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E-Procurement Challenges &

Supplier Enablement in California Counties

by

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BACKGROUND

The term *e-procurement* (electronic procurement) is used to describe a software service solution that conducts business processes between buyers and sellers through electronic communication. It links inter-organizational functions and the automation of transactions through protocols operated by the software service. Since the early 2000s, e-procurement has been adopted by government organizations on a global and local scale to improve competitive purchasing practices and administrative processes (McCue & Roman, 2012). The shift of business practices to an e-procurement system goes beyond transitioning from paper filing to digital repository management. e-Procurement is expected to enhance supplier enablement to expand bidding pools, which leads to greater cost-saving for the purchasing entity. In addition, e-Procurement has the potential to improve competitive purchasing, compliance capabilities, and provide economies of scale for buyers and sellers (Alvarez-Rodríguez et al., 2014).

However, the success of e-procurement is centered on two existing challenges. One is a legal framework for business processes to conduct communication and transactions through a trustworthy digital environment (McCue & Roman, 2012; Roman, 2013). The other is overcoming user experience issues that suppliers and procurement professionals encounter operating new digital functions (Alvarez-Rodríguez et al., 2014; Bof & Previtali, 2009; McCue & Roman, 2012). In fact, a 2011 e-procurement survey of state and local governments in the U.S. and Canada, reported that 57% of 499 procurement professionals do not use the software's core tools, and in some cases, have neglected the use of these tools since deployment (McCue & Roman, 2012). This operational shortfall has shifted priorities away from competitive purchasing and supplier enablement to overcome implementation issues. Consequently, this has obstructed

the development of what e-procurement is or could be, as public organizations take on existing legal and user experience challenges.

This research seeks to identify e-procurement features that enable suppliers to participate online in local government solicitations within California counties. This research also identifies the policies and regulations that California counties have enacted to ensure secure internet bidding. In doing so, commonly adopted web-features collected from California counties with similar characteristics are examined and serve as a foundation in developing supplier participation practices in government solicitations. To address existing challenges of e-procurement and expand the knowledge of e-procurement, this research provides researchers, developers, and practitioners with a theoretical model of supplier enablement practices through web-based features and policies collected from California counties.

Research Gaps in Public Procurement

The study of local government procurement practices is relatively new compared to other topics in public administration research (Trammell et al., 2019). The procurement research in the public sphere began in 1984 and interest increased steadily into the early 2000s, with 48% of public procurement related journal articles published between 2010 to 2018 (Trammell et al., 2019). However, these articles only make-up 1% of all published articles in 15 public administration journals' databases (SCImago Journal & Country Rank (SJR) and Web of Science) (Trammell et al., 2019). In total, 51% of the public procurement articles are focused on "procurement as an organizational-level phenomenon"; 17% used terms such as "contracting out"; and 14% addressed legal issues at all government levels about "legal constraints," "reform" and "legislation implementation" (Trammell et al., 2019, p. 663).

Further analysis shows that the majority of these articles used economic theories, and one-third of articles did not use any theory. These findings show that public procurement research has taken a very narrow view that focuses on quantitative analysis and hinders the production of new theories (Trammell et al., 2019). More importantly, research regarding cost-reduction benefits through tactics related to supplier participation and government e-procurement are unfound. As a result of limited research, public procurement articles based on economic theories are less concerned with qualitative measures, such as advanced competitive purchasing, technological adaptability, and policy solutions to legal issues. The small source of e-procurement information has placed public procurement officials in isolation. As governments take on these systems, they focus on inter-organizational implementation issues with less regard for outcomes, such as competitive purchasing.

Movement Toward e-Procurement

The driving factor that changed U.S. public procurement began in the 1980s during the Reagan-era of economics. As national debt rose, political pressure focused on lessening federal expenditure, resulting in a reduction in state and local government funding for social programs and capital projects (Goodman & Lovemen, 1991). In doing so, more fiscal responsibility was shifted on to the American people to improve public welfare by reducing the size of government and encouraging privatization (Lan & Rosenbloom, 1992; Shafritz & Hyde, 2017). In response, many state and local governments began to "contract-out" costly services and focused on measuring efficiency and effectiveness to solve budget deficits (MacManus, 2002; Savas, 1987). These new processes also required traditional government systems to be replaced with public-facing modern digital services, such as government websites that offer, online filing, and online communication. (MacManus, 2002). These changes brought on the "early hype of digital

procurement" which was software-driven by large data computing claims, and offered faster administrative processes for better decision-making (Roman, 2013, p. 351). As a result, professional training became technology-focused and complex.

What is e-Procurement?

e-Procurement, as a concept, is a system that provides administrative procurement functions that facilitate communication and business practices between public agencies and private businesses. Mota and Filho (2011) describes the use of e-procurement as both a product and construct for transaction services, which interacts with institutional structures to generate or enforce existing constraints on the everyday business choices made by users. This is different from traditional paper-based procurement which exercises purchasing through department contracting rather than government-wide solicitations (Mitchell, 2000). e-Procurement is expected to improve supplier particiaption and cost-saving practices through competitive purchasing using real-time tools. These tools are referred to as 'e-tools,' which include e-notice, e-auction, e-catalog, e-dossier, e-submission, and e-signatures to facilitate the procurement processes on an online platform (Bromberg & Manhoaran, 2015; McCue & Roman 2012). In addition, e-procurement is expected to support an online purchasing experience, similar to shopping on Amazon.com (Croom, 2000; Zsidisin & Ellram, 2001; Croom & Johnston, 2003; Mishra et al., 2007; Brandon- Jones & Carey, 2010).

In this sense an e-procurement system is public-facing and services orientated, with the flexibility to integrate a variety of data sources and rigid enough to adhere to administrative protocols (Croom, 2000; Varney, 2011). However, the benefits of an e-procurement system can be different based on the software services each vendor provides. This has led governments to

select various e-procurement systems which have siloed their experiences and ability to improve competitive purchasing.

e-Procurement in Practice

The transition to e-procurement during the 1990s and 2000s rushed procurement professionals to take advantage of expected benefits with minimal planning. During this first decade, authors MacManus (2002) and Robb (2001) found that procurement professionals were not properly oriented to modern procurement systems, resulting in the failure to meet advanced purchasing expectations. In addition, incorporating supplier information (e.g., paper catalogs, service rates, and quality specifications) into a digital platform has been difficult (MacManus, 2002). Robb (2001) further states that the problem is a "lack of regard for the end-users...either through failure to consult...design...[or] inadequate training on new technology" (p. 48). The poor consideration for end-users (government agencies and suppliers) has created difficulty to properly translate needs and software requirements to develop proper training and legal support (MacManus, 2002).

Furthermore, a user-research study by an international accounting firm, KPMG Consulting (2001), found: "considerable confusion in the marketplace about how [e-procurement] tools should be appropriately applied. [Due to] market hype, over-ambitious planning, [and] a leap toward perceived technology panaceas without paying attention to fundamental purchasing practices" (p.1). The fact that procurement professionals and suppliers have difficulty in modernizing, coupled with expectations for immediate benefits, has led to underperformance and poor end-user training.

