

The Pennsylvania State University

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**IDENTIFYING AND MITIGATING MAVERICK SPEND AT PENN STATE
PURCHASING SERVICES**

A Thesis in

Industrial Engineering

by

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ABSTRACT

The Pennsylvania State University is a state-related, land-grant University with 24 campuses throughout Pennsylvania. The University's total enrollment was about 100,000 students across the 24 campuses in the Fall of 2017. Because of its scale and geographic distribution, the University has adopted a decentralized purchasing strategy for the purchase of goods and services, to support its mission of education, research and service. However, the Department of Purchasing Services at Penn State, University Park, is tasked to support effective and efficient procurement of goods, materials and services across the University, while ensuring compliance to applicable policies, laws and regulations and to maximize utilization of the University's resources and budget. Purchasing Services is also responsible for centralized purchasing activities and maintaining relationships with suppliers. Purchasing Services attempts to capture economies of scale by replacing individual purchases done throughout the University, using organization-wide framework agreements. These benefits can be achieved by standardizing purchasing processes and procedures, which includes implementing an e-procurement system and reducing the authorized supplier base. However, this effort may be a challenge for end users who are used to handling purchases at a local level. This results in various forms of organizational mis-behavior in purchasing, which include purchasing off-contract and/or off-policy, commonly known as "maverick spend", which ultimately affects the bottom-line of an organization.

In order to provide mitigation strategies to Purchasing Services for the challenges faced in centralization and to tackle maverick spending at the University, this thesis has three main objectives: 1) To identify the proportion of maverick spend in different methods of purchasing at Penn State, 2) To identify root-causes of maverick spending behavior at Penn State and 3) To recommend mitigation strategies to Purchasing Services, in order to facilitate effective and efficient centralization initiatives.

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Chapter 1

Introduction

With increasing competition in recent years, most organizations have started focusing on their core competencies, which has led to an increase in the purchase of goods and services from external suppliers. For most manufacturing firms, the purchasing of raw material and component-parts from suppliers constitute a major expense, and accounts for 40%-60% of production costs for most U.S. manufacturers (Ravindran and Warsing, 2013). This has resulted in a greater importance of purchasing for organizational competitiveness. Thus, procurement is one of the key strategic functions within an organization today (Paulraj *et al.* 2006). Procurement involves the process of selecting suppliers, establishing payment terms, strategic vetting, selection, the negotiation of contracts and actual purchasing of goods and/or services.

Organizations have long realized the importance of consolidating its spend with fewer suppliers to leverage its spend capability and realize cost savings through economies of scale, standardization of purchased products, rebate programs, better purchasing policy and time savings (Cousins *et al.* 2008). There has been an increasing trend in centralizing purchasing and an organization's strategic planning for supply base reduction (Harland *et al.* 1999). However, simply establishing centralized contractual relationships with key suppliers will not bring any benefits or savings, as contract compliance is crucial to achieve these (Karjalainen, 2009). Most organizations today adopt a hybrid purchasing strategy wherein the supplier selection and contract negotiation is performed at the centralized procurement department, whereas the purchase of goods/services is decentralized and is performed by various stakeholders of the organization. This sets the scene for different types of non-compliant behaviors in terms of an

organization's purchasing policy, which is also known as "maverick spending" (Karjalainen *et al.* 2009).

Maverick spend can be defined as purchase of goods or services without using the organization's formally defined processes and authorized vendors (Angeles and Nath, 2007). Purchasing goods or services out of contract or from non-preferred suppliers can be detrimental because it impacts profit, contract fulfilment, legal protection, total cost of ownership and supplier relationship (Karjalainen *et al.* 2009). According to Aberdeen studies, the percentage of compliant transactions is 65% on average (Aberdeen, 2006a), and maverick buying in services is on average 24% (Aberdeen, 2003). Lonsdale and Watson (2005), investigating procurement at the National Health Services in UK, found maverick spend to be 50%, which was broadly set to match the national average. Pricewaterhouse Coopers calculated that a firm could gain savings of 30-40% of non-direct spending if they buy only from preferred suppliers (Angeles and Nath, 2007). Also, Kulp *et al.* (2006) estimated that 20-30% of unrealized purchasing savings are due to noncompliance. Clearly, maverick spending is a significant problem for the organizations (Karjalainen *et al.* 2009).

There are various reasons for maverick buying behavior, however there are only a few research publications that identify them. According to Kulp *et al.* (2006) in their case study of GlaxoSmithKline (GSK), the main reasons for maverick buying include lack of knowledge about existing framework/contracts, lack of communication of organization policies to employees, personnel's desire to maintain relationships with unapproved suppliers, lack of specific products in an existing contract and purchase of new product and/or service not on contract. Cox *et al.* (2005b) suggested that maverick buying can occur because other functions in an organization are not competent in procurement activities and unaware of business risks involved. According to Lonsdale and Watson (2005), an informed decision involving functionality-cost tradeoffs may be the reason for maverick buying. Whatever is the reason, the consequences of such buying can be

devastating such as stated by Kulp *et al.* (2006) in their study of GlaxoSmithKline, who lost \$80 - \$120M of its potential savings from volume consolidation because of maverick buying.

Academics and practitioners have proposed several measures to reduce the extent of maverick buying. The most common strategy is monitoring spend, in combination with penalties for misconduct, which is referred to as spend analysis (Karjalainen *et al.* 2009). Studies indicate that spend analysis improves contract compliance, at least to some extent (Minahan and Degnan, 2004). Technologies such as electronic procurement (Angeles and Nath, 2007) and purchasing cards (Roy, 2003), have been proposed as measure to forestall maverick spend. Introducing such technologies can have two effects; it promotes an agent to procure from established framework (Angeles and Nath, 2007), and secondly it increases spend visibility and makes it more difficult for the agent to buy from an outside source without being detected. However, according to Bartolini (2012)'s findings, on average, half of purchasing spending is non-compliant and even the best in class organizations with established e-procurement systems can reach only about 69% contract compliance. Thus, there is a reason to believe that maverick buying remains a serious issue despite the new technologies (Rothkopf *et al.* 2016), and there is no "one-size-fits-all" solution to it. It is extremely important to thoroughly review the procurement processes of an organization and identify root causes of maverick buying, in order to devise a long-term mitigation strategy. As stated by Rothkopf *et al.* (2016) in their study, it is important to involve end users in supplier selection, to reduce maverick buying. It is also important to educate end users about the benefits of using preferred suppliers, and then hold them accountable if they continue to commit maverick spend. Ultimately, a detailed understanding of the procurement process within an organization and challenges faced by employees, is a key to identifying and mitigating maverick spend.

1.1 Motivation

Penn State faculty and staff are encouraged to engage diverse contractors and suppliers whenever possible. Penn State has established productive partnerships with minority-owned, woman-owned, veteran-owned, and HUBZone-certified businesses — the benefits of which include:

- **Competitive Pricing:** By expanding the base, competition is encouraged among contractors and suppliers — which may lead to lower prices.
- **Better Selection:** Increased choices from additional contractors and suppliers, which include a wide selection of minority, women, and smaller businesses, so the purchasing options are not limited to the goods and services offered by a few large companies.
- **Growth of community:** Having local suppliers and minority owned businesses provides opportunity for the society to grow equally and for fair economic distribution.

Penn State Purchasing Services also helps to foster a sense of community in the towns surrounding each of Penn State's 24 campuses. Penn State faculty and staff can choose to either engage with these designated contracted suppliers at the University or work with suppliers outside the contract to fulfill their requirements. In the words of Duane Elmore, Director of Procurement Services at Penn State, "If we partner with Amazon and Walmart, we can buy pretty much anything under the sun, however, we will not be able to boost the local economy, fulfil our social responsibilities and still may not identify the best value by doing so". Thus, Purchasing Services strongly recommends buying goods from contracted suppliers due to the reasons stated above and, therefore, wants to minimize maverick spending. Hence, the stimulus behind this project is to identify the sources of maverick spend and mitigate it, which could potentially result in significant cost savings for the University and provide more business for contracted suppliers.

1.2 Problem Definition

Penn State Purchasing Services has established contractual relationships with strategic suppliers to leverage its spend capability, protect Penn State from legal liabilities and achieve cost savings to optimize the utilization of its budget. The department is also tasked to oversee purchasing at Penn State through various methods of purchasing, and assists end users in purchasing goods and/or services in an improved fashion. However, since the University has adopted a hybrid purchasing strategy, there is an increased potential of maverick buying through certain methods of purchasing. Purchasing Services has long identified the importance of contract lifecycle management, supplier performance monitoring and identification and mitigation of maverick buying, to improve its efficiency and create opportunity for cost savings. However, due to lack of personnel and resources at Purchasing Services, the department did not fully perform some of the above activities.

The payment decision matrix established by Purchasing Services has established the use of specific purchasing methods depending on the object codes of goods and services to be purchased. However, certain methods of purchasing circumvent Purchasing Services, which has garnered attention from the department for further analysis. The main objective of this study was to perform spend analysis of the expenditure through Purchasing Card (p-card) on Amazon Business and Special Request for Checks (SRFC) at Penn State University for the calendar year 2017, in order to identify maverick spend, study the reasons behind maverick spending at Penn State, analyze existing procedures and practices and recommend mitigation strategies to Purchasing Services.

1.3 Reasons for Maverick Buying

A number of researchers have recognized that maverick buying may be encouraged by the hybrid organizational setup of purchasing departments, arguing that centralization of strategic tasks (i.e., negotiation of frame contracts) and decentralized decisions by the end users on the operational levels make firms vulnerable to organizational misbehavior (Karjalainen, 2011). In particular, unobservable actions of end users and the fact that most of the consolidation benefits are realized on the central level are seen as joint drivers of non-compliance (Rothkopf *et al.* 2016). However, to identify the underlying reasons for maverick buying behavior, it is important to understand the motivation of users to commit maverick spend.

In their study, Vardi and Wiener (1996) identified three categories of organizational misbehaviors, which are misbehavior intended to benefit oneself, misbehavior intended to inflict damage to the organization and misbehavior intended to benefit the organization. Karjalainen *et al.* (2009) extended this study to identify five motives for maverick buying. They are lack of knowledge about existing frame contract, lack of product availability with existing supplier, lack of incentive to purchase using existing framework and lack of understanding from a total cost of ownership perspective, lower net price of product / service elsewhere and personal benefits by working with suppliers elsewhere. Kulp *et al.* (2006) in their study of GlaxoSmithKline also identified five major reasons for internal non-compliance for indirect goods and services. They are intent to maintain relationships with established but unapproved suppliers, orders with unidentified suppliers, products not well suited for use, new-purchase situations and lack of information.

Maverick buying may also result from an intent to not relinquish the power to the purchasing function, frustration, facilitation of work, boredom/fun and injustice (Ambrose *et al.*, 2002). Establishing centralized contractual relationships with preferred suppliers also requires

significant change in organizations, which suggests that maverick buying can be a result of resistance to change. Although no studies were found regarding resistance to change or purchasing contracts, Harris (2002) has investigated sabotage in resistance to market-oriented culture change which could be adapted to give reasons for maverick buying as a form of resistance to change.

In his study of unethical behavior in procurement, Badenhorst (1994) identified five reasons for maverick buying. They include the environment of the organization, the role of top management, the existence of limited productive resources, the company culture with regards to its social relations and the intellectual support of the company system. Appelbaum and Shapiro (2006) categorized the types of workplace deviance into interpersonal and organizational, and discussed various underlying reasons for deviant behavior. They include unfair treatment, organizational culture, supervisory behavior, greed, theft approval, intent to quit, dissatisfaction with organization, organizational leadership deviance, organizational justice and citizenship behavior, frustration and negative affect. Gelderman *et al.* (2006) investigated compliance to EU tendering directives in public procurement. They found four reasons for non-compliance which include the purchaser's unfamiliarity with the rules, perceived inefficiency of following the rules, lack of organizational incentives and the expected resistance and readiness of suppliers to take action in case of non-compliance. Irrespective of the root causes for maverick spending behavior, it has a detrimental effect on the bottom-line of any organization.

As understood from the literature review, it is extremely important to identify the root-causes of maverick buying at any organization, to devise a long term mitigation strategy. It is evident that there is no one-size-fits-all strategy for mitigating maverick buying behavior, as it varies greatly from one organization to the other. The root-causes of maverick buying behavior at Penn State are discussed in a later chapter.

1.4 Brief description of Methodology

As described by Bartezzaghi (2007), while conducting research in the domain of purchasing and supply management, it is important to choose the most appropriate method for a research framework, rather than choosing a method that is superior than other. According to him, neither quantitative or qualitative methods are superior than the other by themselves, but the methodological choices must be coherent with the research design. The Table 1-1 below, presents the methodology adopted in this study.

Table 1-1: Research Methodology

Research Method	Research Objects	Methods for data collection and analysis
Systematic review of purchasing methods	Purchasing Services staff University purchasing policy	Informal meetings Internet / web browsing
Quantitative data analysis	Statistical sampling (p-card method) Data analysis (SRFC method)	Expenditure data analyzed for p-card and SRFC transactions for calendar year 2017 obtained from Purchasing Services
Survey	P-card holders and eBuy users involved in purchasing process (Identify root-causes of maverick buying)	Qualtrics survey containing 12 questions, sent via email
Meetings	Internal Audit (Understand existing audit process) Central Accounting (Understand approval path for SRFC method) Controller's Office (Understand approval path for p-card method)	Semi-structured meetings to understand existing processes
Systematic review of policies and procedures	P-card, SRFC policies eBuy System (Understand existing system for purchases) P-card training (Understand training for getting a P-card)	Internet browsing Informal meetings with professionals at Purchasing Services

As can be seen in the Table 1-1 above, initially all the methods of purchasing were studied in detail to identify the role of Purchasing Services in each method. This was done by reviewing online resources and purchasing policy of the University, informal meetings with professionals at Purchasing Services and meetings with people involved in the process of purchasing. After identifying methods which could potentially contain maverick spend, the expenditure data for those methods were obtained for calendar year 2017 to perform detailed spend analysis and identify proportion of maverick spend in each method. For p-card expenditures on Amazon Business, sampling was used because it was infeasible to perform a manual comparison for every line item. From the SRFC expenditure dataset, two subsets of spend were extracted for further analysis. A subset which contained potential maverick spend was further investigated by exploring IBIS, to identify the proportion of maverick spend. Top maverick spend object codes and top maverick spend administrative areas were identified.

Purchasing Services designed and sent out a survey to eBuy users and P-card holders across the University for the purposes of internal business improvement. A summary of survey results provided by the Purchasing Services was used in this study, to identify the root causes of maverick buying behavior at Penn State. The survey included twelve questions and was designed to obtain general information. Meetings were scheduled with professionals at internal audit, central accounting and controller's office to gain better understanding of current purchasing methods, approval paths and to obtain specific information about processes. Then, a systematic review of existing policies and procedures was performed to identify opportunities for improvement. Finally, mitigation strategies for short-term, medium-term and long-term phases were developed with the help of results from data analysis and root-cause analysis.

1.5 Results

The key results obtained by performing quantitative analysis of the expenditure datasets are listed below,

P-card Spend on Amazon Business in 2017:

- On average, about 69% of the transactions for top 10 categories on Amazon Business are maverick
- On average about 59% of the total spend for top 10 categories on Amazon Business is maverick
- On average, Penn State is paying a premium of 27% on the net price of items on catalog, as compared to Amazon Business for the top 10 product categories

SRFC Spend in 2017:

- From 2011 - 2017, spend through SRFCs has increased by more than 62% and SRFC transactions have increased by more than 32%.
- About 12% of the total addressable spend through SRFC in 2017, was maverick
- The phenomenon of maverick spend through SRFC was identified across the University
- About 3.4% of total addressable spend through SRFC was classified as miscellaneous
- Unauthorized spend in certain categories such as non-capital software and travel may expose Penn State to the risk of proprietary information loss and liabilities

The root-causes of maverick spend, as identified in the research are listed below:

- Lack of a clear policy which defines authorized use of SRFC as a method of payment
- Lack of departmental oversight on spend through SRFC
- Lack of corrective action in the case of confirming orders
- Lack of knowledge in using preferred suppliers / volume discounts

- Absence of a policy that mandates purchase of items through eBuy when possible
- Absence of mandatory eBuy and SRFC training for end users involved in purchasing
- Lack of incentives for end users in using preferred suppliers
- Number of University wide p-card holders
- Lack of supplier performance and price monitoring

1.6 Organization of Thesis

The organization of the thesis is as follows. Chapter 2 discusses the background which provides a basis for understanding the later chapters. The identification of maverick spend by statistical methods and data analysis is discussed in Chapter 3. Chapter 4 discusses in detail, the root cause analysis and identification of underlying reasons for maverick spend in the Penn State University-wide purchasing system. A brief review of current purchasing practices and policies is discussed in Chapter 5. Chapter 6 discusses mitigation strategies to reduce maverick spend at Penn State. Finally, Chapter 7 discusses conclusion and future work.

Table 1-2: Structure of Thesis

Chapter	Content
Chapter 1	Introduction
Chapter 2	Background
Chapter 3	Identifying Maverick Spend
Chapter 4	Reasons for Maverick Buying at Penn State
Chapter 5	Policies and Practices at Penn State
Chapter 6	Mitigation Strategies
Chapter 7	Conclusion and Future Work

Chapter 2

Background

According to Leenders *et al.* 2006, the phases in the purchasing process which are most suited for centralization are listed in the Table 2-1 below. According to them, purchasing needs can arise in any organizational unit, but only the purchasing needs which may be potentially common across the organization are selected for centralized approach. For the other subunit specific purchasing needs, the entire process is decentralized except negotiations and contracting, which is centralized purchasing department's expertise. The purchasing unit is responsible for

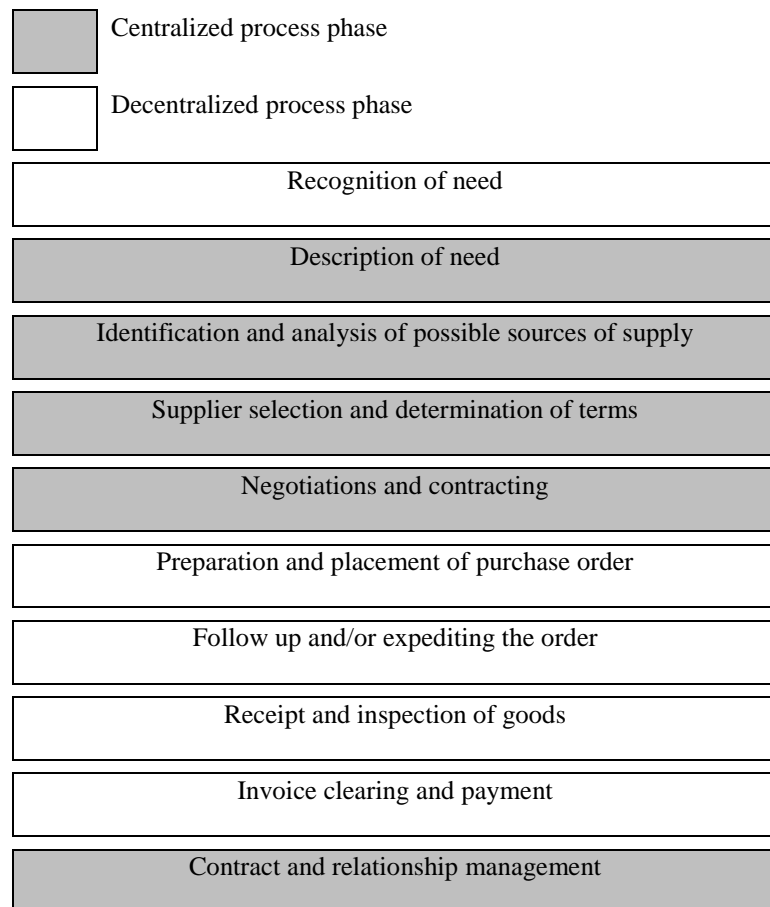


Figure 2- 1: Purchasing process phases suited for centralization (as is from Karjaleinen, 2009)

communicating needs and specifications to potential suppliers. The centralized purchasing unit is also responsible for contract lifecycle management, whereas other tasks such as ordering based on contracts, order follow-up and receiving may be decentralized to all organizational units.

