# EXAMINING A MODEL OF UNDERSTANDING CUSTOMER VALUE AND SATISFACTION DATA

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*Several theoretical frameworks on company efforts to embrace, support, and encourage customer value and satisfaction initiatives and their impact on competitive advantage have been brought forth in recent years. The purpose of this article is to build a solid foundation for understanding, measuring, and testing these important constructs. Overall, this study tested a theoretical model concerning key organizational variables that enable the use of customer satisfaction data. The results find support for all of the hypothesized paths in the model. This is important for practitioners as it demonstrates the value of firms acting on customer satisfaction data (CVS) and the resulting positive business outcomes.*

## INTRODUCTION

Over the past decade, research has examined market orientation and its effects on positive business performance (e.g., Narver and Slater 1990; Jaworski and Kohli 1993; Greenley 1995; Jaworski and Kohli 1996; Han, Kim and Srivastava 1998; Baker and Sinkula 1999; Matsuno and Mentzer 2000). At the core of market orientation is the customer. Theoretically, superior customer value is the ultimate goal of the market oriented firm (Slater and Narver 1995). As a result, market orientation is partially based on customer knowledge (Slater and Narver 1995), which in turn is developed through customer information from concerning overall satisfaction (Webster 1988) and value.

Conceptualization of a market oriented organization put forth by Kohli and Jaworski (1990) indicated that firms striving for a market orientation should generate intelligence, disseminate the intelligence throughout the organization, and most importantly, act on the intelligence. However, truly implementing this model in practice is difficult and has been elusive for many organizations (Johnson 1999). Researchers suggest that organizations collect a

plethora of data, yet dissemination, comprehension, and utilization fails (Garver and Cook 2001; Morgan, Anderson and Mittal 2005). Information, especially rich customer value and satisfaction (CVS hereafter) data, adds little value if it is not disseminated and acted on appropriately (Conduit and Mavondo 2001). Further, market data, including customer satisfaction measures, used in organizational decision making enables organizations to meet and exceed market demands (Kennedy et al. 2003). For example, it is suggested that positive business performance results from focus, responsiveness, and action on customer data (Matsuno and Mentzer 2000).

Organizations collect a vast amount of market intelligence, but CVS research is the most prevalent type of research conducted by companies today (Oliver 1999). Consistent with market orientation researchers, customer satisfaction researchers suggest that the real challenge is getting employees to use this data to drive continuous improvement (Garver and Cook 2001). Practitioners need help in this area, yet only a handful of articles examine theoretical models focused on analyzing and using customer value and satisfaction data to drive process improvements (Mentzer, Bienstock and Kahn 1995; Morgan et al. 2005). As a result, academic researchers are calling for the development and empirical testing of such models (Mentzer, Bienstock and Kahn 1995;

Avlonitis and Gounaris 1997; Garver and Cook 2001; Kirca et al. 2005). Thus, the purpose of this article is to empirically test a model that examines customer data-driven organizations. The remainder of this discussion is built upon the Kohli and Jaworski (1990) conceptualization and behavioral aspect of marketing orientation.

To fulfill the purpose of this article, the following steps will be taken. First, a literature review will examine theoretical constructs and models in regard to using customer value and satisfaction data to drive process improvements and competitive advantage. Then, the research methodology will be put forth, followed by a discussion of the results. Lastly, research limitations, future research, and final conclusions will be explored.

## LITERATURE REVIEW AND MODEL DEVELOPMENT

For many marketing researchers and practitioners, the focus is on making data-driven decisions. With a renewed emphasis on customers, organizations are interested in their positive performance with customers, leading to improved loyalty and retention (Helgesen 2006; Aksoy et al. 2008; Doorn and Verhoef 2008). To achieve this goal, improved understandings and utilizations of customer value and satisfaction data are important. To be data-driven, firms must effectively understand and utilize customer value and satisfaction data. Figure 1 illustrates the hypothesized model.

### Understanding CVS Data

While employees may have access to massive amounts of data, they often lack the necessary skills to analyze and fully understand this data (Garver and Cook 2001; Ammar, Moore and Wright 2008). Research indicates that data must be turned into useful information for decision making (e.g., Kaplan and Norton 1996). In order to understand CVS data, researchers and practitioners must ask the right research questions and apply the right analysis tools. At the most basic level, practitioners need to

understand their relative strengths and weaknesses from the customers' perspective. Furthermore, practitioners need a prioritized list of customer driven improvement opportunities (i.e., What should we work on first?). Clearly, this type of analysis is tied directly into strategic, tactical, and operational decision making.

While most firms gather customer data, few excel in fully understanding this data, and part of this problem may stem from the literature. Market orientation frameworks have failed to emphasize the importance of understanding data, and instead have focused on the dissemination of data. For example, Kohli and Jaworski (1990) defined market orientation as 1) intelligence generation 2) intelligence dissemination and 3) responsiveness. This framework assumes data understanding, but, does not make it explicit. To date, only Wrenn (1997) incorporates the importance of understanding data in a model of market orientation. In their conceptualization, Garver and Cook (2001) make understanding CVS data an explicit step in their model of data-driven firms.

### Using CVS Data

Data utilization is absolutely critical, and without it, CVS resources are wasted. The real payoff of any CVS program is when managers use CVS data to drive decision making and improve products and services. For example, Kennedy et al. (2003) found that when data is used to make decisions, a customer orientation occurs and positively transforms into internal self-enforcement.