The process of implementing e-procurement software is often financially and politically costly, especially if the software is difficult to use (Croom & Johnston, 2003). When

governments decide on e-procurement software to fulfill operational requirements, they are also gambling that it will be as effective as it is perceived to be (Varney, 2011). Ultimately, when these e-procurement systems are applied, the perception of how the system is supposed to function for end-users is under-researched. Rather researchers are focused on challenges for procurement professionals using the system. This situation sets-up a clouded vision for government agencies that want to increase competitive purchasing, and end-up increasing their training budget. As more local governments are modernizing with market e-procurement software, the primary challenges to proper training and development of legal guidelines remain constant.

User Experience Challenges: Research on Procurement Professionals

As the use of e-procurement continued into the 2010s, some government agencies adapted to these new processes, and others avoided the system all-together. A 2012 survey study of NIGP procurement professionals in the U.S. and Canada found that only 20% of agencies implemented an e-procurement software between 2006 and 2011. In comparison, 55% of the agencies implemented e-procurement software in the early 1990s (McCue & Roman, 2012). Moreover, an average of 57% of procurement professionals did not use their organization's e-procurement core features (McCue & Roman, 2012).

For the procurement professionals who indicated use, only about 20% to 32% of users operated e-tools and other features related to contract life-cycle and risk management (McCue & Roman, 2012). Among the total respondents, 55% represented a city or county government (McCue & Roman, 2012). These findings are similar to previous research on state governments conducted in the first decade of e-procurement implementation. Researchers McCue & Roman (2012) suggest the private sector has made minimal progress toward "transformative

expectations" (p. 228). The modernization of public procurement has primarily impacted functional duties and generally unsuccessful in becoming a "financial management tool or an effective policy mechanism" (Roman, 2013, p. 340). However, this survey included a free-response section, which confirmed that procurement professionals are not active participants in the development of the software and feel their needs are unrepresented (McCue & Roman, 2012). Other researchers suggest that endorsement and use among leadership staff are critical for an e-procurement system to effectively actualize expectations (Soliman & Janz, 2004; Pavlou & Gefen, 2004; Chang & Wong, 2010). These claims of cooperation between government leadership, end-users, and the e-procurement provider are further supported by Sacramento County's experience implementing an e-procurement system.

Sacramento County e-Procurement Study

In 2000, the County of Sacramento (the county) initiated a strategic goal of creating a streamlined supplier and bid management system across all departments (Rader, 2011). This initiated a search for an e-procurement software that began in 2005 and continued for five years. In the first few years, the county consulted the California General Services Department (GSD) to ensure that they uphold state procurement regulations. The GSD supported their efforts and allocated funds for the county to purchase new software and cover licensing fees (Rader, 2011). In 2006, an RFP was issued that required an e-procurement system to fully integrate with the county's current SAP financial system and connect across all departments. The RFP resulted in four bids, of which only one was responsive, and did not fully address integrating with the SAP financial system (Rader, 2011). Due to the low response rate, the county decided to cancel the RFP. Later that year, SAP offered a Supplier Relations Management (SRM) application, reporting to the County Executive that the system could save $300,000 per month. Procurement

Officer Craig Rader consulted fourteen other private companies that were using an e-procurement system and found none were bench-marking and tracking their savings with their products (Rader, 2011). The county decided to hold off on issuing another RFP until the market matured, and clear cost-savings could be verified.

Eventually, in 2011 Sacramento County pilot-tested a free software named Public Purchase, provided by The Public Group, a company that focuses on developing government procurement applications. The county slowly rolled out Public Purchase features within small teams. The features were able to provide a service enabling suppliers to access purchasing information, provide cost-saving measures, allow procurement professionals to create and post solicitations, and process electronic transactions. The initial roll-out strategy focused on overcoming employee and organizational concerns by concentrating on user-setup and training.

Training presented a significant challenge for county employees; in some cases, employees lacked the necessary computer and internet skills to begin learning the new system (Rader, 2011). To meet these challenges, the Public Group team stepped in to provide end-user training to county staff. As for supplier roll-out, The Public Group used its national supplier registration database and encouraged Sacramento suppliers to independently register through an online sign-up portal (Rader, 2011). In addition to this, a supplier support team was established to set-up and train suppliers on the system's functionality (Rader, 2011). The online supplier registration led to a cost-saving of $6,000 yearly in postal services, which ended paper registration. Over-time, training became easier for new staff as knowledge was passed on from proficient users, which increased the efficiency of processing administrative documents. Other benefits, such as an increase in supplier participation and improved competitive purchasing, were

inconclusive during the time of the report. In addition, the integration with the county's SAP financial system was not pursued by The Public Group.

The observations by the Sacramento study found that e-procurement software is limited in integration options with other older software products. The county's study also found shortcomings in e-procurement being a dynamic online platform that solves administrative and cumbersome bureaucratic business practices related to purchasing. In addition, the California's GSD did not provide guidance on market research or policy development throughout the project phases.

Rader (2011) recommended several critical steps in cooperation and engagement with end-users. The primary recommendation is that county commissioners and managers should partner with purchasing staff to research and design an e-procurement solicitation that meets end-user needs. Lastly, the selected e-procurement provider ought to work with staff and suppliers to ensure end-user proficiency.

The Sacramento study gives significant insight into the successful implementation of e-procurement in a county government. The final solution presented in this study is to incorporate e-procurement software as an online portal for suppliers to access, easily accessible through a government homepage. allowed end-users to conduct business online. This shows that a web-based solution has the ability to overcome user-experience and legal challenges. Although a web-based solution will not solve these challenges completely, this gives local governments a direction to develop an e-procurement system that is effective.

Furthermore, this research found that experience reports or evaluations of e-procurement systems among counties and cities are rare, or if these data collection methods are used, they are unpublished. Specifically, in California, Sacramento County appears to be the only country that

has conducted and published an e-procurement study. Although there have not been any legal

issues that have been identified by this study, the absence of legal guidance regarding e-

procurement presents a vulnerability for local governments. MacManus (2002) and Robb (2001)

claim that governments tend to focus on technology first and address public policy and

organizational issues later. This leads to the other major challenge of developing proper policies

or regulations that comply with state regulations.

Legal Challenges: California Procurement Laws

Current regulations on California public procurement activities and organizational models for

local governments are found in the California Public Contracting Code (PCC), as well as policies

and ordinances developed by the local government. These laws and regulations require public

procurement departments to use a fair and competitive process that guards against corruption

and fraud. Since the primary use of e-procurement is to improve the bidding process, this

research focuses on PCC Chapter 5: Competitive Bidding Methods. The section references the

state's e-procurement system, the California State Contracts Register (CSCR), which is used to

advertise Request for Proposal (RFP) and Invitation for Bid (IFB) solicitations to potential

suppliers. The procedures require that state solicitations must be advertised for ten working days

on the CSCR, and potential bidders must be formally notified of the bid opportunity through

CSCR advertisement (PCC § 10345).

