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Data-driven business integration in procurement – a case study in an ICT company

Aki Jääskeläinen, Juho Hirn

aki.jaaskelainen@tut.fi

juho.hirn@tut.fi

Department of Industrial Management

Tampere University of Technology, Finland

Abstract:

The strategic status of procurement has strengthened in business organizations during the past 20 years. At the same time, increasing amount of data is available to potentially support purchasing and supply management (PSM). Despite the increasing interest in big data in the academic research and among practitioners, there are less empirical studies on its potential in specific business functions such as PSM. The aim of this study is to investigate the current state and potential opportunities of data usage in integrating procurement activities with business needs. More specifically, the study answers to the following research questions: 1. How does the changing role of procurement function affect its information requirements? 2. What kind of information is currently exchanged between procurement function and other business functions and how the situation could be improved? Qualitative single case study approach is used. The main empirical data set is gathered through 10 interviews in the case company. The global case company of this study operates in the ICT industry. The interviewees are procurement experts, data analysts and representatives of various business lines of the company. It is found that procurement employees see a clear shift in their role towards a strategic business partner in charge of supplier relations and networks. However, the business units still see the role of procurement in more traditional sense relating. The company representatives consider the utilization of data in decision-making as their pitfall. It is apparent that better change and utilization of data between the business and procurement functions could contribute to the value created by the procurement function. The empirical study reveals that the data perceived important by the interviewees still relate to the traditional role of procurement. However, a clear need to combine existing data between business and procurement functions prevails. Further research should investigate the benefits of combining the various data sources linking the business perspective and procurement perspective.

Keywords: big data, decision-making, knowledge management, performance information, performance management, procurement

1. Introduction

The strategic status of procurement has increased in business organizations during the past 20 years (Carter and Narasimhan 1996). Up to 80 per cent of modern organization's cost structure can be sourced goods and services (van Weele 2010). Procurement category management is a recent trend in purchasing and supply management (PSM) aiming at better integration of business objectives and procurement activities. Increasingly, procurement carries out important business tasks and it has been argued that separate procurement organization is no longer appropriate (Brown and Cousins (2004). This creates need requirements for information. Big data is a topical theme followed by most companies. Studies have shown that managers are able to take best decisions when supported by right data (Davenport, 2006). Hazen et al. (2015) presented big data as an emerging area that can radically transform PSM activities. However, PSM has been slow in identifying the potential role of big data (Chae and Holson 2013; Hazen et al. 2015). Data-driven integration between business units and procurement is still uncommon (Pagell 2004). There is a need to understand better the information requirements of PSM supporting overall business objectives (Hesping and Schiele, 2015). It has been stated that strategic decision-making in procurement requires more data on the external environment of the company instead of focusing only on procurement spend (Marakas 2003).

The aim of this study is to investigate the current state and potential opportunities of data usage in integrating procurement activities with business needs. More specifically the study has two research questions:

1. How does the changing role of procurement function affect its information requirements?

2. What kind of information is currently exchanged between procurement function and other business functions and how the situation could be improved?

The data under scrutiny can include both quantitative and qualitative as well as company internal (ERP data, spend data, contract data) and external data (customers, suppliers, competitors). Qualitative case study approach is used. The large and global case company of this study is in the ICT industry which has an ambitious aim to improve its business by applying the ideas of big data analytics. The main empirical data set is gathered through 10 interviews in the case company. The interviewees are procurement experts, data analysts and representatives of various business lines of the company. In addition, a discursive workshop facilitated is organized to verify and elaborate the results of the interviews. As a result, the paper presents how data utilization could be improved to better support the strategic category management in procurement.

2. Literature review

2.1 Changing role of procurement

Procurement's role as a strategic function instead of tactical started to establish in 1980s (Carter & Narasimhan, 1996; Freeman & Cavinato 1990). Many authors have recognized a shift from the traditional, administrative and transactional role towards strategic partnerships, cooperative alliances and supply network management (Lamming et al. 2000; Knudsen 2003; Paulraj et al., 2006). There are also conflicting views on the strategic position of procurement. In practice, procurement is still widely considered to be a support function having a tactical role and performing low value adding activities (Kaufmann & Carter 2004).

