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Why sales reps should welcome information technology: Measuring the impact of CRM-based IT on sales effectiveness

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Abstract

This study seeks to answer the following question: Can sales representatives enhance their performance through their acceptance of information technology (IT) tools? Using data collected from two companies, we show that despite uncertain results and the frequent resistance among salespeople to IT interventions, IT acceptance indeed has a positive effect on sales performance. This occurs because salespeople using IT expand their knowledge and, in turn, gain improved targeting abilities, enhanced presentation skills, and increased call productivity. Thus, sales representatives have a strong incentive to accept IT because doing so is likely to sharpen their own job performance.
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1. Introduction

The theoretical importance of customer relationship management (CRM) is well established in the marketing literature, and though there have been conflicting results in both academic research and the business environment, recent empirical studies have demonstrated that there is a positive relationship between CRM practices and firm performance (Boulding, Staelin, Ehret, & Johnston, 2005). The practical challenge, however, lies in how well employees in the firm adopt and implement CRM-based tactics. Indeed, some research suggests that up to 70% of CRM initiatives result in either losses or no improvement in company performance, largely as a result of deficiencies in implementation (Reinartz, Krafft, & Hoyer, 2004).

According to Reinartz et al. (2004, p. 293), CRM is the "systematic process to manage customer relationship initiation, maintenance, and termination across all customer contact points to maximize the value of the relationship portfolio." Given CRM's expansive nature, we heed the call of Boulding et al. (2005) that further research should delve into specific areas within CRM rather than more macro-level concerns. Our research is centered on operational CRM (Tanner, Ahearne, Leigh, Mason, & Moncrief, 2005) and, more specifically, on acceptance by the sales force of related information technology (IT) that supports the customer-interacting aspects of the firm. Such technology includes sales force automation tools pertaining to lead management, opportunity management, customer-contact management, sales forecasting, and so forth (Tanner et al., 2005).

We define "IT acceptance" as the degree to which a salesperson integrates IT tools into his or her sales activities. More specifically, this concept pertains to the frequency of technology usage, the full usage of the applications' capabilities, the level of integrated and complementary use of different tools, and the usage of technology for analysis purposes.

Most scholars and practitioners would agree that IT plays a prominent, even essential role in the operationalization of CRM. For example, Reinartz et al. (2004) identify technology as a key facilitator of CRM activities, and Jayachandran, Sharma, Kaufman, and Raman (2005) demonstrate that technology performs an important role by influencing relational information processes within the context of CRM. However, the

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existence of such technology is not sufficient; after all, someone must use it. The sales organization's ability and willingness to use IT tools are critical to the ultimate success or failure of the CRM initiative (Babakus, Cravens, Grant, Ingram, & LaForge, 1996; Van Bruggen & Wierenga, 2005), and this is especially true in a business-to-business environment in which the sales force is the primary point of contact between buying and selling entities. In their recent meta-analysis on relationship marketing, Palmatier, Dant, Grewal, and Evans (2006) argue that successful customer relationship marketing depends on effective selection and training of boundary spanners and that salesperson expertise and communication represent two of the firm's most important relationship-building strategies. Our study explores how IT acceptance influences salesperson performance through mechanisms that enhance both expertise and communication.

In this study, we suggest, support, and empirically demonstrate that IT acceptance aids salesperson performance by improving knowledge, targeting skills, sales presentation skills, and call productivity. In doing so, we add value to both practice and research through a stronger understanding of the link between IT and performance and its underlying mediating processes. Moreover, if we can show that IT acceptance enhances sales performance, a strong incentive is created for both sales managers and sales reps to accept future IT interventions because the likelihood of obtaining performance-based bonuses increases.

In general, management assumes that supplying IT tools, such as sales force automation software, will contribute to higher levels of productivity, better customer communication, and enhanced customer relationships (e.g., Campbell, 1998; Colombo, 1994; Conlon, 1999; Goldenberg, 1996; Moncrief, Lamb, & Mackay, 1991). Indeed, although the relationship between IT and sales performance remains largely unsubstantiated, many organizations spend considerable resources in equipping their sales forces with IT. A recent industry report by the Aberdeen Group estimates that more than $27 billion is spent annually on sales force-related CRM software (Gaither, 2005). However, organizations need to justify these substantial investments and can no longer afford to continue to invest in sales technology as a matter of blind faith alone. Moncrief et al.'s (1991) study reveals that "up-front investments in technology" and "expected performance increases" (or the lack thereof) are the most cited reasons for companies not to invest in laptops for the sales force. Further complicating the issue is the frequent resistance of sales personnel to new technology (e.g., Simon & Usunier, 2007; Speier & Venkatesh, 2002). Despite all this, there is a dearth of academic research on the effects of technology on salesperson performance. The effect of IT on more macro-levels of performance and productivity has captured the attention of several academics. Many studies have assessed the effects of IT investments on productivity at the economy/industry level (e.g., Baily & Chakrabarti, 1988; Bresnahan, 1986; Osterman, 1986) or the firm level (e.g., Brynjolfsson & Hitt, 1993; Wierenga & Ophuis, 1997). However, the findings from these studies are mixed and have led to the ongoing debate of the so-called IT-productivity paradox (Brynjolfsson & Yang, 1996; Mooney, Gurbaxani, & Kraemer, 1996; Pinsonneault & Rivard, 1998). Several study limitations have fed this paradox. For example, some studies do not account for the intermediate and intangible benefits of IT and consequently provide little insight into how IT can add value. From a methodological standpoint, the "technology–performance" relationship may be blurred because of the use of data across firms or industries. Another stream of research has investigated the impact of information systems on individual (decision) performance in laboratory settings (DeLone & McLean, 1992; Sharda, Barr, & McDonnell, 1988) or on white-collar workers in general (Millman & Hartwick, 1987; Pinsonneault & Kraemer, 1993; Sulek & Maruchek, 1992). Still, few empirical attempts have been made to investigate the effects of IT on individuals and their work performance (Palmquist, 1992; Torkzadeh & Doll, 1999). Studies in this stream of research have also generated mixed results (e.g., DeLone & McLean, 1992; Sharda et al., 1988) and are limited by common method variance and the use of self-reported perceptions of individual performance and IT use (Igbaria, 1990; Igbaria & Tan, 1997).