Action plans are effective tools to assist practitioners in using CVS data to drive improvements. When opportunities are identified and prioritized for improvement, cross-functional teams create action plans to improve performance. Utilizing many quality tools such as root cause analysis, quality function deployment, and process mapping, practitioners develop plans to improve and leverage performance with customers. Thus, to

**FIGURE 1**
**Proposed CVS Data Model**
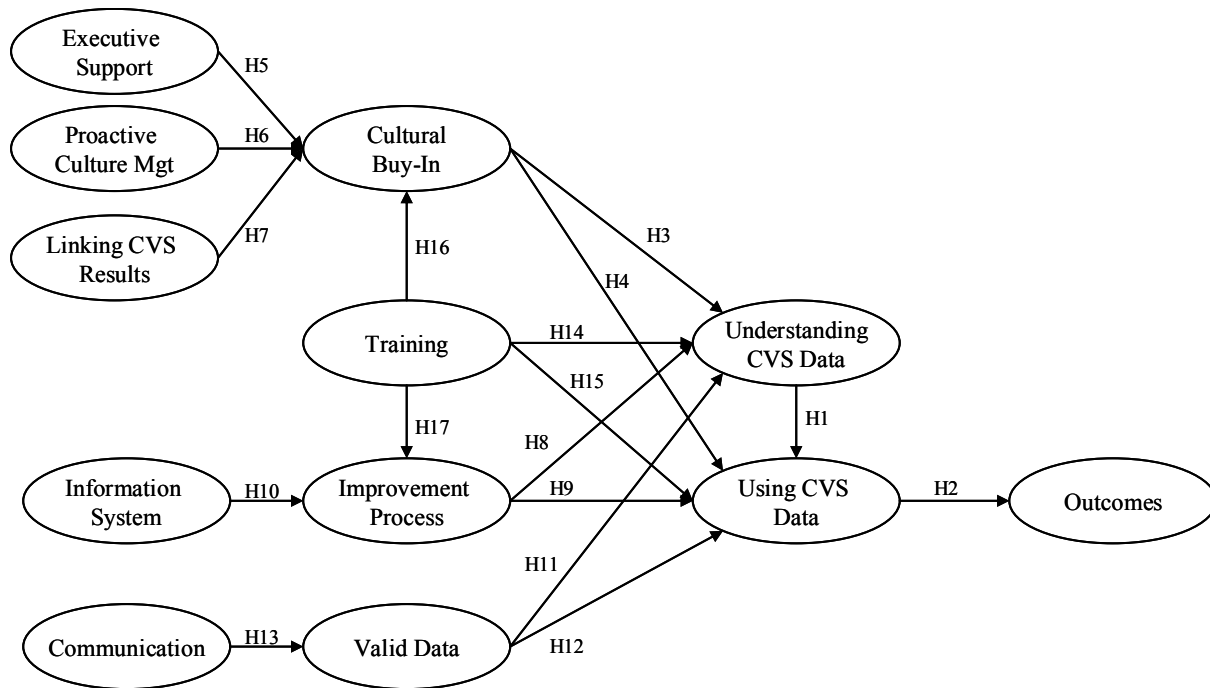


truly be a data-driven firm, practitioners must understand CVS data to guide business decisions. With being CVS data-driven, the voice of the customer is the driving force of business decisions. As a result, we put forth the following hypothesis:

**H₁:** Understanding CVS data will have a positive influence on using CVS data for internal decision making.

**Business Outcomes**

In this research, being a data-driven organization is the result of understanding and using CVS data. Furthermore, organizations that use data to drive strategy are summarized as market oriented. Researchers have presented positive organization benefit of being market oriented. For example, market orientated firms have been found to have positive organizational performance (Kirca et al. 2005) and outperform their less market oriented competitors (Hooley et al. 2000). Since market oriented firms are anticipating customer needs and change, they

have the ability to increase customer satisfaction and loyalty (Slater and Narver 1994). Homberg and Pflesser (2000) found that organizations that truly are market oriented will be inclined to obtain higher customer satisfaction, higher loyal customers, ability to attract new customers, attain a desirable level of market share, and lower acquisition and operating costs. Importantly, they also found a link between positive market performance and financial performance.

Researchers argue that business and financial success are outcomes associated with customer data-driven firms. Most practitioners are interested in CVS programs because of the business outcomes often touted by academic researchers. Outcomes are hypothesized to results from effectively understanding and utilizing CVS data include: improved customer retention, increased sales revenue, increased market share, increased ROI, improved cross-selling, increased customer acquisition. As a result, we put forth the following hypothesis:

**H₂:** Using CVS data to drive internal decision making will have a positive influence on business performance.

## Antecedents of a Customer Data-Driven Organization

In order to leverage CVS data understanding and utilization into financial outcomes, several antecedents need to be in place. In reviewing literature, it can be inferred that an organization that is grounded in data (i.e., understanding and using CVS data) is strongly influenced by four antecedents: cultural buy-in, a formal improvement process, training programs, and employee perceptions of data validity (see Figure 1).

*Cultural "Buy-In".* Many market orientation frameworks are often examined in the context of culture. For example, Deshpande and Webster (1989) draw comparisons of culture to market orientation, defining a culture as shared beliefs and values of the organization. Similarly, other researchers argue for an attitudinal conceptualization of market orientation, defining it as a corporate philosophy of how to conduct business (Drucker 1954; Han, Kim and Srivastava 1998). Other researchers have suggested that market orientation is a combination of attitudes and behavior (Avlonitis and Gounaris 1997).

Improvements in internal customer attitudes about market orientations are likely to lead to implementation within an organization's culture (Gronroos 1990). For example, all employee jobs and responsibilities as well as all internal cues of the organization should be directed to creating value for the customer (Webster 1988). Organizations need to make efforts to continuously develop internal support from all levels to support market oriented activities (Zhou et al. 2005).

To effectively understand and use CVS data, employees need to accept and embrace CVS data and related initiatives. More specifically related to CVS programs, Garver and Cook (2001) suggest that a CVS culture is a shared

set of attitudes, beliefs, knowledge, and behaviors that focus employees on the importance of listening to, understanding, and using CVS data. Similarly, this research defines cultural buy-in as a shared set of attitudes, beliefs, and values that fully support CVS initiatives.

Garver and Cook (2001) suggest that cultural buy-in to CVS programs has a strong impact on the level of data understanding and utilization. They suggest that data-driven firms have a culture that fully supports the constant monitoring of CVS data for internal decision making, placing equal importance on CVS data as they do with financial measures. Therefore, the following hypotheses are put forth:

**H₃:** Cultural "buy-in" positively influences understanding CVS data.

**H₄:** Cultural "buy-in" positively influences using CVS data.

*Executive Support, Persistence, and Intensity.* Top management support is a continuous theme throughout market orientation literature (e.g., Kirca et al. 2005). An essential prerequisite to becoming market oriented is having top management support and having that support clearly communicated throughout the organization (Kohli and Jaworski 1990). For some time, researchers have suggested the importance of executives' role in forming core values and shaping company culture (Felton 1959; Webster 1988). Specifically, top management has a dramatic impact developing a culture that commits to putting customers first (Webster 1988; Day 1994). Executive encouragement reinforces the significance of a market orientation and encourages internal customers to track and respond to the market and share information throughout the organization (Kohli and Jaworski 1993). Furthermore, Deshpande, Farley and Webster (1993) found that top management commitment is a prerequisite for achieving favorable business performance.

