented by Germain et al. (1994, p. 472) and Claycomb et al. (1999a, p. 29). The model will be retested utilizing the validated multi-item scale for JIT-selling, therefore, overcoming a limitation cited by the prior research. The model incorporates JIT-selling as impacting the structure dimensions of integration, performance control, specialization, and decentralization. Generally, it is proposed that an increase in JIT-selling will result in increased levels of integration, performance control, specialization, and decentralization. The model is shown in Figure 1. Although not pictured in Figure 1, we include organization size as a control variable because size has been found to impact organizational structure (Germain et al., 1994). Hage (1980) reports that organization size is positively related to integration, formalization, specialization, and decentralization.

Integration refers to the horizontal integration of the departments within an organization (Germain et al., 1994; Claycomb et al., 1999a). Integration of departments fosters communication, collaboration, and coordination resulting in the more efficient and effective accomplishment of the organization’s objectives (Germain et al., 1994; Claycomb et al., 1999a). This becomes increasingly important as slack resources, such as inventory buffers, are reduced. Variance in output in one department cannot be absorbed by that of another (Claycomb et al., 1999a). This also causes decision making one area to more greatly influence other areas and cost (Claycomb et al., 1999a); for example, smaller lot sizes results in increase costs in labor, packaging, machine set-ups, warehousing, and distribution. In addition, integration could prevent friction from competing functions within the firm.

Both Germain et al. (1994) and Claycomb et al. (1999a) incorporated measures of integrative mechanisms and integrative committees. Germain et al. (1994) hypothesized a positive association between JIT-selling and integration, but did not find support for the hypothesis. Claycomb et al. (1999a) hypothesized a positive relation between JIT-with-customers and integration and found statistical support for the hypothesis. A related study conducted by Green and Inman (2007) examined the relationship between a JIT-II-selling market-oriented strategy and the strategic link between the production and marketing functions. They determined that the relationship between functions strengthened. It is, therefore, hypothesized that the internal functions of
an organization will become more integrated as a result of implementation of a JIT-selling strategy:

**H1.** As JIT-selling increases, internal integration within the organization increases.

Germain *et al.* (1994) proposed that formalized performance control should increase as JIT-selling increases. JIT-sellers work in a competitive environment where information replaces inventory. Since the levels of slack resources have been minimized in JIT organizations, it is necessary to monitor performance closely, increasing the need for information. For example, information replaces safety stock. Also, as the management of processes intensifies, so does the need for intensive measurement (Germain *et al.*, 1994). This need for performance-related information should result in more formalized internal and benchmark control systems. Germain *et al.* (1994) assessed both the extent to which performance is monitored internally and the extent to which it is benchmarked against industry standards and competitors. Claycomb *et al.* (1999a)
similarly assessed performance control, but used the internal and benchmark scales as indicators of the degree of formalization within the organization. It is, therefore, hypothesized that performance control will increase as the result of increased JIT-selling activities:

**H2a.** As JIT-selling increases, the extent of benchmark performance control within the organization increases.

**H2b.** As JIT-selling increases, the extent of internal performance control within the organization increases.

The degree of specialization within an organization relates to the extent that jobs are narrowly defined in terms of required knowledge, skill, and experience (Germain et al., 1994; Claycomb et al., 1999a). Germain et al. (1994) hypothesized that adoption of a JIT-selling strategy would lead to an increased level of specialization within the organization. As customer demands become more precise in terms of quality, quantity, and delivery requirements, more knowledgeable, skilled, and experienced employees are required. Specialized staff is needed to ensure smooth transfer of information (production plan, forecast, etc.) and to handle the increasing complexity of the system. Both Germain et al. (1994) and Claycomb et al. (1999a) measured specialization by asking whether or not certain manufacturing, logistics, and marketing related functions are handled by full-time specialists. Germain et al. (1994) found that internal specialization increases as JIT-selling increases. A positive relationship between JIT-selling and specialization is hypothesized:

**H3.** As JIT-selling increases, the degree of specialization within the organization increases.

The degree of decentralization refers to the hierarchical level within the organization where the authority to make decisions has been delegated (Germain et al., 1994; Claycomb et al., 1999a). Successful JIT-selling requires quick response to changes in customer quality, quantity, and delivery demands. Further, JIT-sellers must be empowered to rapidly solve customers’ problems. Such responsiveness requires that the authority be delegated to lower levels within the organization. Those closest to the customer must be empowered to take actions to solve problems without requesting approval from managers at higher levels within the organization. Decentralization gives those closer to relevant information the latitude to act (Germain et al., 1994). Germain et al. (1994) identified and measure scheduling decentralization and operations decentralization, finding JIT-selling and scheduling decentralization to be inversely related and JIT-selling and operations decentralization to be unrelated. Claycomb et al. (1999a) identified three domains of decentralization (scheduling, strategic, and marketing), measured each one, and found JIT-selling to be positively linked to all three.

Scheduling decentralization involves orders and delivery dates. Intuitively, it would seem that schedulers and planners should have the authority to make changes “on the run” so that customer delivery requirements could be met more effectively. Giunipero and Law (1990) found that the most common change subsequent to JIT implementation was the combining of planning and purchasing into one buyer/planner function. Planners typically handle short-term scheduling requirements while buyers deal with longer term issues such as sourcing. By combining the two, a strategic function (sourcing or supplier selection) is moved into the shorter term, allowing the
buyer/planner to balance sourcing needs with short-term scheduling requirements. Strategic decisions involve supplier selection, location decisions, and service level determination. As JIT-selling increases, individual facilities would need to be able to make service level decisions and warehouse location decisions quickly, without having to defer to a corporate office’s authority. Marketing decisions include pricing and promotion. Claycomb et al. (1999a) note that the increasing degree of necessary interdepartmental coordination may result in marketing decision being pushed downward in the organization. If JIT is indeed higher level marketing service (Dion et al., 1990) and marketing is to emphasize the firm’s JIT characteristics (Natarajan and Weinrauch, 1990), then sales will need more discretion in making short-term pricing and promotion decisions.

The Claycomb et al. (1999a) measures were adopted for this study. Since the scheduling, strategic, and marketing dimensions all include decisions that relate to the ability to quickly respond directly to customer needs, it is hypothesized that all three dimensions will be positively impacted by JIT-selling. Therefore:

\( H4a \). As JIT-selling increases, the degree of scheduling decentralization within the organization increases.

\( H4b \). As JIT-selling increases, the degree of strategic decentralization within the organization increases.

\( H4c \). As JIT-selling increases, the degree of marketing decentralization within the organization increases.

**Methodology**

*Measurement of constructs*

Measurement of the JIT-selling and organizational structure constructs was necessary to test the study hypotheses. The six-item JIT-selling scale was previously derived and validated by Green et al. (2008). The structure-related scales were those used by Claycomb et al. (1999a) and originally drawn from the previous works of Miller and Droge (1986) and Miller (1991). The organizational structure scales included integration (mechanisms and committees), performance control (internal and benchmark), specialization, and decentralization (scheduling, strategic, and marketing). With the exception of the specialization scale, all scales included multiple items with responses recorded on anchored seven-point Likert formats. The specialization scale items required Yes/No responses. The measurement scales are fully displayed in the Appendix. Taking direction from Germain et al. (1994), the control variable organization size is measured by the natural logarithm of the number of employees.

*Data collection*

A random sample of 4,250 manufacturers was generated from the Manufacturer’s News, Inc. database. Data relating to the JIT-selling and organizational structure constructs were collected using a multi-mode survey methodology described and tested by Schaefer and Dillman (1998). A distribution list of the e-mail addresses was developed, and a survey questionnaire was constructed and located on an internet web site. The potential respondents were sent an e-mail message describing the study, promising anonymity, and asking for participation. The e-mail message contained a direct link to the survey web site. A follow-up e-mail message with similar content was
sent two weeks later. Initial and follow-up mail-outs were sent to firms for which the initial e-mailings were determined undeliverable.