For California county governments, the board of supervisors prescribes advertisement

procedures for bids and intent to award, which must be publicly accessible (e.g., posted to an

internet homepage) (PCC § 20125, § 10345). Although these laws and regulations require state

solicitations to be posted on the state's e-procurement system, they do not provide guidance on

web-based bidding for local governments, or instruction on how solicitation notices ought to be

formally distributed. However, in regard to digital signature laws, under Government Code §16.5, county procurement professionals are permitted to use electronic signatures and maintain electronic records, and develop policies and procedures related to e-signatures. These signatures must (1) be unique to the person, (2) be verifiable, (3) be under the sole control of the person using it, (4) be verifiable through linked data, and (5) conforms to regulations adopted by the Secretary of State. This shows that county governments can enact digital signature laws, but have little guidance on a secure bidding environment. Moreover, California local governments are required to ensure that contract awards adhere to anti-discrimination laws, as required by proposition 209.

Proposition 209

Under proposition 209, California government entities are prohibited from discriminating against individuals based on race or gender (Cal. Const. Article 1, Section 31). This includes government solicitations with regard to outreach to businesses that are considered minority-owned and women-owned business enterprises (MWBE). Although this appears to be somewhat restrictive, local governments are permitted to conduct "inclusive outreach" that targets MWBEs, and other business enterprises (OBEs) (Gross & Lohrentz, 2012, p. 10). This type of outreach is supported through data collection of entity contracts that permit governments to identify business demographics for recording purposes (Gross & Lohrentz, 2012). By enacting inclusive outreach and targeted data collection within policy guidelines and e-procurement systems, agencies can take steps toward developing competitive pools of bidders.

LITERATURE REVIEW

Procurement Research Sources

Challenges of regulations and user involvement are reflected in the shallow pool of scholarly research on e-procurement, particularly regarding government implementation strategies, challenges, and solutions (Alvarez-Rodríguez et al., 2014; Coggburn, 2003; McCue & Roman, 2012; Moon, 2005; Reddick, 2004). For example, the first decade of U.S. e-procurement research was based on survey data from the International City/County Management Association (ICMA) on electronic government (e-government) among local governments. The authors: Moon (2002), Holden et al. (2003), Reddick (2004), Norris & Moon (2005), and Murphy (2009) used this data to develop theories on implementation strategies and concluded that the operation of "transaction-based e-government" is limited to a few states and cities and relies on end-user engagement, specifically with suppliers (Norris & Reddick, 2013, p. 170).

Furthermore, the integration of technology in the public sector is a continuously moving target due to frequent updates and constraints of administrative and political influences (Fountain, 2001). The complexity of e-procurement systems in public procurement make deployment, training and policy development very challenging (Leukel & Maniatopoulos, 2005; Henriksen & Mahnke, 2005). Generally, the implementation of e-procurement has received mixed results, in some cases expectations were met, and in others poor adoption led to financial waste (Somasundaram & Damsgaard, 2005). Those who have reported success have mostly benefited from improved administrative processes. In an NIGP (2001) survey, procurement professionals reported a 75% reduction in cost, and 85% mentioned time-saving. Forrester Research, Inc. also reported a 54% reduction in paper and printing costs, and 43% faster response times from end-users based on a survey of procurement directors in 35 state and local

governments (Sharrard, 2001, p. 5). Similar reports suggested that market forces' have influenced governments to take on these new systems to receive the same benefits (MacManus, 2001). Although these benefits have little to do with actual procurement work, or how e-procurement can improve competitive processes, political pressures have pushed governments to take-on these changes.

There are large discrepancies among survey results of city and county governments that have reported using an e-procurement system. In a comparison of International City Management Association (ICMA) members' responses and National Association of Counties (NACo) members' responses to surveys conducted between 2000 and 2001, 4.2% of NACo respondents reported using procurement online compared to 48% of ICMA respondents (Edmiston, 2003). As for the features used, 25% of ICMA respondents reported offering online bids and proposals, while only 6.7% of NACo respondents recorded offering these features (Edmiston, 2003).

Edmiston (2003) found that there is confusion on the terminology used to describe "procurement," "bids," and "proposals" among inter-governmental users. In addition, only 13 of the 100 largest cities in the U.S. have reported conducting online bidding, and about half of all U.S. cities reported public access to downloadable solicitation documents in 2008 (Holzer et al., 2009). The inconsistency among local governments using proper terminology and online abilities has also slowed the development of legal guidelines for transactions and internet bidding. According to a NIGP survey, 65% of local government entities do not recognize electronic signatures, despite the passage of the Electronic Signatures Global and National Commerce Act in 2000 (NIGP 2001). Another survey administered by the National Association of State Procurement Officials (NASPO) (2001) reported that 46% of states have not enacted a digital

signature law. Although these issues began in the early 2000s, they still exist today.

In recent studies and journal articles on procurement professionals, e-procurement literature, and e-procurement evaluation reports have concluded that a government e-procurement model has yet to be developed to guide a homogenous process (Baek, 2015; Brandon-Jones & Carey, 2010; Bromberg & Manoharan, 2015; McCue & Roman, 2012; Norris & Reddick, 2013; Pham, 2019; Rader, 2011; Vaidya et al. 2006). Furthermore, the absence of a generally-accepted model has led county governments to elect various software service solutions created by private businesses that offer different web-based services that enable suppliers to participate online in local government solicitations (Alvarez-Rodríguez et al., 2014; Bromberg & Manoharan, 2015). This particularly affects California counties using an e-procurement system to practice compliant outreach in accordance with Proposition 209 to local suppliers. Under California's anti-discrimination Proposition 209, only some targeted outreach types through data collection are allowed to be used to improve bidding pools (Gross & Lohrentz, 2012). In turn, county supplier enablement tactics operated through e-procurement systems can improve permitted types of targeted outreach.

Under these conditions, several theories have developed about implementation strategies for governments to transition their procurement to modernize systems that support different types of government-operated web-based services. In addition, this research explores theories related to public procurement to understand its function in government. Exploring these theories provides a conceptual understanding of how end-users interact with an e-procurement system.

Theory of Public Procurement

A theory used frequently in public procurement to explain market forces and public procurement purposes is the theory of auctions and competitive bidding. This theory was developed by

Milgrom, & Weber in 1982, in which several auction types are compared and discussed. The theory is that all auctions, no matter what type, end in a similar range of prices. However, auctions that isolate bidders to compete are more likely to arrive at a consistent bidding price. The number of competitors in an isolated auction influences the price at which a product is sold. A more competitive auction leads to a consistent price. Milgrom & Weber (1982) further discuss several ways that competitors can use market forces and key information to take advantage of auctions.

This theory has been primarily used on public procurement research to frame economic research. In regard to this research, the theory of auctions and bidding explains the importance of a competitive and active supplier database for e-procurement systems to produce cost-saving. Dekel (2008) expands this concept further by applying the legal requirements that the government uses when conducting solicitations. This is referred to as the legal theory of competitive bidding, which is described as a "mechanism" of public procurement framed on three objects. The first is to ensure that contracting is conducted with integrity, without the influence of favoritism or corruption. Second, the function of public procurement is to contract efficiency and economically. Third, ensure that a competitive process is conducted for anyone interested in doing business with the government. These concepts give the framework of how public procurement is expected to function and its related organizational duties. These theoretical concepts support the advancement of supplier engagement, as it is a public procurement mechanism and a necessary part of conducting competitive purchasing (citation for these statements). This understanding helps frame the next section on theories of implementation.