Because of its scale and geographic distribution, Penn State has adopted a hybrid purchasing strategy, where the authorized end users across the University may be able to purchase goods and/or services on behalf of the University. The end users may utilize various methods of purchasing to support its mission of education, research and service, depending on the type of purchase, dollar amount and authorized limits. The Department of Purchasing Services at Penn State, University Park, is tasked to oversee the purchasing of goods and services across all of its campuses. However, the department has limited purchasing authority over several administrative units which include the Office of Physical Plant, Housing and Food Services, University Libraries, the Applied Research Laboratory (ARL), Multimedia and Print Center, Penn State Milton S. Hershey Medical Center (College of Medicine) and Administrative expense (Salary and Research Grants). Since Purchasing Services has a limited authority over these departments, we consider the spend through these departments as unaddressable and beyond the scope of this study. The focus of this study is limited to spend by other administrative units through the methods discussed in this chapter, and we refer to it as “addressable spend”.

Since the identification of need may be decentralized, any authorized end user can make a purchase on behalf of the University. However, depending on the dollar value of the purchase, an end user should choose an appropriate method of purchasing. This chapter discusses at a high level, the methods of purchasing available to end users at Penn State and the role of Purchasing Services in each method. It also discusses the preferred use of all the methods of purchasing, and possibility of off-contract/maverick spending through each method.

2.1 Methods of Purchasing

In order to facilitate effective spend analysis, the University has defined its own object classification codes in the areas of income and credits, salaries, wages and expenses and transfers. These classification codes are called object codes, and they must be specified while purchasing any goods and/or services on behalf of the University through any of the available methods. Purchasing Services has developed a payment decision matrix, which may be used as a guideline to select appropriate method of purchasing depending on the object codes of goods and/or services to be purchased. The payment decision matrix is attached to the appendix and may be referred for detailed understanding. Faculty and staff are encouraged to use the following methods of purchasing at Penn State,

- eBuy Program
 - Catalog Purchase
 - Purchase Orders / Non-Catalog Purchase
 - Standing Orders / Blanket POs
- Purchasing Card (p-card)
- Special Request For Checks (SRFC)

Our aim is to gain an in-depth understanding of all the purchasing methods to identify the possibility of maverick spend in each method. All methods are explained at a high level with the help of flowcharts, which describe the approval path for a typical order placed through any given method, and the involvement of Purchasing Services in processing or reviewing that order. The blue boxes in the flowchart depict the involvement of Purchasing Services in the process. The oval boxes denote the start or end of a process, whereas rectangular boxes show in-progress steps. The arrowheads depict the direction of flow in the process.

2.1.1 Catalog Purchase Flowchart:

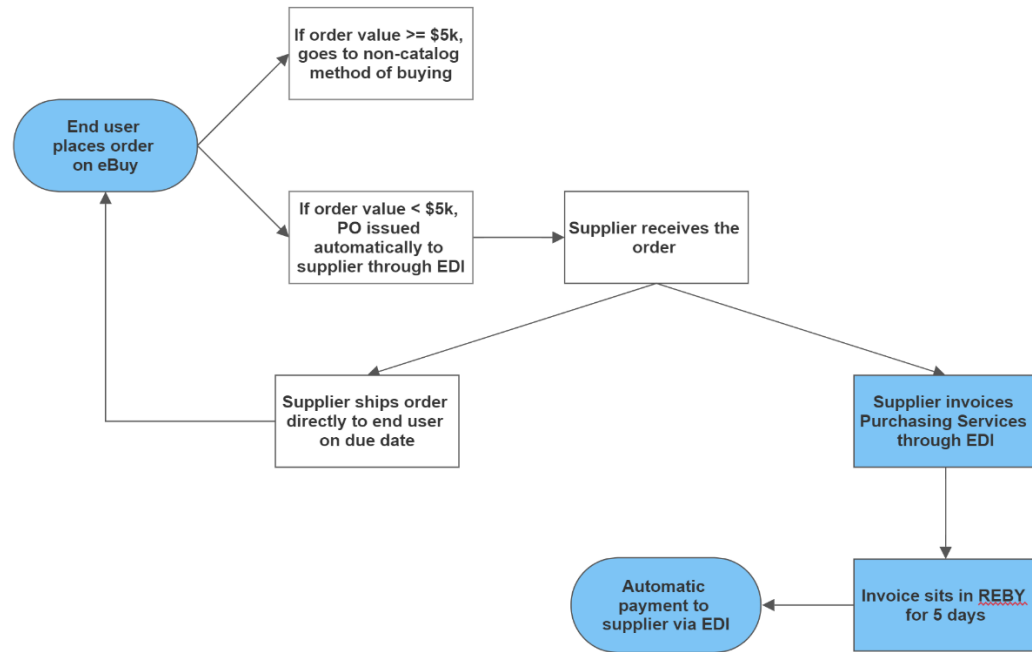


Figure 2- 2: Approval path for catalog purchase

A punchout catalog or electronic purchasing catalog is a method for an end user to buy from a supplier's website from within the organization's own procurement application or hosted e-procurement system. Using an online purchasing catalog, an end user can view a standardized list of products that have been reviewed and approved in advance by the purchasing staff and place pre-approved orders through the system. The advantages of such a method of buying include reduced paperwork, increased efficiency, streamlined process and improved spend leverage due to volume discounts. However, the drawbacks are limited options for end users and potential complexity of using an online catalog. It is generally preferred for small dollar – high volume purchases such as office supplies, computers, electronic devices, etc., in order to eliminate inefficiency and to automate the Procure-to-Pay (P2P) cycle.

Purchasing Services has developed a system called eBuy catalog for catalog purchases. The department has established long-term relationships with 30 suppliers, who sell their

goods/services through eBuy. The catalog contains most of the purchasing categories such as office and janitorial, scientific / laboratory, athletic training and medical, computer / technology, MRO / facilities, furniture and electronics. All users are encouraged to use this method of purchasing for small-dollar value components, to leverage Penn State's spend capability. Any Penn State employee can access the eBuy system by using their Penn State Access User ID and password. However, a Penn State employee needs to obtain budget pre-authorization from the Financial Officer (FO) of their administrative area before submitting preauthorized orders through eBuy. FOs generally review the request, and can assign one or more budgets and provide a spending limit of up to \$4,999 per order to any user. If a user does not have pre-authorization, the order follows a pre-defined approval path.

Once authorized by an FO, a user may register for eBuy training to get an overview of the catalog purchasing process through eBuy. Catalog orders in eBuy allow the user to shop from Penn State priced items listed in Penn State's contract. However, if the item is not available in any of the catalogs, a user is encouraged to use other methods of purchasing. A user has to select the budget for purchase before placing an order through the catalog. If the total value of the order is less than \$5,000, a purchase order (PO) is issued automatically and sent to the supplier through Electronic Data Interchange (EDI). After receiving the PO, the supplier ships the item directly to the requester on the due date and simultaneously sends an invoice to the Purchasing Services through EDI. The invoice sits in REBY for 5 days, during which the department and/or end user have the option to change the budget for that purchase. However, no action is required by the end user and the invoice is processed automatically after 5 days.

Purchasing Services has complete control over this method of purchasing as it is responsible for supplier selection, price negotiation and supplier performance monitoring. Moreover, as the P2P cycle is automated, there is very little cost associated with processing a catalog transaction. Thus, it is the most preferred method of purchasing for small dollar items.

2.1.2 Non-Catalog Purchase Flowchart:

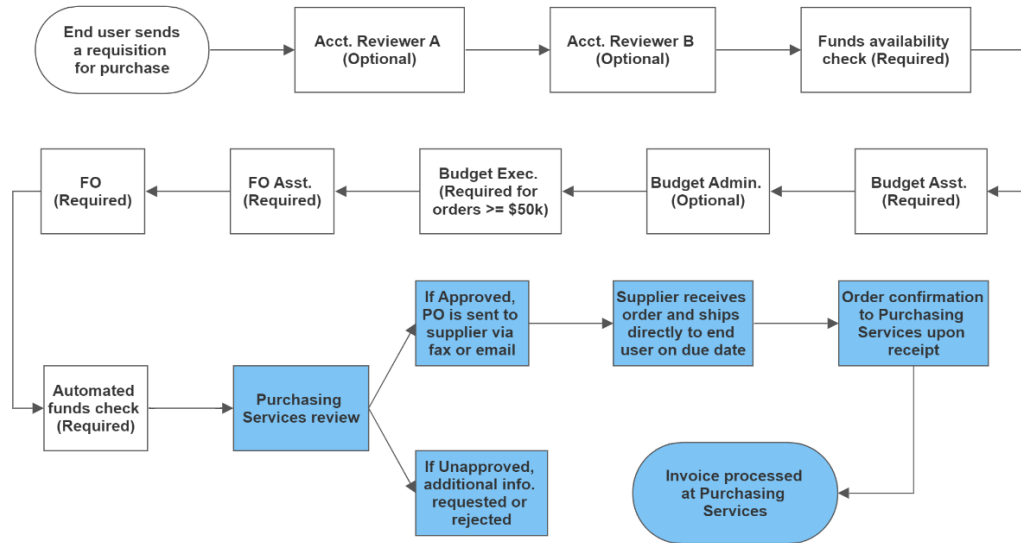


Figure 2- 3: Approval path for non-catalog purchase.

A **Non-Catalog Purchase Order** is the process of placing an order with a supplier when the goods and/or services are not available in an online catalog. The advantage of using this method is that a buyer can achieve best price through competitive bidding, and may not be required to sign a contract with the supplier for long term relationship. However, due to the high transaction processing cost associated with this method, it is preferred for buying goods and/or services which are non-recurring and/or for high dollar – small volume items.

When the value of a single good/service is greater than or equal to \$5000, the non-catalog/purchase order is the preferred method of purchasing at Penn State. In this method, after an end user identifies a buying need, the requirement is entered into eBuy. Any quotes/pricing or single/sole source justifications should also be submitted with the requisition. Policy FN18 defines minimum number of audits in an approval path for a transaction at the University, depending on its dollar amount. A department may choose to establish a larger number of audits and accordingly, the purchase requisition travels electronically through the approval path. As can

be seen in the flowchart, this may include Account Reviewer, Funds Availability Check (Automated), Budget Assistant, Budget Administrator, Budget Executive, Financial Officer, Accounting and any other approval which the department may decide to have. A funds availability check is performed at the department, before it is sent to Purchasing Services for a review.

Purchasing Services processes the requisition in accordance with the University guidelines and bidding thresholds. As stated in the policy BS09, bids are not required for orders with a total cost of less than \$10,000. However, bids may be solicited by a Purchasing Agent, taking into consideration lead time, availability of substitutes, and knowledge of the general marketplace. For purchases between \$10,000 and \$25,000, evidence of competition is required, and the Purchasing Agent may solicit written bids from at least three responsive and responsible suppliers. Purchases over \$25,000 require, whenever possible, written bids or proposals from at least three responsive and responsible suppliers solicited by Purchasing Services. The Purchasing Agent must justify the source and the price, and is responsible for determining the validity of any sole source justifications. After the review process, if the product qualifies for a purchase, Purchasing Services sends a purchase order (PO) to the supplier through email or fax. Purchasing Services holds the right to request additional information or reject the requisition if they find the purchase to be inappropriate. Once the PO is sent, the supplier confirms the order and ships the good/service directly to the requester on the due date. After receiving the goods, the requester/department sends an order confirmation to the Purchasing Services, and a three-way match is performed, before accounting processes the payment.

As can be seen above, this method of purchasing involves significant time and effort and is therefore preferred for expensive items/one time purchases. Purchasing Services is involved in the approval and invoice processing stages, and therefore has complete control over non-catalog purchases. A special form of non-catalog purchase is called standing orders / blanket orders and will be discussed next.

2.1.3 Standing Order / Blanket Order Flowchart:

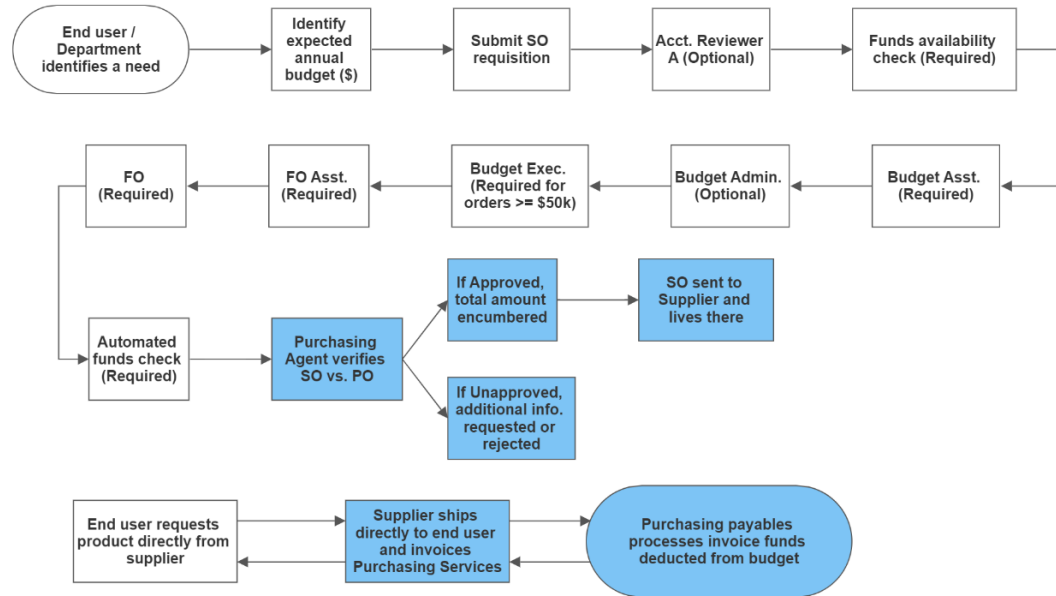


Figure 2- 4: Approval path for a standing order purchase.

A **Standing Order / Blanket Order** is a purchase order that a customer places with its supplier to allow multiple delivery dates over a period of time, without the need to go through all the steps of purchasing with each order. It is used when there is recurring need for a good and to take advantage of pre-negotiated pricing. Based on a blanket order, sales order and invoice items can be created as needed until the contract is fulfilled, the end of order period is reached or a pre-determined maximum order value is reached. The advantage of such a method is that it allows a customer not to hold more stock than necessary, and avoids transaction processing cost for frequent purchase orders, while favoring discount pricing through a volume commitment. On the supplier side, a blanket order may provide the benefit of guaranteeing ongoing business and also helps the supplier better predict future cash flows and orders. On the downside, forecast inaccuracy and large number of invoices are common problems associated with this method.

At Penn State, the process begins with identification of need by an end user / department. The department/end user then predicts an expected annual spend for that specific good and/or

service, and submits a Standing Order requisition along with a budget for it. As can be seen in the flowchart above, the requisition flows electronically through the various stages of the approval path in the same sequence as the non-catalog / purchase order method. After the requisition is approved and a budget check is performed, it is forwarded to Purchasing Services. A Purchasing Agent verifies the appropriateness of the standing order based on his/her general knowledge of marketplace and availability of alternatives. It is generally approved by Purchasing Services and the forecasted amount of spend is encumbered for that standing order. A standing order (SO) is issued to the supplier, which contains the details of the agreement. The difference between a standing order and a non-catalog purchase order is that the former does not require an approval for every order, once it is established and the budget is encumbered for its use.

After a standing order is sent to a supplier, an end user may request the good and/or service directly from the supplier by indicating the specific standing order number. The supplier ships the items directly to the end user and sends an invoice directly to Purchasing Services, however a three-way match is not performed in this method. Purchasing Payables processes the invoice and funds are deducted from the budget. The disadvantage of this method is that the expenditure data of this method does not contain line-item level of detail, which makes it challenging for Purchasing Services to have complete spend visibility. Moreover, since a three-way match is not performed in this method, there is potential possibility of payment inaccuracy or overpricing on invoices in this method.

As can be seen above, Purchasing Services is involved in the stages of a standing order approval and invoice processing, which decreases possibility of maverick spend. However, since the department does not have clear visibility into its spend through this method, there is an effort to replace standing orders by catalog purchases where possible. The department continues to face resistance to change from certain end users and departments and thus it is a preferred method for purchase of certain goods/services.

2.1.4 P- Card Purchase Flowchart:

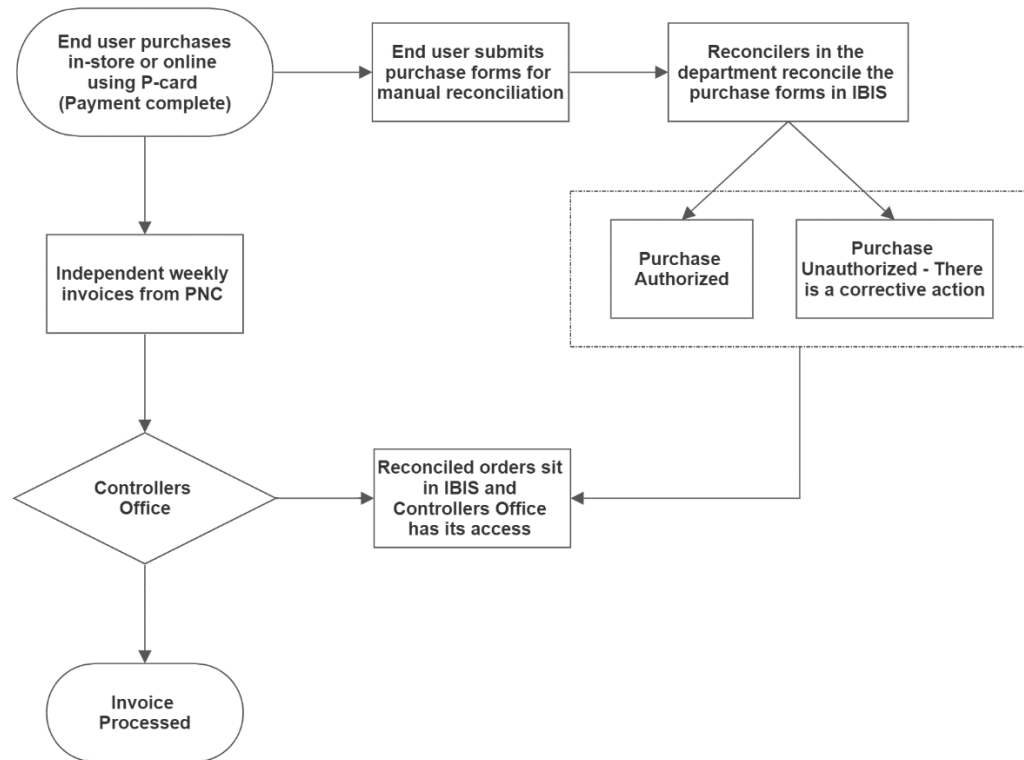


Figure 2- 5: Approval path for a p-card transaction.

Purchasing cards, also called p-cards, are a type of commercial card that allows organizations to take advantage of existing credit card infrastructure to make electronic payments for a variety of business expenses. P-cards are generally issued by organizations in the Corporate, Education and Government sectors. The benefits of using p-cards include faster payment processing, reduced paperwork, improved cashflow and convenience. However, since the p-card holder has the authority of purchasing directly, this method has high potential of promoting maverick spend.

Penn State has partnered with PNC Bank to issue p-cards. Employees who wish to apply for a p-card must first successfully complete the p-card on-line tutorial and Cardholder Certification Quiz and electronically agree to the Purchasing Card Cardholder Agreement during the certification process. Approval for obtaining a University p-card is then processed on an IBIS

form “Add Purchasing Card Authorization”. The Budget Administrator or Budget Executive and Financial Officer for the unit must approve the form, including the appropriate purchase transaction types and spending limits, before a p-card is issued. Approvers have the authority to set lower limits than the University maximums for any card. Each user has an assigned transaction limit, daily limit and monthly limit on their p-card.

In this method of buying, the end user uses a p-card to purchase goods/services and payment is completed up front. The end user is then required to complete and submit a support form associated with that purchase for reconciliation to the Budget Office of their department. The support form requires an end user to provide a detailed description of the need to purchase the item(s) using their p-card, and specify a budget for that purchase. The end user also has to provide the original receipt with the support form, and a signature to affirm that the purchase was made by them. During the process of reconciliation, the reconciler verifies the use of a p-card according to the policy, and whether it was an approved purchase. They also compare the receipt with the invoice from PNC bank to detect any anomalies. Once approved, the reconciler enters the details of the purchase in IBIS, for future reference and audit purposes. However, if the purchase is not approved during the reconciliation process, the Budget Office holds the right to charge the buyer by the amount of the good/service. Independently, the Controller’s Office receives an invoice from PNC Bank on a weekly basis, where the invoice is processed.