Carter & Narasimhan (1996) consider the image and status of procurement to be affected by the contribution of procurement to both the overall corporate performance and the performance of other functions. They conclude their study in four findings. First, procurement has an impact on the overall performance of a company. Second, procurement plays a crucial part in the competitiveness of a company and it should be involved in the corporate strategy formulation and decision-making. Third, partnering with suppliers provides more benefits than traditional supplier relationships based on procurement power and leverage. Finally, routine, operational procurement can be decentralized but centralized control is required over strategically oriented procurement activities.

Tassabehji & Moorhouse (2008) studied how procurement professionals perceive their role within their organizations. Some interviewees felt that the role of procurement was still very traditional as an administrative function. Others recognized procurement having a strategic, value adding role to the organization but they still considered the communication of value to their organization to be troublesome. Only in one instance of their 22 interviews the procurement function was represented at an executive board level. Interviewees felt that their role was changing but very slowly and incrementally. Internal acknowledgment, early involvement in the decision process, internal support to procurement strategy, and cultural barriers and resistance to change were considered the main challenges and issues created by the changing role of procurement.

Procurement category management aims to shift procurement role from an operational function towards a strategic business partner. Van Weele (2010, pp.207-214) sees category management as a strategic tool for procurement. Every spend category and supplier base needs to follow different strategic choices. According to O'Brien (2009), category management essentially supports the interaction between procurement and business units.

2.2 Information sources and processes

The popularity of big data has risen with other trends, such as Internet of Things (IoT). Usage of big data has been recognized to provide many benefits in the literature. It has been linked to efficiency, reactivity, transparency, quality, and productivity (Nakano & Oji 2012, Lau et al. 2013). Big data has been defined by using the 5 Vs: volume, velocity, variety, value, and veracity (Russom 2011; Wamba et al. 2015). Volume refers to the large amount of data, velocity to the frequency or the speed of data generation, variety to the huge variety of data sources and formats, value to the economic benefits extractable by big data, and veracity to the importance of data quality. In this study the variety of data sources and value from data will be emphasized.

In general, managerial information needs can be divided into a three-dimensional cube called “cube of business information” (Hannula and Pirttimäki, 2005). The axes are information subject, information source, and information type. Information subject and information source can be internal or external. Information type can be qualitative or quantitative. Cube of business information is an illustrative tool which allows approaching different information needs systematically. Figure 1 is an illustration of the cube of business information with the axes of information source and information type.

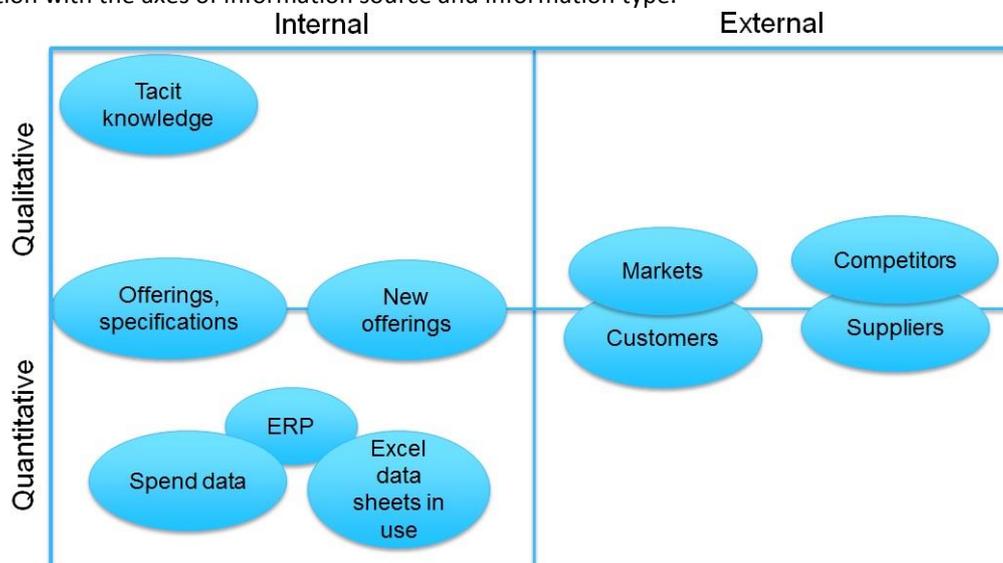


Figure 1 Simplified version of the cube of business information (adapted from Hannula & Pirttimäki 2005)

In Choo’s information management cycle (Figure 2), information management is a nonstop process with six phases: 1) *identification of information needs*, 2) *information acquisition*, 3) *information organization and storage*, 4) *development of information products and services*, 5) *information distribution*, and 6) *information use*. *Adaptive behavior* is considered to be the beginning of the cycle since organization’s actions create information. These actions interact with other organizations and systems altering the environment and generating new messages and information.