Theories on Strategic Implementation: From e-Government to e-Procurement

Several scholars have developed theoretical models based on e-government systems that are widely accepted as guidance on e-procurement implementation. These theoretical models range from posting solicitations on a website to integrating a fully operational financial and contract management system. For example, Hiller and Belanger (2001) and Moon (2002) each propose a four to five-step model, beginning with (1) an open-source of frequently updated information, followed by (2) two-way communication that leads to (3) fiscal transactions, ending with (4) integration, and (5) civic participation. This cycle of stages guides an agency to adopt a fully integrated e-procurement system and provides a practical repetitive process for the system to continue.

The cycle begins with delivering basic and relevant information on solicitations via a website. The information provided is updated frequently, and accurately reflects real-time updates. The next two stages instruct the procurement department to open a communication channel using the website, to allow the facilitation of transactions eventually. In these stages, the website is a catalyst for information exchange between supplier and buyer for transactions to occur. Lastly, the integration and participation stages are conceptualized as a fully functioning portal that acts similarly to an online marketplace (i.e., a reverse Amazon.com for the government). Buyers post solicitations for suppliers to respond, while the portal ensures that procurement laws and active policies are followed. This type of implementation is focused on an e-procurement system with users that are technically skilled (Hiller & Belanger, 2001; Moon, 2002).

Another approach, proposed by Layne and Lee (2001), suggests a four staged model focused on a fully integrated e-procurement system for immediate integration across agencies to deliver a solicitation management system, capable of facilitating transactions between the

suppliers and agencies. This consists of (1) cataloging, (2) transaction, (3) vertical integration, and (4) horizontal integration. This model suggests an inter-governmental approach that begins with collecting information from agencies to develop transactional knowledge of products. It is joined with information on contracting and procurement processes for suppliers to reference. Layne and Lee (2001) suggest that procurement professionals are often bothered by frequently repeated supplier questions; therefore, would benefit from an internet source of information to increase productivity.

The transaction stage leads to the development of single or multiple interfaces that facilitate suppliers' transactions to interact with procurement professionals. This stage is loosely described but is expected to provide forms and processes that reduce administrative tasks and improve communication. This type of preparation is focused on providing support functions for transactional exchanges.

The final stages of vertical and horizontal integration are conceptualized as joining purchasing and financial systems across agencies (Layne and Lee, 2001). The models explain a general process that a government can take to implement e-procurement and give insight to the learned process during the initial use of e-procurement systems.

Although these models provide guidance on the process of implementing an e-procurement system, they fail to describe necessary public-facing components to ensure supplier participation. Specifically, these implementation theories suggest a final e-procurement model that is similarly designed to online markets operated by private businesses. The major misstep this study finds in these theories is the legal and procedural layers that make public purchasing fundamentally different from online consumer purchasing.

In a more recent study, Roman (2013) developed a Practice-Oriented Normative Model

that has "habitual failures" and how to avoid repeating the same mistakes (p. 350). This model identifies five dimensions in e-procurement implementation that should be addressed before installation. These dimensions give clear guidance on how government procurement can make critical steps toward a modern public procurement system. Roman (2013) advises that (1) a clear-goal and legal framework must be developed, "shortcomings of e-procurement platforms can be traced in large part to politically-driven implementation" (p. 350). In doing so, (2) procurement professionals become more focused on developing e-procurement as "an effective policy and financial tool" whose (2) "transformative effects will go only as far as its users and the supporting institutional structures will allow it to go" (Roman, 2013, p. 351). This means that (3) the scale at which the technology of e-procurement is used will affect the human constructs that provide grounds for transformative impacts. Moreover, (4) governments work more efficiently when a shared procedure or practice is recognized across government levels. Roman (2013) also advises that if data captured goes unused, it is likely that the system is being misused, costing the agency money. Lastly, (5) e-procurement is a continuous learning process to allow all users to share key information and provide real-time solutions and support flexible changes in the system.

This normative model provides flexibility for practitioners to control in-put sources to develop a better out-put (Roman, 2013). This model, in turn, relieves pressure on government leadership to establish a proper implementation strategy that functions efficiently internally and is user-friendly externally (Roman, 2013). As noted here, the reliance on internal users is critical and can only be actualized when the organization supports adaptive measures to expand. This means that effective implementation includes organizational readiness for modernization efforts. In some cases, previously referenced, e-procurement failure occurs when there is an inadequate

amount of required knowledge within the organization to institute effective change. Examining

similarities among governments that have been able to adopt an e-procurement system yields the

potential to replicate or match these conditions, which assists in the development of a strong

implementation model.

Characteristics of Cities Using e-Procurement

Several factors have been associated with governments that use e-government initiatives such as

e-procurement. These factors include form of government (FOG), IT capacity, budget size, and

population (Carrizales, 2008; Reddick, 2004; Moon, 2002; Norris & Kraemer, 1996; Schwester,

2009; Teo & Tan, 1998; Ho & Smith, 2001). Moon (2002) and Carrizales (2008) have found a

positive correlation between e-government adoption and a council-manager FOG in cities.

Specifically, Carrizales (2008) studied New Jersey municipalities and found that a mayor-council

FOG was less likely to adopt an e-government system. This research suggests that the political

influence on elected leaders may be an impediment, and city managers' policy authority will

support the advancement of new initiatives (Carrizales, 2008; Moon, 2002).

A council-manager FOG was also found to correlate with a greater IT capacity among

U.S. cities. Research by Norris & Kraemer (1996), Teo & Tan (1998), Reddick (2004), and

Schwester (2009) found similar results that show that the size of an IT department is correlated

with e-government installation. Specifically, the number of full-time IT staff is reported to

increase supportive knowledge when taking on new technology (Schwester, 2009). Lastly, fiscal

stress and population were significant factors that drove policymakers and government leaders to

find cost-saving measures. Ho & Smith (2001) and Reddick (2004) found that the cities and

states pressured by budget deficits to improve spending measures and identify cost-effective

changes are more likely to consider digital tools to improve spending through e-procurement purchasing (Reddick, 2004).

In conjunction with this research, Bromberg & Manoharan (2015) studied e-procurement implementation among the largest populated cities in the U.S. to test web-based e-procurement adoption levels. They joined implementation theories designed by Hiller & Belanger (2001), Layne and Lee (2001), and Moon (2002), and created stages theory. Stages theory suggests that e-procurement adoption goes through stages to complete a full implementation. To test this, the authors developed a Mokkean scale based on implementation stages from a 1 to 7 point scale based on website features. A single (1) point is given for each feature that a website offers, and if the feature does not exist, no (0) point is given.