The benefits of using a p-card at Penn State include faster payment processing, elimination of a suppliers request for invoice, elimination of follow up calls, reduced paperwork and elimination of reimbursements for travel purposes. This method of purchase is preferred to purchase items/services which are not on catalog, and for small dollar value purchases under \$2,000. It is also meant to be used for the purpose of travel. As can be seen from the flowchart above, Purchasing Services has no control over this method of buying, which may result in an increased potential for maverick spending.

2.1.5 Special Request for Checks (SRFC) Purchase flowchart:

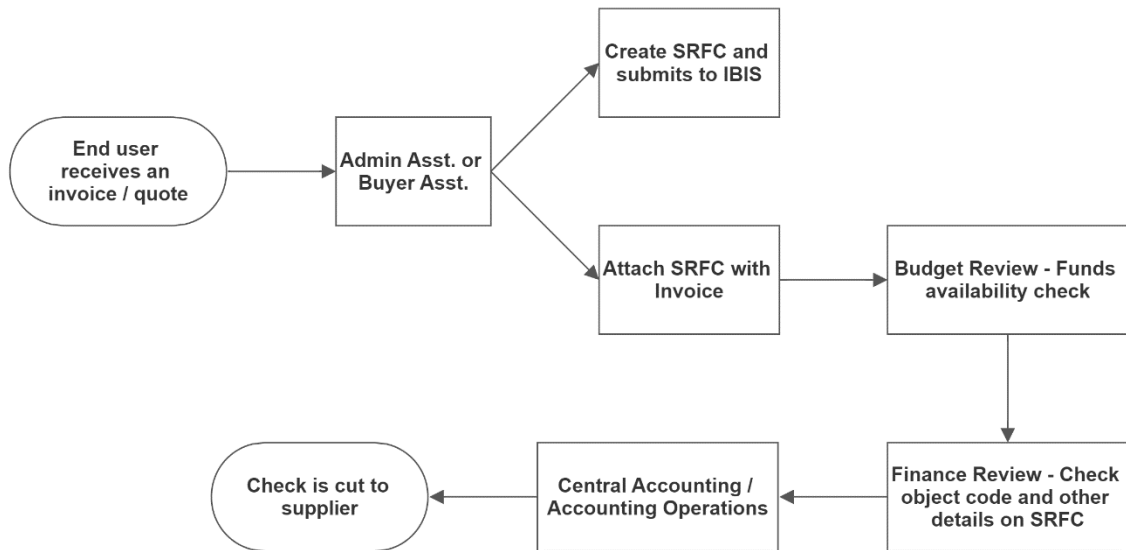


Figure 2- 6: Approval path for an SRFC transaction.

A Special Request for Check is one of the methods to make a payment at Penn State. It is preferred for payment in certain categories / object codes which are listed in the payment decision matrix and for invoices with values typically between \$2,000-\$10,000. According to University policy, a payment through SRFC always requires an explanation, and attachments when possible. Thus it is preferred only when no other method of payment can be used. Examples of such situations include paying utilities bill, paying a student researcher, membership dues, etc. The benefits of such a method include quicker processing time, and flexibility in use. However, the drawback is that a three-way match is not performed while processing an invoice through this method, which makes it the least visible method in terms of compliance monitoring and spend visibility. Moreover, this method has a high potential to promote confirming orders or after the fact orders, which are defined as unauthorized purchases made by end users without prior approval of Purchasing Services. This method has a high potential to promote such confirming order and thus maverick spending.

Any user with access to IBIS can request a payment through SRFC. If new employees / users want access to IBIS, they need to contact the Access and Security Representative (ASR) in their department/unit, who determines whether they should be granted an access. Upon that determination, the ASR needs to complete and submit an AIS System Access Request Form to the accounting department. If approved by accounting, the form is passed to the Information Technology team, and they provide access to the users. IBIS data and/or reports can be accessed via the data warehouse, the mainframe (CCOM), and Electronic Document Distribution System (eDDS), and may require individual access accounts and procedures.

As can be seen in the flowchart above, this process usually begins when an end user receives an invoice or quote. Most times, the end user receives an invoice as the goods and/or services have already been purchased up front. The end user then submits the invoice to an Administrative Assistant / Buyer Assistant within their department who creates an SRFC in IBIS. During this stage, the routing budget for that SRFC is also selected. After the creation of the SRFC, it is submitted within IBIS which creates a document number for that specific SRFC. A copy of the SRFC is then attached to the original invoice and sent to a routing budget for review. Each routing budget has a defined approval path for its use, so depending on the routing budget selected, the SRFC follows a specific approval path. However, as a minimum requirement, two sets of reviews are performed for any SRFC transaction, which are a budget check and a financial check. A funds availability check is performed during the budget check, to confirm availability of funds before it is passed further. During the financial check, details of the SRFC are checked which include correct object code, explanation/reasoning, policy check, etc. Once it is approved by the department, it is sent to Central Accounting or Accounting Operations where the payment is processed for the supplier.

As can be seen above, payment is processed to the supplier, based on a request by the end user, without confirming the actual receipt of goods and/or services which poses a significant

threat to the University. Moreover, an end user usually purchases the good and/or service upfront, which may be an unauthorized purchase through SRFC according to the payment decision matrix. Thus, this method has a potential to promote maverick buying. If an end user faces resistance from Purchasing Services for the purchase of goods and/or services because of non-compliance or improper procedures, he/she may choose to pursue SRFC as a method of payment and circumvent Purchasing Services. Such actions may prove to be extremely detrimental to the University as it may violate policies, expose Penn State to the risk of liabilities and prevent Penn State from achieving spend leverage with approved vendors.

2.2 Purchasing Methods of Further Interest

After briefly reviewing various methods of purchasing at Penn State, it is evident that spend through p-cards and SRFCs have limited visibility due to decentralization and no involvement from Purchasing Services. Thus, the focus of this study is to analyze the expenditure data for these methods and identify the proportion of maverick spend in each method. Our study is based on the assumption that any spend through Purchasing Services may not be considered as maverick.

Chapter 3

Identifying Maverick Spend

The first step in the process of devising an effective mitigation strategy is identification of maverick spend. A structured approach was used in this analysis wherein all the purchasing methods were initially studied in detail. The methods which had little or no involvement from Purchasing Services were studied in further detail. As discussed in Chapter 2, p-cards and SRFCs do not have direct oversight from Purchasing Services. The use of p-cards at Penn State was initiated to improve efficiency, provide flexibility to end users and for emergency and travel purposes. However, recent p-card spend on Amazon Business indicates that this method of purchasing has potential maverick spend. Similarly, the payment decision matrix establishes authorized use of the SRFC for the purchase of goods and/or services. However, the spend through SRFC in recent years has been increasing disproportionately, which indicates a potential violation of payment decision matrix.

To maintain consistency in analysis, the expenditure data for Amazon Business and SRFC transactions was obtained for calendar year 2017. The p-card expenditure on Amazon Business was selected for initial analysis, instead of the entire p-card expenditure. The following section discusses the total spend at Penn State in 2017, distribution of spend across various methods of purchasing and the subset of spend which was analyzed in detail. The later sections in this chapter discuss the process of spend analysis and its importance, detailed spend analysis of p-card and SRFC spend dataset, and the results obtained.

3.1 Total Spend in 2017

As discussed in Chapter 2, any authorized end user can make a purchase on behalf of the University. It is important to identify the total number of end users involved in purchasing, to gain a better understanding of the underlying reasons for maverick spending behavior. In 2017, there were 3,216 end users who purchased at least once through eBuy and there were 4,987 active p-card users for goods and services. It was not possible to determine the number of end users that requested payment through SRFC. However, it is evident that a large number of authorized end users may increase potential of maverick buying. There are 81 administrative areas at Penn State that are authorized to approve purchase requisitions for non-catalog, standing order and SRFCs.

In order to facilitate spend analysis, there are several standard classification schemas such as standard identification codes (SIC), North American Industry Classification System (NAICS) codes, Universal Standard Products and Services Classification (UNSPSC) codes, etc. However, the University has defined its own object codes as discussed in Chapter 2. Since Purchasing Services is involved in the purchase of goods and services only, the scope of this study is limited to object codes defined for expenses and transfers. There are approximately 188 object codes used to classify expenses and transfers at the University, which include stationery and office supplies, laboratory supplies, food supplies, group meals, travel, meeting expense, etc.

The breakdown of annual spend by various methods discussed in Chapter 2, is shown in Figure 3-1 below. As can be seen from this figure, SRFC contributes to largest proportion of the total spend, at 48%. Together, SRFC and p-card spend make up over 50% of the total spend, which does not have direct oversight from Purchasing Services. Moreover, it can also be seen from Figure 3-2 that SRFC and p-card make up about 67% of the total orders. Interestingly, the spend through the eBuy catalog is only 3% of the total spend on goods and services. This may be a result of a small authorized supplier base as well as low user adoption. This shows the

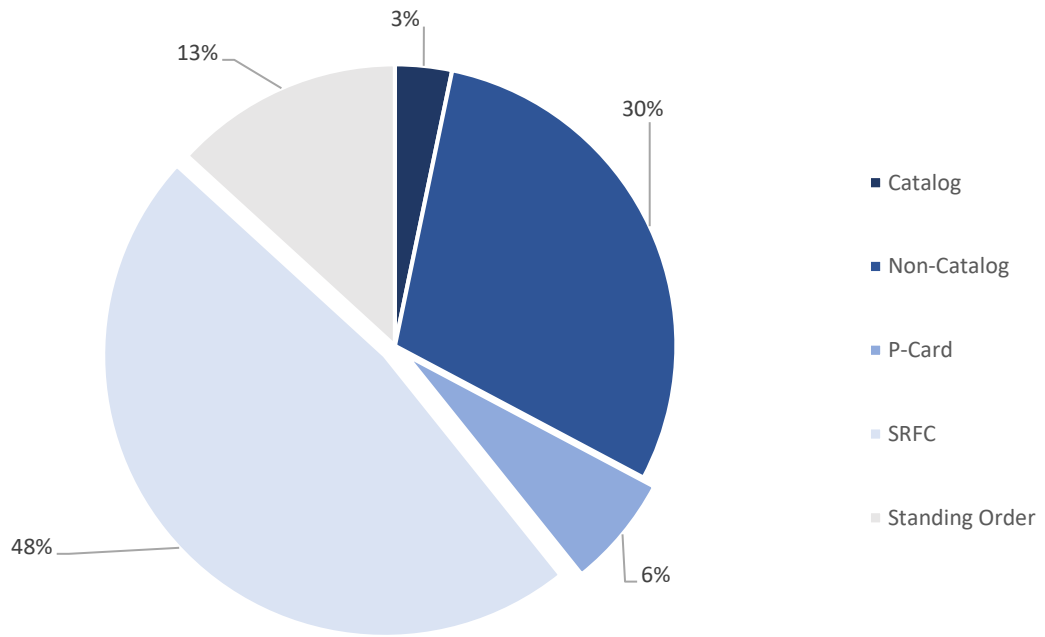


Figure 3- 1: Spend (\$) distribution by purchasing methods at Penn State.

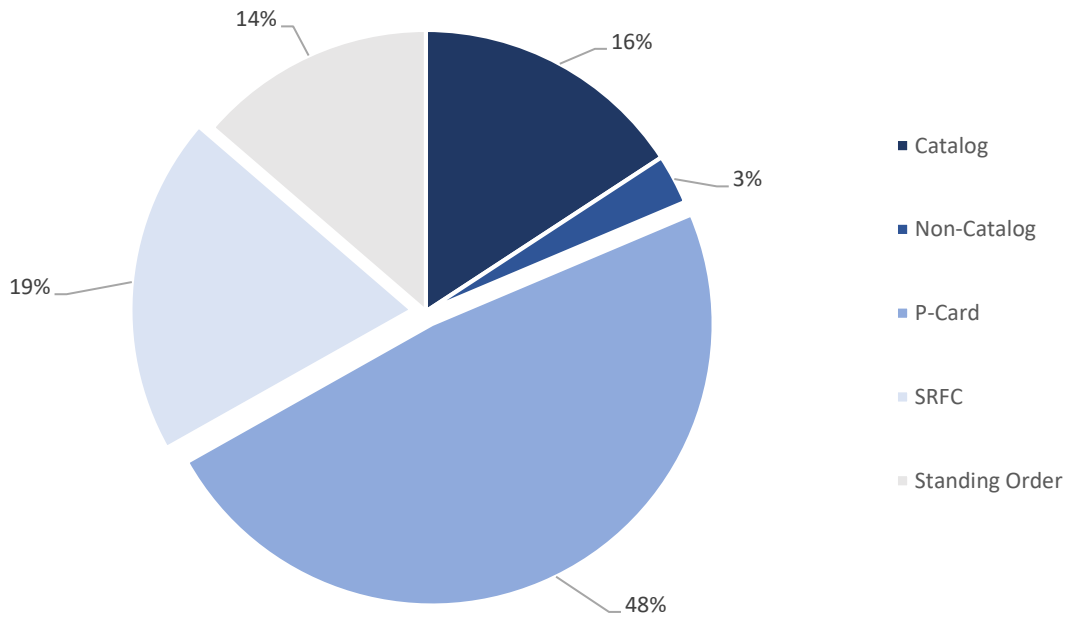


Figure 3- 2: Number of orders distribution by purchasing methods at Penn State.

importance of spend analysis to identify potential suppliers for long-term partnership, as well as end user training. It is also interesting to observe that non-catalog orders comprise of only 3% of the total number of orders but contribute to 30% of the total spend. This is due to high spend per orders for non-catalog orders. Similarly, SRFCs and standing orders have a high spend per order. This explains the reason for a robust approval path for these methods. The focus of this study will be limited to SRFC and p-card spend, which is shown as separated slices in the figures above.

3.2 Spend Analysis

Spend Analysis is the process of collecting, cleansing, classifying and analyzing expenditure data with the purpose of decreasing procurement costs, improving efficiency, and monitoring controls and compliance. There are three core areas of spend analysis - visibility, analysis and process. By leveraging all three, organizations can generate answers to three crucial questions. They are: 1) what are we spending on (commodity); 2) who are we spending for (cost center); and 3) where are we spending it (suppliers). These questions help an organization find gaps in its spend data and leverage its spend capability. A thorough spend analysis is the first step in identifying maverick spend by analyzing product categories and departments where non-conformity occurs.

The process of spend analysis begins by collecting expenditure data from all sources including accounts payable (AP), general ledger (GL), p-card, e-procurement system, etc. The next step is to cleanse and classify the data correctly. This includes finding and correcting errors in transactions and descriptions, as well as grouping spend with same suppliers. This step also includes correctly classifying spend by object codes / commodity codes. Finally, by analyzing the total spend of various categories and suppliers an organization can create opportunities for savings through spend leverage. Currently, Penn State does not have all a central database for all

expenditure data. Also, the expenditure data contains errors and misclassifications, and is inconsistent among different methods of purchasing. This chapter discusses, at a high level, spend analysis for two methods of purchasing, and the results obtained.

3.3 P-card Spend Analysis

Of the total p-card spend on goods and services at the University in 2017, p-card spend on Amazon Business accounted for about 5% and contributed to about 10% of the total number of orders through p-card. Performing a thorough spend analysis of the entire p-card expenditure data was infeasible because of its size. The p-card spend data on Amazon Business was selected for analysis of maverick spend for three primary reasons. First, the spend data on Amazon Business was well recorded which facilitated detailed spend analysis. Second, it was relatively easier to compare the availability of products on eBay (online catalog) versus an e-retailer website as opposed to comparing it with in-store purchases. Third, Amazon Business is not a preferred supplier of Penn State University and is primarily to be used only for purchase of books and commodities which are unavailable through the online purchasing catalog. So any purchase through Amazon Business which is not according to the policy may be identified as maverick.

Due to the ease of purchasing through Amazon Business, however, recent purchasing pattern indicates an increase in its use for products available within eBay catalog. Since p-card transaction processing is not automated, there is a cost associated with every transaction, which ultimately affects the bottom-line of University (Moreover, Amazon Business no longer provides free shipment to the University for orders smaller than \$25). It also results in loss of business to the University's contracted suppliers which affects Penn State – supplier relationships adversely. Thus, the goal of this analysis is to identify the proportion of maverick spend in Amazon Business. In addition, the item price were also compared for both the methods.

3.3.1 Dimensions of Dataset

Penn State has partnered with Amazon Business for the purchase of items which are not available through the online catalog. Any p-card holder at Penn State can activate their Amazon Business account using their Penn State email ID and anyone purchasing from Amazon Business on behalf of Penn State must do so via an Amazon Business account. However, the guidelines for Amazon Business establishes that an end user may purchase items from the eBay catalog if they are available, and choose to pursue Amazon Business, if it is unavailable through the eBay catalog. Figure 3-3 below, shows a snapshot of p-card spend on Amazon Business. The dimensions of the original dataset were 22,805 x 60. Here 22,805 represents the line items of the spend data and not the orders, as a single order could contain multiple items. This dataset with line items was used instead of a dataset with orders as it facilitated better analysis, which will be discussed in the following section. The dataset had 60 attributes which included order date, order ID, order quantity, shipping address, shipping carrier, Amazon Standard Identification Number (ASIN), order description, the United Nations Standard Products and Services Code (UNSPSC), product category and seller name. There were 61 product categories in the expenditure dataset. Dimensionality reduction was performed in Microsoft Excel to reduce the number of attributes.

ID	Order Date	Order ID	Account Groc	PO Number	Order Quanti	Order Subtot	Order Shippir	Order Promo	Order Tax	Order Net To	Order Stat
1	1/17/2018	80376-0932222 Q - R			1	\$329.95	\$54.70	(\$54.70)	\$0.00	\$329.95	Pending Fi
2	1/17/2018	48118-0995442 O - P			2	\$25.68	\$11.10	(\$11.10)	\$0.00	\$25.68	Pending Fi
3	1/17/2018	44904-9425011 O - P			2	\$31.94	\$9.66	(\$9.66)	\$0.00	\$31.94	Payment C
4	1/17/2018	44904-9425011 O - P			2	\$31.94	\$9.66	(\$9.66)	\$0.00	\$31.94	Payment C
5	1/17/2018	90621-3720256 S - T			3	\$112.97	\$0.00	\$0.00	\$0.00	\$112.97	Payment C
6	1/17/2018	90621-3720256 S - T			3	\$112.97	\$0.00	\$0.00	\$0.00	\$112.97	Payment C
7	1/17/2018	90621-3720256 S - T			3	\$112.97	\$0.00	\$0.00	\$0.00	\$112.97	Payment C
8	1/17/2018	45635-3498627 S - T			4	\$99.67	\$16.39	(\$16.39)	\$0.00	\$99.67	Pending Fi
9	1/17/2018	45635-3498627 S - T			4	\$99.67	\$16.39	(\$16.39)	\$0.00	\$99.67	Pending Fi
10	1/17/2018	68406-4720251 S - T			1	\$179.00	\$9.58	(\$9.58)	\$0.00	\$179.00	Pending Fi
11	1/17/2018	17474-3964240 I - J			1	\$24.99	\$6.03	\$0.00	\$0.00	\$31.02	Pending Fi
12	1/17/2018	18256-7798646 K - L			1	\$14.95	\$6.99	\$0.00	\$1.32	\$23.26	Pending Fi
13	1/17/2018	34476-3238656 K - L			1	\$93.85	\$11.88	(\$11.88)	\$0.00	\$93.85	Pending Fi
14	1/17/2018	15397-0740243 O - P			5	\$52.95	\$14.70	(\$14.70)	\$0.00	\$52.95	Payment C
15	1/17/2018	15397-0740243 O - P			5	\$52.95	\$14.70	(\$14.70)	\$0.00	\$52.95	Payment C
16	1/16/2018	59394-2013856 I - J			2	\$29.66	\$0.00	\$0.00	\$0.71	\$30.37	Pending
17	1/16/2018	59394-2013856 I - J			2	\$29.66	\$0.00	\$0.00	\$0.71	\$30.37	Pending
18	1/16/2018	14009-3537005 I - J			1	\$19.99	\$0.00	\$0.00	\$1.20	\$21.19	Pending
19	1/16/2018	48004-4967422 I - J			2	\$30.00	\$4.95	\$0.00	\$0.00	\$34.95	Pending Fi
20	1/16/2018	48004-4967422 I - J			2	\$30.00	\$4.95	\$0.00	\$0.00	\$34.95	Pending Fi

Figure 3- 3: Snapshot of P-card spend on Amazon Business in 2017.