Parallel with past research, our research suggests that in order for a firm to have full buy-in, there must be proper and explicit

executive support. In order for executives to properly build an organizational culture that is truly driven by CVS data, it must be treated as a pillar of organizational value and strategy. In recent years, executives have treated industry "hot topics" as corporate saviors, such as EDI, ERP and eCommerce. Therefore, avoidance of overemphasis on support for supplementary "hot topic" programs, coupled with emphasis on data-driven measures and action, leaves only explicit executive communication and commitment. In addition, communication may come in varying mediums, but, most importantly, it needs to be delivered with intensity and persistence (Garver and Cook 2001; Garver and Gagnon 2002) and effectively communicated within and outside the organization (Slater and Narver 1994). Put explicitly, Kennedy et al. (2003, p. 77) state that:

> For staff members to internalize a customer orientation, they must experience an unbroken circuit of passionate, sincere, unified, and committed leadership from top levels to local managers. Any break in connectivity dilutes and can even negate top leaders' positive influence.

By simply saying that buy-in is important, executives fail to communicate their intensions through behavior. Although spoken words are important, executive actions (signaling behavior) have the greatest impact on transforming culture (Garver and Cook 2001) because organizational executives can be seen as internal role models (Jaworski and Kohli 1993). Anecdotal evidence would suggest that executives would signal the importance of using CVS data by: funding CVS initiatives with the proper resources, intensely question CVS results, actively searching for solutions to CVS issues, indicating their usage of CVS in decision making, and prioritization of organizational commitments around using CVS data. As a result, we hypothesize that:

**H₅:** Executive support, persistence, and intensity positively influence cultural "buy-in".

*Proactively Managing The Culture.* In order to obtain "buy-in", the culture must be proactively managed in a way that nurtures an environment that embraces CVS data understanding and utilization (Garver and Cook 2001). Top management can initiate nurturing and development of internal customers through learning activities that assist in the development of a market oriented culture (Jaworski and Kohli 1993; Gainer and Padanyi 2005). For example, utilization of feedback from internal customers offers a proactive approach to culture management (Masiello 1988). Previous research has indicated that firms need to continuously market the firm to employees just as it does to the customers (Maxham and Netermeyer 2003).

No firm will have full "buy-in" unless goals, strategies, and outcomes are fully expressed and embraced throughout the organization. Members of the organization not only see the benefits, but also know their role in obtaining organizational goals.

Strategies to manage the culture include recruiting CVS champions. In short, champions enact change management strategies in an attempt to positively influence the company culture and increase the analysis and use of CVS data (Garver and Gagnon 2002). Some of these strategies include recognizing employee performance, mass communication strategies, and receiving and using employee feedback (Garver and Gagnon 2002). As such, it is hypothesized that:

**H₆:** Proactively managing the culture positively influences cultural "buy-in".

*Linking CVS Data To Other Performance Measures.* Demonstrating a linkage between CVS data and other important performance measures has a strong influence on cultural buy-in. For example, organizational goal setting and performance can affect cultural transition (Kennedy et al. 2003). Further, market oriented behaviors must drive employee reward systems that, in turn, become motivators in developing a market oriented organization

(Webster 1988; Kirca et al. 2005). Thus, we conceptualize linking as the process of overtly indicating to internal customers the importance, use, and outcomes of CVS data in organizational strategy.

First, linking CVS data to internal quality, productivity, and financial performance connects CVS data to mainstream management. Second, demonstrating a solid linkage between CVS performance and financial performance grabs the attention of managers, and shows that CVS is often a leading indicator of retention, market share, sales revenue, and profitability. Finally, linkages can be used to create internal rewards, which in turn can increase internal satisfaction, increase professionalism, and reinforce desirable behaviors (Hampton et al. 2004). Alignment and linkage of CVS data to rewards and outcomes is crucial for market oriented behaviors (Day 1999). Best practice companies know the importance of linking CVS data to various types of performance measures and are now actively pursuing these tasks. As a result, we hypothesize the following:

**H₇:** Displaying a linkage between CVS data and other important performance measures positively influences cultural "buy-in".

*Improvement Process.* The second antecedent to becoming a data-driven organization is the improvement process. Garver (2003) suggests that a formal customer-driven improvement process leads to higher levels of both understanding and using CVS data. Conceptually, we present a formalized improvement process as a structured plan that guides analysis and action plans. The improvement process starts by addressing the strategic questions, such as: What attributes are most important to customers? What are the firm's strengths and weaknesses?

In contrast to "understanding CVS data," the improvement process is just that, a process for selecting improvement opportunities, with the first step involving the analysis of customer data. Essentially, "understanding CVS data" is

the output or effectiveness of the improvement process.

The goal of the analysis is to prioritize various improvement opportunities based on CVS data. Yet before selecting final improvement initiatives, certain variables are assessed to further scrutinize the opportunities. For example, what opportunities are aligned with the current strategy? What opportunities are currently most feasible? What opportunities offer the best ROI? What opportunities offer the lowest cost? What opportunities can be completed and implemented in the least amount of time? Research suggests that implementing a structured approach such as this leads to improved understanding and utilization of CVS data (Garver 2003). Thus, the following hypotheses are put forth:

**H₈:** A formal improvement process positively influences understanding CVS data.

**H₉:** A formal improvement process positively influences using CVS data.

*Information Systems.* Intelligence dissemination includes all system wide communication strategies, which may be used to distribute data to different functional areas and processes (Garver and Cook 2001). Effective information sharing and exchanges must be available for internal customers to evaluate all information available to them (Slater and Narver 1995). Information systems provide employees with such capabilities, and as such, they are critical factor in making sure that information is used in strategic decision making, as data-driven firms would do. Organizations today rely heavily on information systems for numerous activities such as supporting and making decisions, creating cross-functional databases, product information, and intranets (Day 1994; Slater and Narver 2000). Information systems facilitate the use and sharing of information within an organization. In fact, internal customer satisfaction can result from the effective use of information systems (Day 1994).