The sales literature reveals only a few studies on sales technology. These studies focus on the adoption of sales technology (e.g., Gatignon & Robertson, 1989; Jones, Sundaram, & Chin, 2002; Schillewaert, Ahearne, Frambach, & Moenaert, 2005) or retrospectively examine salesperson failure to adopt technology and the consequences for organizational commitment, job satisfaction, and fit (Speier & Venkatesh, 2002). A few studies have considered technology and sales performance, but they either lack solid empirical data (e.g., Collins & Schibrowsky, 1990; Moriarty & Swartz, 1989; Wedell & Hempeck, 1987; Zabiah, Bellenger, & Johnston, 2004) or use descriptive perceptional data of sales managers or salespeople (Keillor, Bashaw, & Pettijohn, 1997; Moncrief et al., 1991). Some studies, such as that of Ko and Dennis (2004) which links sales technology, salesperson performance, experience, and expertise using multi-source data, and the study by Ahearne, Srinivasan, and Weinstein (2004) which suggests a curvilinear relationship between sales performance and technology use, have examined the direct link between IT use and sales performance, but have not examined the facilitating mechanisms through which this link occurs.

Still, given the prominence of CRM as a strategic lever in today's business environment and IT's pivotal role in CRM systems (e.g., Jayachandran et al., 2005; Payne & Frow, 2005), additional studies are needed to thoroughly examine the impact of IT on individual salesperson performance (Marshall, Moncrief, & Lassk, 1999) and to understand the underlying mechanisms of IT use and salesperson performance. The current study investigates whether and how IT helps salespeople perform better, and it alleviates the major limitations of previous research by studying these phenomena within a "controlled" setting (i.e., tests in two industries, not a cross-section of industries) and by using multiple data sources rather than single-source self-reported perceptions. We develop and test a theory of technology and salesperson performance in two study sites from different industries. Our model includes *mediating* variables that reflect the benefits of sales technology. Finally,

we discuss the results and implications of the study and provide suggestions for future research.

2. Conceptual model and hypotheses

We propose that acceptance of IT positively influences salesperson performance and that this positive relationship between IT acceptance and performance is a function of the mediating processes that involve enhanced call productivity and expanded knowledge, along with improved targeting and sales presentation skills. Our conceptual foundation was formed by integrating a rigorous literature search with multiple rounds of qualitative information gathering. First, we conducted six one-on-one interviews with CRM and sales automation experts to explore the usage of different IT tools by salespeople and how it might affect work processes and performance. Second, we conducted a qualitative field study in the U.S. division of a mid-sized multi-national pharmaceutical company. Data were collected by means of four one-on-one interviews with sales representatives and three additional field sales trips with sales representatives. These field sales trips lasted an entire day and represented a "regular day in the life of each sales representative." The field trips included interviews, observation, and short verbal protocols in which sales reps demonstrated and verbalized usage of their sales automation system (Ericcson & Simon, 1980; Todd & Benbasat, 1987). Subsequently, two sales managers who supervised the representatives that participated previously were interviewed. All interviews were recorded, transcribed, and subjected to a thematic content analysis that was independently conducted by the researchers (Miles & Huberman, 1994). The preliminary results were corroborated in multiple rounds, and discrepancies were discussed until mutual agreement was achieved. The draft model was presented to the company in a group feedback session. The company executives confirmed the research model, and no major adjustments were made.

2.1. The IT-performance link for salespeople

In this study, we consider IT as a set of software applications in support of salesperson activities. This implies that we assessed the impact of IT across a broad and integrated set of applications or tools, beyond specific hardware technologies. Compared with traditional information and communication methods (e.g., face-to-face, telephone, written documents and reports), electronic tools possess several different information and communication capabilities. Inspired by several authors, Huber (1990) theorizes that advanced information technologies enable managers to stay informed and communicate with the salesperson and to be involved in decision-making processes. Individuals using technology are able to communicate more easily across time and geographic location, to communicate with greater precision to targeted groups, and to record more reliably the content and nature of communication events. Decision making is facilitated by IT because, among other things, large amounts of information about organizational transactions can be stored and retrieved more quickly, accessed selectively, or accurately reconfigured such that new information is created. Information technologies also enable professionals to use and access electronic media at almost any time from any place and to communicate information in almost any form (e.g., text, sound, image) (Bock & Applegate, 1995; Jarvenpaa & Ives, 1994). In summary, IT increases the richness, complexity, and mobility of information and knowledge because of increased communication speed, information availability, bandwidth, connectivity, remote accessibility, and computer memory (Fulk & DeSanctis, 1995; Jarvenpaa & Ives, 1994). Not surprisingly, it is suggested that IT increases personal effectiveness (Igbaria, 1990; Igbaria & Tan, 1997; Millman & Hartwick, 1987), improves the decision making process for middle managers (Buchanan & McCalman, 1988), and enhances communication processes and, thus, the work performed (Good & Stone, 1995).

From the previous assertions, it might be assumed that salesperson use of IT has similar effects and ultimately improves salesperson performance. Indeed, there are indications that IT-savvy sales representatives can build stronger customer relationships, provide better customer service, and enhance their productivity and sales effectiveness as a result of improved information access, management of customer files, problem-solving capabilities, sales presentations, and communication between the home office and the sales force (Agency Sales Magazine, 1997; Colombo, 1994; Duncan & Moriarty, 1998; Keillor et al., 1997; Moncrief et al., 1991). Information technologies may have "automational" or efficiency effects (e.g., doing things more quickly and cheaply) and informational and transformational outcomes (e.g., doing things more effectively, executing tasks that previously were not possible without technology, developing new capabilities and skills) (Day, 1994; Grover, Teng, Segars, & Fiedler, 1998; Mooney et al., 1996). This enhanced efficiency and effectiveness translates into improved salesperson performance measures.

H1. IT acceptance has a positive effect on salesperson performance.

2.2. Mediating processes

The previous discussion implies, however, that IT results in several interrelated and intermediate value-adding mechanisms that may (or may not) lead to increased end performance (Brynjolfsson & Yang, 1996; Mooney et al., 1996; Ragowski, Ahituv, & Neumann, 1996). Thus, to better explain the relationship between IT acceptance and salesperson performance, our theoretical model includes intermediate benefits that are potentially enhanced by a salesperson's acceptance of IT and that have previously been shown to be important determinants of performance (Behrman & Perreault, 1982; Brown & Peterson, 1994; Churchill, Ford, Hartley, & Walker, 1985; Sujan, Weitz, & Kumar, 1994).