3.3.2 Methodology

As discussed in the previous section, the dataset contained attributes such as ASIN and UNSPSC code, however Purchasing Services has not defined a unique ID for products or services which are available through its online catalog, which could facilitate identification of maverick transactions for the entire dataset. Moreover, the UNSPSC code is a taxonomy of products and services for use in eCommerce, which can provide detail up to the commodity level. The code cannot be used to identify a product / service at the item level. Thus, in order to identify whether the items bought through Amazon Business were maverick or not, every item in the transaction had to be checked manually. This was the reason for selecting Amazon Business expenditures containing line items.

Since the dataset was too large to manually make a detailed comparison for each purchase with the products available through the online catalog, the top spend categories were identified for further analysis. This was done by applying the Pareto Principle to the dataset, in

Table 3-1: Top spend categories by P-card spend on Amazon Business

Product Category	Proportion of Spend	Proportion of Orders
Personal Computer	0.19	0.10
Book	0.14	0.18
Office Product	0.12	0.15
CE	0.06	0.05
Business, Industrial, & Scientific Supplies	0.06	0.07
Home Improvement	0.06	0.08
PC Accessory	0.05	0.05
Toy	0.04	0.05
Speakers	0.04	0.04
Photography	0.04	0.02
Electronic Gift Card	0.03	0.01
Sports	0.03	0.04
Home	0.03	0.05
Health and Beauty	0.03	0.04
Wireless	0.03	0.02
Kitchen	0.03	0.04
Total	1.00	1.00

which about 20% of the categories contributed to 80% of the total spend. Table 3-1 shows the top 16 categories which contributed to about 85% of the total spend on Amazon Business.

As can be seen in the Table 3-1, books are the second largest product category in terms of spend, however, p-cards may be used for purchasing books as Penn State does not have a contracted supplier for books. It is assumed that books do not include notepads and writing books which are available through eBuy office supplies. Thus, books were eliminated from further analysis. Similarly, Penn State does not have any contracted suppliers for health and beauty products, electronic gift cards, toys and sports, so these categories were eliminated from further analysis. This process resulted in the top ten spend categories for further analysis. These include personal computers, business industrial scientific, office products, consumer electronics, PC accessories, speakers, home improvement, photography, home and kitchen.

Each category in Table 3-1 contained a large number of orders, and thus line items, so it was infeasible to perform manual comparisons for all the line items. Simple random sampling was used to select a sample of transactions from the entire population for all product categories. Each individual transaction in the sample was chosen randomly from the population (product category), such that each individual transaction had the same probability of being chosen at any stage during the sampling process. In the study, 60 transactions were randomly selected from each of the ten categories for further analysis. A sample size of 60 was chosen to satisfy the Normality condition and subsequently all of the 600 randomly selected transactions were manually compared with products available through the eBuy catalog to identify the number of maverick transactions (MT) and the total amount of maverick spend in each of the ten categories in the sample data.

3.3.3 Assumptions

Several assumptions made during the analysis of Amazon Business include the following,

- All identified maverick items were not the exact SKU as compared with the items available through eBay catalog (similar items from different companies were considered maverick)
- The expenditure dataset was from 2017, but the items were compared in 2018 with the assumption that the catalog items were same in 2017
- The categories excluded from further study such as books, beauty products, toys and sports do not contribute to maverick spend
- A sample size of 60 is sufficient to satisfy the condition of Normality and it is independent of the size of population
- The sample is assumed to be Normally distributed and the mean values of both, the sample and the population are the same
- No additional shipping charges were involved with either Amazon Business or catalog suppliers i.e. assumed that final shipment total included the shipping charges
- The proportion of maverick spend in sample was extrapolated to get maverick spend in population, assuming it to be Normally distributed

3.3.4 Analysis and Results

The Table 3-2 below shows the total number of maverick transactions for each category when compared with items available on the eBay catalog. As can be seen from the Table 3-2, most of the categories have a significant proportion of maverick transactions. On an average, the total proportion of maverick transactions for the top ten categories is about 69%. However this does not imply whether the spend committed for items on Amazon Business is more or less than

Table 3-2: Proportion of maverick transactions by category

Product Category	Maverick Transactions (Out of 60)	Maverick Transaction Percentage
Personal Computer	46	77%
Office Product	53	88%
Business, Industrial, & Scientific Supplies	51	85%
Home Improvement	41	68%
Consumer Electronics	48	80%
PC Accessory	29	48%
Speakers	52	87%
Photography	20	33%
Home	43	72%
Kitchen	32	53%
Total	415	69%

the potential spend that would have been committed for the same items on the eBay catalog. For this reason, the price of all maverick items in Amazon Business was compared with the same item price on the eBay catalog. The price comparison for all categories is shown in Table 3-3 below. It is interesting to observe that Penn State, on an average, is paying a premium of 27% on the net price of items for the top ten categories on the eBay catalog as opposed to Amazon

Table 3-3: Net Price comparison between Amazon Business and eBay.

Category	Amazon Spend Proportion	Catalog Spend Proportion	eBuy Premium over Amazon
Personal Computer	0.23	0.18	103%
Office Product	0.08	0.10	162%
Business, Industrial, & Scientific Supplies	0.19	0.16	105%
Home Improvement	0.05	0.07	173%
Consumer Electronics	0.18	0.23	170%
PC Accessory	0.06	0.07	148%
Speakers	0.05	0.03	76%
Photography	0.06	0.05	102%
Home	0.07	0.08	142%
Kitchen	0.04	0.03	109%
Total	1	1	127%

Business. This spend however, does not include the cost of shipping and processing transactions through both methods. As found by Chaudhary (2018) in his paper, the cost to process a p-card transaction at Penn State was found to be between \$10.20 - \$21.10, depending on the number of people involved in the process of purchasing through p-card method. In his study, he also performed a sensitivity analysis of total spend on Amazon Business, by taking different values of transaction processing cost. He concluded his study by identifying that the maverick spend committed on Amazon Business by end users at Penn State, did not incur additional cost to the University, even after incorporating the cost of processing a transaction. However, there are other costs associated with purchases made through Amazon Business. These include longer cycle time, cost of installing standard software and specifications of PCs as required by the University, cost of extended warranties (Amazon Business offers a one-year warranty as opposed to contracted suppliers who offer three-year warranty), etc. Calculating cost avoidance by purchasing through eBay catalog is beyond the scope of this study, and may be focused on in the future.

Finally, the Table 3-4 below shows the proportion of maverick spend on Amazon Business. As can be seen, on average about 59% of the total spend on Amazon Business is maverick in the sample. Interestingly, the University is spending a lower dollar amount based on net price of the items, than they would have by purchasing through the eBay catalog. The scope of this study, however, is only limited to finding the proportion of maverick spend in the spend through p-card and SRFC methods. Here, maverick spend is not necessarily an extra cost to the organization, rather any expenditure that violates pre-established procedures and policies.

Since we used a sample size of 60 during the sampling process, we assume a Normal distribution of the population, and extrapolate our results to the population. The proportion of maverick spend for the top ten categories in the population is 59%, as seen in the Table 3-4.

Table 3-4: Proportion of maverick spend by categories.

Product Category	Maverick Spend Percentage
Personal Computer	64%
Office Product	93%
Business, Industrial, & Scientific Supplies	77%
Home Improvement	71%
Consumer Electronics	72%
PC Accessory	32%
Speakers	70%
Photography	21%
Home	77%
Kitchen	55%
Total	59%

From the discussion above, three critical insights can be derived for the expenditure on Amazon Business in calendar year 2017 at Penn State. They are as follows:

- On average, about 69% of the transactions for top 10 categories on Amazon Business are maverick
- On average about 59% of the total spend for top 10 categories on Amazon Business is maverick
- On average, Penn State is paying a premium of 27% on the net price of items on catalog, as compared to Amazon Business for the top 10 product categories

3.4 Special Request for Check (SRFC) Spend Analysis

The spend through SRFC method in calendar year 2017 contributes to the largest proportion of the total spend at Penn State, for the methods discussed in Chapter 2. In fact, the total spend through SRFC is greater than the total spend through eBuy (catalog, non-catalog and standing orders). Moreover, as seen earlier in Chapter 2, SRFC does not provide clear spend

visibility since a three-way match is not performed during the actual processing of payment. This may prove to be a significant threat to the University, considering the volume of transactions and the total spend through this method of purchasing.

As discussed earlier in Chapter 2, this method generally begins when an end user receives an invoice. Upon discussion with professionals at Purchasing Services, it was found that Purchasing Services does not currently process confirming orders, and so, the end users may be compelled to pursue other methods of purchasing to process such transactions. The end user may also decide to use an SRFC to avoid going through the purchasing process, or for the purpose of convenience. However, it ultimately affects the bottom-line of the University and its efficient use of funds and resources. In order to identify the proportion of maverick spend, a thorough spend analysis was performed on the SRFC expenditure data for calendar year 2017. It was found that a significant amount of spend went through SRFC and was unauthorized. The following sections analyze the proportion of maverick spend in the SRFC expenditure dataset.

3.4.1 SRFC Spend Trend

The Table 3-5 below shows the trend of spend through different methods of purchasing over the last seven years. The spend through eBuy consists of catalog, non-catalog and standing orders. Due to the implementation of the eBuy catalog in 2012-13, and the overall increase in the University budget, there is an increase in overall spend through eBuy. It is interesting to observe that the number of transactions and total spend through p-card, remained relatively constant over the years. However, the total spend and transactions through SRFC have increased dramatically in the last seven years. It was interesting to observe that the total spend through SRFC was less than the total spend through eBuy by about 24% in 2011, whereas it surpassed the total spend through eBuy by about 2% in 2017. This data by itself, is insufficient to support our hypothesis of

Table 3-5: Year Over Year Growth in spend and transactions through purchasing methods.

Year	SRFC		P-card		eBuy	
	YOY Growth in Spend (\$)	YOY Growth in Transactions	YOY Growth in Spend (\$)	YOY Growth in Transactions	YOY Growth in Spend (\$)	YOY Growth in Transactions
2012	26.14%	2.72%	2.34%	-0.06%	-1.20%	-6.14%
2013	2.00%	2.51%	-2.07%	-1.92%	8.51%	-0.94%
2014	2.29%	7.12%	-0.37%	-2.12%	11.05%	0.79%
2015	13.16%	15.28%	-0.30%	4.68%	-1.79%	0.29%
2016	1.96%	4.42%	-2.09%	-4.27%	-2.78%	-1.23%
2017	7.16%	-2.25%	5.17%	1.68%	7.66%	1.90%
Cumulative 2011 - 2017	62.72%	32.72%	2.50%	-2.23%	22.38%	-5.40%

significant maverick spend in the SRFC spend data. However, it surely generates an interest for further research and forms a basis for exploration of reasons behind this growth.

3.4.2 Dimensions of Dataset

The dimensions of the original dataset were 89,297 x 12, and it included various attributes such as object code, administrative area code, invoice date, voucher number, vendor name, budget and net invoice as can be seen in the Figure 3-4 below. An administrative area code is a unique designation provided to each administrative unit, for its identification. There are 81 administrative areas across the University. The object code facilitated the analysis of non-compliant purchasing by various goods/services, whereas, administrative area code enabled classification of spend by various departments. To preserve confidentiality in the study, each administrative area was assigned a unique two-letter code randomly such that any specific two-letter code had an equal chance of being assigned any given administrative area. The pattern of code was simplified and was designed as follows. The first letter of a code could assume any letter from the English alphabet i.e., 26 possible values, and the second letter of the code could

Object.Coc	Admin.Arc	Typ	Invoice.Dat	mnemonic	pmt.summary.numbr	Detail.number	Voucher.numbr	Vendor.Name	Payee.Name
301	87	SRFC	5/25/2017	NKSPS	2909650	16087000018758	373970	BUSH JASON	JASON BUSH
301	21	SRFC	11/5/2017	LANGUT	3031664	170210000104820	328516	THE BARASH GROUP	THE BARASH GROUP
301	93	SRFC	1/11/2017	WSINTPG	2844409	160930000014992	352259	KEYSTONE BUS PRODUCT	KEYSTONE BUSINESS PRODUCT
301	4	SRFC	8/31/2017	AG	2979971	170040000102555	312036	WESLIE KHOO	WESLIE KHOO
301	78	SRFC	8/9/2017	BDBUSOP	2960516	170780000020502	306975	ULINE	ULINE
301	52	SRFC	8/7/2017	WPSXRAD	2956943	170520000013441	306633	PRINTERMECH	PRINTERMECH
301	78	SRFC	7/25/2017	BDICC	2952344	170780000019561	304933	VERITIV	VERITIV OPERATING COMPANY
301	52	SRFC	6/15/2017	WPSX	2926947	160520000072965	379219	PRINTERMECH	PRINTERMECH
301	91	SRFC	3/30/2017	SVDSPS	2880330	160910000010751	363892	4IMPRINT	4IMPRINT, USA
301	86	SRFC	7/31/2017	MAPRMKT	2990993	170860000005456	315436	MILLER A	ANNE MILLER
301	86	SRFC	11/10/2017	MABUSSV	3035572	170860000009574	329550	LABORLAWCENTER, INC	LABORLAWCENTER, INC
301	78	SRFC	5/19/2017	BDICC	2909116	160780000102377	373564	VERITIV_OPERATING CO	VERITIV OPERATING COMPANY
301	78	SRFC	11/1/2017	BDFIN	3029956	170780000047933	327906	BARNES & NOBLE COLLE	BARNES & NOBLE COLLEGE BO
301	91	SRFC	3/30/2017	SVFTCA	2880330	160910000010756	363892	4IMPRINT	4IMPRINT, USA
301	65	SRFC	1/11/2017	PSCCH	2822740	160650000015801	345023	UNIGUEST	UNIGUEST
301	78	SRFC	3/2/2017	BDICC	2853815	160780000082582	355605	VERITIV	VERITIV OPERATING COMPANY
301	79	SRFC	1/11/2017	BKHLTHS	2828950	160790000031846	347188	QUILL CORPORATION	QUILL CORPORATION
301	78	SRFC	10/16/2017	BDICC	3013545	170780000038934	322392	VERITIV_OPERATING CO	VERITIV OPERATING COMPANY

Figure 3- 4: Snapshot of SRFC spend in 2017.

assume either A, B or C i.e., 3 possible values. So a total of 78 possible codes were developed. Examples are AA, AB, AC, BA, BB, BC, CA, CB, CB, DA, DB, DC, etc. Since there are 81 administrative areas, the remaining three codes were created as AD, AE and AF. The assignment of codes was done randomly to avoid the possibility of inference from the two-letter codes. Thus, none of the codes should be interpreted as an abbreviation for an administrative area or college. For example, IA does not represent Intercollegiate Athletics.

3.4.3 Methodology

Initially, the unaddressable spend was removed from the expenditure data. Using the payment decision matrix at Penn State as a basis, two subsets of data were extracted from the original dataset. According to the payment decision matrix, the object codes listed in Table 3-6 below, strictly disallow the use of SRFC as a method of purchasing at Penn State. Thus, the expenditure data of SRFC was analyzed and a subset corresponding to these object codes was extracted, which was called ‘Maverick Spend’. This dataset contributed to 9.1% of the total transactions and 5.3% of the total spend through SRFCs at Penn State.

As defined in Table 3-7 below, certain object codes have restricted authorization in the use of SRFC as a method of payment. All transactions that violated this policy were extracted in a

table called 'Potential Maverick Spend'. This dataset consisted of roughly 0.9% of total transactions, and contributed to about 11% of the total spend through SRFCs. Since the dataset contained a relatively fewer number of transactions, but contributed to significant amount of spend, this dataset was analyzed in greater detail. The explanations provided by end users for these transactions were looked up manually in IBIS, and with the assistance of purchasing experts, the transactions were categorized as maverick or non-maverick. Since it was not possible to categorize the maverick spend in this dataset with 100% certainty, it was called potential maverick spend. The final potential maverick spend dataset contained 0.5% of the total transactions, and contributed to 6.8% of the total spend through SRFCs.

Here, in the methodology of extracting two subsets from the entire expenditure data, we have assumed that the object codes are coded accurately. As discussed in Chapter 2, before an SRFC is sent to central accounting for final processing, there are a set of reviews performed within the department to verify the correctness of details listed on the SRFC. Our assumption is based on the fact that object codes are verified for any anomalies, within the department itself.

Table 3-6: Object Codes for Non-SRFC purchase (Payment Decision Matrix).

Object Code	Good or Service	SRFC
301	Office Supplies	NO
303	Lab Supplies, Radioactive Materials, Biohazardous Materials, Animals	NO
304,305, 306, 308	Food, Custodial, Laundry, or Motor Vehicle Supplies	NO
307	Recreational or Athletic Supplies	NO
309	Miscellaneous Supplies	NO
322	Postage UP Campus	Use Multimedia & Print Center (M.P.C.) for postage.
392	Consulting Fees/Services	NO
414	Printing and Copying e.g. brochures	NO - Print Portal must be used.
458	Promotional Printing including Novelties (Must be PSU Licensee if PSU logo or wording are printed on items)	NO
452, 716	Software 1	NO
407	IT Services provided by Internal Vendors	NO - use internal billing mechanisms (IDCC)
481, 482, 483, 484, 485, 486	Computer Equipment	NO
459	Non-computer Equipment under \$5,000	NO
705	Fabrication of Capital Equipment	NO
710	Capital Non-Computer Equipment	NO
781, 782, 783, 784, 785, 786	Capital Computer Equipment	NO
740	Livestock	NO, except for non-research animal auctions, or if PO not accepted by vendor.

Table 3-7: Object Codes for Non-SRFC purchase (Payment Decision Matrix).

Object Code	Good or Service	SRFC
324, 329	Meeting Expenses	Yes, for smaller events (under \$10,000 in costs) or with approved caterers. Any agreements must be sent through Risk Management for approval. Purchase Order is preferred.
325, 332	Group Meals	Yes, for smaller events (under \$10,000 in costs) or with approved caterers. Any agreements must be sent through Risk Management for approval. Purchase Order is preferred.
Any Travel Object Code	Hotels or other Lodging	Yes, for group travel less than \$10,000 or if a PO will not be accepted. All agreements must be sent to Risk Management for approval.
Any Travel Object Code	Bus/Chartering Rentals for Group Travel	Yes, for group travel less than \$10,000 or if a PO will not be accepted. All agreements must be sent to Risk Management for approval.
Any Travel Object Code	Entertainment Venues such as museums	Yes, for group travel less than \$10,000 or if a PO will not be accepted. All agreements must be sent to Risk Management for approval.
375, 377	Short-Term Facility Rentals (including storage units)	Yes, if under \$5,000 total over the term of the rental with duration less than one year. All agreements must be sent to Risk Management for approval before renting.
367, 368, 369, 376, 377, 715	Equipment Rental (including IT Equipment)	Yes, if less than one year and totaling less than \$5,000 - but all agreements must be sent to Risk Management for approval prior to renting.
370,371	Maintenance and repair (not IT related) 1 IT related – see 488	Yes, for small repairs. Less than \$10,000 only.
391	Honorarium	Yes. Honorarium payments may not exceed \$1000.
393	Personal/Professional Services (Normally paid via payroll if PSU employee)	Yes, if value of service in total under \$10,000 or if payment is to an agency/company for a speaker or artist. Any agreement/contracts related to the service must be preapproved by Risk Management.
411	Purchased Services (Normally paid via payroll if PSU employee)	Yes, if value of service in total under \$10,000 and is being paid to an individual.
412	Photographic Services ²	Yes, if value of service under \$10,000. Agreement must be preapproved by Risk Management prior to service.
447	Non-Employment Advertising	Yes if under \$10,000
487	IT Services provided by External Vendor	Yes, if value of service in total under \$10,000
488	IT maintenance (Hardware and Software maintenance)	Yes, for small repairs. Less than \$10,000 only.