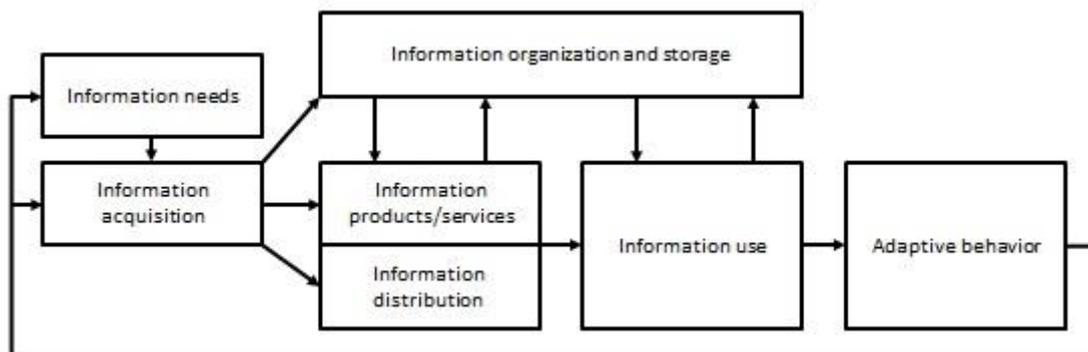


Figure 2 Information management cycle (adapted from Choo 2002)

Key starting point for all the process models on information management are the information needs. According to Choo (2002, p. 24) *information acquisition* is driven by *information needs*. In this phase, members of the organization seek information about the environment in order to clarify the situation, and to have the information needed for decision-making and problem-solving. *Information needs* are characterized by the subject’s requirements and the situational contingencies. Different problems and decision-making situations require different kind of information. (Choo 2002, p. 24)

2.3 Data driven business integration in procurement

Literature on the integration of business units and procurement from the data utilization perspective is still scarce and most of the prevailing literature focuses on the benefits of integration instead of the manners in which integration is achieved (Pagell 2004). In the previous literature, there is no research on data-driven

integration between procurement and business units, although, some areas of procurement-related data have been studied extensively (Ho et al. 2010). Studied research areas include supplier evaluation and purchasing performance measurement. Managerial information needs of purchasing performance measurement include objectives setting, determining future actions (Gunasekaran *et al.*, 2004), strategic alignment and demonstrating of financial contribution (Pohl and Förstl, 2011), identification of deviations from standards (Cousins *et al.*, 2008) and benchmarking (Giannakis, 2007). Typical purposes of procurement performance measurement include control and monitoring of the overall costs of procurement and internal communication highlighting internal value created indicating the ‘internal customer’ logic (Caniato *et al.*, 2014).

Hazen et al. (2015) consider big data as an emerging area in the field of procurement which could support competitiveness and transform the management of procurement. Still, the role of big data has been slowly identified by procurement professionals (Chae & Holson 2013; Hazen et al. 2015). Many authors consider spend data the main source of information in procurement and spend analysis is associated with strategic sourcing (Driedonks et al. 2010). However, the evaluation of relationships between organizations and organizational units (Gunasekaran *et al.*, 2004) sets new needs for information. It has been argued that the soft dimensions of management are critical in the supplier relationship (Giannakis, 2007) and that value-creation in supplier-purchaser relationships is multi-dimensional in nature, consisting of aspects of efficiency, effectiveness, and network functions (Möller and Törrönen, 2003). It is widely known that financial measures do not ensure the long-term sustainability of a firm or a relationship (Chia et al., 2009) and there appears to be a consensus in the literature that performance measurement supporting inter-organizational collaboration requires both financial and non-financial measures (Giannakis, 2007; Nudurupati et al., 2015).