2.2.1. Call productivity

We define "call productivity" as the number of sales calls or visits a sales representative makes to his or her customers over

the number of hours worked during a specified period (Brinkerhoff & Dressler, 1990). Call productivity is a key measure of salesperson efficiency because salespeople can make more calls given a certain work effort. An important reason companies supply their salespeople with IT is to increase the efficiency of the sales staff. Advocates of sales technology propose that technology reduces the time salespeople spend on repetitive support and non-selling tasks (e.g., administrative tasks), and thus it frees up capacity for salespeople to make more sales calls (Goldenberg, 1996; Moncrief et al., 1991; Moriarty & Swartz, 1989). Similarly, Sharda et al. (1988) propose that the use of decision support systems shortens managers' decision-making time. Finally, Good and Stone (1995) assert that computer technology improves and facilitates information processing and communication, and thus the quantity of work performed increases. Evidence of this comes from a sales manager who expressed the following during one of our interviews:

> Technology helps [salespeople's] productivity and efficiency. Based on their computer analyses, what they know about the customer, and determining the best time to see a specific customer, they can make eight calls a day.

In general, the numbers of calls made in relation to the duration of time worked are accepted as being indicative of the effort a salesperson puts into his or her customer portfolio. Several empirical studies in the sales literature support the logical relationship that stronger effort leads to heightened performance (Brown & Peterson, 1994; Churchill et al., 1985).

2.2.2. Knowledge

Knowledge pertains to the technical and market knowledge of a salesperson, such as expertise about product applications, specifications, customer use situations, and the industry in general (e.g., competition, trends) (Behrman & Perreault, 1982). The importance of salesperson knowledge along with information-gathering skills and activities is well recognized in the personal selling literature (e.g., Ingram & LaForge, 1997; Krishnamoorthy, Misra, & Prasad, 2005; Moncrief, 1986; Rapp, Ahearne, Mathieu, & Schillewaert, 2006). Sujan, Sujan, and Bettman (1988) suggest that a salesperson's effectiveness and knowledge can be enhanced by providing market research information and encouraging him or her to use that information. To use their knowledge effectively, salespeople must be able to acquire information about sales and market situations (Le Bon & Merunka, 2006; Weitz, Sujan, & Sujan, 1986). Because of its storage, retrieval, and network capacities, IT has the potential to enable and facilitate information acquisition, dissemination, and utilization (Glazer, 1991; Huber, 1991). Information technology enables sales representatives to draw on an expansive (computerized) organizational memory of people and databases and to use it to update their beliefs and state of knowledge about business relationships (Day, 1994; Huber, 1991; Sinkula, 1994). For example, electronic communication media can link a salesperson to other professionals within and across organizational boundaries. In addition, a sales representative can search online databases or the Internet for customer- and business-related information and use that information in customer interactions. This implies that sales representatives who exhibit high levels of IT usage have access to a more expansive base of external and organizational information sources, knowledge, and people than their less-technology-savvy counterparts. In their updated review of sales activities, Marshall et al. (1999) support this reasoning in stating that intelligence gathering and dissemination processes occur more and more through the use of computers. Increased knowledge acts as an enabler for salespeople in several ways, in particular as it relates to their targeting and presentation skills.

Two comments of sales representatives illustrate this, as follows:

> I use the computer to find out what topics a customer is interested in. I pull a lot from the internet (e.g., articles) and sometimes put together binders for my customers. It gives me ammunition to support my arguments.

> Information technology has brought information to use a lot quicker. Information can be shared on specifics of products, and there is more communication in the field between managers and representatives. Our Lotus Notes applications allow better communication of what is happening in the field. All this has increased the knowledge of people.

2.2.3. Targeting skills

Targeting refers to a salesperson's ability to identify and select the prospects and customers with high interest, potential, and ability to buy, so that by initiating sales contact, the salesperson can efficiently convert these (potential) customers into actual sales. Information technology tools, such as sales automation systems, help sales representatives decide which customers to target at the right time by increasing their knowledge. Indeed, one of the principal purposes of IT is to provide the sales organization with information that enables it to effectively and efficiently manage points of contact with prospects and customers. With vast information available at his or her fingertips, the salesperson can make decisions as to which prospects and customers to call on at any particular time and for whatever purpose.

Salespeople develop a strong understanding of their portfolio by running specific data queries, sorting customer lists based on "business potential," analyzing purchase patterns, identifying customer needs, classifying customers, and using this knowledge to extend sales effort into the most profitable product–customer combinations. In doing so, salespeople can better assess which (candidate) customers might flow through the sales funnel and result in a sale. As such, salespeople also acquire procedural knowledge that consists of action plans (Weitz et al., 1986) that can help in targeting. The salesperson experientially knows the products customers find most attractive and can use this knowledge to identify which market segments are prone to buy and to target accordingly. In addition, salespeople can actively monitor competitive campaigns and respond by tailoring their own targeting practices.

Although targeting skills have not been included in previous theoretical models of salesperson performance, they are a basic part of marketing strategy (Kotler, 1994) and intuitively should have a positive impact on sales performance. The importance of identifying and effectively screening potential customers is widely recognized as a prerequisite for sales success in direct marketing (Kotler, 1994) and personal selling (e.g., Kamakura, Ramaswami, & Srivastava, 1991; Stanton & Spiro, 1999).

2.2.4. Sales presentation skills

Salespeople's increased knowledge due to IT also affects customer communication. By managing their knowledge repositories electronically, salespeople can improve their presentation skills in several ways. Marshall et al. (1999) show that sales representatives attribute a key role to computerized technologies in terms of the level and quality of information they are able to provide during sales calls. Other authors (e.g., Agency Sales Magazine, 1997; Colombo, 1994; Duncan & Moriarty, 1998; Keillor et al., 1997; Moncrief et al., 1991) have argued that sales technology may lead to (1) quicker access to better information, (2) faster response and answers to customers, (3) enhanced quality of customer interactions, and (4) increased personalization and customization of presentations and responses. By the same token, interpersonal communication technologies (e.g., e-mail) enable sales representatives to respond to customers more promptly and knowledgeably, even when they are away from the customer's site.

In all, high market and technical knowledge allows the juxtaposing of product benefits with the weaknesses of competitive offerings to deliver strong comparisons. Salespeople can also convey the information in a more convincing manner. By presenting and using market information to provide a coherent business and financial justification for the sale, the salesperson can better frame the value proposition to the buyer and make a stronger case for the sale. Knowledge also enables the salesperson to prepare for potentially adversarial buyer positions that might arise during the sales presentation. Salespeople who are high in technical knowledge can speak intelligently about specific customer applications for a given product, thus conveying a level of technical expertise that is assuring to the customer. A salesperson illustrated this, as follows:

> If you know a lot about the buying behavior of your customers before you go in, you have an edge. I assemble each customer's prescribing behavior, look at the application where I have my call notes, and determine what message I want to focus on this time. Instead of having a generic message with my customer, I can go in and focus on their needs and wants. It is up to each individual to gather all that information and mold it into a good presentation. Also, if a customer has a question, I do a search on the web, for instance, and provide them a personalized answer.