As e-procurement features become increasingly more complex within a government, the government's rank of adoption becomes more advanced. For example, stage one adoption is a city that offers downloadable solicitations online. If a city provides a two-way communication source on the website, the city is given another point, entering the second stage of adoption, and so on. The research found that an average e-procurement adoption score among U.S. cities is 3.46. This score means that the majority of the US cities with the largest populations are providing downloadable solicitation documents (e.g., downloadable .PDF file), providing solicitation status information online (e.g., status such as awarded, canceled), accepting bids via email or submission to the website. The population range for cities in this survey was 49% have a population of less than 200,000, and 3% have more than a million residents, resulting in a mean population of 384,000. Local governments' budget expenditures ranged from $39 million to $9.6 billion . most cities that scored seven (the highest-ranking level) were found to have a population of less than 500,000, with the exception of the following: Philadelphia (1.5 million), Columbus

(855,000), Seattle (688,000), and Baltimore (621,000). This score means that the e-procurement system includes features that allow bid acceptance, submissions, online bid awards, and, most importantly, internet bidding (Bromberg & Manhoaran, 2015).

Bromberg & Manhoaran (2015) also assert that the application of stages theory fits within these results. This shows that most cities have adopted basic e-procurement features on a publicly accessible website. The authors also note that high ranking couties reflected an easy to use website with several key features. For example, in New Haven, Connecticut, the procurement homepage allows bidders to be notified of new contracting opportunities and to access contracting resources. Similarly, the City of Columbus, Ohio procurement homepage provides clear instructions on how to view, register, and participate in contracting opportunities. This shows that at the city level, governments are focusing more on providing a service-orientated website experience for suppliers.

Lastly, Bromberg & Manhoaran (2015) determined that cities with an IT department and/or a council-manager FOG are more likely to have a higher ranking level of e-procurement adoption. Other indicators, such as budget size and population, were considered inconclusive in this study. The findings show that e-procurement systems operated in local governments are slowly supporting similar public-facing features to facilitate exchanges with suppliers.

Web-based Solutions

There are several web-based solutions developed by computer scientists that have facilitated online purchasing. These solutions have become the basic framework to conduct e-commerce and provide a logical framework to understand the software (i.e., architecture) that is most likely implemented in government procurement departments. The two primary forms of conducting transactions online, as described by Alvarez-Rodríguez et al. (2014), are the sale-side model and

the buy-side model. These models have been primarily used to frame e-procurement software for private businesses. The sale-side model is a web-based system (typically operated through an application) that allows suppliers to offer goods through a catalog for buyers to purchase. The buyers take actions to view, select, and purchase independently. This type of model is typically used by small and medium-sized businesses. The buy-side model is structured for organizational purchasing of goods and/or services to accomplish multiple objectives. In this model, buyers are responsible for collecting necessary information from suppliers to select the best match to meet the objective. The buyer is actively seeking the seller.

Based on these structures, a buy-side model would theoretically fit best in a public procurement setting. However, conducting public purchasing in this manner contradicts the purpose of improving competition to meet cost-saving goals. Conflicts occur with the buy-side model because public procurement operates in a non-discriminatory fashion to attain a high-volume of bids, ensuring that the best price is offered. From the government perspective, the buyer, i.e. procurement professional, is not an activity seeking a supplier. Rather, the procurement professional is qualifying suppliers to bid on a solicitation. This reversal of roles relies on suppliers to navigate the software platform to place a bid. This ultimately shifts the development of a supplier pool large enough to lead to competitive purchasing to the number of suppliers that can efficiently navigate the software. Moreover, suppliers can offer the same good or service, so delineating differences through an online environment can be difficult for buyers, who must determine a pool of qualified suppliers that match a solicitation's requirements. Suppliers are also operating in an online environment that varies by providers and neighboring local governments. It is important to note here that the variety of e-procurement systems operated by local governments can hinder a supplier's participation and decrease competition.

Lastly, Alvarez-Rodríguez et al. (2014) points out that terminology in private sector procurement has been difficult to properly translate into a unified understanding of e-procurement applications, even among similar industries. They note that "common data models, formats and formal query languages can help to the creation of new knowledge-based systems" (p. 816). This means that e-procurement providers would benefit from the development of a unified model to make using e-procurement software more efficient for the public. Similarly, working toward a unified public-facing system can also improve supplier enablement for local governments. This research shows that web-based designs are critical to addressing challenges in transitioning from paper-based systems to a real digital ecosystem for purchasing processes.

METHODOLOGY

Research Method and Design

The research method of this paper uses grounded theory coupled with a constant comparative analysis (CCA) research design to gather core ideas from established e-procurement implementation theories to develop a theoretical model of web-based services for suppliers to participate in local government solicitations. Grounded theory was developed by Glaser & Strauss (1967) to compare factual data against theories related to complex problems and unify these concepts for practical application. In this research, grounded theory guides the theoretical framework to establish an understanding of the factors that contribute to the development of public-facing web-based services to improve competitive purchasing. This research seeks to understand the commonalities of public-facing web-based services among county governments, to create a model that unifies differences and supports suppliers' use of e-procurement in a more productive and standard fashion.

This research draws on theoretical implementation models and computer science purchasing models that have created e-procurement systems. The CCA research design allows for constructive fact-finding to generate a combination of items that are necessary to build a new perspective based on qualitative data. The analysis of this research design follows a four-phase process, as described by Glaser & Strauss (1967). (1) Phase one compares similarities or "incidences" among the categories created (p. 105). (2) Phase two makes connections between categories and determines value. (3) Phase three eliminates categories and/or adds relevant information to refine the boundaries of the analysis. Lastly, (4) phase four is the accumulation of the relevant data and theoretical framework to create the new "theory," in this case, theoretical model. It is important to note that this methodology allows the researchers to make new

judgments about the factors that influence the outcome and the theories that guide its conditions (Glaser & Strauss, 1967). This research contributes to the existing theories and qualitative data to create a more applicable framework for future theory development in public procurement research.

The methodology begins with purposive sampling to identify county governments with similar characteristics that also operate an e-procurement system. In this way, the findings and analysis of this research can properly identify common web-features and e-procurement laws and regulations enacted in California counties. The website data collection is based on previous research by Bromberg & Manhoaran (2015) that identifies e-procurement web-features. The next two sections explain the sampling and data collection process.

Purposive Sampling

In order to identify similarities, empirical evidence reviewed in this paper shows several indicators of e-procurement adoption. These indicators are: population size, council-manager FOG, IT Department, and budget (Carrizales, 2008; Reddick, 2004; Moon, 2002; Norris & Kraemer, 1996; Schwester, 2009; Teo & Tan, 1998; Ho & Smith, 2001). For this research, FOG is excluded, because only four California counties are not governed by a board of supervisors. Furthermore, the budget expenditure of county governments is noted but not considered as a factor for adoption. The strongest correlation between e-procurement adoption among cities and states is large population size, and having an IT Department (Bromberg & Manhoaran, 2015; Moon, 2002; Schwester, 2009). In California, the average population of a county is 681,245, of which the largest counties have a population of over 1 million. This research considers counties that have a population range of 500,000 to 3.3 million, and that have an IT Department, to

identify generalizable information. Table 1 below shows the counties listed by population and their characteristics.