The data set was divided into early and late responding groups and the means of the measurement items for each of the study scales were compared using ANOVA to assess for non-response bias. Each of the measurement scales was assessed for unidimensionality, reliability, and validity, and the stated hypotheses were assessed using structural equation modeling techniques.

Sampling
Of the 4,250 manufacturers from the Manufacturer’s News, Inc. database surveyed, 180 responded with data useful to this study. Germain et al. (1994) intentionally focused on manufacturers who market to external customers in their JIT-selling study. In particular, they surveyed logistics managers within manufacturing organizations. Claycomb et al. (1999a) similarly focused on logistics managers. The same general manufacturing focus was carried forward in this study. The sample frame, however, included marketing and sales managers in the manufacturing sector.

The gross response rate of 4.2 percent for this study is relatively low and requires some explanation. This relatively low gross response rate was not unexpected and is partially attributed to heavy reliance on a web-based data collection methodology. Klassen and Jacobs (2001) indicate that web response rates can be expected to be approximately half of that of other data collection methodologies, such as mail surveys. Although higher response rates are desirable, Harmon et al. (2002) note that low response rates are typical in industrial research. Examples of low response rates in this type of research are 6.7 percent (Ward and Zhou, 2006), 7.5 percent (Nahm et al., 2003), 6.7 percent (Tan et al., 2002). Hunt (1990, p. 174) suggests that otherwise credible research not be “rejected on the basis of potential non-response bias – no matter what the response rate is.” Klassen and Jacobs (2001) identify high data item completion rates, and an increased likelihood that best practice users (i.e. JIT-sellers) will respond via the web, as benefits of a web-based approach to data collection. The data item completion rate for this study was 94 percent.

Additionally, there is concern that the sample size of 180 is insufficient to support factor analysis given the generally accepted threshold of five responses per measure scale item. While the survey originally contained 42 measurement scale items requiring a sample size of 210 (42 * 5), the subsequent measurement model incorporated only 35 separate items due to parceling of the dichotomously measured specialization items and re-specification of other scales as described in the following measurement scale assessment subsection thereby reducing the required sample size to 175 (35 * 5). Hair et al. (2006) report that sample sizes in the 100-150 range are recommended to ensure stable solutions with maximum likelihood estimation techniques are used, as in the case for this study. It should also be noted that examples of high-quality management research incorporating structural equation modeling conducted with similar sized samples is reported in the literature: Fullerton and Wempe (2009) with 121 responses; Daugherty et al. (2009) with 125 responses; Menor and Roth (2008) with 166 responses; and Naor et al. (2008) with 189 responses.

To allow assessment for non-response bias, respondents were categorized as responding to either the initial or follow-up requests sent approximately three weeks later. Those responding to the initial requests were classified as early responders; those
responding to the follow-up requests were classified as late responders. About 57 percent (102) of the respondents were categorized as early respondents and 43 percent (78) were categorized as late respondents. Following the procedure recommended by Armstrong and Overton (1977), means for the numeric demographic (years in current position, number of employees, and annual revenues) and all measurement items were compared between early and late respondents with no significant differences found that non-response bias has not negatively impacted the assembled data set.

When data for all study measurement scales are collected from single informants, there is concern that common method bias may inflate estimates of the relationships between independent and dependent variables (Podsakoff and Organ, 1986). Harman’s one-factor test was used post hoc to examine the potential bias (Podsakoff and Organ, 1986). Substantial bias is indicated when either a single factor or one “general” factor explains the majority of the total variance (Podsakoff and Organ, 1986). Results of the factor analysis revealed nine factors with eigenvalues greater than one, which combined to account for 71 percent of the total variance. The first factor accounted for only 21 percent of the total variance. As an additional test, Mossholder et al. (1998) recommend assessing common method bias through single factor confirmatory factor analysis. This analysis with all items loading on one factor does not fit the data well with a \( \chi^2 \) ratio value of 10.495, a non-normed fit index (NNFI) of 0.413, and a comparative fit index (CFI) of 0.449. This lack of fit indicates that common method bias is not a significant concern with the data set. Based upon the results of Harman's one-factor test and the single factor confirmatory factor analysis, problems associated with common method bias are not considered significant (Podsakoff and Organ, 1986).