Sales presentation skills embrace factors that are related to the interactions between the customer and the sales representative. Behrman and Perreault (1982) identify giving high quality sales presentations and working well with customers as an important behavioral dimension of salesperson performance. This construct pertains to the role of the salesperson as an external representative of the firm and includes both the delivery of clear, well thought-out presentations and the effective response to questions posed by the buyer. Behrman and Perreault demonstrated that sales presentation skills were significantly correlated with a salesperson's overall performance.

Thus:

H2. The relationship between IT acceptance and salesperson performance is explained by the following mediating processes:

H2a. IT acceptance has a positive effect on salesperson call productivity, which in turn positively influences salesperson performance.

H2b. IT acceptance has a positive effect on salesperson targeting and sales presentation skills (which are both mediated by knowledge), which in turn positively influences salesperson performance.

3. Method

We used a field study format to test the effects of IT acceptance on salesperson performance (Stone, 1978). Data were collected in two separate companies with multiple respondent surveys combined with data from company records. The choice for a field study design within two separate companies and industries was inspired by our desire to establish greater levels of generalizability while controlling for confounding external effects due to variable market or organizational contexts. Similar methods and identical measures were employed in both studies to ensure comparability.

3.1. Pharmaceutical and consumer packaged goods research sites: background

Study participants were salespeople who worked for (1) a mid-sized U.S. division of a European multi-national pharmaceutical company (the same firm from which the qualitative data were obtained) and (2) a division of a large multi-national consumer packaged goods (CPG) firm based in the United States. The pharmaceutical salespeople were responsible for marketing and selling (in the industry referred to as "detailing") two product lines directly to physicians. The CPG salespeople were responsible for marketing and selling one specific product category with several different product lines directly to retail accounts. Both companies provided a good sample frame for testing our empirical model because they fulfilled three major conditions necessary for our research: (1) there was a broad array of IT applications available to the sales force, (2) the use of technologies was voluntary such that variance in IT usage among sales representatives existed, and (3) the company's sales force was large enough to allow for advanced statistical analyses. In addition, both firms operate in contexts that are highly information and data intensive (Ahearne, Gruene, & Burke-Jarvis, 1999; DeSarbo, Degeratu, Ahearne, & Saxon, 2002), enabling sales representatives to manipulate and analyze

sales and market data through the use of IT. In addition, communication among colleagues and with the home office (Moncrief, 1986) is critical in both industries, and IT tools such as e-mail and groupware can facilitate such communication.

3.2. Data acquisition procedure

The sales force used as our pharmaceutical sample frame consisted of 238 sales representatives and 29 sales district managers. Each manager supervised five to ten sales representatives. Mail surveys were sent out to all 238 sales representatives and 29 sales managers, including a letter from the vice president of sales supporting this research and a postage-paid business reply envelope addressed to the researchers. All participants were assured complete confidentiality.

The data acquisition procedure yielded a response of 203 sales representatives, or an 87.5% response rate. In addition, all 29 sales district managers returned their surveys (for a 100% response rate). Merging both survey data sets with the company records (i.e., bonus and call data) using the territory number as a unique identification key and deleting unusable responses resulted in a data set that contained 187 full data records (related to the same number of sales representatives), for a usable response rate of approximately 83%. These response rates are in line with other studies in a sales management context, even though our study combines data from different survey respondents (Challagalla & Shervani, 1996; MacKenzie, Podsakoff, & Fetter, 1993). Of the sample, 50% were male, and the median age was between 26 and 35 years. The average experience in a sales job was 9.5 years (st.dev. = 7.4), the average tenure within the company was 6.8 years (st.dev. = 7.2), and the salespeople worked in their territory an average of 4.7 years (st.dev. = 5.9).

The sales force used as our CPG sample frame consisted of 138 sales representatives and 17 sales district managers. The mail survey procedure (e.g., cover letter, reply procedure) was the same as in Study 1. This yielded a response of 112 sales representatives, or a usable response rate of 92%. Again, all 17 sales district managers returned their surveys (for a 100% response rate). Survey data sets and company records (i.e., bonus and call data) were merged on the basis of the territory number, and all responses were usable. Of the sample, 48% were male, and the median age was between 26 and 35 years. The average experience in a sales job was 10.2 years (st.dev. = 6.1), and the average tenure within the company was 4.5 years (st.dev. = 5.1).

3.3. Construct measures

The measures used in both studies were obtained from three sources: (1) the sales representatives (IT acceptance levels), (2) their first-line sales district managers (knowledge, sales presentation skills, and targeting skills), and (3) company records (call productivity and sales performance). The managers evaluated different facets of the representatives' performance. Furthermore, company policy stipulated both weekly sales meetings and frequent field visits, which allowed regular contacts between managers and field salespeople. Therefore, we deemed the managers to be appropriate judges for rating these skills (Behrman & Perreault, 1982). We used the same data sources and measurement items (except for minor changes in case industry specifics required wording adjustments) for both samples.

We assessed IT acceptance with a five-item scale based on the work of Speier and Venkatesh (2002) and Schillewaert et al. (2005). We assessed sales presentation skills using an eight-item scale adapted from Behrman and Perreault (1982). We measured targeting skills with a new five-item scale that gauged the manager's assessment of a salesperson's ability to identify, select, and focus on the prospects and customers with the strongest potential of being converted into profitable sales. Table 1 lists the measures for the multi-item constructs. All scales were seven-point Likert scales anchored by "strongly disagree" and "strongly agree." In assessing knowledge, we considered whether its measures were reflective ("symptomatic") indicators or formative

Table 1
Measures used in study

IT acceptance
Based on Speier and Venkatesh (2002) and Schillewaert et al. (2005) — Source: salesperson
I consider myself a frequent user of IT.
I fully use the capabilities of our IT.
I have completely integrated our IT applications into my sales process.
I frequently use IT to sort, visualize and analyze market data.
I utilize different IT in an integrated way so that they work well together.
Knowledge
Based on Behrman and Perreault (1982) and Ahearne et al. (1999) — Source: sales manager
Is an excellent resource of competitive information.
Has a lot of information on industry trends.
Is well-informed about important events in our industry.
Knows all the specifications and applications of our products.
Is an excellent source of information about this "*product category*".
Keeps abreast of technical developments.
Knows and understands very well what "product users" are going through.
Targeting skills
New scale — Source: sales manager
Always targets the right *customers* in his/her sales approach.
Always calls on those *customers* that have potential.
Constantly works on the highest priority *customers* first.
Is very good at identifying, selecting and calling on profitable *customers*.
Consistently calls on *customers* that provide the most business.
Sales presentation: dealing with customers
Based on Behrman and Perreault (1982) — Source: sales manager
Presents information to *customers* in a clear and concise manner.
Is very responsive in handling *customer* questions.
Provides a lot of new information to *customers*.
Is aware of the personal interests and hobbies of *customers* and talks about them.
Always asks *customers* the appropriate questions.
Demonstrates the product value well.
Addresses *customers*' objections and issues adequately.
Gains *customer* commitment.