Table 1: Selected County Characteristics

Selected Counties	Population Size	Form of Government	Budget Expenditure in 2019	IT Department
San Diego County	3,302,833	Charter - Board of Supervisors	$56 billion	✓
Orange County	3,164,182	Charter - Board of Supervisors	$53 billion	✓
Riverside County	2,383,286	General Law - Board of Supervisors	$50 billion	✓
San Bernardino County	2,135,413	Charter - Board of Supervisors	$48 billion	✓
Santa Clara County	1,922,200	Charter - Board of Supervisors	$58 billion	✓
Alameda County	1,643,700	Charter - Board of Supervisors	$34 billion	✓
Sacramento County	1,510,023	Charter - Board of Supervisors	$40 billion	✓
Contra Costa County	1,133,247	General Law - Board of Supervisors	$33 billion	✓
Fresno County	978,130	Charter - Board of Supervisors	$20 billion	✓
Kern County	883,053	General Law - Board of Supervisors	$24 billion	✓
San Francisco County	870,044	Charter - Board of Supervisors	$12 billion	✓
Ventura County	848,112	General Law - Board of Supervisors	$20 billion	✓
San Mateo County	765,935	Charter - Board of Supervisors	$18 billion	✓
San Joaquin County	732,212	General Law - Board of Supervisors	$17 billion	✓
Stanislaus County	539,301	General Law - Board of Supervisors	$12 billion	✓
Sonoma County	501,317	General Law - Board of Supervisors	$12 billion	✓

Sources: U.S. Census, 2019; Murphy, 2009; Yee, 2019.

Data Collection

Theoretical implementation models developed by several researchers guide this research in identifying categorical information related to suppliers using e-procurement. Specifically, this research incorporates the Mokken scale of e-procurement implementation based on websites developed by Bromberg & Manhoaran (2015). To measure e-procurement web-features, information was gathered from official county procurement websites. The implementation level may correlate to the ease of use for suppliers.

The website information collection in this study expands on the Mokken scale through an assessment on a six-point scale to measure integration levels from basic, to intermediate, to advanced. The basic and intermediate levels are designed to capture the e-procurement features that have been widely adopted. The advanced-level will identify counties that have implemented laws and procedures on internet bidding and/or e-procurement. Table 2 shows a breakdown of each implementation level.

Table 2: Mokken Scale

e-Procurement Implementation		
E-Procurement Implementation Stage	*E-Procurement Features*	*Evaluation Questions*
Basic Level	- Downloadable solicitations	Does the county provide access to downloadable solicitation documents (.doc or .pdf)?
	- Information for Online Bid Submission	Does the county procurement website provide information on bid proposal submission?
	- Procurement Information Contact for Suppliers	Does the county procurement website provide procurement professional contacts?
Intermediate Level	- e-Procurement Portal for Online Bidding	Does the county support an online bidding e-procurement portal for suppliers and procurement professionals?
	- e-Procurement Technical Support for Suppliers	Does the county provide supportive technical issues with the e-procurement system?
Advanced Level	- e-Procurement Procedures and Policies	Does the county have procedures or policies related to internet bidding?

FINDINGS

Phase 1: Initial Findings

Generally, California counties are ranked at a basic level of e-procurement implementation, with an average score of 3.65. The average score shows that web-based features in California provide access to the county's e-procurement supplier portal and support communication between suppliers and procurement professionals. By comparison to Bromberg & Manhoaran (2015), the California counties that were studied for this research are generally lacking, considering that they have large populations and IT departments. The distribution shows that Santa Clara, San Bernardino, and Sacramento counties scored the highest at an intermediate level of implementation. The majority of counties ranked at a basic level, meaning that they provided solicitation information, an e-procurement portal, and a contact to communicate with the procurement department. Among the lowest-ranked counties, San Mateo and Stanislaus, surprisingly, collected a point at the advanced level due to enacting digital signature policy. This shows that the scale modeled after Bromberg & Manhoaran (2015) stages theory does not accurately apply in this instance. Generally, all counties operated a single e-procurement system, with the exception of Santa Clara, Ventura, and San Bernardino counties, which uses supportive contracting software systems or a supplemental e-procurement provider for specific solicitation purposes.

Although there appears to be a cohesiveness of content among counties, the retrieval of data was generally difficult to gather from each website. The website homepages held limited information to service suppliers and did not present a clear starting point or procedural process that guided users from registration to participation in a solicitation. This study finds that parent-page titles such as "Doing business with the County" and "Supplier Registration" are commonly

interchanged to include the following subpages: supplier registration, supplier outreach events &

local business programs, procurement policies, contracting resources, and introduction training.

In some cases, the division of information led to a path of unnecessary subpages or button-

images that appear unclickable. Lastly, the twelve out of the sixteen counties did not provide a

technical support contact for suppliers, rather listed a general email for procurement-related

questions. To accurately show the differences, points are distributed by each level in Table 3

below.

Table 3: California County Implementation Levels

Selected Counties (listed by population)	Implementation Level			
	Basic	Intermediate	Advanced	Total
San Diego County	2	1	0	3
Orange County	2	1	0	3
Riverside County	3	2	0	5
San Bernardino County	3	2	0	5
Santa Clara County	3	2	1	6
Alameda County	2	1	0	3
Sacramento County	3	2	0	5
Contra Costa County	2	1	0	3
Fresno County	2	1	0	3
Kern County	2	1	0	3
San Francisco County	2	1	0	3
Ventura County	2	1	0	3
San Joaquin County	2	1	0	3
Stanislaus County	2	1	1	4
San Mateo County	1.5	1	1	3.5
Sonoma County	2	1	0	3
Average Total	2.22	1.44	0.13	3.65

Phase 2: Categorical Values - Comparing County Implementation Levels

This section evaluates the initial findings to determine whether further consideration of other factors is required. In doing so, results are refined to interpret relationships between categories and usage of web-features among each county. The sections below examine each level and category in-depth to develop a summary of commonalities, unique differences, and the gaps between.