Of the respondents, 95 percent held either line management positions responsible for the firm’s marketing function: 64 percent percent held positions as marketing managers or marketing/sales related positions and 31 percent held positions as CEO, president, or general manager. The remaining 5 percent of the respondents held vice-president positions in functions other than marketing, such as manufacturing and operations. Respondents averaged nine years in their current positions. Mean sales for the firms included in the sample were $320 million, and the mean number of employees per firm was 1,343; 96 percent of the respondents represented manufacturing organizations; and 18 specific manufacturing standard industrial classification codes were identified. Respondents represented 40 different states.

Results

Measurement scale assessment

The study scales were individually assessed for dimensionality, reliability, and validity and then incorporated into a measurement model for an overall assessment of fit. Some re-specification of the scales was necessary to achieve unidimensionality. The two integration scales were combined into one scale since both loaded on a single factor. It was also necessary to combine the decentralization scale items in a manner different than originally specified and to assess dimensionality of the decentralization scales in a multi-factor confirmatory factor analysis. A review of the items in the integrative mechanisms and integrative committees scales supports the combination of the two scales into one since the integrative mechanisms items of interdepartmental committees and task forces logically fit under the integrative committees classification.
from a content validity perspective. A review of the scheduling decentralization and strategic decentralization items also provides logical support for combining items 1 and 2 (production scheduling and delivery dates) from the strategic decentralization with items 1, 2, and 3 (production volume, selection of suppliers, and goods to be manufactured) of the strategic decentralization scale from a content validity perspective. These five items are more closely relate to scheduling than to the remaining strategic decentralization items that have to do with strategic decisions related to the number and location of factories and warehouses. Because the specialization scale items are dichotomous, they were parcelled as recommended by Williams et al. (2009).

\( \chi^2 \) ratios of less than three (Kline, 1998), root mean square error of approximation below 0.08, and NNFI, CFI, and goodness of fit index values of 0.90 or greater indicate sufficient dimensionality (Ahire et al., 1996; Garver and Mentzer, 1999). Garver and Mentzer (1999) recommend computing Cronbach’s coefficient alpha to assess scale reliability with alpha values greater than or equal to 0.70 indicating sufficient reliability. As reported in Table I, the alpha values for all study scales exceed the recommended value, indicating sufficient reliability. Ahire et al. (1996) recommend assessing convergent validity using the normed fit index coefficient with values greater than 0.90 indicating strong validity. Discriminant validity was assessed using a \( \chi^2 \) difference test for each pair of scales under consideration, with a statistically significant difference in \( \chi^2 \) indicating validity (Garver and Mentzer, 1999; Ahire et al., 1996; Gerbing and Anderson, 1988). All possible pairs of the study scales were subjected to \( \chi^2 \) difference tests with each pairing producing a statistically significant difference. While all scales do not meet all criteria, taken as a whole, the results presented in Table I indicate sufficient unidimensionality, convergent and discriminant validity, and reliability.

Koufteros (1999) recommends that the individual scales be incorporated together in a measurement model and that this model be subjected to an additional confirmatory factor analysis. Table II presents the results of the assessment of the measurement model. \( \chi^2 \) ratio values of less than 2.00 and NNFI and CFI values greater than

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<th>Scale</th>
<th>( \chi^2 ) ratio</th>
<th>RMSEA</th>
<th>NNFI</th>
<th>CFI</th>
<th>GFI</th>
<th>NFI</th>
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</tbody>
</table>

Notes: aValidity assessment using confirmatory factor analysis was not completed for the specialization scale because it contains only three parcels or for the individual decentralization scales because they were incorporated into a single, multi-factor confirmatory factor analysis; RMSEA, root mean square error of approximation; NNFI, non-normed fit index; CFI, comparative fit index; GFI, goodness of fit index; NFI, normed fit index