Notes: Seven-point rating scales are anchored by 1 (strongly disagree) and 7 (strongly agree). Italics indicate that wording was adapted to fit the context (pharmaceutical or CPG).

("causal") indicators. Given that market knowledge and technical knowledge tap distinct aspects of the knowledge construct, they should be viewed as formative rather than reflective indicators of the construct (see Bollen & Lennox, 1991; Fornell & Bookstein, 1982; Jarvis, MacKenzie, & Podsakoff, 2003). Therefore, rather than modeling knowledge as a latent construct with reflective indicators, we modeled it as a scale score, with measurement error terms fixed at one less the estimate of the scale's reliability, multiplied by the variance of the knowledge scale score (Jöreskog & Sörbom, 1982), respectively. We used a subjective estimate of .85 (Nunnally & Bernstein, 1994) to assess reliability rather than Cronbach's alpha because Cronbach's alpha measures internal consistency reliability and there is no reason to expect these indicators to be internally consistent (see Bollen & Lennox, 1991). We clarify the objective measures and covariates in the following paragraphs.

3.3.1. Call productivity

Productivity measures are traditionally expressed as ratios of output divided by input. Here, the productivity measure is expressed as the number of calls made in an average week (numerator=output) divided by the number of hours a sales representative works in an average week (denominator=input) (Brinkerhoff & Dressler, 1990). Goldenberg (1996) suggests using the same measure to assess a tangible benefit of sales automation, namely, that salespeople can spend more time selling in the field and calling on customers. We obtained the measure of number of calls made by a sales representative from company records or, more specifically, the sales reporting system. We obtained the number of hours a sales rep works in an average week from the self-report sales representative questionnaire.

3.3.2. Sales performance

We obtained salesperson performance from company records. We operationalized performance using the total year bonus/commission per sales representative based on achieved sales levels. The bonus was calculated based on the volume of products sold (prescriptions or products) to customers (physicians or retail accounts) in a salesperson's territory (a company-defined set of physicians or specific geographic region) as compared with a target quota that is set at the beginning of the year by an external organization specializing in sales force compensation. Because prescription information in the pharmaceutical industry is accurately tracked at the physician level (because the industry is heavily regulated by the Food and Drug Administration), with more than 90% of all pharmacies reporting customer-prescribing data to IMS Health, this information represents an accurate picture of a sales representative's performance. Similarly, the CPG company had accurate records tracking the salesperson's selling record, which led to a good representation of overall sales performance. We assembled the bonus measure for both samples four to six months after we completed the final survey data collection.

3.3.3. Control factors

We added control factors to our model to test the effects of IT acceptance and the related information-based benefits on sales performance in the presence of other important variables, which may also affect sales performance or intermediate variables. The purpose of examining covariates is to rule out rival explanations for our findings as well as to find the boundaries of the hypothesized effects (Draper & Smith, 1980). The covariates we used were as follows: (1) the length of time a sales representative had been with the company, (2) the length of time a sales representative had been working in his or her territory, and (3) total sales experience. Meta-analyses of the sales literature have found that these effects significantly explain individual salesperson performance (e.g., Brown & Peterson, 1994; Churchill et al., 1985).

4. Results

4.1. Measurement model

Using the two-step approach for testing structural equation models (Anderson & Gerbing, 1988; Baumgartner & Homburg, 1996; Bentler & Chou, 1987; Costner & Schoenberg, 1973), we conducted a series of confirmatory factor analyses on the construct measures to assess the psychometric properties of the scales with multiple items. Prior to combining the CPG and pharmaceutical data sets for analysis, we standardized both call productivity and sales performance measures since measures from the two samples were on different scales. Following guidelines that Segars (1997) and Kim and Hagtvet (2003) suggest, we also evaluated the fit of the single-factor models to ensure item unidimensionality. After the reliability, validity, and model fit within each category of constructs were established, we conducted an overall confirmatory factor analysis on the entire set of constructs using the maximum likelihood estimation procedure. Because the total number of measured variables was large (25), we used item parceling when estimating all models (Hall, Snell, & Foust, 1999; Landis, Beal, & Tesluk, 2000). Models using parcels often are preferred when sample sizes are relatively small (e.g., Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994) and, in addition to being more parsimonious, tend to reduce various sources of sampling error (MacCallum, Widaman, Zhang, & Hong, 1999). To gauge model fit, we report the Standardized Root Mean Square Residual (SRMR) and the Comparative Fit Index (CFI; Bentler, 1990). We also report chi-square values that provide a statistical basis for comparing the relative fit of all models. The SRMR is a measure of the standardized difference between the observed covariance and the predicted covariance, and in general, SRMR values $\leq .10$ are considered favorable (Kline, 2005). The CFI is an incremental fit index that contrasts the fit of a hypothesized structural equation modeling model against a baseline (uncorrelated indicators) model. Historically, incremental fit indices such as CFI$<.90$ in structural equation modeling models have been considered less than desirable. Although there is some controversy in the literature as to which fit indices are most appropriate under different conditions, researchers such as Hu and Bentler (1999) have proposed that the use of combined cutoffs, such as CFI$\sim\geq .95$ and SRMR$\sim\leq .10$, results in a better balance of Type I and Type

II tradeoffs in evaluating models; as such, we adopt this approach.