3.4.4 Assumptions

The following assumptions were made during the analysis of the SRFC expenditure data,

- Object codes in the SRFC expenditure dataset are accurately coded
- Classification of spend in potential maverick spend data is accurate
- The use of an SRFC during emergency purposes and unique situations is ignored

3.4.5 Analysis and Results

As discussed earlier in Section 3.4.2, two datasets were extracted from the entire expenditure data. Both the datasets were analyzed separately and together to analyze the distribution of spend by administrative areas and object codes. The following sections discuss the analysis of the datasets, and the results obtained.

3.4.5.1 *Spend by Administrative Area*

Initially, maverick spend was distributed by administrative areas to analyze spend distribution. Of the total 71 administrative areas that committed maverick spend, 14 contributed to about 83.6% of the total spend. The bubble chart in Figure 3-5 below, shows the distribution of these 14 administrative areas by annual spend and number of transactions. The size of the bubble also indicates the total spend by that administrative area. It was extremely interesting to observe that even though the administrative area TB did not have the highest number of transactions, it had largest contribution to the total maverick spend and thus, it is clearly an outlier. It was interesting to observe that seven out of these 14 administrative areas were commonwealth campuses of Penn State. This suggests that the maverick spending behavior is common across the University.

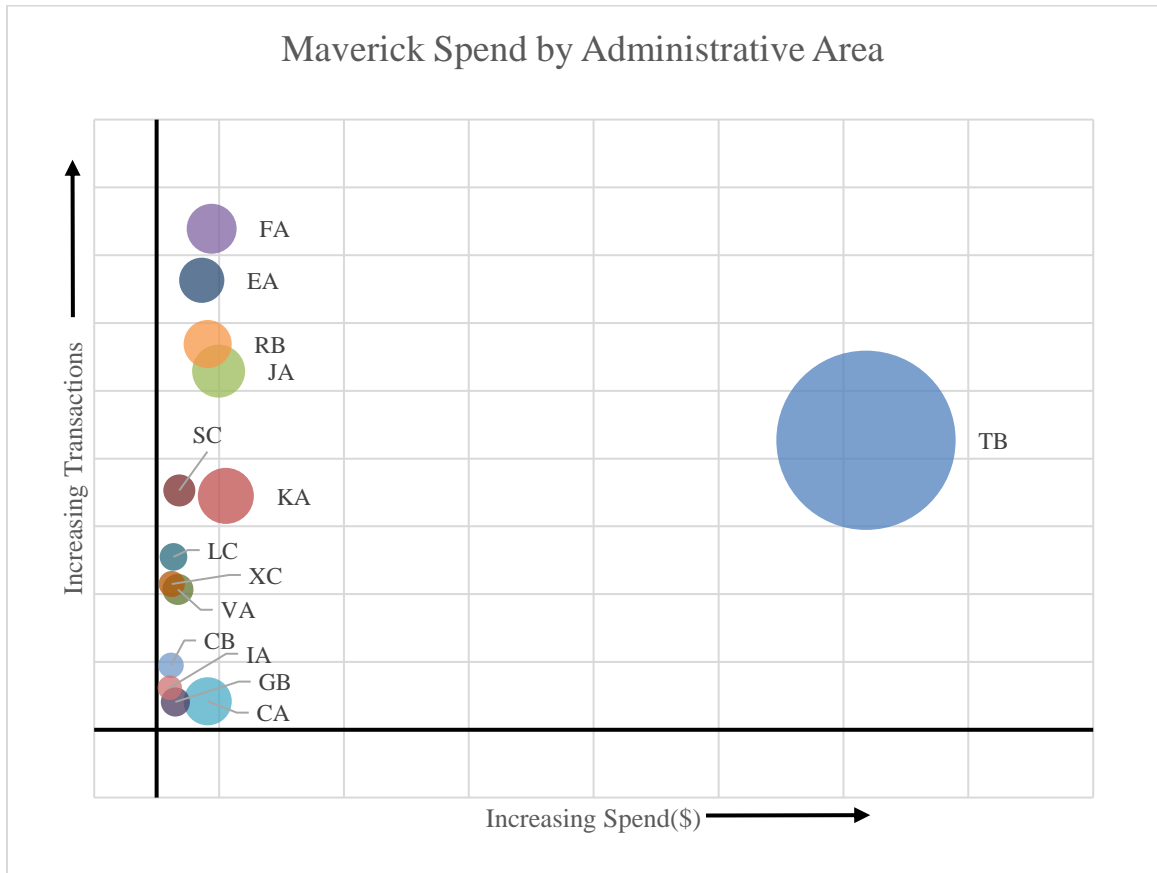


Figure 3- 5: Maverick Spend distribution by administrative areas.

Similarly, the potential maverick spend data was distributed by administrative areas to analyze spend trends. Of the total 47 administrative areas that committed potential maverick spend, 14 administrative areas contributed to about 82.7% of the total spend. The spend distribution for these 14 administrative areas is shown in the Figure 3-6 below. It is interesting to observe that administrative area CA is an outlier in this case. In fact, there are only five administrative areas which are common in both the graphs. They are TB, CA, JA, CB and IA. Interestingly, there is only one commonwealth campus in the top 14 administrative areas in case of potential maverick spend data. Further analysis at the level of individual administrative areas may be performed to clarify this anomaly. Performing spend distribution by administrative areas, allows identification of top maverick spenders by spend, however, it does not provide an idea of

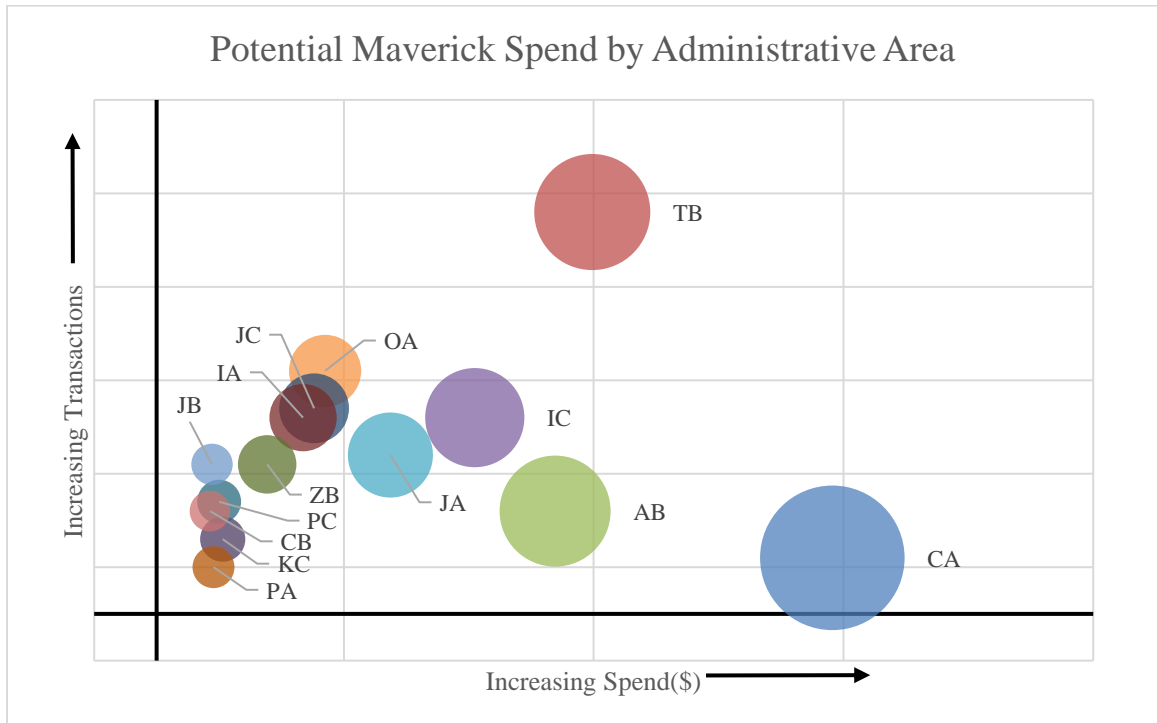


Figure 3- 6: Potential Maverick Spend distribution by administrative areas.

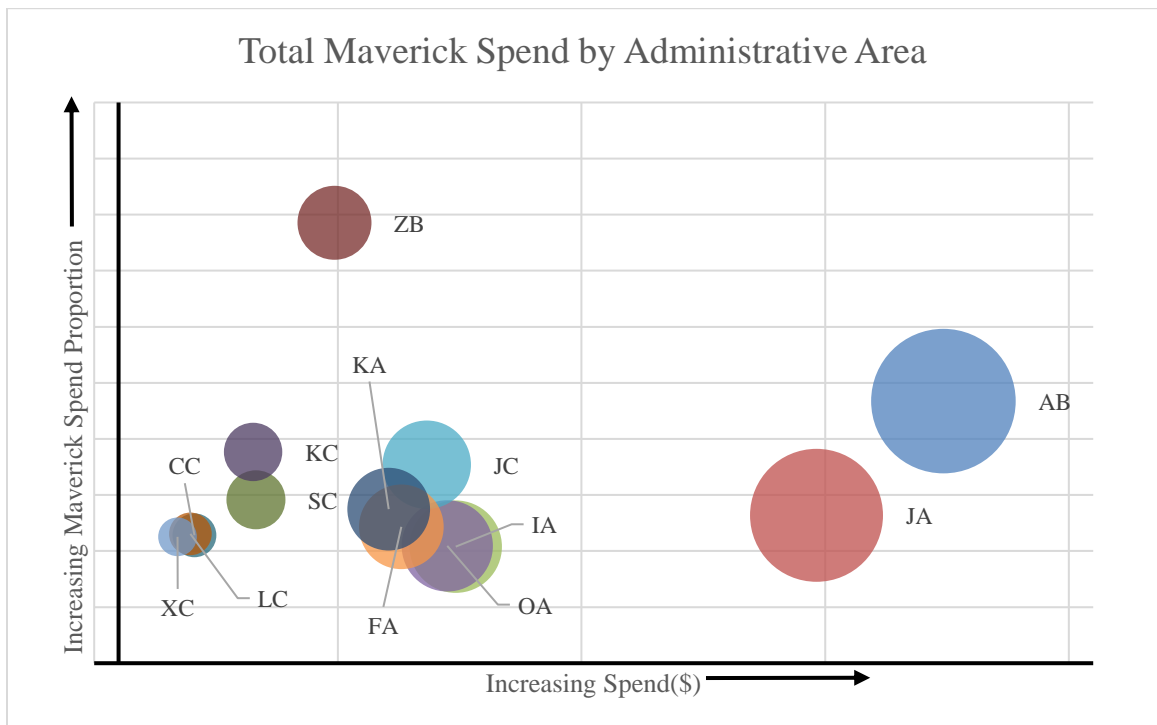


Figure 3- 7: Total Maverick Spend distribution by administrative areas.

primary administrative areas to target as a part of the mitigation strategy. This is because if the budget for an administrative area is much greater than the others, the absolute value of maverick spend by that administrative area could be greater than other areas. However, the proportion of maverick spend through SRFC, could be smaller than other administrative areas. The focus should be on administrative areas which exhibit high degree of non-compliant behavior. For this reason, 'Total Maverick Spend' was calculated by taking the sum of both maverick spend and potential maverick spend for each administrative area. Then the proportion of total maverick spend was calculated as a percentage of total spend through SRFC for each administrative area. Administrative areas were subsequently ranked based on the value of total maverick spend and its proportion. About 15 from a total of 71 administrative areas contributed to 72 % of the total maverick spend. These 15 administrative areas were plotted as shown in Figure 3-7 above. Due to the relatively high spend by administrative areas TB and CA, they were eliminated from the plot to avoid skewness. At least 20% of the total spend through SRFCs, for each of the administrative area in figure 3-7 is maverick. Thus, a detailed analysis of approval path for SRFC transactions, should be performed for the above 15 administrative areas. If the value of maverick spend is more important than the proportion of maverick spend, then the administrative areas from the right to the left of the graph along the x-axis, must be prioritized. Conversely, if the proportion of maverick spend / behavior is more important than the spend value, then administrative areas from the top to bottom of the graph along y-axis must be prioritized. In either case, these administrative areas are found to be the top offenders of policy according to data analysis, and must be prioritized to reduce maverick spending at the University.

3.4.5.2 Spend by Object Codes

In order to develop a mitigation strategy, identifying top administrative offices that commit maverick spending is insufficient. The maverick spend data was also distributed by object codes to identify top product categories, which is shown in the Figure 3-8 below. According to the Aberdeen Group study (2004), as much as 30% of all the spending data are incorrectly categorized or classified as “miscellaneous” across all the industries, due to insufficient commodity expertise, which further complicates efforts to analyze and leverage spending. In the case of Penn State, only about 2% of the total spend through SRFCs is classified as miscellaneous. However, about 63.5% of the spend data in maverick dataset is classified as

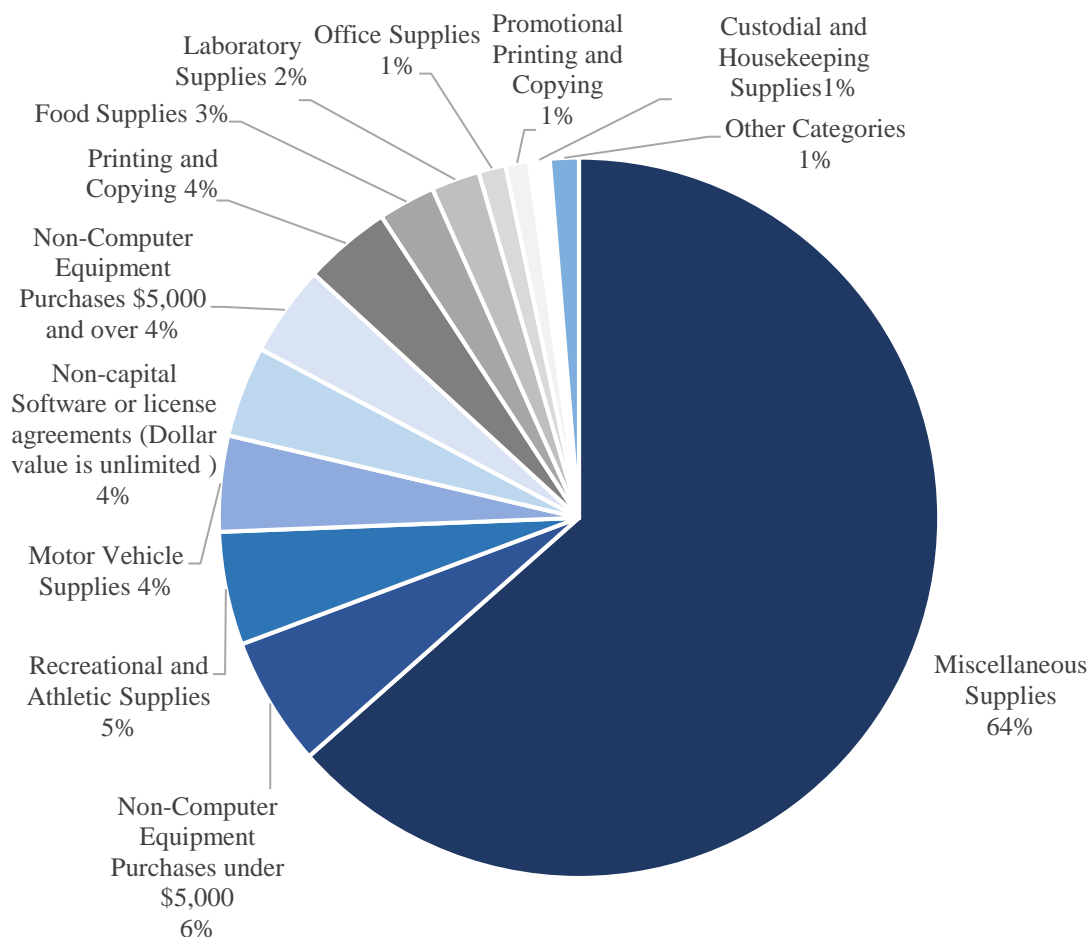


Figure 3- 8: Maverick Spend distribution by Object Codes.

miscellaneous, which makes it challenging to further analyze it. As can be seen in Figure 3-8, a significant amount of unauthorized spend was pursued in non-capital software or license agreements. Since the use of any software may expose Penn State to the risk of proprietary loss of confidential information, any software must be approved by the Office of Information Security, before its purchase. Thus, this spend poses significant threat to the University. An interesting observation was made in that the average spend per transaction for non-computer equipment purchases, is over \$15,000, whereas SRFCs should generally be used for transactions smaller than \$10,000 in value. This indicates violation of a University policy, as any purchase over \$10,000 requires evidence of competition, and solicitation of bids from at least three competitor suppliers.

Similarly, we can observe that there is a significant spend in product categories such as non-computer equipment purchases under \$5,000, laboratory supplies and office supplies, which are available through eBuy. This prevents Penn State from achieving spend leverage with its contracted suppliers. A significant dollar amount is spent on printing and copying, in spite of having a contracted supplier of the University. This suggests that the end users prefer to get the services outside the preferred supplier because of better pricing, better service, convenience or past practice. As a result, the University is losing significant spend leverage due to such purchases. As discussed earlier in the Section 3.4.3, our analysis is based on the assumption that the object codes are coded correctly, and the analysis could change significantly due to input errors by the users.

Similarly, the potential spend data was distributed by object codes to identify top spend product categories. As can be seen in the Figure 3-9 below, purchased services and awards to employees, and personal / professional services contribute to about 80% of the total potential maverick spend through SRFC. Since this dataset was analyzed manually with the assistance of purchasing professionals, explanations provided by the end users for all the transactions in the dataset were reviewed in IBIS. It was identified that the biggest reasons for non-compliant

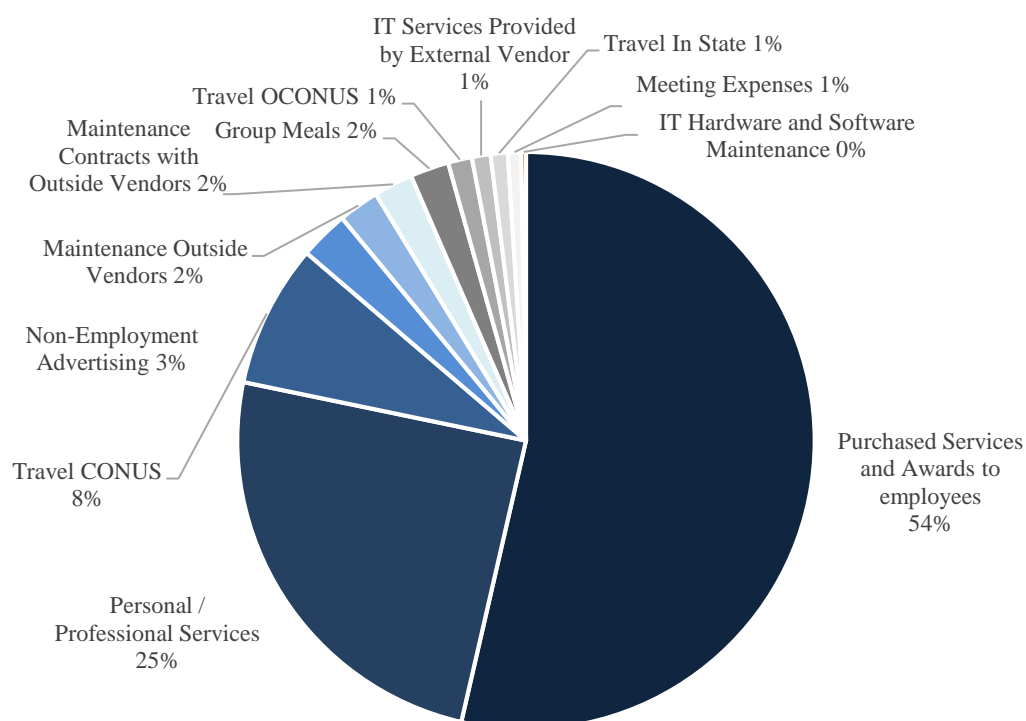


Figure 3- 9: Potential Maverick Spend distribution by Object Codes.

purchasing in these two categories were in an attempt to avoid the pre-established approval path for convenience and due to confirming orders. Moreover, it can be seen from the chart above, there is significant spend in the categories travel and group meals as well. Due to the risk of liabilities and duty of care, University policy requires that all travel and group meal expenses must be reviewed and approved by risk management, and that for any expense greater than \$10,000, purchase order / non-catalog order should be the preferred method of purchasing. In spite of these policies, there is a significant spend in these categories.