3. Research methodology

This study applies a single case study approach. The case company of this study is in the ICT industry. It has a global purchasing organization but main business area is Northern Europe. The case company has adapted category management for around five years. Interviews were conducted to reveal the current state of procurement and data usage in the company. In total, eleven persons were chosen for an interview using purposive sampling. The chosen persons were considered important for versatile investigation of the selected case and phenomenon at hand. Interviewees included managers and experts from procurement, analyst positions and business unit managers. Interviewees’ responsibility areas are shown in *Table 1*.

Table 1 Interviewees per organizational unit

Group of interviewees	Number of interviewees
Procurement	4 Interviewees
Analysts	3 Interviewees
Business unit personnel	5 Interviewees

All interviews were recorded and transcribed. Interview responses were handled anonymously to ensure integrity. Semi-structured interviews were exploratory by nature, focusing on the current state and role of procurement in the company, and opportunities of improvement in company’s data utilization. Hannula and Pirttimäki’s (2005) cube of business information is presented to the interviewees when identifying the most useful sources of data. In addition, the data-themed questions are based on Choo’s (2002, p. 24) information management cycle. All phases of information management cycle are covered in the questions except adaptive behavior, information organization and storage.

4. Empirical results

4.1 Role of procurement in the case company

Half of the respondents, especially those who had been employed for a longer period of time, recognized the shifting role of procurement from an operative support function towards a more strategic partner. The

remaining half of the respondents still considered procurement to be a traditional support function. One of the respondents from a business unit not affiliated with the case saw procurement's role as "a servant". Category management was considered to be adapted to a further degree in the case business unit. This was supported by the fact that the respondents of this business unit were the ones who considered procurement to be a significant partner. Procurement perceived itself to be a facilitator and a consult bringing business units together and providing input and pragmatics to their decision-making.

The results reveal that procurement saw a clear shift towards a strategic business partner in charge of supplier relations and networks instead of contract negotiator with no strategic input. The change was considered to happen slowly. Management of procurement considered the main reason for this to be the fact that the beliefs and the way how business units perceived procurement could not be changed at once by flipping a switch but instead incrementally, piece by piece. Management of procurement considered some business units to be easier to work with because there were positive experiences in the past which allowed the people in those business units to be more adaptive to change their way of thinking.

The value added by procurement was still considered very traditionally. Operational elements of value were considered more important than strategic elements of value. Interview results are shown in *Figure 5*. Six out of seven non-procurement interviews considered the main value procurement brought to be good contract terms, prices, and negotiation skills to achieve them. Three out of seven non-procurement interviews also provided a more strategic form of value from procurement: supplier management and knowledge. One of the interviewees concluded by saying:

"This has been very price- and cost-focused which is an easy way to do procurement, getting the price down. Rather the value comes from building these ecosystems. If you think about our company strategically, our role will shift more and more towards a service integrator."

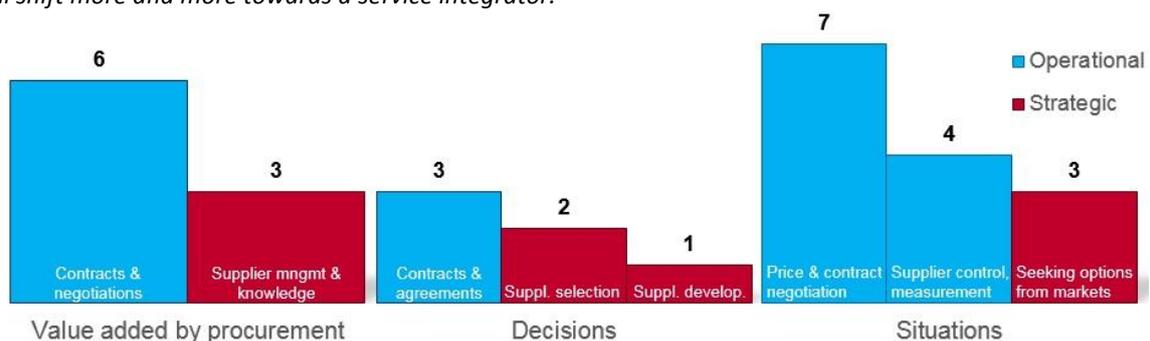


Figure 3 Interview results on procurement's role.