Vast corporate expenditures are not nearly enough to facilitate benefit from information systems in a data-driven organization. The extensiveness of the list above indicates that it is imperative that all employees have access to the customer data. By all employees having access to CVS data, they will be able to not only respond to customer needs, but also be proactive in anticipating needs (Kohli and Jaworski 1990). In many global organizations that would quickly escalate into an insurmountable proposition without the use of an elaborate information systems. Further, without information systems, dissemination and analysis of CVS data could possibly perish before effective use.

The construct of improvement put forth previously is highly dependent upon an effective information system, which effectively shares and analyzes data. In terms of information dissemination archaic methods of development and distribution are gone and new technologies of information systems are used to distribute online reports and raw data for specific analysis (Garver and Cook 2001). In best practice companies, the formal improvement process is built into the information system so that employees have improvement analysis data at their fingertips. Thus, the following hypothesis is put forth:

**H₁₀:** Information systems that effectively share and analyze CVS data positively influence the structured improvement process.

*Valid Data.* Employees need to believe that valid, scientific methods are behind the firm's CVS program (Garver and Cook 2001). Valid data refers to the extent to which employees believe in, trust, and represent customers. In short, if employees do not believe in the validity of CVS data, they will not act upon the results. Valid data can be gathered through customer satisfaction surveys, market surveys, focus groups, interviews, and even competitor analysis. In fact, researchers have suggested that internal employees have more confidence in the data when an outside research firm gathers and analyzes the data (Deshpande 1983;

Day 1999). Furthermore, necessary measures need to be taken to scientifically prove the validity of the data. Communicating validity and its scientific background can be very difficult, hence the reason for internal customers being more receptive to research from outside vendors (Garver and Cook 2001). The point is simple, if employees believe in the validity of the data, they are more likely to take time and effort to understand and utilize the data. The following hypotheses are put forth:

**H₁₁:** Perceptions of valid data positively influence understanding CVS data.

**H₁₂:** Perceptions of valid data positively influence using CVS data.

*Communication.* Internal communication that is valued by an organization can assist in development of customer and market orientations (Webster 1994; Strong and Harris 2004). In fact, communication strategies can be effective at shaping an employee's perceptions of CVS data validity (Garver and Gagnon 2002). Specifically, communication is the uninterrupted flow of data, information, feedback, and results that is shared among the organization's members. For example, a market focused firm should have all internal employees discussing customer needs (Masiello 1988).

Corporate communication comes in various formats and is both formal and informal. In addition to keeping CVS top of mind for employees, communication plays an important role in shaping perceptions of the data. Fast and accurate communication of data help suggest that the data is valid. Furthermore, effective communication should directly address the issue of valid data. Communicating a rigorous methodology of collecting data is essential for shaping employee perceptions of data validity. The following hypothesis is put forth:

**H₁₃:** Communication has a positive influence on perceptions of valid data.

*Training,* Training is an effective tool used to satisfy internal customers (Day 1994). Market orientations can require special skills from employees, which can be obtained from

training programs (Reukert 1992). In prior research, training programs have been identified as ways to indicate the importance of customer and market orientations to internal employees (Conduit and Mavondo 2001). We conceptualize training as the process by which organizations support employees by offering to enhance the development of special skills needed to understand and use CVS data.

Training programs utilized by customer champions are used to influence data-driven behaviors, cultural buy-in, and an effective improvement process. Understanding and utilizing CVS data requires specific knowledge and behaviors. While these may be learned from trial and error, best practice companies use training programs to educate all employees on how to understand and utilize CVS data (Garver and Gagnon 2002). Training is essential for an organization to become a data-driven firm, as employees must learn how to use the data for decision making. Employees have access to large amounts of data, yet may understand only a small portion of this data and as a result, many employees may lack the skills necessary to turn data into information (Garver and Cook 2001). Unless the skills to collect intelligence from the market are incorporated, the company will be unable to show responsiveness to customers' needs and satisfy them (Avlonitis and Gounaris 1997). Thus, most training time should be devoted to understanding customer listening tools, analyzing CVS data, and using the data to drive competitive advantage (Garver and Gagnon 2002).

Training programs are also effective at influencing cultural buy-in. Garver and Cook (2001) suggest that best practice companies use training in altering attitudes and transforming the cultures by showing the importance of being customer focused. Training also influences employee "buy-in" because it shows employees that executives are serious about understanding and using CVS data for decision making. Employees will recognize the importance and message that executives are

sending through time, money, and resources being dedicated into training programs.

Finally, training programs also help to shape and lead the vigorous improvement processes. Due to its relatively new adoption and detail oriented reporting and analysis, many organizations lack the skill level among employees to support this. Training will not only show the importance of the improvement process, but also teach the methods, skills, and analysis needed to conduct these methods. Therefore, the following hypotheses are put forth:

$H_{14}$: CVS training programs positively influence understanding CVS data.

$H_{15}$: CVS training programs positively influence using CVS data.

$H_{16}$: CVS training programs positively influence cultural "buy-in".

$H_{17}$: CVS training programs positively influence improvement processes.

## METHOD

To fulfill the purpose of this paper and test the hypothesized model, a web based survey was developed to measure the constructs in the proposed model. In this section, the following research techniques will be examined: 1) scale development process, 2) web based survey administration, and 3) preliminary data preparation.

**Scale Development Process**

The purpose of this section is to report quantitative research methods undertaken to develop, refine, and validate measurement scales for constructs represented in the model. Because most of these constructs are new to the literature, validated measurement scales were not available. Thus, to develop reliable and valid measurement scales, the instrument development process put forth by Churchill (1979) and later adapted by Gerbing and Anderson (1988) was undertaken.

Results from a prior qualitative study, along with construct definitions, were the primary input for item generation. Using data from a

prior qualitative study, specific language and phrases used by participants guided item development. For each of the main constructs (except for the presence of training programs and proactively managing the culture), at least six measurement items were developed to capture the essence of each construct. Initial survey construction also included guidance from relevant literature reviews. Once items were generated, panel discussions with academic researchers were conducted to scrutinize scale items and their correspondence to the conceptual definition. During this phase, many items were deleted because of poor wording, redundancy, or on grounds of content and substantive validity (Garver and Mentzer 1999).

Ten point scales using bi-polar anchors (strongly disagree – strongly agree) were used for most of the survey questions. These anchors are commonly used in academic studies and best fit the context of the participants. Ten point scales were used to maximize the sensitivity of the measurement scales, and were deemed relevant for the sample of participants.