Table I. Individual scale assessment results
0.90 indicate reasonable fit (Koufteros, 1999). Results of the analysis indicate that the measurement model fits the data relatively well with an NNFI of 0.944 and a CFI of 0.951. The $\chi^2$ ratio of 1.521 is less than the recommended value of 2.00. The individual measurement scales are considered sufficiently reliable and valid and the fit of the measurement model is considered sufficient to support further analysis.
**Structural equation modeling results**

Results of the assessment of the structural model are presented in Table III. These results provide information necessary to evaluate the study hypotheses. The significant path identified from JIT-selling to integration with a standardized estimate of 0.35 and an associated t-value of 4.05 supports hypothesis one that JIT-selling is positively associated with integration. The significant path from JIT-selling to benchmark performance control with an estimate of 0.43 and an associated t-value of 5.18, and the significant path from JIT-selling and integrative performance control with an estimate of 0.26 and associated t-value of 3.10, support hypothesis two; that JIT-selling is positively associated with performance control. The significant path from JIT-selling to specialization with an estimate of 0.21 and an associated t-value of 2.64 supports H3; that JIT-selling is positively associated with specialization. The paths from JIT-selling to scheduling, strategic, and marketing decentralization are not significant as expected, however. H4 that JIT-selling is positively associated with decentralization is, therefore, not supported. It should also be noted that the control variable organization size is significantly related to all of the organizational structure constructs with the exception of strategic and marketing decentralization. The next section will discuss the meaningful conclusions, limitations, and directions for future research.

**Conclusions and limitations**

Germain et al. (1994) proposed that adoption of a JIT-selling approach would result in a modified organizational structure. In a follow-up study, Claycomb et al. (1999a) hypothesized that a JIT-with-customers approach would similarly result in structure modifications.

<table>
<thead>
<tr>
<th>Model link</th>
<th>Standard coefficients</th>
<th>t-values</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypotheses tests</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>JIT→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integration</td>
<td>0.35</td>
<td>4.05</td>
<td>H1: supported</td>
</tr>
<tr>
<td>Benchmark performance control</td>
<td>0.43</td>
<td>5.18</td>
<td>H2a: supported</td>
</tr>
<tr>
<td>Integrative performance control</td>
<td>0.26</td>
<td>3.10</td>
<td>H2b: supported</td>
</tr>
<tr>
<td>Specialization</td>
<td>0.21</td>
<td>2.64</td>
<td>H3: supported</td>
</tr>
<tr>
<td>Scheduling decentralization</td>
<td>-0.15</td>
<td>-1.81</td>
<td>H4a: not supported</td>
</tr>
<tr>
<td>Strategic decentralization</td>
<td>-0.02</td>
<td>-0.26</td>
<td>H4b: not supported</td>
</tr>
<tr>
<td>Marketing decentralization</td>
<td>0.03</td>
<td>0.36</td>
<td>H4c: not supported</td>
</tr>
<tr>
<td><strong>Control for organization size</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size→</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Integration</td>
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<td>3.24</td>
<td></td>
</tr>
<tr>
<td>Benchmark performance control</td>
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<td>3.20</td>
<td></td>
</tr>
<tr>
<td>Integrative performance control</td>
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<td>3.16</td>
<td></td>
</tr>
<tr>
<td>Specialization</td>
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<td>4.55</td>
<td></td>
</tr>
<tr>
<td>Scheduling decentralization</td>
<td>0.30</td>
<td>3.79</td>
<td></td>
</tr>
<tr>
<td>Strategic decentralization</td>
<td>0.09</td>
<td>1.11</td>
<td></td>
</tr>
<tr>
<td>Marketing decentralization</td>
<td>0.30</td>
<td>2.65</td>
<td></td>
</tr>
</tbody>
</table>

Notes: $\chi^2$ ratio = 2.003; RMSEA = 0.075; NFI = 0.840; NNFI = 0.899; CFI = 0.907; IFI = 0.908; GFI = 0.741