The decisions business units did with procurement also supported traditional view of procurement. Three out of seven non-procurement interviewees considered the decisions done with procurement to be contracts and agreements which is an operational decision. Strategic decision-making was scarce. Only two out of seven non-procurement interviewees selected suppliers and partners in collaboration with procurement and one out of seven non-procurement interviewees made decisions about supplier base development with procurement. The situations where other functions used procurement's services were also very traditional and operational. All non-procurement interviewees included procurement into the process when contracts and prices were negotiated. Four out of seven non-procurement interviewees used procurement for supplier and partner control, contractual management, and supplier measurement. Only three out of seven non-procurement interviewees used procurement to assist in seeking options from the supplier markets. Some interviewees considered procurement to be rarely involved early in the tendering process to the customer. Interviewees concluded by saying:

"Business units are directly in contact with suppliers. That is not good."

"They provide us with contractual and financial negotiation...that's 10 % of what they could do...They are seeing the full breadth of technologies from multiple business units so they can actually advise us in the technology selection as well."

Overall business units wanted procurement to be a strategic business partner who would provide input for strategic decisions such as technology and supplier selection. It was considered important for the company's

future success that procurement’s role would become more strategic. Head of a business unit considered the following:

“The role of procurement as a service integrator should enable and catalyze multiple partners as an ecosystem instead of using negotiation power one partner at a time.”

4.2 Data utilization in procurement

Interviewees were asked to focus on the data most relevant for them. Interviewees considered data to be in a support role in their work. One interviewee referred to data as *“the gasoline for a car”*. Internal data sources were much more commonly used and external data sources were used ad hoc if at all. Overall, the data exchange was very situational and interviewees did not recognize any formal or determined way for changing information between procurement and business units. This was also considered a problem in some instances. One interviewee concluded on data exchange between procurement and business unit as follows:

“I do not recognize any controlled or determined data exchange between us. Instead, it is situational.”

Interview results on data are shown in Figure 7. Spend data was considered the most relevant in procurement. One interviewee emphasized that *“most valid is the spend data which makes a frame for everything”*. Business units also requested spend related information, such as spend per partner, the most from procurement instead of raw spend data. Eight out of ten interviewees recognized spend data information being requested from procurement. Second most common data requested from procurement was information about contracts and frame agreements. Most often business units asked about pricing and what kind of agreements case company had with a certain supplier. This information was not stored in a database and it was requested with e-mails, phone calls or face-to-face. This was considered problematic and time-consuming for both the procurement and business unit personnel. The information was often needed ad hoc in urgent matters and therefore, the burdensome way for acquiring the information posed problems. Centralized and systematic way for providing basic information about contracts and suppliers was considered valuable by interviewees.

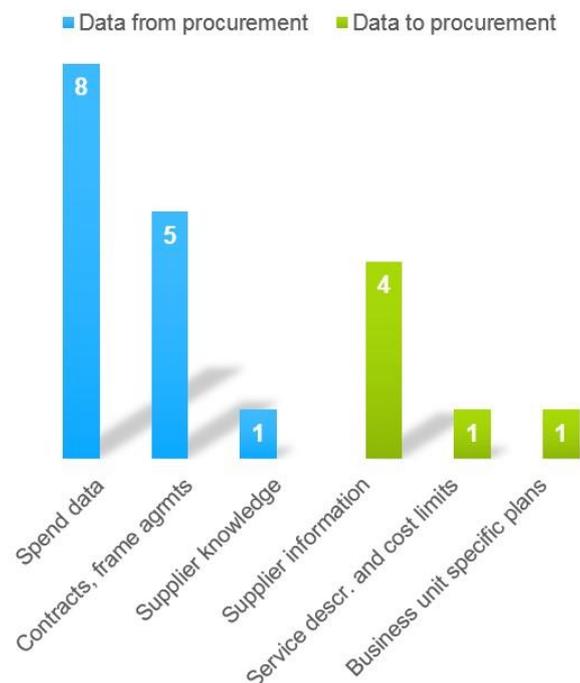


Figure 4 Interview results on data

Business units also asked information about the suppliers from procurement, although, only one interviewee considered this to be common and systematic. Mostly business units were conscious about the supplier base and only looked for advice from procurement when supplier base needed modification. Procurement requested mostly supplier information from business units. Four out of ten interviewees reported procurement requesting supplier information from business units. Requested information included the most important suppliers, how supplier base should be developed and what prospects and opportunities exist for

the supplier base. One interviewee reported procurement asking for service descriptions, demands, and cost limits for procured services and products from business units. This was needed for making contracts and agreements with supplier. One interviewee recognized procurement requesting business unit specific plans. This was needed for category development to understand what kind of goals and plans business units have for the future. The requested plans included business unit strategies, budgets, income statements, and information on investments. Strategies and budgets of business units were considered essential for category management.