Once the measurement scales were developed, they were embedded into a web based questionnaire and "read throughs" were conducted with the target population (Dillman 1978). "Read throughs" were conducted to ensure that the domain of the construct was being tapped and that the intended meaning of each question was properly interpreted. Based on feedback from the target population, the survey was adjusted and refined. The researcher conducted "read throughs" with seven respondents from the sample population, adjusting the measurement scales as necessary.

**Data Collection**

The final survey was built on a secure website. Dillman (2000) suggests that workers in organizations and members of professional organizations generally have internet access, thus helping to substantiate the use of electronic surveys for data collection. Not surprisingly, the popularity of web based surveys has

increased dramatically over the past few years because of their numerous advantages. For example, Griffis, Goldsby and Cooper (2003) find that web based surveys are superior for large sample sizes and importantly, these researchers found no difference in the data collected online and the data gathered via mail. Also, research suggests that business professionals often prefer electronic surveys due to time pressures at work (e.g., Nesbary 2000).

Data integrity was of the utmost importance in this study. The web based survey was posted on a secure website, and only those participants who were invited to take the survey (via a special tracking mechanism) were able to access and complete the survey. Once each participant completed the survey in its entirety, they would no longer be able to access the secure server.

Participants in the survey were chosen from a comprehensive list of customer satisfaction data professionals that had participated in customer satisfaction conferences within the past year. This list of respondents was a national sample of companies representing numerous industries. The participants had a wide variety of titles but all of them had responsibility in part for their firm's customer satisfaction program. The comprehensive list consisted of 902 participants, containing the appropriate contact information. For this sampling frame, a web based survey was particularly appropriate, because the majority of conference participants indicated that email was their primary method of contact. Of the 902, approximately two percent (20) of conference attendees did not supply email addresses, resulting in a sampling frame of 882 individuals, representing a variety of different industries.

The next step in the instrument development process was to collect survey data. A customized email invitation was sent to study participants. The email explained the purpose of the research study and their importance in the study, and then asked them to click on the customized tracking link to take the survey. As

an incentive to improve response rates, summary results were shared with study participants. Approximately one week later, a follow-up email was sent to those participants who had not yet responded. The overall response rate was tremendous, with 215 responses representing a response rate of approximately 24 percent.

## Data Preparation

Important to any research study, the data was thoroughly examined using a variety of descriptive statistics including the following: frequencies, means, standard deviations, outliers, and a variety of graphing techniques. After this process, any and all data problems were addressed, including missing data.

After descriptive statistics were examined, missing data was addressed. Of the 215 returned surveys, seven surveys were deemed to be unusable. Most of the unusable surveys responded to only a small number of the questions, or did not have enough experience to fully answer the questions. Otherwise, missing data was not a major problem for this study. For the remaining usable surveys, the overwhelming majority filled out the entire survey, answering each question. Because we are using AMOS to analyze the data, we imputed the missing data using mean based replacement methods. At this point, the data is ready for advanced data analysis employing structural equation modeling.

## RESULTS

To fulfill the purpose of this study, structural equation modeling was employed to validate the measurement model, test research hypotheses, and examine the overall structural model. Structural equation modeling researchers propose a two step procedure when testing theoretical models (Bollen 1989; Gerbing and Anderson 1988; Williams, Medsker and Holohan 1994). The first step is to examine and validate the measurement model, with the second step testing the structural model and conducting hypothesis tests.

**Validating the Measurement Model**

Confirmatory factor analysis in structural equation modeling (SEM hereafter) was conducted to refine and validate the measurement model. To accomplish this, the following tests were conducted: scale unidimensionality, scale reliability, convergent validity, and discriminant validity.

*Scale Unidimensionality.* Because all the scales were created for this study, exploratory factor analysis was first undertaken to examine the unidimensionality of each construct. Employing both principal components analysis and maximum likelihood factor analysis techniques in SPSS, all constructs (except for "improvement process") in the model showed strong evidence for unidimensionality. For example, using an eigenvalue of 1 as the cutoff value for unidimensional constructs, only one factor (dimension) was extracted and all factor loadings possessed substantial magnitudes (most loadings .70 and higher).

The "improvement process" construct actually displayed three factors (dimensions) in exploratory factor analysis, which actually corresponds to the conceptual definition. Dimension 1 relates to analyzing quantitative data to identify improvement opportunities, while dimension 2 corresponds to analyzing qualitative data to identify improvement opportunities. Dimension 3 corresponds to other factors that affect which improvement opportunity is selected, such as feasibility, ROI, cost investment, strategic direction, and time constraints. In future analysis, "improvement process" is modeled as a higher order factor consisting of three separate, but related dimensions.

To assess unidimensionality in confirmatory factor analysis (CFA) using AMOS, we examined the overall measurement model fit and components of the measurement model (Steenkamp and van Trijp 1991; Medsker, Williams and Holohan 1994; Garver and Mentzer 1999). To evaluate overall model fit, fit indexes were selected that meet the criteria

for an "ideal" fit index. Marsh, Balla and McDonald (1988) propose that the criteria for an ideal fit index are: 1) relative independence of sample size, 2) accuracy and consistency to assess different models, and 3) ease of interpretation aided by a well defined continuum or preset range. Many fit indexes simply do not meet these criteria, because many are adversely affected by sample size (Marsh, Balla and McDonald 1988; Medsker, Williams and Holahan 1994). Meeting these criteria, the overall fit of the model is tested by two measures: the Tucker-Lewis index (TLI) and the comparative fit index (CFI). An acceptable value for both measures is .90 or greater (Hulland, Chow and Lam 1996). Measurement model fit statistics from confirmatory factor analysis for each latent variable and the corresponding measurement items provide further evidence that each construct is indeed unidimensional.

SEM guidelines suggest that researchers examine components of the measurement model to complement overall model fit evaluations (Bollen and Long 1992). Examining components of the measurement model, standardized parameter estimates between indicators and latent variables should 1) have the correct sign, 2) possess a substantial magnitude (equal or greater than .70), and 3) be statistically significant (t-value $\geq$ 1.96) (Steenkamp and van Trijp 1991; Hulland, Chow and Lam 1996). In the measurement model, all items possessed the correct sign and were statistically significant. Only two items possessed magnitudes below .70, and these were both above .60. As such, all scales are considered unidimensional in nature.