Table III. Structural model results
Specifically, Germain et al. (1994) hypothesized that a JIT-selling strategy would positively impact organizational integration, performance control, specialization, and negatively impact scheduling decentralization. Additionally, they hypothesized that JIT-selling would have no impact on operational decentralization. They found support for all but the integration hypothesis. Germain et al. (1994) surveyed logistics managers of manufacturing firms using established measures of structure and a less developed single-item measure of JIT-selling. This study generally replicates, but expands, the Germain et al. (1994) study by surveying a different group of manufacturers (marketing and sales managers) and incorporating a more valid and reliable six-item measure of JIT-selling developed by Green et al. (2008). Generally, the propositions that JIT-selling impacts organizational structure are supported. Specifically, the results of this study indicate that JIT-selling leads to increased integration, performance control, and specialization. The hypothesized relationship between JIT-selling and decentralization is not supported by study results.

The finding that JIT-selling does not impact decentralization is interesting and puzzling. Germain et al. (1994) proposed that JIT-selling impacts scheduling decentralization but not operations decentralization. They stated that scheduling decentralization concerned decisions related to when things were done and that operations decentralization concerned decisions related to how things were done. Further, they argued that JIT-selling as a strategic initiative was more closely related to scheduling decentralization than to operations decentralization. Claycomb et al. (1999a) proposed that JIT-with-customers would impact decentralization and incorporated measures related to scheduling decentralization, strategic decentralization, and marketing decentralization. For purposes of this study, operations decentralization was replaced with strategic decentralization and marketing decentralization, because they more closely represent decisions related to the marketing function.

While the objectives of the study were successfully accomplished, limitations of the study should be noted. First, caution should be exercised when generalizing the results of this study beyond manufacturing applications. Results from two distinct manufacturing-based groups, logistics managers and marketing managers, support generalization within the manufacturing sector, however. Second, the original Germain et al. (1994) study incorporated environmental uncertainty as an antecedent to JIT-selling and a measure of operations decentralization that this study does not. The uncertainty scale was omitted from the survey form in the interest of parsimony. Following the lead of Claycomb et al. (1999a), the operations decentralization scale was replaced with the more market-oriented measures of decentralization. Although the item completion rate is relatively high and a comparison of the responses between early and late respondents found no statistical differences, it should also be noted that the response rate is relatively low raising concerns related to non-response bias. Interpretation and generalization of the results should be made with these limitations in mind.

There remains some discrepancy between the previously reported results and those reported here. Primarily, decentralization was not found to be positively associated with JIT-selling. Additional research is required to clarify these conflicting results. It may be necessary to improve the quality of the decentralization scales. The scale items did not load on separate factors as expected and it was necessary to remove several items to achieve sufficient dimensionality. From a broader perspective, it would be interesting to incorporate the various total system JIT constructs (JIT-selling,
JIT-production, JIT-purchasing) discussed by Claycomb et al. (1999a) and the JIT-information construct introduced by Green et al. (2007) as antecedents to the organizational structure constructs within a more encompassing model that also incorporates measures of organizational performance.

In summary, the value of these research results involves replicating the findings of Germain et al. (1994) and Claycomb et al. (1999a), and utilizing a comprehensive and valid measurement scale for JIT-selling, therefore, overcoming the limitation of their prior research. JIT-selling does impact organizational structure. Managers adopting the strategy can expect increased levels of integration, performance control, and specialization. The impact of JIT-selling on the level of decentralization remains somewhat unclear, however, requiring that additional investigation be undertaken.