Interviewees also proposed interest for developing the data between procurement and business unit. Five interviewees considered proactiveness and faster responsiveness important area for development. Nevertheless, interviewees were not able to come up with specific ways for improving proactiveness. Scanning the supplier base and estimating future spend beforehand were considered important and useful. One interviewee considered the following important:

“If you can step out from the history to the future, you can make a big difference for the future.”

Five interviewees highlighted that spend data and contractual data are separate. This caused a lot of manual work when business units needed information about the contracts. Requesting information about contracts was considered time-consuming by business units and they argued that it should be available through a centralized channel, such as a SRM database. At the moment, the case company did not use a SRM system but it would be implemented when the ERP system will be updated. One interviewee emphasized formality and regularity in reporting data about spend and contractual information, such as supplier measurement. At the moment, this was considered irregular and ad hoc. One interviewee considered the category strategy formation to be more of a rehearsal at the moment and considered it to be important for it to become a wider documentation in the future.

5. Discussion and conclusions

The results regarding the changing role of procurement resemble those of Tassabehji and Moorhouse's (2008). In both studies, procurement employees saw a clear shift in their role towards a strategic business partner in charge of supplier relations and networks, instead of contract negotiator with no strategic input. However, the business units still see the role of procurement in more traditional sense. Currently, the case company used data-driven integration mechanisms between the two parties only situationally. The responsibility for cross-functional data sharing or integration was not assigned to anyone. Most of the time, the person, who had the need for such integration, had the responsibility for finding out what information is available in the company. Personnel in one organization unit were not aware of the information or data in other organization units. Even in the studied modern ICT company, there was still a need for better IT system-based integration. This was emphasized by the fact that business unit personnel considered it time-consuming to request supplier-related information from procurement when this information could be stored in a common database, such as, a supplier relationship management (SRM) system. In summary, there was no formal platform for sharing information between procurement and business units which hindered information sharing between them. Also the responsibilities for managing the information sharing were unclear.

Better change and utilization of data between the functions could contribute to the value created by the procurement function and this should be emphasized in the future research. One possible area of research relate to changing information processing required by functional integration (Trautmann et al., 2009). Information processing capacity is affected by both vertical (e.g. harmonized IT infrastructures) and lateral (e.g. cross-unit teams) integration mechanisms. Vertical integration mechanisms consist of centralization, formalization, standardization, and vertical information systems. Lateral mechanisms consist of, for example, job rotation, cross-unit teams, and integrators.

This study started with an ambitious goal of learning more on the potential of big data usage in purchasing and supply management since the lack of literature on the issue. This goal was also shared by the case company. However, the empirical study revealed that the interviewees highlighted the need to improve the understanding of data which can be regarded as 'traditional', e.g. past transactions and costs. Hence, even the usage of this 'small data' sets still requires improvement. The discussed data is still typically derived from inside the organizational boundaries but it connects different organizational functions in a new way. Currently

the information exchange between procurement and business units is very ad-hoc with no formal procedures. Business unit interviewees regarded it important that purchasing function could provide better information regarding suppliers and supply markets. It was also regarded essential that the value of purchased services or products could be demonstrated better. The next step in data utilization was seen to take the form of supplier data base combining all the relevant information of suppliers and supply markets. This information could include both financial and non-financial, subjective and objective data by combining the more qualitative data from supplier agreements, purchasing spend data and supplier performance evaluation results. In addition, modern procurement should expand its view from spend analyses into the value that the supplier base provides to the company. The literature should pay more attention to defining taxonomies and models supportive to data-driven business integration in the context of procurement.

This study has limitations which should be addressed in further research. The study had an access only to the purchaser company perspective and complementing viewpoint would increase the understanding on the specific characteristics inherent in the performance measurement of buyer-supplier relationships. The paper examined only single case which means that the results can be applicable only in similar contexts and they should be further tested. This study is still ongoing and a further study will be implemented to test the benefits and demonstrate the ideas of combining the data from procurement and business units.

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