*Scale Reliability.* To assess the reliability of each scale, Cronbach's Alpha was assessed through SPSS. Reliability was confirmed for all scales that contained at least three measurement items. Alpha coefficients range from .70 to .97, with all scales displaying excellent reliability, as shown in Table 1, along with scale means and standard deviations.

*Convergent Validity.* Ideally, convergent validity within a single study should be accomplished and tested for by employing completely different methods to measure constructs. While this is the ideal situation, it is often difficult to operationalize in practice. A surrogate test for convergent validity is often conducted by evaluating the measurement model in CFA (Gerbing and Anderson 1988; Steenkamp and van Trijp 1991; Garver and Mentzer 1999). In short, examination of the measurement model results confirmed convergent validity for each scale. The final measurement model displayed a good overall fit. The paths from latent variables to their indicators are all in the right direction, possess a magnitude over .70, and are significant at an alpha level of .05, providing statistical evidence for convergent validity in this study.

*Discriminant Validity.* Discriminant validity tests are important for any research study. To test for discriminant validity, chi-square difference tests were conducted for all possible pairs of constructs in the model, modeling latent variable as different constructs, then as a combined construct. Relatively large chi-square differences suggest that the constructs are discriminating well and tapping into different constructs. Relatively large differences in chi-square along with statistically significant p-values provide evidence for discriminant validity and suggest that the constructs are discriminating well and statistically acting as different constructs. In the measurement model, the statistics suggest that "understanding" and "using" CVS data do not properly discriminate from one another. They instead display characteristics of a single, higher order construct. All other constructs in the model show strong evidence of discriminant validity, yet the problem between understanding and using CVS data needs to be addressed.

Conceptually, research suggests that distinct and different constructs exist (Garver and Cook 2001); however, the statistics provide evidence that they are more appropriately modeled as a single, higher order construct. To deal with this

**FIGURE 2**
**Revised CVS Data Model**
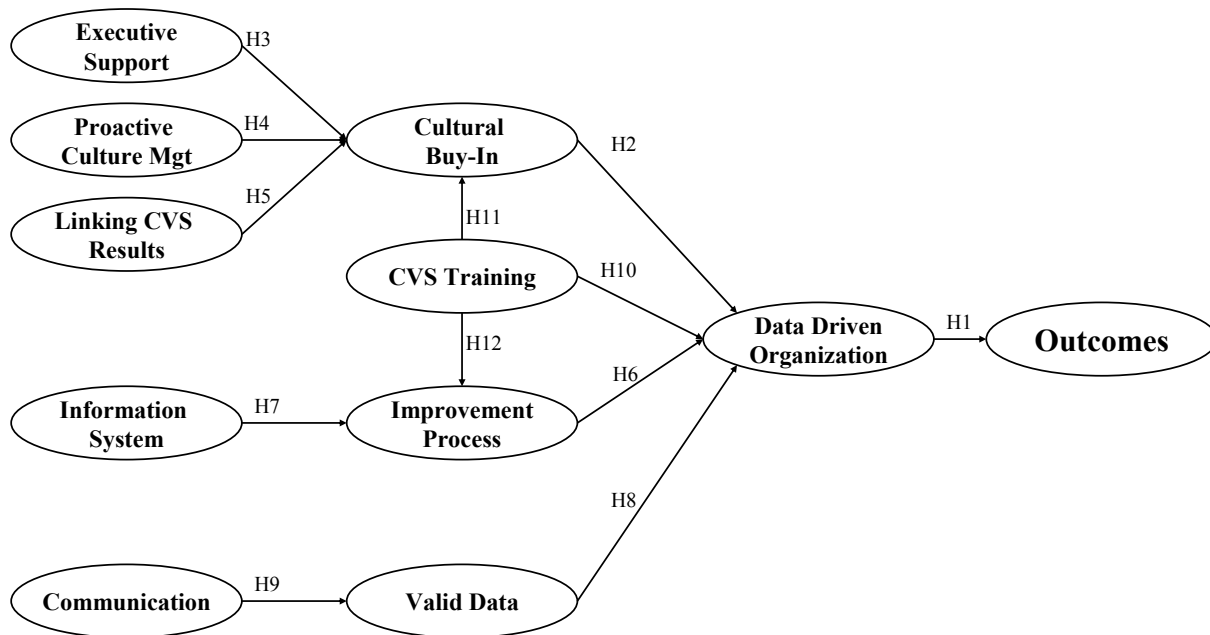


issue, understanding and using CVS data will be combined into a higher order construct, labeled "data-driven," for all further modeling. Because of this change in the model, certain hypotheses were combined; the revised model and hypotheses are put forth in Table 2 and Figure 2.

**Examining the Structural Model**

Now that the measurement model has been examined, it is time to examine both the measurement model and structural model simultaneously. Because of model complexity, partial disaggregation will be introduced and explained briefly. Then, results for the overall model fit and hypotheses tests will be presented.

*Partial Disaggregation.* As discussed in the literature, SEM software programs cannot tolerate a large number of indicators per latent variable (Bagozzi and Heatherton 1994; Baumgartner and Homburg 1996; Dabholkar, Thorpe and Rentz 1997; Garver and Mentzer 1999). To decrease model complexity, composite indicators were created for most

constructs in the model. This procedure is recommended by SEM researchers and is commonly practiced in the literature when measurement scales possess a large number of items (Bagozzi and Heatherton 1994; Bagozzi and Edwards 1998).