Similarly, a significant unauthorized spend was identified in construction, which is included in the category maintenance outside vendors. After looking at the spend distribution by administrative areas and object codes, it is highly imperative to assess approval paths for SRFC transactions, and to ensure compliance monitoring. As discussed earlier in Section 3.4.1, the

spend through SRFC has been increasing consistently over the last few years, and it may continue to increase if there is limited compliance monitoring.

3.4.5.3 Duplicate Vendor Names

As discussed earlier in Chapter 2, each SRFC is entered into IBIS manually before it is sent to Central Accounting / Accounting Operations for final processing. Because SRFCs are entered manually, there is a high probability of duplication of vendor names in IBIS. For instance Amazon, amazon.com and Amazon Business, are all recorded as different vendors. This phenomenon was experienced for several vendors in the expenditure data. Due to this reason, it is difficult to gain clear spend visibility to discover potential new suppliers for long term partnership. This problem is not only limited to maverick spend and potential maverick spend datasets, but also the entire SRFC expenditure dataset. Since SRFC is the largest method of purchasing at Penn State, it would be extremely useful to analyze top spend suppliers and observe spending pattern with them over the years. If the University has a significant spend with a supplier over a consistent period of time, the University may decide to negotiate a long term contract with that supplier for better spend leverage.

Using the findings in this chapter, the following critical insights can be derived,

- From 2011 - 2017, spend through SRFCs has increased by more than 62% and SRFC transactions have increased by more than 32%.
- About 12% of the total addressable spend through SRFC in 2017, was maverick
- The phenomenon of maverick spend through SRFC was identified across the University
- About 3.4% of total addressable spend through SRFC, was classified as miscellaneous
- Unauthorized spend in certain categories such as non-capital software and travel, may expose Penn State to the risk of proprietary information loss and liabilities

Chapter 4

Reasons for Maverick Buying at Penn State

4.1 Meetings

The systematic review conducted to understand purchasing methods in detail, lead to identification of different forms of potential maverick buying and root-causes for the same. In an effort to unravel the root-causes of maverick buying, a series of meetings were scheduled with purchasing professionals, internal audit, financial officers, reconcilers and professionals involved in the payment processing.

The case context for the meetings were professionals involved in purchasing through p-cards and SRFCs because these methods were identified as containing potential maverick spend. The meetings were scheduled for theoretical reasons, and to investigate root-causes for maverick buying behavior. The meetings were scheduled with people who were most likely to respond and provide information to expand upon the topic of maverick buying at Penn State and support the study. The meetings were semi structured which allowed natural interaction and provided interesting comments in addition to fulfilling original purpose of the study. Two of the attendees were representatives from Purchasing Services, one from internal audit, one from central accounting, one from corporate controllers office and four from units involved in purchasing through these methods. The average duration for all meetings was approximately one hour. The key insights derived from the meeting are discussed in the following section.

4.1.1 Meeting Findings

Confirming orders / After the fact orders – The most common reason identified for maverick spend through SRFCs was found to be confirming orders. According to one of the senior purchasing professionals, most end users approach their department with an invoice against the purchase of goods and/or services. Since the goods/services have already been purchased before prior approval, most departments choose to approve SRFC for the payment, while warning the end user for non-compliant behavior. Moreover, since Purchasing Services at Penn State does not currently process Purchase Orders for confirming orders, the users may be compelled to use an SRFC. This further motivates the end user to commit maverick spend and bypass the pre-established processes of purchasing. This partially explains the reason for such high spend through SRFCs in the recent years.

Lack of compliance monitoring – One of the senior purchasing professional explained that lack of compliance monitoring on approval and payments through SRFC, could be a potential reason for non-compliant behavior. Since there is no department which is designated to overlook all the payments made through SRFC, and the task is decentralized to individual administrative areas, there is an increased tendency for such behavior. Limited compliance monitoring also leads to an increased ease of use or convenience, and the end users are motivated even further to commit such maverick spend.

Lack of end user knowledge – The attendees mentioned several situations in which end users were not aware of the eBuy catalog program. Even in the summary of survey results provided by Purchasing Services, several respondents responded that they were unaware of such an online catalog (eBuy) at Penn State. This may be because Penn State is a large decentralized organization, and it may be difficult to communicate the benefits of using preferred suppliers and to provide training eBuy training to end users. Another reason could be people's reluctance in

learning new technology. Currently, eBuy training for users is voluntary and fragmented.

Moreover, anyone who wishes to obtain a p-card is required to complete online p-card training.

But any end user purchasing through eBuy is not required to undergo eBuy training. This facilitates the use of a p-card even for items available through eBuy, which does not enable Penn State to leverage its spend capability with approved suppliers.

eBuy complexity – Several attendees explained that since eBuy has a difficult user interface, end users prefer to use Amazon or other e-retailers instead of eBuy. However, from the summary of survey results it was evident that only 25% of the respondents had received formal training in eBuy, which explains the reason above. Another reason provided was that only a few users in any given office are trained in using eBuy, and if they are unavailable due to any reason, the other end users have to rely on p-cards for purchase. This may be a case of forced maverick spending.

Current Policy – The existing policy on the use of Amazon Business does not mandate the use of eBuy catalog for available items. In fact, it promotes the use of Amazon Business for categories other than office supplies, laboratory supplies and janitorial supplies. This fact is also supported by the p-card spend analysis, where about 69% of the transactions for top 10 categories on Amazon Business were maverick. A senior purchasing professional believes that a change in the existing policy is required to materialize the benefits of negotiated contracts. Similarly, during one of the meetings it was discovered that currently *there is no clear policy defined for the use of SRFC as a method of payment* at Penn State. Thus, any end user may not be held accountable for violation of the payment decision matrix, as sanctions are not defined for SRFC misuse.

Number of P-card holders – Some attendees also argued that the number of p-card holders in the Penn State University wide system is very large. In 2017, there were 4,987 active p-card holders for goods and services at Penn State. Also, as discussed in Chapter 2, due to the ease of obtaining a p-card at the University, and due to lack of working knowledge of p-card use, there may be an increased potential of non-compliant behavior in purchasing through p-card.

4.2 Survey

Purchasing Services sends out a survey regularly to the end users at Penn State, to understand and improve existing purchasing practices. In an attempt to understand the reasons for off-contract spending at the University, Purchasing Services designed and sent out a survey to approximately 11,400 end users across the University. These end users included eBuy users and p-card holders. The total response received was approximately 1,300, making the response rate 11.4%. The survey had 11 questions of which one question was scale based, and one question was open field, and 9 questions were multiple choice. The questions were designed such that the respondents had minimum cognitive burden in answering them. A summary of the survey results was obtained from Purchasing Services to analyze the responses and derive some valuable insights.

4.2.1 Survey Findings

According to the survey results, of the total number of respondents, more than 77% of end users were aware of preferred suppliers or volume discount through eBuy catalog purchasing. However, interestingly, only 25% of the total respondents had received formal training in eBuy catalog purchasing. This result strongly indicates that the end users are not motivated to participate in eBuy training. This may be due to the lack of incentive for end users to purchase through eBuy catalog, or due to the lack of interest from upper management in understanding the benefits of using preferred suppliers and promoting the same within the organization. Moreover, since the training is currently voluntary, an end user is not required to take the training. Through one of the questions, end users were asked if they had read the purchasing policy of the University. Of the total respondents, more than 80% responded positively that they had read and

understood the University purchasing policy. This is an important finding, as it supports the fact that most users do not commit maverick spend due to the lack of awareness of purchasing policy. Thus, Purchasing Services may focus on other mitigation strategies, such as better compliance monitoring for effective results.

The next set of questions in the survey were focused on analyzing the perception of end users towards user-friendliness of eBuy catalog. The question asked about the ease / difficulty of finding an item on eBuy catalog, and it was a scale based question from 1 being easiest to 10 being most difficult. The mean of responses was 5.17, which was right in the middle of the scale. Another question asked the users whether they would prefer to use eBuy catalog if its interface was more user friendly. More than 52% of the responses were positive, whereas about 44% of the responses were neutral. Only about 3.7% of the total responses were negative. The above result is consistent with the prior result, and it supports that over half of end users find eBuy catalog to be more complex than e-retailers, which may be a potential reason for low user adoption. However, this may also be due to the fact that only 25% of the respondents had received formal training in eBuy catalog.

The next set of questions in the survey asked the respondents whether they checked for the availability of an item on eBuy catalog before purchasing it using their p-card. About 47% of the respondents looked for an item on eBuy catalog before purchasing elsewhere, and about 27% respondents looked for an item on eBuy catalog only sometimes. This result was found to be a bit inconsistent, in that about 75% of the respondents did not receive formal training in eBuy catalog. The argument is that if they did not receive formal training in purchasing through eBuy catalog they would choose to pursue other methods due to lack of knowledge. Alternatively, it may be possible that due lack of training in using eBuy catalog, the end users may find it challenging to find an item on catalog, leading to maverick spending behavior. To follow up, users were asked whether the net price of items available through eBuy catalog were higher than other e-retailer

websites or in-store purchases. About 19% of the respondents argued that the prices were usually higher on catalog, and about 59% of the respondents agreed that prices were higher sometimes. This fact supports our analysis of p-card spend on Amazon Business, where the net price of items on the eBuy catalog was found to be higher by about 27% as compared to Amazon Business, across the top ten categories.

The next set of questions in the survey was aimed at identifying reasons for the use of a p-card. The users were asked about their preferred method of purchasing for small-dollar value items. It was not surprising to find that about 53% of the respondents preferred a p-card over eBuy catalog, whereas about 46% of the respondents preferred the eBuy catalog. This result was consistent with above findings as 75% of the users did not receive formal training and about 52% of the users would adopt the eBuy catalog if it was more user friendly. Another question asked the users about the situations under which they purchased using a p-card instead of eBuy catalog. About 30% of the respondents preferred to use a p-card when an item was unavailable in the eBuy catalog, making it the most preferred situation. About 26% of the respondents preferred to use a p-card when a cheaper option was available elsewhere. However, users do not analyze the purchase from a total cost of ownership perspective and compare items solely on the basis of net price. About 22% of the respondents agreed that they preferred to purchase using a p-card because better option / variety was available elsewhere. Approximately 13% of the respondents used a p-card because of complexity in using the eBuy catalog. This is an interesting finding as there are reasons for higher use of a p-card other than complexity of the eBuy catalog. Interestingly, about 5% of the respondents did not have budget preauthorization to purchase through the catalog.

Finally the end users were asked which method of purchasing was least expensive for the University to process, according to their knowledge. The results were consistent as out of the total number of respondents about 64% believed that processing eBuy catalog purchases was the least

expensive, 25% believed that processing p-card transactions was the least expensive, 6% believed that processing standing orders was least expensive, 3% believed that processing non-catalog / purchase order was least expensive and only 2% believed that processing SRFCs was the least expensive.

4.3 Root-Causes of Maverick Spend

For maverick spend through a p-card and SRFC at Penn State, the following were identified as root causes,

- Lack of clear policy which defines authorized use of SRFC as a method of payment
- Lack of departmental oversight on spend through SRFC
- Lack of a corrective action in case of confirming orders
- Lack of knowledge in using preferred suppliers / volume discounts
- Absence of a policy that mandates purchase of items through eBuy when possible
- Absence of a mandatory eBuy and SRFC trainings for end users involved in purchasing
- Lack of an incentive for end users in using preferred suppliers
- Number of University wide p-card holders
- Lack of supplier performance and price monitoring

Chapter 5

Reviewing Existing Policies and Procedures

5.1 Penn State University Policies

Penn State policies provides the current, official policies and guidelines approved and made public by the Board of Trustees and officers of the University. “University Policies” are policies with broad application throughout the University system, designed to enhance the University’s mission, promote operational efficiencies, and reduce institutional risk. Such policies help ensure compliance with applicable laws and regulations, promote ethical standards and integrity, and are approved in accordance with applicable procedures. (About Penn State Policies)

Purchasing Services, a division of Procurement Services within the Office of Auxiliary and Business Services, is the designated authority for the effective and efficient procurement of goods, materials, and services for The Pennsylvania State University. Purchasing Services' primary objectives are to provide quality service to University requisitioners; ensure compliance to applicable policies, laws and regulations; and cost containment for maximum use of University dollars.

Purchasing Services at University Park is responsible for the procurement of, and payment for, all materials and services obtained for use by the University Park Campus and all Commonwealth Campuses. In order to ensure the best possible service, individual Purchasing Services' personnel are assigned specific commodities. The following section will discuss the existing policies that relate to the use of p-card and SRFC as a method of payment. (University Policies & Procedures)

5.1.1 BS14 Penn State Purchasing Card

The policy BS14 is set forth by the University to observe regulations in the use of a Penn State Purchasing Card. According to this policy (BS14 Penn State Purchasing Card), the Penn State p-card is the only credit card authorized to be used for the purchase of goods and services chargeable directly to the University. The p-card may only be used to acquire goods, materials, authorized services and travel-related expenditures which are necessary for the ongoing operations of the University, and may not be used for personal use. Card holders are responsible for receiving material and services, and forwarding purchase documentation as an evidence of the transaction to the reconciler. The reconcilers are responsible for assuring that suitable documentation of the transaction has been obtained and are responsible for reconciling the documentation against the transaction data provided to the University from the card-issuing bank.

The policy also defines the appropriate use of p-card and lists specific restrictions on the types of goods and/or services which may be purchased using Penn State p-card. According to the policy p-cards are not to be used to circumvent General Stores or standard purchasing procedures. However, as defined in the policy within specific restrictions of goods and services, Penn State p-cards may be used for purchases made through the Penn State Amazon Business account and certain other types of purchases. Currently the policy does not mandate the use of eBuy for items available through the catalog. This partially explains the reason for the high number of maverick transactions in the Amazon Business dataset. There may be a high proportion of maverick transactions for the in-store purchases as well, as the policy does not mandate the use of the eBuy catalog for available items.

5.1.2 Procedure PC2009 - Penn State Purchasing Card

The procedure PC2009 (Procedure PC2009 – Penn State Purchasing Card) explains the entire procedure related to the Penn State Purchasing Card. Within the procedure, it is recommended to check the availability of items on the eBuy catalog, before it is purchased using a p-card. However, it is not required to be purchased through the eBuy catalog, if it is available. The procedure also discusses the process for issuing a p-card. Currently, there is no limit on the number of p-cards in the University-wide purchasing system. Any Penn State employee is eligible to obtain a p-card by completing a Purchasing Card On-line Tutorial and Cardholder Certification Quiz and by electronically agreeing to the Purchasing Card Cardholder Agreement. Once a card is issued to an employee, there is no mandatory refresher online training or knowledge based learning / training for the employee. However, according to one of the senior purchasing professionals at Penn State, an informal training is conducted regularly for reconcilers, which is voluntary. Similarly, there are department-based programs for end user training, depending on the initiatives of senior management within any given department. But there is no formal centralized training for p-card holders after a p-card is issued.

5.1.3 Amazon Business Guidelines

According to the (Amazon Business) guidelines, any p-card holder at Penn State may create an Amazon Business account using their Penn State email ID, and purchase any items using their p-card. The Amazon Business website promotes the use of the eBuy catalog for purchase of office supplies, laboratory supplies and janitorial supplies, but it does not mandate the same. In fact, according to the guidelines, the users are encouraged to use Amazon Business to achieve business pricing and quantity discounts.

5.1.4 FN18 University Approval Authorization Policy

The policy FN18 (FN18 University Approval Authorization Policy) establishes minimum approvals required on University expenditures and budgetary and personnel documents, while assuring proper level of administrative control. The policy pertains to all transactions through IBIS, eBuy and ERS. A finance officer is responsible for establishing an approval path in all administrative systems and to approve all expenditure, budgetary and personnel transactions that directly affect a budget. This policy specifies minimum approval requirements and setting a higher level of approval for lower dollar thresholds is permissible. According to the policy, all expenditure actions of \$100,000 or more must be approved by the budget executive of that administrative area. Similarly, all expenditure actions between \$10,000 and \$99,999 must be approved by budget administrator. All of the expenditure and budgetary actions under \$10,000 must be approved by budget assistant and/or financial assistant.

5.1.5 SRFC Policies

During this research it was discovered that there is no clear policy which is defined by the University for the payments through SRFC. The approved uses for SRFC are mentioned in the payment decision matrix, as well as they are mentioned in some other policies. However, there is no clear policy defined for the use of SRFC as a method of payment. This was an extremely interesting finding as the SRFC is the largest method of payment for goods and services at the University. This finding also partially explains the reason for significant growth in the spend through SRFC over the last few years. The approval path for a SRFC within an administrative area is established by the financial officer, and may be different for different administrative areas. Moreover, there is no department/office which is tasked to oversee the payments through SRFC.

5.2 Expenditure Data

Purchasing Services performs spend analysis of spend through eBuy on an irregular basis to identify new potential suppliers for the catalog. However, the department is unable to perform analysis of the entire expenditure data regularly due to the challenges mentioned below,

- Disparate data sources – Since Penn State has various methods of purchasing, spending data is located in multiple systems across the organization. These include Accounts Payable (AP), General Ledger (GL), Enterprise Resource Planning (ERP), IBIS, purchasing and legacy system. Spending data is also found outside the organization, in systems like purchasing card (P-card) systems, automated clearinghouse (ACH) and bank feeds. Aggregating the spend data from all these disparate sources into one central database for analysis is challenging.
- Incongruent vendor naming conventions – In the p-card and SRFC expenditure datasets, there were many instances where in a single supplier had multiple unique names. For instance, FedEx is one of the vendors for Penn State. There are 43 unique names for FedEx in the expenditure database. It may also be possible that the University has business with a different unit of the same company, as in the case of Dell. There are at least five subsidiaries of Dell that the University does business with. It is also possible that the University is purchasing goods from a distributor or seller, in spite of having a direct contract with the product manufacturer. Ultimately, these issues pollute spend data and do not facilitate analysis of true spend patterns and limit spend leverage with suppliers.
- Labor intensive cleansing and classification processes – Since the University has different methods of purchasing, different attributes of data are collected in each method. It is required to clean and classify the data into one central database before performing spend analysis. For example, the spend with B&H in 2017 through p-cards was \$174,105, through catalog purchases was \$722,593, through non-catalog purchases was \$660,555 and through standing

- orders was \$ 9,900 in calendar year 2017. As can be seen, the total spend with B&H was \$1.57 million but the University cannot leverage its spend capability because it is disaggregated into different methods, and there is no clear visibility of the total spend. It is also important to classify the data to facilitate accurate data analysis as discussed earlier.
- **Insufficient commodity expertise** – In order to correctly classify the products and services, it is required to have expertise in product and data attributes. However, the personnel responsible for classifying the data may not have expertise in product details. This can be observed in the SRFC spend data, where about 3.4% of the total addressable spend through SRFC was classified as ‘Miscellaneous’, which may be due to lack of knowledge and expertise of products and data.
 - **Limited analytics capability** – Identifying patterns and savings opportunity requires detailed analysis, however, Penn State currently does not use data visualization solutions to enable detailed spend analysis. Most of the analysis is currently performed using basic spreadsheet applications and Microsoft Access, which limits the breadth and sophistication of analyses that can be performed. It is strongly recommended that the University should adopt data visualization software to enhance visibility into spend trends and leverage that information for better decision making.
 - **Inaccurate or incomplete data** – One of the key requirements for effective spend management is the accuracy of spend data. As observed from the expenditure data of various purchasing methods, a lot of information is missing in the dataset and has N/A values. Such incomplete dataset, hinders clear spend visibility and it must be cleansed before performing the analysis.

5.3 Training

5.3.1 eBuy Training and Resources

5.3.1.1 New User Training

New user training is conducted by Purchasing Services to educate end users in three main aspects as stated below,

- Purchasing –This session covers topics such as the role of Purchasing Services, types of purchases, dollar thresholds, roles of purchasing professionals, Purchasing Services website, payment decision matrix and primary contacts for questions related to eBuy.
- eBuy catalog orders – This session covers the entire procedure of creating and sending an order through the eBuy catalog. It also covers the training to find past orders to review it.
- Non-catalog orders – This session covers the entire procedure of creating and sending a non-catalog order to Purchasing Services. It also covers the training for approvers, on how to approve an order.