The measurement model fits the data well (χ^2 statistic = 45.827, df = 32, p > .05; CFI = .995; SRMR = .02). Thus, each latent construct used is unidimensional. All factor loadings of the indicators to their respective latent constructs were significant. All individual item reliabilities are larger than .50, the lowest composite reliability is .92, and the lowest average variance extracted is .85, thus providing evidence that all constructs possess adequate convergent validity and reliability (Bagozzi, 1980; Fornell & Larcker, 1981). The high composite reliabilities could be due, in part, to carryover effects or yea-saying; however, the extent to which composite reliabilities exceeded the .60 benchmark is reassuring (Bagozzi & Yi, 1988). Whereas correlations between the independent variables seem high, all squared correlations between the latent constructs were smaller than the average variance extracted from the respective constructs (see Table 2), in support of the measures' discriminant validity (Fornell & Larcker, 1981). In addition, we tested for multi-collinearity; the resulting variance inflation factors range from 1.1 to 3.3, which is well below the threshold of 10.0 that signifies a concern (Snee & Marquardt, 1984). The average variance inflation factor was 2.2, which is much lower than the suggested criteria of 6.0 (Rawlings, Pantula, & Dickey, 1998). In addition, all condition indices were significantly less than 30, as Belsley, Kuth, and Welsch (1980) suggest. Taken together, these analyses appear to indicate that multi-collinearity is not a significant issue in our model.

4.2. Test of structural model

Following the framework that MacKinnon, Lockwood, West, and Sheets (2002) and Baron and Kenny (1986) suggest, we fit several structural models to test the intervening effects present in our conceptual model, in effect isolating the direct and indirect effects for IT acceptance. Structural equation modeling techniques have long been advocated as preferable to regression techniques for testing mediating relationships, as they allow for the modeling of both measurement and structural relationships and yield overall fit indices (Baron & Kenny, 1986).

Table 2
Construct correlations, reliabilities, and average variance extracted

Construct	1	2	3	4	5	6
1. IT acceptance	.86, .92, .85					
2. Targeting	.14	.95, .99, .98				
3. Sales presentation	.10	.86**	.95, .99, .98			
4. Knowledge	.22**	.78**	.84**			
5. Call productivity	.31**	.30**	.31**	.40**		
6. Sales performance	.14*	.52**	.59**	.64**	.34**	

*p < .10, **p < .05 (N = 299).
The diagonal entries are reliability estimates for the latent constructs. The first entry is Cronbach's index of internal reliability consistency (α), the second is Bagozzi's (1980) construct reliability index (ρ), and the third is Fornell and Larcker's (1981) index of the average variance extracted by the construct ($\rho_{vc(\eta)}$). The off-diagonal entries are intercorrelations among latent constructs (Φ matrix from confirmatory factor analysis) and thus corrected for attenuation due to measurement error. Compared with Table 1, single-item measures are added to the measurement model.

Table 3
Hypothesized and final models: standardized effects and model fit statistics

Relationships	Hypothesized model	Final model
IT acceptance → knowledge	0.23*	0.21*
IT acceptance → call productivity	0.32*	0.23*
Knowledge → targeting skills	0.82*	0.82*
Knowledge → sales presentation skills	0.85*	0.85*
Targeting skills → job performance	0.15**	0.15**
Sales presentation skills → job performance	0.33*	0.33*
Call productivity → job performance	0.16*	0.16*
Knowledge → call productivity	–	0.35*
Controls		
Experience → knowledge	0.40*	0.40*
Experience → targeting skills	−0.11*	−0.11*
Experience → sales presentation skills	NS	–
Experience → call productivity	NS	–
Experience → job performance	0.31*	0.31*
χ^2 (df)	203.49 (46)	168.29 (47)
p-value	0.00	0.00
CFI	0.95	0.96
SRMR	0.09	0.06
Variance explained for all latent constructs		
Call productivity	.12	.21
Knowledge	.21	.21
Targeting skills	.61	.61
Sales presentation skills	.72	.72
Salesperson performance	.44	.46

*p < .01, **p < .05, NS p > .05.

The first step in the analysis was to fit a direct effects model that estimated the direct path of IT acceptance to performance, with no paths leading to the mediating variables or stemming from the mediator variables to performance, though all mediators remained as latent variables in the model. Although this model exhibited poor fit indices (χ^2 = 348.9, df = 50, p < .01; CFI = .90; SRMR = .17), the results indicate a positive relationship between IT acceptance and sales performance (β = .13, p < .05), in support of our main hypothesis.

Next, we estimated the model. This no-direct-effects model provides parameter estimates from IT acceptance to all the mediating constructs and from the mediating constructs to performance, but it contains no direct effect from IT acceptance to performance. Table 3 reports the test of this hypothesized model. The model fit is significantly improved compared with the direct effects model (χ^2 = 203.488, df = 46, p = .00; CFI = .95; SRMR = .09), and all significant relationships are in the hypothesized direction, thus providing evidence for the nomological validity of our model (Steenkamp & van Trijp, 1991). As Table 3 shows, the hypothesized model receives considerable support; all suggested relationships are significant.

Our final model examined the direct effect of IT acceptance on performance, including the mediating processes. This saturated structural model fit the data well (χ^2 = 202.9, df = 45, p < .01; CFI = .95; SRMR = .10), but it was not a significant improvement over the hypothesized (no-direct-effects) model

Table 4
Test of mediating properties of final model: standardized effects decomposition

Independent variable (IV)	Mediating variable	Dependent variable (DV)	Effect of IV on mediator	Effect of mediator on DV	Indirect effect of IV on DV	Sobel test *t*-stat	Sobel test *p*-value
IT acceptance	Call productivity	Performance	.233	.147	.132	2.442	.014
IT acceptance	Knowledge	Performance	.211	.488	.138	3.436	.000
IT acceptance	Knowledge	Targeting	.211	.821	.173	3.595	.000
IT acceptance	Knowledge	Presentation	.213	.846	.178	3.615	.000
Knowledge	Targeting	Performance	.821	.147	.450	2.392	.016
Knowledge	Presentation	Performance	.846	.325	.450	4.927	.000

($\Delta\chi^2$ (1)=.588, NS). Thus, we retain the hypothesized model as the appropriate model on which to continue our analysis.

The next step in our estimation procedure was to test the over-identifying restrictions of the model individually, based on the Lagrange-multiplier modification indices. This was to confirm whether market knowledge, targeting, sales presentation, and call productivity are complete or only partial mediators of the effects of IT (MacKenzie et al., 1998). We also deleted all non-significant paths from the control variable during this step.

This review suggests an additional path from knowledge to call productivity. Thus, knowledge also partially mediates the relationship between IT acceptance and call productivity. The standardized path coefficients and goodness-of-fit indices of the revised model appear in the second column of Table 3. The model fit of the revised model is significantly better when we consider a chi-square difference test between both models (35.18 $\Delta\chi^2$ decrease with 1 additional *df*). Similarly, the other fit indices are also improved (CFI=.96, and SRMR=.06). A summary of the direct and indirect effects, along with Sobel mediation test statistics, appears in Table 4. In each case, the indirect effect of the independent variable on the dependent variable through the mediator (i.e., the amount of mediation) is significantly different from zero. In other words, as hypothesized, in each case the association between the independent variable and the dependent variable has been significantly reduced by the inclusion of the mediating variable in the model. Fig. 1 shows a final model of the effects of IT acceptance on sales performance.