While no set procedure is commonly followed when forming composites (Baumgartner and Homburg 1996; Bagozzi and Edwards 1998), researchers suggest that items should be randomly assigned to composites (Dabholkar, Thorpe and Rentz 1997). In this study, items were randomly assigned to form two to three composites for each latent variable. For "improvement process," items from each dimension were grouped together, forming three composites, each representing its own lower order factor. This allows SEM to maintain its advantage of accounting for measurement error while minimizing problems associated with model identification and complexity. In Table 3, the results of partial disaggregation in the measurement model are displayed. The results display that parameter estimates from composites to latent variables are of sufficient magnitude and are statistically

**TABLE 1**
**Scale Reliability**

| Construct | Number of Items | Coefficient Alpha | Mean | S.D. |
|---|---|---|---|---|
| Buy-In | 4 | 0.913 | 6.440 | .446 |
| Communication | 6 | 0.703 | 5.521 | .773 |
| Understanding CVS Data | 3 | 0.832 | 5.583 | .458 |
| Using CVS Data | 3 | 0.927 | 4.779 | .602 |
| Executive Support | 6 | 0.848 | 6.325 | 1.086 |
| Performance Outcomes | 7 | 0.923 | 6.295 | .391 |
| Valid Data | 3 | 0.971 | 6.756 | .190 |
| Improvement Process | 14 | 0.922 | 5.754 | .460 |
| Information System | 9 | 0.952 | 4.438 | .559 |
| Linkage | 7 | 0.808 | 1.497 | .118 |
| Proactively Manage Culture | 1 | *N/A* | 7.150 | 2.084 |
| Training | 1 | *N/A* | *N/A* | *N/A* |

**TABLE 2**
**Revised Hypotheses**

| Hypothesis Number | Hypothesis |
|---|---|
| $H_1$ | Being data-driven (i.e., understanding and using customer satisfaction data) will have a positive influence on positive business performance outcomes. |
| $H_2$ | Cultural "buy-in" positively influences being data-driven (understanding and using CVS data). |
| $H_3$ | Executive support, persistence, and intensity positively influence cultural "buy-in". |
| $H_4$ | Proactively managing the culture positively influences cultural "buy-in". |
| $H_5$ | Displaying a linkage between CVS data and other important performance measures positively influences cultural "buy-in". |
| $H_6$ | A formal improvement process positively influences being data-driven. |
| $H_7$ | Information systems that effectively share and analyze CVS data positively influence the structured improvement process. |
| $H_8$ | Perceptions of valid data positively influence being data-driven. |
| $H_9$ | Communication positively influences perceived validity. |
| $H_{10}$ | CVS training programs positively influence being data-driven. |
| $H_{11}$ | CVS training programs positively influence cultural "buy-in." |
| $H_{12}$ | CVS training programs positively influence improvement processes. |

significant. For example, all parameter estimates have p-values less than .001 and range in magnitude from .60 to .99, with most values being .80 or greater. Only two parameter estimates are below the .70 cutoff value put forth by Steenkamp and van Trijp (1991). In summary, the partial disaggregation measurement model performs quite well.

*Overall Model Fit.* Traditional goodness of fit indices, such as chi-square, are not necessarily the best indication of overall model fit (e.g., Bagozzi and Yi 1988). Thus, other measures (TLI and CFI) of overall fit were assessed which meet the "ideal index" criteria (Garver and Metnzer 1999). After testing the overall model fit of both the measurement and structural model simultaneously, we find that both the TLI and the CFI exceed an acceptable baseline measure of .90. The TLI was 0.920 and CFI was 0.934, both suggesting a model that fits well. The results are shown in Table 4.

*Hypotheses Tests.* Table 5 contains the results of the hypotheses tests. The first hypothesis states that being a data-driven organization leads to favorable business outcomes. This relationship is statistically significant with a parameter estimate of .490, thus being confirmed in the model.

Displaying positive influences on becoming a data-driven firm, cultural buy-in, a formal improvement process, valid data, and training programs all display statistically significant relationships, with substantial parameter estimates. For example, cultural buy-in displays the largest impact (.609) on being data-driven, with improvement process and perceptions of valid data displaying more modest, yet still substantial relationships (.371 for improvement process and .289 for perceptions of valid data). Having company wide training programs displays a statistically significant relationship (p-value of .048) on becoming data-driven, yet the parameter estimate shows a relatively modest impact (.088).

Cultural buy-in is positively influenced by four constructs that include: proactively managing the culture, linkage to other performance measures, training, and executive support, persistence and intensity. All four relationships are statistically significant and display parameter estimates that are substantial in magnitude. For example, executive support, persistence, and intensity have the largest impact on cultural buy-in, with a parameter estimate of .43 for this relationship. Proactively managing the culture displays a statistically significant relationship with a substantial parameter estimate of .400, while displaying a linkage between CVS results and other performance measures also shows a substantial magnitude of .373. Training program displays a statistically significant relationship, yet a more modest impact on cultural buy-in with a parameter estimate of .119.

Positively influencing perceptions of data validity, communication strategies display a statistically significant relationship with a substantial parameter estimate of .579. Additionally, the results show that training programs positively influence an improvement process with a parameter estimate of .230.

### DISCUSSION AND CONCLUSIONS

After testing the hypothetical model, our statistical results provide evidence for its confirmation. If organizations desire and strive for optimal business outcomes, one clear way is to focus on becoming a customer data-driven firm. By striving to become a data-driven firm, the organization is focused on its customers and utilizing their feedback to drive decisions and solutions. By doing so, firms should be rewarded with high levels of business performance.

Organizations can become data-driven through various means. However, through literature reviews, interviews, research, and analysis, we have determined that four facets are essential to a data-driven firm: cultural buy-in, training, a formal improvement process, and perceptions of valid data. Without these factors, development of a data-driven organization would be difficult.

**TABLE 3**
**Partial Disaggregation Measurement Model Results**

| Construct | Composite | Parameter Estimate | P-Value |
|---|---|---|---|
| Data-driven | DDCOMP1 | 0.815 | 0.001 |
| | DDCOMP2 | 0.889 | 0.001 |
| | DDCOMP3 | 0.830 | 0.001 |
| Outcomes | OUTCOMP1 | 0.913 | 0.001 |
| | OUTCOMP2 | 0.850 | 0.001 |
| Buy-In | BUYINCOMP1 | 0.965 | 0.001 |
| | BUYINCOMP2 | 0.798 | 0.001 |
| Executive Support | ESPISTR | 0.873 | 0.001 |
| | ESPISPOK | 0.829 | 0.001 |
| | ESPIACTI | 0.867 | 0.001 |
| | ESPIINTE | 0.925 | 0.001 |
| | ESPISUPP | 0.851 | 0.001 |
| | ESPIGIVE | 0.893 | 0.001 |
| Linkage | LNKCOMP1 | 0.848 | 0.001 |
| | LNKCOMP2 | 0.739 | 0.001 |
| Improvement | IMPRCOP1 | 0.720 | 0.001 |
| | IMPRCOP2 | 0.601 | 0.001 |
| | IMPRCOP3 | 0.877 | 0.001 |
| Info Systems | INFCOMP1 | 0.929 | 0.001 |
| | INFCOMP2 | 0.934 | 0.001 |
| Valid Data | CSDOURAC | 0.910 | 0.001 |
| | CSDOURTR | 0.993 | 0.001 |
| | CSDOURVA | 0.974 | 0.001 |
| Communication | COMCOMP1 | 0.677 | 0.001 |
| | COMCOMP2 | 0.983 | 0.001 |