1. **Basic Level.** The basic level of implementation is intended to capture a minimum standard for counties that conduct online bidding. There are several counties that provide in-depth content that surpass simple web directions and solicitation downloads. Each category below identifies the similarities and highlights the web-features that further support supplier use of the e-procurement site.

   a. **Downloadable Solicitation Information:** County websites generally posted limited information on webpages that included the title, closure date, and issuing department of the solicitation. In total, thirteen counties required registration to their procurement portal to view document language, download the bid packet, and participate. This requirement to register with an e-procurement platform also placed these counties at an intermediate level. As for the other three counties, each allowed public access to view and download bid packets, however, required registration to participate in the solicitation. In contrast, Santa Clara County offers pre-solicitation information to converse with suppliers and improve county scopes of work. The county allows agencies to post draft scopes of work, and requirements for competitive solicitations before they are finalized. This is intended to maintain transparency and provide a market research source for county procurement

professionals. The 'Industry Comment for Competitive Procurement' webpage allows the public to comment on these drafts to improve on the contract language to match updated terms and consult with procurement professionals. In addition, the county posts sole-source contacts for suppliers to view and comment on. Suppliers that can provide the equivalent or better services and meet the other contract requirements are encouraged to comment with information related to providing those services. These webpages provide an interactive opportunity for suppliers to develop professional relationships with procurement professionals.

b. **Information for Online Bid Submission:** This category is intended to identify how a supplier can participate in or submit a bid proposal. Santa Clara, Riverside, Sacramento, and San Bernardino counties were awarded points in this category for including a downloadable guide or video on submitting a bid proposal. The remaining counties often had limited information on the actual procedure and process of submitting a bid proposal online. County websites typically directed users to register in order to submit proposals. The available information did not include details about how to submit proposals using the e-procurement portal or a bid submission template. This topic was generally marginalized by pages related to registration, standard contract terms, and other informational resources. This research finds that videos are the most uncommon medium to communicate information, however, is easier to consume than pages of instructions. For example, Sacramento County recorded a live supplier introduction workshop using their procurement portal, Public Purchase. The video included a tutorial on navigating, required bid documents, and a real example of responding to a proposal on Public Purchase. This video provided clear and relevant information to new users. This also set

expectations and ensured that technical questions could be answered by the video's content. Similarly, Riverside County provided a three-part video guide that explained the registration process, responding to a proposal and required contract insurance types. This series of videos addresses general concerns and questions that new suppliers may have. By comparison to the other forms of written communication, these videos provide substantive content as opposed to the general mechanical process of submitting a bid proposal.

c. **Procurement Contact Information for Suppliers:** Twelve of the sixteen counties surveyed provided a general email and phone number for suppliers to contact regarding procurement questions. Among the other four counties, each provided contacts divided by functional teams, which included each professional's full name, email, phone number, and industries or commodities they handle. Furthermore, Santa Clara County, Alameda County, and Riverside County also provided contacts for outreach and small business programs each operates. The availability of the information on procurement professionals supports supplier engagement opportunities to interact more personally than querying a general email. However, points were given to all counties in this category because a general email meets a basic requirement for communication with suppliers.

2. **Intermediate Level:** At this level, the categories attempt to evaluate the ways that e-procurement systems are used and the ways that counties provide technical support. The two categories below define the common uses of e-procurement software and how the county addresses supplier technical issues. The sections below further explain qualitative differences between these categories.

a. **e-Procurement Portal for Suppliers:** Generally, each county uses an e-procurement

software to conduct exchanges of bid information and collect basic profile data on

suppliers. The commonalities between these procurement portals were the use of

commodity codes and registering with the county or agency. During the registration

process, new suppliers select commodity codes specific to the system. Once registered,

suppliers are able to search for contracting opportunities based on geographic location

and/or industry from other registered agencies (e.g. government, non-profit, private

organizations) on the platform. Advertisement of bid opportunities is primarily through

the e-procurement website, and notifications are distributed using commodity codes

associated with the supplier profiles. In comparison, sixteen counties use ten different e-

procurement providers, of which five counties use Public Purchase, and three counties

use BidSync. The majority of counties (12) use commodity codes classified by the

National Institute of Governmental Purchasing (NIGP). Overall, these systems act the

same, however, each host a supplier database for its institutional users.

b. **Supportive Technical Services for Suppliers:** This category was developed to ensure

that supplier end-users have technical support contact using an e-procurement portal..

The initial findings show that seven counties use a general email in place of a direct

technology support contact. In comparison, Santa Clara County procurement employs an

e-procurement team and a vendor outreach team. Suppliers can email or call to assist with

technical issues. Santa Clara County also offers account maintenance assistance and

vendor registration events. Other counties such as Riverside, San Diego and Sacramento,

included an e-procurement provider contact whom suppliers can email directly. Overall

the extent of technical services within these counties are technical assistance contacts.

3. **Advanced Level.** At this level Santa Clara, Stanislaus and San Mateo County qualified for this

level by enacting an e-signature policy for online transactions. The remaining countries have not established policies related to internet bidding. The e-signature laws are further examined below.

a. **e-Procurement Procedures and Policies:** Santa Clara, Stanislaus and San Mateo counties' digital signature policies include similar language on its usage with regard to internet transactions. Each policy references California Government Code §16.5, which allows government agencies to use digital signatures for online documents. The policies differ on the extent of the application and signature authority for online purchases and document exchange. Stanislaus County included the use of digital signatures as an update to the procurement manual by approval of their Board of Supervisors in 2019. The update acknowledges the use of digital signatures for purposes related to online purchasing and competitive solicitations (County of Stanislaus, 2019). San Mateo County, on the other hand, issued an administrative memorandum in 2013 by the County Manager that prescribed uses of digital signatures for all departments. The policy recognizes digital signatures internally and externally, including exchanges with suppliers. The policy goes beyond California Government Code §16.5 by requiring electronically signed contracts to be encrypted using applications such as Adobe Acrobat to ensure secure document exchange (Maltbie, 2013). These two counties also show that government leadership is a critical factor in amending or creating new department policies. Lastly Santa Clara County had undergone several recent updates in 2014, 2016, and 2017. Their electronic signature policy is applied to all county agencies and departments to initiate contracts. Santa Clara County also accepts digital audio files and graphic representations as valid electronic signatures.

Summary of Findings

Overall a dividing factor that placed counties in the basic or intermediate level was providing suppliers with bid submission information and technical support dedicated to service suppliers. The four counties that scored at an intermediate level (Santa Clara, Riverside, Sacramento, and San Bernardino) have a population range of 1.5 million to 2.3 million and a budget expenditure of $40 billion to $50 billion (U.S. Census, 2019; Yee, 2019). Interestingly, Alameda County, with a population of 1.6 million, ranking under Santa Clara County with a budget expenditure of $34 billion, did not place due to the lack of bid submission information. However, Alameda County conducts outreach and supports a business program titled SLEB (Small, Local, and Emerging Business program).

Furthermore, Santa Clara County and Riverside County provide a full list of procurement and outreach or business program for contacts that each operates. This research finds a relationship exists between counties that provide bid submission information, IT support contact or team, and professional contact information with the demographics of population size and budget expenditure. In comparison, these counties each provided unique supplier engagement through pre-solicitation information, local/small business programs, video guides on procedures, and dedicated technical support teams.

As for Stanislaus and San Mateo counties that reached the advanced level and lacked in several categories. Although both had the lowest populations, and the smallest budgets of $12 billion and $18 billion, respectively. Santa Clara County is the only county that scored in each category and provided the most engagement opportunities for suppliers interested in government contracting. It is important to note that Santa Clara county's advanced rank does not make the procurement website was not significantly easier to use. The site provide more options for

suppliers to connect with procurement professionals and potential contracting opportunities. Based on these comparisons, policies related to internet bidding are rare; however, can be achieved at the lowest level of implementation with leadership support. As for counties that placed in the basic level, each posted downloadable solicitation information and used an e-procurement system to facilitate internet bidding and source suppliers.