4.2.1. Comparison of the two groups

We conducted a multiple-groups analysis to determine whether the hypothesized model differed across the two samples constituting our combined data set (i.e., pharmaceutical and CPG companies). To begin, we tested two multiple-groups models. In the first model, we allowed the seven structural path values to vary between groups, and in the second, we constrained the groups' path coefficients to be equal. The model fit was acceptable in both models (Model 1: χ^2=260.3, *df*=92, *p*=.00; CFI=.95; SRMR=.10; Model 2: χ^2=426.7, *df*=124, *p*=.00; CFI=.95; SRMR=.10), and the chi-square

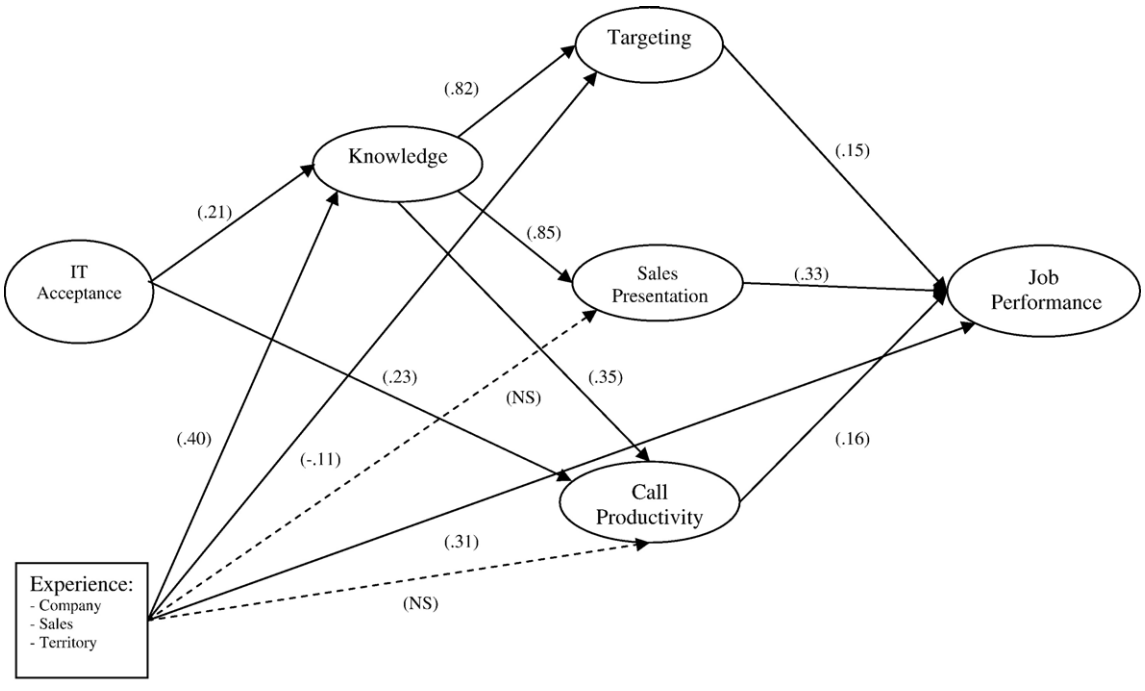

Fig. 1. Model of the effects of IT on sales performance (path coefficients).

Table 5
Standardized path estimates from multiple-groups model

Criterion and predictor	Pharmaceutical sample	CPG sample
Knowledge		
IT acceptance	.21	.33
Call productivity		
IT acceptance	.27	.37
Targeting		
Knowledge	.84	.81
Sales presentation		
Knowledge	.84	.83
Job performance		
Targeting	.13	.40
Sales presentation	.22	.22
Call productivity	.18	.10

Notes: All paths except that of targeting–job performance were constrained to be invariant between groups because this path was significantly different between samples. All paths except that of call productivity–job performance in the CPG sample were significant at $p<.05$.

difference between the two models was significant, indicating that the pharmaceutical and CPG sample path coefficients differ. We followed up this test with a series of individual tests in which we separately examined differences in the pair of coefficients associated with each of the structural paths. One by one, we compared the paths of the more restrictive model with that in which only the particular path in question was permitted to vary. Among the focal constructs, only the path from targeting skills to job performance varied significantly between groups. The positive relationship between the two constructs was more prominent in the CPG sample than in the pharmaceutical sample. In addition, whereas the path coefficients from call productivity to job performance were not significantly different between groups, the relationship between call productivity and job performance was not statistically significant in the CPG sample. We speculate that in the CPG industry, simply reaching more customers or making more calls does not necessarily translate into performance improvements. Whereas the zero-order correlation (.20) between call productivity and performance is significant at the $p<.05$ level, it is lower than that in the pharmaceutical sample (.43), and factors other than call productivity (as our data suggest here) may be more crucial in improving sales performance in the CPG industry. One difference may be that in the CPG sector, salespeople work on a decision-making unit that consists of multiple members, whereas in the pharmaceutical sector, the dyad is more "one on one" because the physician solely decides to prescribe a certain drug. In addition, in the CPG industry, it is equally important to pamper customers and spend time with them, which may work counter to conducting more calls within a specific time span. Finally, additional marketing-mix elements (e.g., in-store communication, consumer advertising) may influence sales.

A model in which the path from targeting to job performance was allowed to vary between groups reflected a significant improvement in fit over the model in which all paths were held invariant (χ^2 change of 6.1 with 1 *df*), though this model remains inferior to the original model in which all paths were allowed to vary. Table 5 presents the structural coefficients from the model in which all the paths except that from targeting to performance were held invariant.

4.3. Hypotheses tests

Our analyses provide support for all hypothesized main effects. H1 is supported, suggesting that IT acceptance has a positive effect on salesperson knowledge. Consistent with H2a, the results indicate a positive relationship between IT acceptance and a salesperson's call productivity and between call productivity and performance. As predicted in H2b, a sales representative's knowledge mediates the relationship between IT acceptance and targeting and sales presentation skills, and the relationships between targeting and performance and between sales presentation skills and performance were both significant. Altogether, the results indicate that these predictor variables explain a substantial proportion ($r^2=.46$) of the variance in salesperson performance.