Currently, in-person training and webinar trainings are conducted on a monthly basis.

However, the training is voluntary.

5.3.1.2 Live Helpdesk

Purchasing Services offers live assistance to any end user purchasing through eBuy. The primary function of the helpdesk is to facilitate usability of eBuy, which includes tasks such as error prevention, user profile administration, clarifying questions related to approval paths and automatic system rejections, new user assistance and approval authorization administration. End users may also refer to the Purchasing Services website and find answers to FAQs on using eBuy.

5.3.2 P-card Training and Resources

5.3.2.1 Purchasing Card On-line Tutorial

Employees who wish to apply for a p-card must first successfully complete the Purchasing Card On-line Tutorial and Cardholder Certification Quiz, and electronically agree to the Purchasing Card Cardholder Agreement during the certification process. The training is available on the Purchasing Services website, and is required to be completed by the end user before obtaining a p-card. The training covers the following topics: allowable expenses, purchasing card process, purchase limitations, ethics, interacting with vendors, information for receipts, vendor selection, prohibited uses, cardholders beware, returning purchases, monthly statement, cancelling a purchase card, card misuse and sanctions.

5.3.2.2 Voluntary training for Reconcilers

The Office of Corporate Controller at Penn State conducts voluntary training for reconcilers. It is a live web based training, and held twice every semester. The topics covered are basic functions of reconcilers such as checking authorized purchases, budget, object code classification, invoice matching, policies, etc. Many departments also conduct individual training for educating reconcilers on policies and procedures. However, there is no mandatory training.

5.3.2.2 Resources for End Users

The Purchasing Services website has a page for p-card users which contains various resources and quick links. It also explains the process of obtaining or cancelling a p-card. The page also has p-card FAQs and a helpline number for p-card holders.

5.3.3 SRFC Training and Resources

5.3.3.1 SRFC Training

There is training available through Penn State IT on the use of IBIS and new users are encouraged to take that training. Moreover, informal trainings are conducted by Financial Officers for end users in using SRFC, but they are voluntary. In addition, trainings are conducted for Finance Officers and their role, but there is none that specifically relates to the FOs role in approving SRFCs. However, there are no mandatory trainings for end users or approvers.

5.4 Penalties

5.4.1 P-card Misuse

Procedure PC2009 details the disciplinary actions in case of cardholder misuse. The sanctions for card holder misuse may include suspension or cancellation of the card to more severe disciplinary action such as termination. A detailed list of examples of p-card misuse may be read in policy BS14 or procedure PC2009.

5.4.2 SRFC Misuse

Since there is no clear policy that defines the authorized use of SRFC as a method of payment, there are no sanctions for misuse of SRFC. During a meeting with one of the senior professionals it was found that individual departments may choose to have disciplinary actions ranging from warning to termination, depending on the severity of SRFC misuse. However, there is no official policy or procedure that defines the sanctions for SRFC misuse.

Chapter 6

Mitigation Strategies

After performing the quantitative analysis and root-cause analysis, the following mitigation strategies are recommended, for the short-term, medium-term and long-term phases.

6.1 Short-Term Phase (0 - 6 months)

6.1.1 Change in Policy

As discussed in Chapter 5, the current policy on the use of Penn State p-card does not require an end user to purchase items through the eBuy catalog even if they are available. The end users may purchase items from off-contract suppliers, which may not enable Penn State to achieve spend leverage and volume discounts with contracted suppliers. Moreover, the Amazon Business guidelines promote the use of Amazon Business for better business pricing. Thus, the end users may not be held accountable for committing maverick spend if they purchase off-contract. The spend analysis of p-card expenditure on Amazon Business discussed in Chapter 3 attests the fact that 59% of the spend on Amazon Business in 2017 was maverick. Similarly, as discussed in Chapters 4 and 5, there is no clear policy defined for payments made through SRFC. End users are encouraged to use payment decision matrix as a basis to determine the method of purchasing, but are not required to use it. As discussed in Chapter 3, about 12% of the total addressable spend through SRFC in 2017 was maverick. The end users may not be held accountable for unauthorized purchases through SRFC, due to the lack of a policy.

Thus, Purchasing Services should modify the existing policy defined for the use of Penn State p-card, to mandate the use of the eBuy catalog for available items. This will ensure

increased spend through eBuy catalog, and may result in better pricing and volume discounts from contracted suppliers. Purchasing Services should also create a new policy which defines the approved use of an SRFC as a method of purchasing, as well as clearly defining approval path for an SRFC transaction. The policy should also include sanctions for misuse of an SRFC and confirming orders. Since SRFC is the largest method of payment for goods and services at Penn State, it is highly imperative to establish a policy and monitor payment through this method to ensure compliance, and leverage spend capability of Penn State.

6.1.2 End User Training

As discussed in Chapter 5, the end users are required to undergo online training and take an online test before obtaining a Penn State p-card. However, the end users are not required to undergo eBuy training or SRFC training. Looking at the spend distribution by various methods, it is evident that the spend through p-cards was only 6% of the total spend for goods and services in 2017, whereas the spend through eBuy and SRFC combined was about 94% of the total spend. This signifies the importance of an end user training in using eBuy and SRFC. Moreover, from the discussion in Chapter 4, it is evident that more than 50% of the respondents believed that the eBuy catalog is more complex as compared with other e-retailers. However, only 25% of the respondents had received a formal training in eBuy. With Purchasing Services looking to grow the eBuy catalog program by including new suppliers to the catalog, it is highly imperative that the end users are trained in purchasing through eBuy. Similarly, as SRFC is the largest method of payment for goods and services at Penn State, it is important to train end users in using SRFCs.

Purchasing Services should include a mandatory eBuy training in the process of obtaining a Penn State p-card for goods and services. Since eBuy catalog and p-card are preferred for the purchase of small dollar-high volume items, this training will ensure that the end users receive

adequate training for purchasing through both these methods, and may be equipped to make better informed decisions. In addition to this, any end user that requests access to IBIS should be required to undergo a brief training in the use of a SRFC. Along with these trainings, a modification in the policies discussed in the previous Section and compliance monitoring of purchasing activities, will enable Penn State to reduce maverick spending.

6.2 Medium-Term Phase (6 months – 2 years)

6.2.1 Spending Analysis

As discussed in Chapter 3, the total spend through eBuy catalog in 2017 was only 3% of the total spend on goods and services. This is an extremely small portion of the total spend, which may be attributable to the fact that the University has only 30 contracted suppliers. It is important to perform spend analysis to determine new product categories and new suppliers for strategic partnership. However, Purchasing Services cannot perform spend analysis of the entire expenditure data for goods and services, due to the challenges discussed in Chapter 5.

Thus, Purchasing Services should work on the challenges discussed in Chapter 5, and regularly perform spend analysis for the entire expenditure data, to identify top spend item categories, top spend departments and top spend suppliers. Performing thorough spend analysis will assist the department in strategic decision making and supplier selection, which will facilitate identification of savings opportunities through aggregation and volume discounts.

According to Aberdeen (2004), the success of any supply management program is largely dependent on its ability to access, organize and analyze its spend data. According to their research of about 200 enterprises, they discovered that only a few enterprises knew what they spent on, who did they spend it with and who did they spend it for. Thus they performed a detailed study of

Table 6-1: Best practices for spend analysis (Aberdeen, 2004).

No.	Spending analysis practice
1	Audit existing spend data management capabilities
2	Access all spend data sources within and outside the organization
3	Adopt a common classification schema organization-wide
4	Establish efficient and repeatable data cleansing and classification capabilities through the use of software or services
5	Augment category expertise to ensure data and classification accuracy and validation
6	Classify spending at a detailed level
7	Enhance core spend data with vital business intelligence
8	Increase frequency and coverage of spending analyses
9	Utilize advanced reporting and decision support tools
10	Continuously expand uses and scope of spend data management program

effective strategies for spend analysis, by examining spend data management initiatives and software as services implementations at more than 30 leading enterprises. Based on their study, they found ten best practices for spending analysis which are mentioned in the table 6-1 above.

6.2.2 Change Management

As discussed in Chapter 1, one of the biggest factors that may influence non-compliant behavior in purchasing is organizational culture and the role of top management. In order to effectively implement any organizational change, it is important to adopt a top down approach. Since Penn State has more than ten thousand authorized end users across the University-wide purchasing, it is critical to involve senior management in the strategy development for any new process or procedure, during the early stages. An interest from senior management may result in higher user adoption of the eBuy catalog, and a higher compliance to purchasing policies. It will also positively affect the reputation of the University and the organizational leadership.

Purchasing Services must communicate the benefits of using preferred suppliers and adherence to purchasing policies, to the senior management at Penn State. These benefits include not only tangible benefits such as cost savings, time savings spend leverage and volume rebates, but also intangible benefits such as improved buyer-supplier relationships, protection from liabilities, information security and better service. This may be done after performing a thorough spend analysis of the entire expenditure data, and identifying opportunities for savings. Involvement of senior management is crucial for the successful implementation of change management.

6.3 Long-Term Phase (beyond 2 years)

6.3.1 P-card Program Growth

The use of p-cards at Penn State is currently limited to small dollar value items, typically less than \$2,000, and which may not be available through the eBuy catalog. The purchasing policy BS14 defines guidelines for the use of p-card as a method of purchasing. However, recent advances in technology have enabled improved integration of p-card data with other purchasing methods, and has thus received a wide adoption from universities across the US, for more than just off-contract and small dollar-value purchases. According to a report by JP Morgan (2007), there has been a significant increase in the use of p-cards as a permanent payment vehicle at many universities. According to Aberdeen's (2005) study, the biggest hinderance in wide acceptance of the p-cards is the fear of fraudulent activities. However recent technological advancements allow integration of p-card with General Ledger (GL), Enterprise Resource Planning (ERP) systems, and e-procurement systems and thus provide a high level of spend visibility, which facilitates detailed spending analysis. In his paper, Roy (2003) discusses the

Table 6-2: Levels of data collection (How P-Cards Work).

	Date	Supplier	Transaction Amount	Sales Tax	Customer – Defined Code	Line-Item Detail
Level 1 Standard	X	X	X			
Level 2 Variable Data	X	X	X	X	X	
Level 3 Detailed Data	X	X	X	X	X	X

concepts of basic knowledge of p-card use and working knowledge of p-card use, and how they can be leveraged to increase use of p-card purchase for approved suppliers. Based on academic research and current practices at Penn State, the following strategies are recommended,

- Improve Integration of p-card spend data – According to Beth Enslow of the Aberdeen Group (2004), best in class organizations are reconciling p-card transactions online. An electronic card management system is integrated into the organization’s general ledger, thereby allowing accounting entries for card transaction to be automatically fed into the enterprise-wide financial reporting system. Currently p-card transactions are reconciled manually at Penn State, which involves significant manual effort and creates an opportunity for error in data. However, reconciling p-card activities via electronic workflows enables collection of complete level 2 and level 3 data, which can further increase spend reduction by 1.3% - 5.5% via sourcing and compliance effectiveness (Aberdeen, 2005). Penn State should identify suppliers that can provide level 2 and level 3 data as shown in table 6-2 above, which can improve spend visibility and thus compliance monitoring. It will also result in gaining better spend leverage and financial reporting.
- Purchases under master agreement – Currently p-cards are used at Penn State only for incidental, unplanned or undefined purchasing transactions. However, Aberdeen (2005) recommends using p-cards as a permanent payment vehicle, as an alternative to an e-

procurement system with approved suppliers, to reduce transaction and process costs via an electronics payment approach. Some end users have difficulty using online catalogs and thus, are encouraged to commit maverick spend through other methods of purchasing. This approach has benefit as it promotes such end users to purchase from approved suppliers. Aberdeen also recommends the p-card director to be active in strategic sourcing and supplier selection activities. Penn State should explore possibilities of adopting p-cards as a permanent payment vehicle.

- Establish effective monitoring – It is extremely important to monitor the activities of p-cards and establish control to successfully run a p-card program. Currently, reconcilers and Internal Audit at Penn State are responsible for monitoring the activities of buyers through all methods of purchasing, and take corrective action or inform the responsible personnel about the same in the event of non-compliance. In their study JP Morgan (2007) studied the controls at various universities, the findings of which are as follows: George Washington University runs its payroll list against the list of p-card holders to monitor card abuse. If there is any discrepancy, the card holder is investigated further with the possibility of a termination of their account. Yale University issues individual p-cards only to faculty, postdoctoral associates and staff members who are authorized to purchase travel related services. Department cards are issued to primary users within a department and may be used for business meals, food or catering expenses, miscellaneous supplies, air travel, hotel / conference deposits, etc. Texas Women’s University uses a Merchant Category Code (MCC) to block certain types of suppliers from p-card use. Penn State University must adopt some controls to check the use of p-cards as well as monitor activities on a regular basis.
- Extend the use of p-cards to purchase orders and other categories – Traditionally, p-cards have been used for purchasing certain categories such as office supplies, computer equipment, MRO supplies, etc. However, recent studies indicate that p-cards may also be

used for non-traditional service categories such as advertising, marketing, print, maintenance, temporary services and consulting. This paradigm shift is backed by a clear intent to reduce paperwork to the largest extent possible. It is also recommended to use p-cards for purchases that originated from small dollar value purchase orders in order to improve efficiency. As discussed earlier, electronic reconciliation would greatly reduce the manual effort and facilitate improved spend visibility. Penn State may choose to adopt p-card usage for non-traditional categories.

- Mandate P-card user training – According to his research, Roy (2003) explained that compliance in use of a p-card is a function of both basic knowledge of a p-card as well as a working knowledge of p-card. The basic knowledge of a p-card may be attained by attending a half-day seminar organized by the purchasing department or p-card issuer. The basic knowledge entails familiarity with p-cards and how to use p-cards along with other methods of purchasing from authorized vendors. Currently at Penn State, an end user is required to complete online training followed by an online quiz to qualify for obtaining a p-card. However a working knowledge entails gaining detailed knowledge of p-card which can be obtained only after its actual usage. During this stage, it is important to educate end users of the organizational benefits associated with compliant usage of p-cards, which include long term buyer-supplier relationships, clearer accounting and reporting, improved spend visibility and better spend leverage. There is a need to impart a working knowledge of the p-card at Penn State, to observe compliance in its use.
- Establish Ghost card programs – Penn State does not have ghost card programs with high volume suppliers in categories such as MRO, office supplies, janitorial, etc. For this reason, there is a need to issue many individual p-cards for end users, which increases the possibility of maverick buying. The absence of a ghost card program also necessitates standing orders / blanket orders, which decreases spend visibility for Purchasing Services as discussed earlier.

The University must identify its high volume suppliers and may introduce ghost card programs, to curb the total number of p-cards in the University-wide system.

- Involvement from upper management – It is important to understand the benefits of having a p-card program, which eliminates paper checks and invoices thereby decreasing cost and time for the University. These benefits must be demonstrated to higher management for successful growth of the p-card program at Penn State.

6.3.2 Compliance Monitoring

As discussed in Chapter 4, currently Penn State does not have a designated department that is responsible for monitoring the spend through SRFCs. Central Accounting or Accounting Operations is responsible for receiving requests for SRFCs and making the final payment to the suppliers. However, there is no department which is responsible for monitoring compliance in use of an SRFC as per the payment decision matrix. This partially explains the reason for the exponential growth in the spend through SRFCs over the last seven years. As discussed in Chapter 1, and as stated by Karjalainen (2011), compliance monitoring is extremely important to realize the benefits of negotiated contracts or established policies. Compliance monitoring also ensures protection of an organization against legal liabilities and efficient use of resources.

After the modification and creation of policies discussed in Section 6.1.1, it is recommended that Penn State should designate a department/office to monitor the spend through SRFCs. This includes monitoring compliance with regards to the policies, ensuring adequate end user training, exercising corrective actions in case of non-compliance and assuring efficient use of the University's budget. Similarly, the spend through p-cards should be monitored regularly to verify compliance in its use. Due to the large number of transactions and spend through these two methods, this strategy is recommended in the long-term.

6.4 Action Plan

The following action plan is developed for Purchasing Services based on the discussion in this chapter,

Table 6-3: Action Plan for Mitigating Maverick Spend

Time Phase	Mitigation Strategy	Current Practice	Future Recommendation
Short-term (0 – 6 months)	Change in Policy	<ul style="list-style-type: none"> eBuy Catalog not mandated No clear policy for SRFC use 	<ul style="list-style-type: none"> Mandate use of the eBuy catalog for available items Establish new policy for SRFC use
	End User Training	<ul style="list-style-type: none"> Voluntary eBuy training No SRFC training 	<ul style="list-style-type: none"> Mandate eBuy training for p-card holders Mandate SRFC training for SRFC users
Medium-term (6 months – 2 years)	Spend Analysis	<ul style="list-style-type: none"> Spend analysis performed irregularly Only performed for spend through eBuy 	<ul style="list-style-type: none"> Perform regular spend analysis of the entire expenditure data for goods and services Adopt data visualization software to facilitate spend analysis
	Change Management	<ul style="list-style-type: none"> No involvement of senior management in change management 	<ul style="list-style-type: none"> Involve senior management in new policy implementation for effective results
Long-term (beyond 2 years)	P-card Program Growth	<ul style="list-style-type: none"> P-card use limited to off-contract purchase Manual reconciliation 	<ul style="list-style-type: none"> Adopt p-card as permanent payment vehicle Incorporate electronic reconciliation
	Compliance Monitoring	<ul style="list-style-type: none"> No designated department to monitor spend through SRFCs Incomplete monitoring of spend through p-card 	<ul style="list-style-type: none"> Designate an office / department to monitor spend through SRFCs Complete monitoring of p-card spend using electronic reconciliation

Chapter 7

Conclusion and Future Work

This study is based on the work of previous scholarly research on how to identify non-compliant behavior in purchasing, also known as maverick buying, and to provide solutions to mitigate the same. In doing so, a structured approach was used to review different methods of purchasing at Penn State University. The methods which did not provide a clear visibility into the process were identified and studied in greater detail to understand the approval flow of transactions through those methods. After gaining a detailed understanding of the methods, the proportion of maverick spend in each method was estimated using quantitative analysis. A root-cause analysis was then performed by using various means such as surveys, meetings, discussions, reviews of policies and current practices at the University. Finally, mitigation strategies were recommended for the short-term, medium-term and long-term phases to mitigate or eliminate maverick buying. This study establishes a basis for future work which can further assist the University in achieving a streamlined operation and an efficient use of its resources. Future work may be focused in the following areas,

- Spend analysis for new potential suppliers – After cleansing and classification of the expenditure data, it may be analyzed in further detail to identify new suppliers for potential partnership. The University may have suppliers with significant annual spend but due to poor visibility, it may not be able to leverage its spend capability by negotiating new contracts. Potential suppliers may be identified for long term partnerships.
- P-card expenditure other than Amazon Business – Due to the high volume of transactions, it was infeasible to perform a manual audit for the entire p-card expenditure data. However, Amazon Business contributes to less than 5% of the total spend and thus, most of the p-card expenditure data remains unexplored, which may exhibit different maverick buying behavior

than on Amazon Business. It would be interesting to know about the trend of p-card use for in-stores purchases to further contribute to purchase card growth program.

- Standing orders expenditure data – As discussed in Chapter 2, a standing order / blanket order is approved and negotiated by Purchasing Services, which decreases the possibility of maverick buying. However, a three way match is not performed in this method during actual delivery of goods and/or services, which reduces visibility into actual spend through this method. Another drawback of this method is that it fragments the total spend with a supplier into different methods, thus hindering spend trend with that supplier. This may, however, be eliminated by having a central database for spend through all the methods. Future research may be focused on analyzing expenditure data of standing orders to verify whether there is fraudulent activity from supplier end, or due to collusion between end user and supplier.
- SRFC expenditure spend analysis by administrative area – This study focuses on identifying the total proportion of maverick spend in the SRFC expenditure data, based on certain assumptions. However, future work may be focused on performing an in-depth analysis of the SRFC approval path for high maverick spend administrative areas, to devise an effective mitigation strategy.
- Supplier performance monitoring / contract administration – It is assumed in this study that contracted suppliers of Penn State have maintained the terms and conditions of contract, during all stages of purchasing. However, when the item price in a catalog was compared to that of Amazon, it was found that the net price of items was frequently higher for items available through the eBuy catalog. Future research may be focused on tracking the performance of suppliers or contract administration to verify whether the suppliers are compliant or not. This may include comparing net price, analyzing variation in price, warranties, delivery promises, etc. The results may contribute to the actual reasons for maverick buying.