This research finds that the majority of counties have not progressed significantly in providing advanced competitive purchasing as expected. At the minimum, e-procurement requires the conduct of internet bidding and exchanges of information with suppliers. These findings suggest that the majority of counties have not developed a clear procedure for suppliers to conduct internet bidding, nor have the capacity to take on end-user issues with a dedicated technical team. The inconsistencies among the counties hinder supplier engagement, which ultimately affects the potential for competitive purchasing.

ANALYSIS

Phase 3: Categorical Relevance and Expansion

Based on the information gathered, the majority of counties use e-procurement as a tool only to conduct exchanges with suppliers, while only a few counties have moved forward in developing a procurement website that improves supplier engagement. In addition, previous research shows that e-procurement systems have the ability to change public procurement, both internally and externally, to improve competitive purchasing and further support suppliers doing business with government agencies. This study reasons that e-procurement implementation does not take on stages, rather the implementation process is fluid and requires a series of actions to occur, starting with a vision of external application operated by the county and supported by an e-procurement provider.

This study suggests that the majority of counties have suffered from Roman's (2013) habitual failures, as noted in the Practice-Oriented Normative Model. Roman (2013) suggests that poor system training can be reflected in "minimal levels of usage of strategic functions" (p. 351). In addition, "a more encompassing adoption effort will be associated with a higher probability of transformative impacts" (p. 351). This means that the lack of supportive measures for suppliers and policy development is a reflection of the poor adoption among other supportive departments within each county. The majority of counties appear to have failed within these two dimensions. From this analysis and the initial findings, a service-oriented website has yet to be fully developed. The minimal application of web-features and relevant supplier information found in these county websites shows that counties are continuing to struggle with properly implementing services that support supplier engagement in e-procurement.

Phase 4: Theoretical Model

Based on the research in this study and the organizational support needed to fulfill e-procurement implementation, this research develops a direction for counties to create a service-oriented website. Specifically, this model is a combination of theory and qualitative findings addressed in this study. The framing of this model is also guided by Roman's (2013) Practice-Oriented Normative Model, which defines the three e-procurement contributors.

This research theorizes that there are three contributors that make-up the e-procurement system. These contributors are suppliers, providers, and the government agency. Both suppliers and the government agency operate on the provider's platform. Similar to most theoretical models, the platform is treated as a tool to conduct purchasing. However, the provider and the government agency are active facilitators in serving suppliers. In this way, the function of facilitating exchanges on the platform relies on the government agency and provider to engage with suppliers.

These roles are similar, but each contributor operates differently from the other. On the one hand, the provider controls the administrative and procedural functions for the government agency to efficiently conduct business with suppliers. On the other hand, the government agency must seek out and generate suppliers to join the provider's platform to conduct business. Therefore, suppliers within the system provide goods and services to government agencies on the providers' platform. The providers create the digital environment for end-users to conduct business, and the government agency employs providers to host public purchasing and source suppliers. Each contributor has a role in the operation of the system and make-up the exchanges that occur.

In this framework, government agency users facilitate exchanges with suppliers by means of the e-procurement system. The government agency's function and responsibility are to ensure

that suppliers enter and properly use the e-procurement platform, while the provider is only required to assist with procedural functions. This approach is in contrast to other implementation theories that suggest that the provider's platform is responsible for sourcing suppliers, in order to relieve administrative pressures on the agency. According to research cited in this study, the majority of governments nationally have accomplished this goal of improving administrative functions. They continue to lack in actualizing competitive purchasing because they are not contributing to the development of a source of suppliers. Based on this understanding, this research defines the following theoretical model for county websites to engage suppliers with e-procurement to create a larger bidder pool and thereby drive down costs.

Local Uniformity

The advancement of competitive purchasing relies on a uniform process that can be recognized by counties and their constituent cities. Government agencies that work toward the development of a unifying public procurement process simplify procedures for suppliers and increase sourcing opportunities. Uniform procedures, such as digital signatures, permit administrative processes to be easily transferable between organizations and reduce verification necessities. This change improves a supplier's ability to engage with government agencies more efficiently.

These actions also assist in sourcing suppliers that have conducted work within the region of the local governments. A single source of policy information, which simplifies website content. The administrative requirements posed by the unified policy can also dictate basic web-features that suppliers use. The outcome of this action results in similar user experience due to the consistent procedural requirements.

Supplier Engagement Initiatives

To ensure that local uniformity and a supplier entry point are possible, governments should incorporate supplier engagement initiatives. The primary duty of the team would be to report and investigate barriers to competitive purchasing. This would allow for a dynamic team to address issues related to technical and procedural struggles that suppliers experience. The team would work cross-functionally with e-procurement providers, internal procurement staff, and neighboring agencies. Due to the constantly changing digital environment, this team would play a key role in the assessment of procurement technology and implementation.

Development of Supplier Entry Point

The procurement homepage must take on a services-oriented approach to design and development for suppliers. As stated throughout this research paper, the driving factor for effective and efficient e-procurement systems is the proper use of the system's features. In order to achieve this, a design and roll-out plan must be developed with the e-procurement provider to take full advantage of the provider's services and reporting abilities. The absence of this consideration has placed web designs in the hands of staff members that do not understand the needs of the supplier or the potential for services to advance supplier engagement. The design of a services homepage is just as important as training internal staff to use the system property. An entry point ensures that all potential suppliers are given the same information and opportunity to do business with the government. This also provides strategic access to leveraging key information based on how users operate the system after entry. Essentially, a user-friendly entry-point can register the supplier in the database, deliver training information, and distribute required documents. It is important to note this is not a supply portal operated by the provider, but instead, this entry-point is within the procurement homepage and tailored for new suppliers.

Report and Repeat

Lastly, a cost-benefit analysis of external web-features and user-experience surveys of the overall system should occur regularly and be made public. In doing so, system improvements are identified and contribute to market research for government agencies. These evaluations also improve the overall use and practice of improving online public procurement. This allows for a continuous learning process tracking the changes in modernizing government.

CONCLUSION

There is a lack of uniformity in regard to service-oriented supplier enablement, and regulatory processes related to internet bidding. This research collects qualitative data based on a website scale originally developed by Bromberg & Manhoaran (2015) to identify web-features on government procurement websites. The data collected found that the majority of counties that were ranked at a basic level provided solicitation information, an e-procurement portal, and a contact to communicate with the procurement department. Among the lowest scoring counties, San Mateo and Stanislaus still placed at the advanced level due to enacting digital signature policy.

To address these challenges and expand the knowledge of e-procurement, this research created a theoretical model of government web-based services and policies to enable suppliers to more effectively interact with e-procurement. Generally, the collection of website information has been used to evaluate the performance of e-government implementation through exchanges between government agencies and the public (Holzer et al., 2010). In addition to this, the functions of e-government and, in this case, e-procurement is reliant on websites to distribute information and facilitate services (Bauer & Scharl, 2000; Huang, 2007).

However, there are limitations of website analysis with regard to identifying internal inputs that cause website out-puts. This study is also limited to California's larger counties, the sample of counties chosen, with an expectation to capture advanced websites. Further research on internal usage of e-procurement and external web-features could reveal challenges to modernizing website services.

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