5. Discussion and implications

This study's findings support the overall assertion that a salesperson who integrates IT tools into his or her sales activities can significantly improve his or her performance and achieve underlying efficiency gains and information-based benefits, sales skills, and behaviors. This is an important empirical finding given the ongoing debate on the link between IT and performance (i.e., the IT-productivity paradox) and continued investments by companies in advanced sales technology. The results also support early evidence of productivity gains due to sales automation (Moriarty & Swartz, 1989; Rivers & Dart, 1999). Although the amount of variance explained by the direct effect of sales technology may seem rather low, the effect is "robust" because it links different data sources (i.e., IT acceptance by the salesperson, salesperson evaluations by the sales manager, and performance data from archival records) and is confirmed in two industry settings. In addition, the amount of variance explained in salesperson performance compares favorably with the individual contributions made by other variables in previous sales studies (Churchill et al., 1985).

Assessing the mediating process behind the overall direct relationship between IT and salesperson performance helps in the understanding of "how" IT may be beneficial at the level of the individual sales representative. Specifically, salespeople using IT expand their knowledge and, in turn, gain improved targeting skills and enhanced presentation skills; they are also able to increase their call productivity.

Information technology applications aid salespeople's information processing and enable them to update their understanding of important business relationships (Huber, 1990). They also help salespeople improve their technical knowledge with respect to their products and their ability to compare and analyze their product's standing against competitive products. Because greater market knowledge leads to a keener sense of the potential customer base and segments, salespeople can focus

their efforts accordingly and target customers who are most likely to fit the sales organization's offerings. Salespeople who can focus their efforts on customers who are qualified and ready to buy are better able to achieve quotas. To the best of our knowledge, this study is the first to assess salesperson targeting as a sales skill, and thus no empirical benchmark for this relationship exists. Nevertheless, our study supports the widely accepted assumption of the importance of effective prospecting and the Pareto principle in a personal sales setting.

In addition, when salespeople have greater insight into their markets and products, they are more effective in communicating their value proposition and thus can make more compelling sales presentations to elicit favorable reactions from buyers. It is important to note that a salesperson's knowledge levels and sales presentation accomplishments are often regarded as dimensions of "behavioral" performance (Behrman & Perreault, 1982; Ingram & LaForge, 1997). To our knowledge, our study is also the first to provide estimates of the linkage between behavioral and objective output performance.

Similar to the impact on targeting and presentation skills, our data suggest that technology-led knowledge improvements favorably affect call productivity. Greater knowledge about the market and competitive offers enable salespeople to make more calls in a given period. In addition, our findings empirically support Moriarty and Swartz's (1989) suggestion that technology should reduce time spent on non-selling tasks, such as scheduling sales calls, updating customer records, compiling sales reports, and assembling market information. The positive effect of call productivity on sales performance is consistent with previous research regarding the influence of effort/motivation on sales outcomes (Brown & Peterson, 1994; Churchill et al., 1985). Buyer–seller exchanges rely heavily on cumulative face-to-face communication and interpersonal contact. As mentioned previously, when salespeople increase the number of sales calls they can make, they are more likely to achieve their quotas.

This study has important implications for sales management. The positive relationship between IT and performance and the intermediate benefits provide a good justification for the implementation of IT into the sales force. In other words, if a company invests in IT, improvements in salesperson behavior and performance can be achieved. This study also helps organizations quantify some of the intangible benefits associated with providing the sales force with technology, an issue that has proved to be difficult (Rivers & Dart, 1999). Furthermore, when salespeople can see the positive outcomes of IT acceptance among their colleagues, they may value these tools more highly and be willing to invest in the effort necessary to learn to use them and regularly incorporate them into their daily activities. This study shows that sales representatives have a strong incentive to accept IT because doing so is likely to sharpen their own job performance.

The findings herein imply that companies should intentionally recruit salespeople who have the ability to apply computer technologies to their daily activities. Similarly, training efforts should emphasize information gathering and communication by means of advanced information technologies. Companies could actively involve high-performing, IT-savvy salespeople in this training process. Such an approach could also enhance salespeople's attitudes toward and comfort level with all relevant sales technologies.

6. Limitations and suggestions for future research

This study suggests that there is a positive relationship between IT and salesperson performance, but it is certainly not definitive. Although we combined multiple data sources into the test of our model, this approach leads to several related consequences. First, our research design is cross-sectional in nature. Although we collected the sales performance indicators after the measures of sales representatives' and managers' assessments, purely causal inferences remain difficult to make. From the cross-sectional nature of our design, we cannot rule out possible spurious correlations or reverse causal relationships. For example, not only might high-performing sales reps more easily accept IT (e.g., because they have less to fear from knowledge spillovers), but reps for which IT has more performance-enhancing potential might also accept IT more readily. Thus, evidence of causality through longitudinal and/or experimental studies is needed.

Second, the relationships between knowledge and targeting and between knowledge and sales presentation may be somewhat inflated as a result of common method variance because they are all rated by the same source (sales manager). In addition, although our findings add support to the importance of sales skills (or behavioral performance) for output sales performance, these relationships could be somewhat inflated because of demand effects. At the time of the survey, managers may have had an idea of how their salespeople were performing year to date. Still, as mentioned previously, the final actual sales performance numbers were not available at the time of the survey data collection. The choice of the sales managers as evaluators of all sales skills may also imply some limitations. An argument can be made that the dimension related to sales presentation and dealing with customers is best assessed by customers. Customers could rate the salesperson on the aspects that affect customer attitudes and their purchases (Behrman & Perreault, 1982). Still, from a practical point of view, this was not feasible.

Some of these limitations provide worthwhile avenues for future research. Longitudinal research using a field experimental approach could counteract the limitation of the cross-sectional design and the making of causal inferences. Tracing IT usage, sales performance, and sales behavior from the outset of IT implementation would demonstrate how the acceptance process unfolds and when and how performance benefits are generated for specific types of salespeople. Similarly, research combining multiple rounds of qualitative and quantitative data collection techniques could add valuable knowledge about the interplay among salespeople's acceptance of IT, its consequences, and the intra-firm adoption process over time.

In this research, we focused only on the (positive) effects of IT on salesperson performance. Models in future research could also incorporate other important effects of IT on the individual

salesperson. For example, it would be useful to explore the psychological outcomes (e.g., job satisfaction, role stress) of introducing advanced information technologies to salespeople. The effects of technology on social and group communication interactions could also be assessed. Finally, research could explore the moderators of the relationships among IT acceptance, the intermediate variables, and salesperson performance.

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