**TABLE 4**
**One Model Fit**

| Overall Model Measure | Overall Model Score | Acceptable Model Fit | Acceptable Baseline |
|---|---|---|---|
| TLI | 0.92 | Passed | 0.9 |
| CFI | 0.934 | Passed | 0.9 |

**TABLE 5**
**Hypothesis Test Results**

| Hypothesis Number | Hypothesis | Parameter Estimate | P-Value | Accept or Reject |
|---|---|---|---|---|
| $H_1$ | Being data-driven (i.e., understanding and using customer satisfaction data) will have a positive influence on positive business performance outcomes. | 0.490 | 0.001 | Accept |
| $H_2$ | Cultural "buy-in" positively influences being data-driven (understanding and using CVS data). | 0.609 | 0.001 | Accept |
| $H_3$ | Executive support, persistence, and intensity positively influence cultural "buy-in". | 0.430 | 0.001 | Accept |
| $H_4$ | Proactively managing the culture positively influences cultural "buy-in". | 0.400 | 0.001 | Accept |
| $H_5$ | Displaying a linkage between CVS data and other important performance measures positively influences cultural "buy-in". | 0.373 | 0.001 | Accept |
| $H_6$ | A formal improvement process positively influences being data-driven. | 0.088 | 0.048 | Accept |
| $H_7$ | Information systems that effectively share and analyze CVS data positively influence the structured improvement process. | 0.119 | 0.023 | Accept |
| $H_8$ | Perceptions of valid data positively influence being data-driven. | 0.371 | 0.001 | Accept |
| $H_9$ | Communication positively influences perceived validity. | 0.230 | 0.001 | Accept |
| $H_{10}$ | CVS training programs positively influence being data-driven. | 0.575 | 0.001 | Accept |
| $H_{11}$ | CVS training programs positively influence cultural "buy-in." | 0.289 | 0.001 | Accept |
| $H_{12}$ | CVS training programs positively influence improvement processes. | 0.579 | 0.001 | Accept |

In order to make everyone within the organization perceive that the organization is focused on data-driven decision making, cultural buy-in is essential. Further, buy-in is not easy to obtain; our research has shown that buy-in is strongly influenced by executive support, linkage of CVS to other important performance measures, CVS training programs, and proactively managing the culture. When an organization realizes and focuses on these factors, it is beginning to align itself in the direction of a data-driven organization.

Another facet that organizations must have in place before becoming data-driven is the employee perception that their CVS data is valid and accurate. Strong company communication from frequent sources – email, web, newsletter, meetings, etc. – must continually reinforce the use of CVS data and its accuracy.

A formal improvement process also leads to being a data-driven firm. The formal improvement process guides both understanding and use of CVS data, and has a dramatic effect on becoming data-driven. Further, information systems must be in place to support a formal improvement process.

Finally, the business function that helps tie all of these conditions together is training. Proper training is essential to drive and sell data-driven decision making. Training has a direct influence on the organization becoming data-driven because the individual users in the firm need to know how to use it. Further, training also influences buy-in and the improvement process. The correct training needs to be in place and utilized for users to perceive that the goals and direction of the organization are tangible and valid.

Customer value and satisfaction data is the most common type of marketing research conducted by companies today, yet little empirical research has examined how organizations positively influence the level of understanding and utilization of CVS data to drive competitive advantage. This study makes

a significant contribution to the literature by putting forth a model that explains key variables that impact an organization's ability to understand and respond to CVS data, and empirically testing this model. Additionally, it puts forth new measures that are statistically validated for use in future research.

From a management perspective, this study helps practitioners understand key drivers of improving organizational understanding and utilization of CVS data. Not only does this study put forth key variables that need to be in place, but it also guides practitioners to those variables which have the most impact on getting employees to understand and use CVS data. Because many of the variables in this model are ignored currently by practitioners (i.e., a small percentage of companies deploy CVS training programs), hopefully this study will make the case for putting as much time, energy, and resources into understanding and using CVS data as companies currently do with collecting CVS data.

## LIMITATIONS AND FUTURE RESEARCH

As with any research study, there are limitations which need to be overcome in future research. Web based surveys were used to collect data. While there are many advantages to this collection method, certain limitations exist such as the exclusion of participants who do not use email. Generalizability issues also surround this study. The final sample size is also a limitation. While the final sample size meets some general guidelines for conducting SEM research, it is clearly below other guidelines. As in any study, a larger sample size (or one that meets generally accepted guidelines) is preferred. However, the sample size limits the statistical power of this study and not the stability of the parameter estimates. Even with limited statistical power, the results were highly significant. Because of the limited sampling frame, these results should be viewed as tentative in nature and not necessarily generalizing to the entire population. Further, while these limitations do not diminish this

study's theoretical contribution, future research should be designed and conducted to overcome these current limitations.

In spite of these limitations, this study makes a significant contribution to our understanding the factors contributing to becoming a data-driven organization and the resulting effect a data-driven organization has on business performance. Future research should be designed to overcome the limitations of this study so that scientific knowledge in this area can rapidly proceed.

Improving a firm's understanding and utilization of CVS data is imperative to organizational performance (Norton and Kaplan 1994), and is a worthy area for future research. First, this study needs to be replicated to increase the generalizability of the model and the research findings.

Additionally, would various models be more applicable to different groups of organizations? For different groups of companies, what model is most appropriate? This study examined one overall model. Would relationships and the strengths of those relationships change with different groups or segments of organizations? For example, are employee perceptions of data validity important to address in all companies? Is linking CVS results to other important traditional performance measures important in all companies? How many different models may be appropriate and what would the nature of those models be? Latent class regression may be an appropriate analysis tool to help answer these questions.

In conclusion, this study makes a significant contribution to the body of knowledge by examining factors leading to greater understanding and usage of CVS data and the impact upon business performance. The study puts forth a model that is confirmed though the use of structural equation modeling. To this point, little research has examined this research area, and more research is needed.

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