- Tracking end users purchasing history – The focus of this study has been on identifying maverick buying behavior exhibited by various departments and from the perspective of goods and/or services. Future work may be focused on tracking purchasing activities of individual end users to identify different groups of people based on their maverick buying behavior. Purchasing Services will be better positioned to take corrective actions for fraudulent use of the system.
- Cost avoidance estimation – This study focuses on the proportion of maverick spend in the p-card and SRFC expenditure datasets. However, the opportunity cost associated with purchasing outside the pre-established procedures and practices, is beyond the scope of this study. Future work may focus on identifying the missed opportunity cost savings due to maverick spend.

Appendix A

Glossary

Account Reviewer – Individuals in the requisitioner’s department designated by the Financial Officer as being responsible for verifying and potentially editing the requisition before it is sent to the Budget Office of that department for approval.

Administrative Area Code – An administrative area code is a unique two digit code designated to each administrative unit, for its identification. There are 81 administrative areas at Penn State.

Approval Path – The approval path represents the approval levels required for processing a transaction.

Budget Administrator – Individuals designated by the budget executive as being responsible for operating and controlling specific budget areas within the budget executive's administrative area. The budget administrator approves transactions at the specified dollar levels and categories, affirming the action meets the mission and goals of the unit and the University, demonstrates good stewardship of University resources, and that the action is appropriate within University Policies, Guidelines, and Procedures.

Budget Assistant – Individuals delegated by the budget administrator (with the concurrence of the budget executive and Financial Officer) to approve transactions in their own name for the budget administrator within the limits of the authorization policy. Budget assistants are typically regular staff positions with knowledge of the unit's mission and goals and a level of judgment suitable for making decisions regarding transactions, as determined by the accountable budget administrator.

Budget Office – The group consisting of the financial officer and the staff that is responsible for managing the financial and accounting needs of a specific Administrative Area.

Budget Executive – Individuals who are responsible to the President, Executive Vice President and Provost, or a senior vice president for the management of an administrative area. These individuals are normally the President's administrative staff, academic Deans and Chancellors. The budget executive approves transactions at the upper dollar levels and specified categories, affirming the action meets the mission and goals of the unit and the University, demonstrates good stewardship of University resources, and that the action is appropriate within University Policies, Guidelines, and Procedures.

Catalog Purchase – Any purchase made through the eBuy catalog by an end user.

Compliance Monitoring – Monitoring activities, procedures and processes to ensure compliance with applicable policies and regulations.

Confirming Order – The unauthorized purchase of goods or services without prior approval of Purchasing Services.

Corporate Controller's Office – The Office of the Corporate Controller is responsible for receiving and disbursing all cash and maintaining appropriate accounting records for these transactions. The Controller is also responsible for establishing, promulgating, and enforcing guidelines and controls established for receiving and expending all funds.

eBuy Catalog – An online marketplace developed by Penn State University where faculty and staff can place pre-authorized orders and purchase items available on catalog.

Encumbrance – Funds that have been reserved when a purchase requisition is finalized to avoid overspending.

EDI – Electronic data interchange is a method of transferring business information and/or funds between enterprises electronically, instead of paper.

End User – The ultimate/final buyer of goods/services at Penn State University

Financial Assistant – Individuals delegated by the Financial Officer to approve transactions in their own name for the Financial Officer within the limits of the authorization policy. This position aids the Financial Officer in assuring that expenditures are controlled, assets of the University are protected, and that all actions are in compliance with University Policies, Guidelines, and Procedures. The financial assistant also ensures the accuracy of all documents/actions through all financial systems.

Financial Officer – Individuals who represent the Corporate Controller in the various budget executive areas. This position has the responsibility of assuring that expenditures are budgetarily controlled, assets of the University are protected, and that all actions are in compliance with University Policies, Guidelines, and Procedures. The Financial Officer is also responsible for ensuring the accuracy of all documents/actions through all financial.

Ghost Card Program – A type of card account whereby an account number is issued or provided to a specific supplier or supplier type for the payment of purchases made by an organization's employees. Also referred to as Ghost Card or Supplier/VendorCard.

Hosted Catalog – Hosted catalogs are set-up based on the University's previous spend and contain the top purchased items that allow users to search across suppliers to find the item they need at the best price.

IBIS – Integrated Business Information System (IBIS) is the electronic business system used at Penn State, composed of a variety of business applications and systems to provide financial and human resource information.

Maverick spend – Purchase of goods or services without using the organization's formally defined processes and/or authorized vendors.

Non-Catalog Purchase – A non-catalog order is for goods and services not available through the eBuy catalog.

Object Code – Classification codes developed by Penn State in the areas of income and credits, salaries, wages and expenses and transfers, to facilitate effective spend analysis.

Pareto Principle – The Pareto Principle states that, for many events, roughly 80% of the effects come from 20% of the causes.

Pre-authorization – A Financial Officer providing pre-authorized funds to an end user to facilitate purchases from the eBuy catalog, that do not require additional approvals.

Procurement – It is the process of selecting suppliers, establishing payment terms, strategic vetting, selection, the negotiation of contracts and actual purchasing of goods and/or services.

Punch-out Catalog – A punchout catalog or electronic purchasing catalog is a method for an end user to buy from a supplier's website from within the organization's own procurement application or hosted e-procurement system.

Purchase Order – The actual ordering document sent to a supplier that contains the details of the purchase and any applicable terms and conditions.

Purchase Requisition – A purchase requisition is a request for goods or services made by an end user to Purchasing Services. If the requisition is approved, Purchasing Services submits a purchase order to the supplier.

Purchasing Agent – Individuals who represent Purchasing Services and are responsible for justifying the source of purchase and determining the validity of competitiveness. This generally means soliciting competitive bids based on established bidding thresholds.

Purchasing Card – The Penn State Purchasing Card is a Visa charge card that enables authorized Penn State employees to purchase certain goods and services and travel expenses directly from a supplier. It eliminates the need for additional paperwork and it can be used for transactions up to a predetermined limit, which varies by employee.

Purchasing Card Holder – Any Penn State employee who has been issued a Penn State p-card and is authorized to purchase on behalf of the University.

Purchasing Services – Purchasing Services, a division of Procurement Services within the Office of Auxiliary and Business Services, is the designated authority for the effective and efficient procurement of goods, materials, and services for The Pennsylvania State University.

Reconciler – The Financial Officer or that individual delegated by the area's FO to perform the daily reconciliation between p-card receipts and daily electronic notification from the issuing bank for goods and services transactions

Reconciliation – It is the process of ensuring that the money leaving the account matches the actual money spent.

Special Request for Check (SRFC) – It is a method of payment where the end user requests direct payment to an individual or entity or supplier.

Spend Analysis – It is the process of collecting, cleansing, classifying and analyzing an organization's expenditure data with a goal of decreasing procurement costs and improving efficiencies.

Standing Order – Standing Orders are issued to suppliers for a specific period of time and a stated amount of money. Purchases are limited to supplies of a repetitive nature.

Three-way match – Matching purchase order, shipping order and invoice to ensure receipt of goods and/or services before final payment is processed.

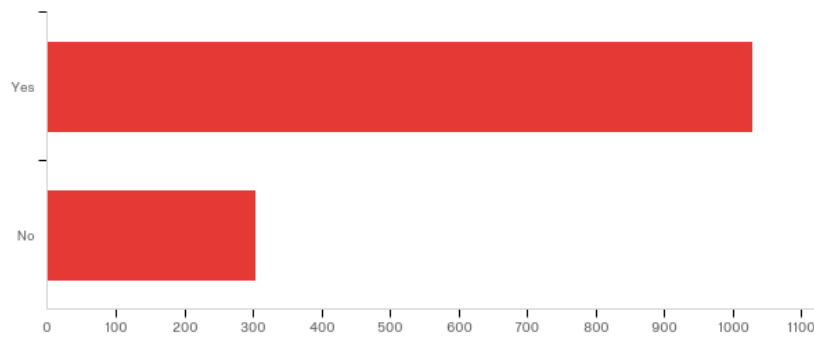
Appendix B

Survey Results

Summary of Survey Results

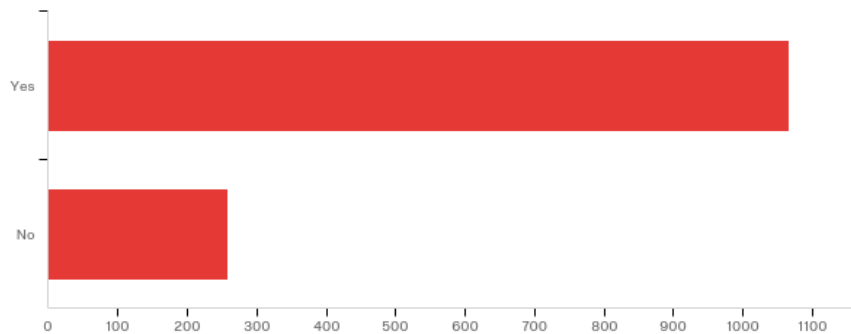
Attached is a summary of survey results provided by Purchasing Services which was anonymous and was provided to help identify root-causes of maverick spending at the University.

Q2 - Are you aware of preferred suppliers / volume discounts through eBuy (catalog) purchase?



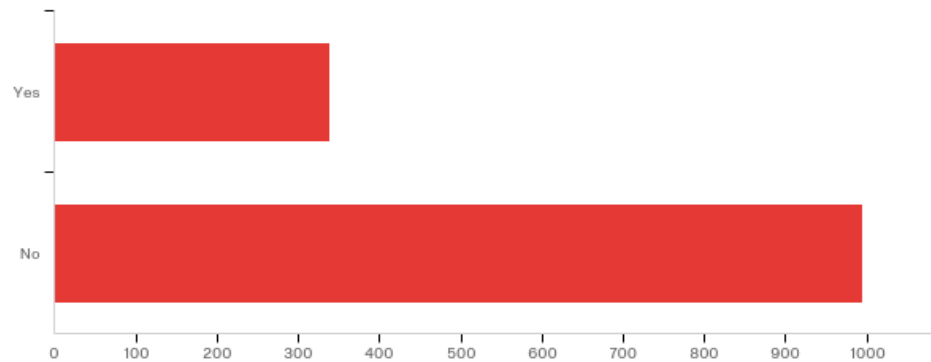
#	Answer	%	Count
1	Yes	77.24%	1028
2	No	22.76%	303
	Total	100%	1331

Q3 - Have you read the purchasing policy of Penn State University?



#	Answer	%	Count
1	Yes	80.45%	1066
2	No	19.55%	259
	Total	100%	1325

Q4 - Have you attended any formal training for eBuy (catalog) purchases?



#	Answer	%	Count
1	Yes	25.38%	338
2	No	74.62%	994
	Total	100%	1332

Q6 - How easy/difficult is it to find an item on eBuy on a scale of 1 (very easy) – 10 (very difficult) ?

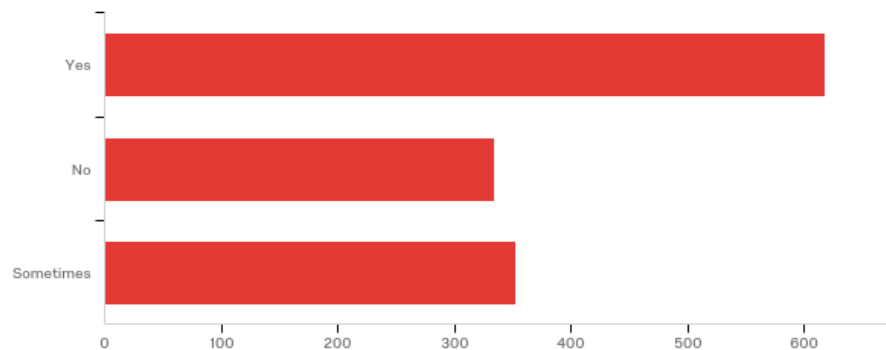
Mean – 5.17

Std Deviation – 2.34

Variance – 5.48

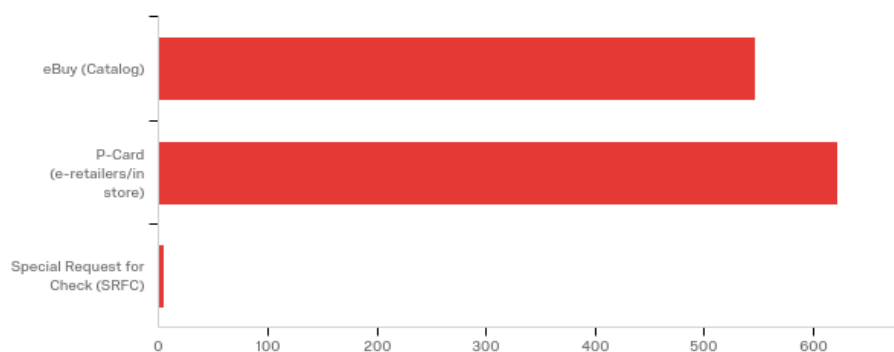
Count – 1123

Q7 - Do you look for an item on eBuy (catalog) before purchasing from e-retailers(Amazon)/in-store?



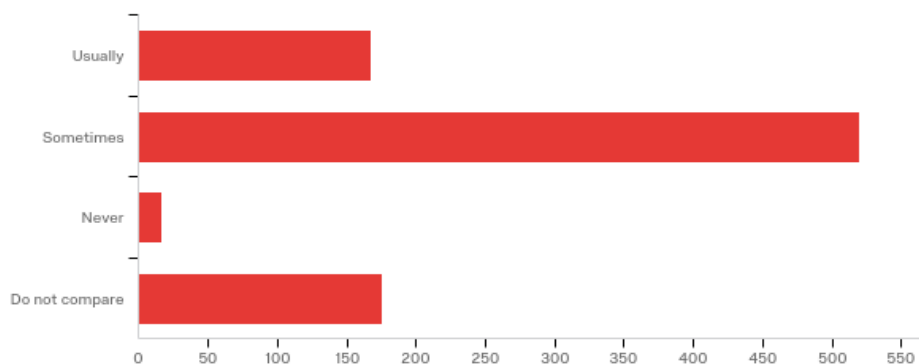
#	Answer	%	Count
1	Yes	47.39%	618
2	No	25.61%	334
3	Sometimes	26.99%	352
	Total	100%	1304

Q8 - What is your preferred method of purchase for small dollar value items?



#	Answer	%	Count
1	eBuy (Catalog)	46.60%	548
2	P-Card (e-retailers/in store)	52.98%	623
3	Special Request for Check (SRFC)	0.43%	5
	Total	100%	1176

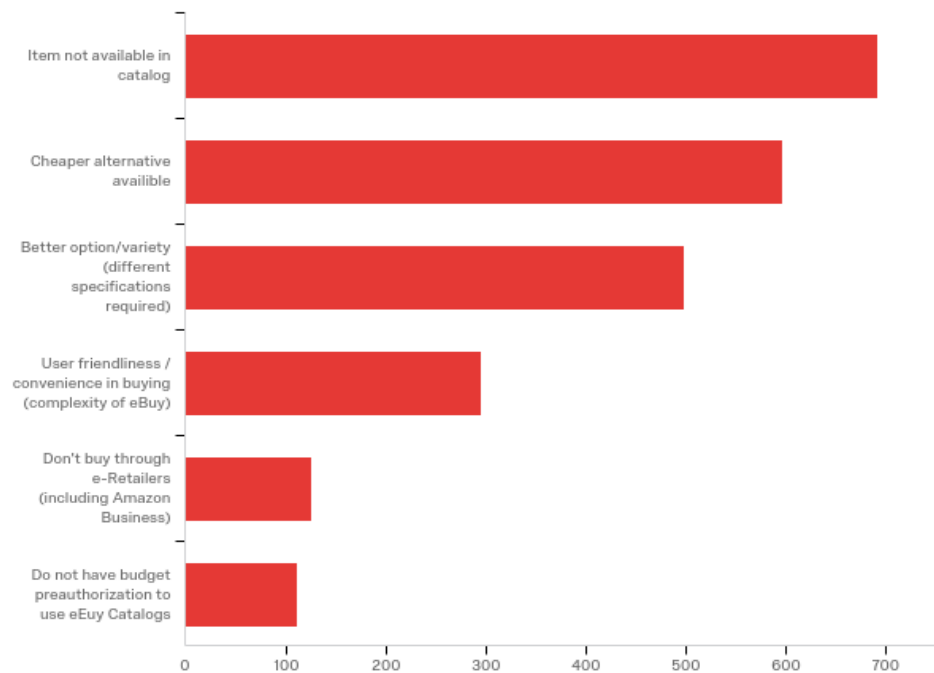
Q9 - Are prices of products/services on eBuy (catalog) generally higher than e-retailers(Amazon) / in-store?



#	Answer	%	Count
1	Usually	19.07%	168
2	Sometimes	59.02%	520
3	Never	1.93%	17
4	Do not compare	19.98%	176
	Total	100%	881

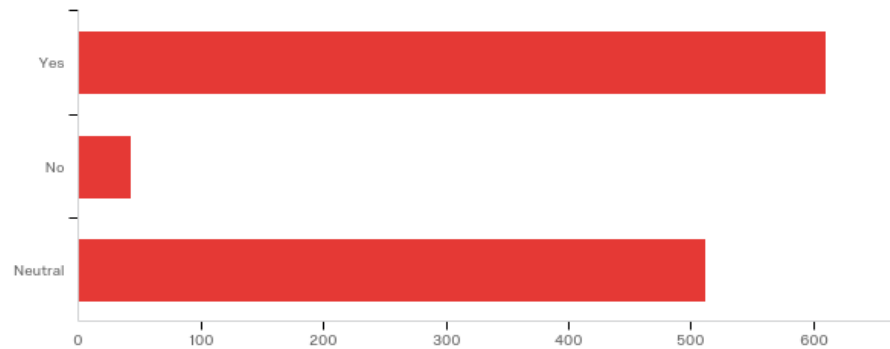
Q10 - When do you purchase from e-retailers(Amazon)/in-store instead of eBuy (catalog)?

*Select all that apply



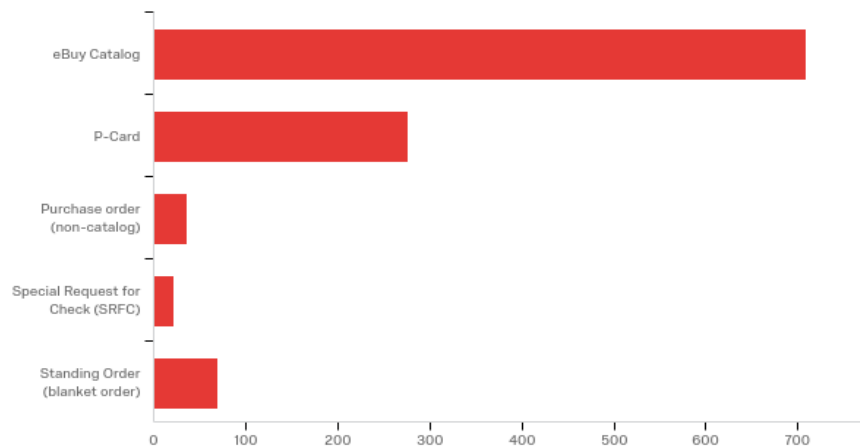
#	Answer	%	Count
1	Item not available in catalog	29.81%	692
2	Cheaper alternative available	25.72%	597
3	Better option/variety (different specifications required)	21.50%	499
4	User friendliness / convenience in buying (complexity of eBuy)	12.71%	295
5	Don't buy through e-Retailers (including Amazon Business)	5.43%	126
6	Do not have budget preauthorization to use eBuy Catalogs	4.83%	112
	Total	100%	2321

Q11 - Would you prefer to use eBuy if the interface was like Amazon.com (more user friendly)?



#	Answer	%	Count
1	Yes	52.40%	611
2	No	3.69%	43
3	Neutral	43.91%	512
	Total	100%	1166

Q12 - According to your knowledge, which purchasing method is the least costly for the University to process?



#	Answer	%	Count
1	eBuy Catalog	63.70%	709
2	P-Card	24.80%	276
3	Purchase order (non-catalog)	3.23%	36
4	Special Request for Check (SRFC)	1.98%	22
5	Standing Order (blanket order)	6.29%	70
	Total	100%	1113

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