References


Further reading


Appendix. Measurement scales

*Just-in-time selling*

Indicate the extent to which you agree with each of the following statements (seven-point scales with endpoints “strongly disagree” and “strongly agree”).
Integrative mechanisms scale
In assuring the compatibility among decisions in one area with those in other areas, to what extent is each of the following used? (seven-point scales with endpoints “rarely used” and “frequently used”).

| IM1 | Interdepartmental committees |
| IM2 | Task forces |
| IM3 | Liaison personnel |

Integrative committees scale
To what extent is decision making at top levels in your firm characterized by participative, cross-functional committees in which different departments, functions or divisions get together to decide the following classes of decisions? (seven-point scales with endpoints “rarely used” and “frequently used”).

| IC1 | Distribution service strategy |
| IC2 | Marketing (or sales) strategy |
| IC3 | Capital budget decisions |
| IC4 | Long-term strategies (of growth and diversification) and decisions related to changes in the firm’s operating philosophy |

Benchmark performance control
Please rate the extent to which performance is compared to industry standards or competitors on the basis of each of the following (seven-point scales with endpoints “rarely used” and “frequently used”).

| BPC1 | Functional costs (e.g. transportation, manufacturing, selling) |
| BPC2 | Customer service (e.g. fill rate, cycle time, on-time delivery) |
| BPC3 | Productivity levels |
| BPC4 | Operations (e.g. warehousing, manufacturing, transportation) |
Internal performance control scale
Please rate the extent to which performance is monitored internally on the basis of each of the following (seven-point scales with endpoints “rarely used” and “frequently used”).

| IPC1       | Functional costs (e.g. selling, transportation, manufacturing) |
| IPC2       | Customer service (e.g. fill rate, cycle time) |
| IPC3       | Cost controls by fixing standard costs and analyzing variation |
| IPC4       | Productivity analysis |
| IPC5       | Customer satisfaction and follow-up |
| IPC6       | Profitability |

Table AV.

Specialization scale
Please indicate whether each of the following is dealt with by at least one full-time specialist (Yes/No responses).

| SPC1       | Warehouse facilities design |
| SPC2       | Plant facilities design |
| SPC3       | Material handling |
| SPC4       | Market research |
| SPC5       | Sales forecasting |
| SPC6       | Distribution equipment |
| SPC7       | Plant or warehouse facility location |
| SPC8       | Production scheduling |
| SPC9       | Transportation scheduling |
| SPC10      | Manufacturing quality control |

Table AVI.

Scheduling decentralization scale
Which management level has the authority to make decisions in the following areas? (seven-point scales with endpoints of “decision made above the chief executive” and “decision made by individual below first level supervisor”; intermediate points expressly associated with specific organizational level).

| SCD1       | Production scheduling |
| SCD2       | Delivery dates to customers and priority of orders |

Table AVII.

Strategic decentralization scale
Which management level has the authority to make decisions in the following areas? (seven-point scales with endpoints of “decision made above the chief executive” and “decision made by individual below first level supervisor”; intermediate points expressly associated with specific organizational level).


**Marketing decentralization scale**

Which management level has the authority to make decisions in the following areas? (seven-point scales with endpoints of “decision made above the chief executive” and “decision made by individual below first level supervisor”; intermediate points expressly associated with specific organizational level).

<table>
<thead>
<tr>
<th>STD1</th>
<th>Production volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD2</td>
<td>Selecting suppliers</td>
</tr>
<tr>
<td>STD3</td>
<td>Goods to be manufactured</td>
</tr>
<tr>
<td>STD4</td>
<td>Location of factories</td>
</tr>
<tr>
<td>STD5</td>
<td>Number of factories to operate</td>
</tr>
<tr>
<td>STD6</td>
<td>Location of field warehouses</td>
</tr>
<tr>
<td>STD7</td>
<td>Number of field warehouses to operate</td>
</tr>
<tr>
<td>STD8</td>
<td>Distribution service levels (e.g. fill rates)</td>
</tr>
</tbody>
</table>

Table AVIII.

<table>
<thead>
<tr>
<th>MD1</th>
<th>Pricing</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD2</td>
<td>Channels of distribution</td>
</tr>
<tr>
<td>MD3</td>
<td>Advertising/promotion strategy</td>
</tr>
<tr>
<td>MD4</td>
<td>Target market selection</td>
</tr>
</tbody>
</table>

Table AIX.

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