Knowledge Leadership Report

Alternative Transaction Technologies to Augment Cash Registers

May 2013
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Alternative Transaction Technologies to Augment Cash Registers

May 2013

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Executive Summary

Card-based transactions have been gaining increasing popularity ever since their introduction. Due to their ease of implementation and ability to track expenses, consumers prefer using their credit or debit cards to make payments. This has required businesses to be flexible with card acceptance and a reduced emphasis on cash-only transactions. However, credit and debit card transactions, referred to here as traditional transaction methods, have a complex fee structure. Multiple fees are levied on the merchant and this is especially harmful for small businesses looking to make small-ticket transactions. As a result, they tend to impose restrictions on consumers wishing to make purchases, in the form of cash-only or minimum purchase amounts. If the consumer is unable to meet those demands, this might result in lost revenue.

Figure 1. Market perception map for multiple alternate technologies

Alternate technologies have been developed that alter the banking system of these cards or the point of sale (POS) device. These technologies, while still allowing consumers to use their cards provide the merchants with lower-cost options for making these transactions. A student survey conducted by OTCR revealed that a majority of people prefer making their payments by cards. These respondents were also willing to pay a low convenience fee for small ticket transactions. Parallel business case studies indicated that small merchants indeed avoid traditional card transactions due to high fees. Most of them have implemented alternate technologies (such as Square) or are
considering it. These results indicate a shift occurring in the way small ticket transactions are being made.

Although there are a number of technologies being developed for this purpose, not all are conducive for small businesses. Based on the average ticket price and number of transactions, particular technologies are more advantageous. A market perception map of some of the prominent technologies (Figure 1) allows us to place them relative to each other for certain price and volume sales.

This report attempts to explain the complex fee structures of traditional financial transactions and their disadvantages for small businesses. It also provides information on alternate technologies that can augment the cash registers, saving the business large fees and potentially increasing their transaction volume.
Introduction

Financial transactions drive the success or failure of all businesses, big or small. An opportunity to increase the number of transactions or revenue generated per transaction has significant long term implications. Typically, traditional payment processing methods defined as a pre-purchased electronic terminal used as the point of sale (POS) device have been used for processing card transactions. Advanced payment methods have been developing rapidly to compete against these traditional methods. These alternative technologies are new payment systems that alter the traditional structure and are gaining market share within Electronic Fund Transfer (EFT) networks. They are categorized as either involving the use of a mobile system as the POS or at the POS. The development of these trends means that small businesses have more choices than ever before.

This document gives an analysis of different transaction technologies with regards to advantages and disadvantages of each, along with recommendations based on the transaction trends of the business. Small businesses will find this useful to navigate the changing alternate transaction landscape with the possibility to reduce payment processing fees.

There are multiple other sources that aggregated data on transaction technologies. The Nilson Report\(^1\) categorizes vast data on transaction trends and global patterns. While this report uses some of that data, it is organized and presented with a different target audience and focus.

It is critical to understand and analyze the market and cost breakdowns behind credit cards, debit cards, and additional mobile technologies. Evaluation of the underlying financial system behind these technologies serves to determine their cost and value proposition. Multiple parties have interactions in each technology and this paper sets out to uncover the function of each. User demographics also play an important role in the application and adoption of the payment system. Different age groups and ethnicities derive alternate usage patterns and payment choices. Distinct differences between debit and credit cards exist on both the cost and value to customer side.

A student survey was conducted to assess payment profiles in Champaign-Urbana. The results outlined significant distinctions between technology preferences and student spending habits. Further information was gathered through local small business case studies. The two companies studied were a small coffee shop chain and a paintball park. Similarly, transaction details and preferences of several merchants from the local Farmer’s Market were also studied. While each business had individual needs and priorities, overarching themes of cost and value prevailed and the analysis of the results can be applied to a multitude of other businesses.

\(^1\) http://www.nilsonreport.com

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Analysis was done with respect to value added by each technology in addition to the costs and fees associated with each. Historical small business transaction costs were used in conjunction with usage patterns to determine potential revenue and subsequent technology value.

Card-based Financial System

The card system is a complex network that involves interactions between different components to process a transaction. Over time and through various consumer and market preferences, certain companies have become prominent in their respective categories. The majority of companies process transactions in a similar manner. However with regards to transactions, credit and debit cards are handled differently within this system. Before understanding the underlying mechanisms of the transactions, it is important to identify factors that constitute the financial system.

Individual Market Components

The EFT market has grown substantially throughout the 20th century to become the complex web of companies and entities that exist today. For simplicity, major components of the market can be divided into five categories: card networks, card issuers, merchant card processors, merchants, and consumers\(^2\)

Card Networks

Card networks operate the electronic data infrastructure that allows near-instantaneous transactions between merchants and consumers. Visa, Inc. for example, runs the largest card network in the world. Their role in the industry is to relay the charges the cardholder has accepted to the card issuer. Card networks serve as administrators in this EFT network. They settle rates that businesses pay and manage issuing and acquiring banks. Card networks also maintain a computer network and route transactions between the different components of the EFT network. Key examples of these networks are Visa, MasterCard, American Express, and Discover.

Card Issuers

While card networks operate the transactions, the card issuers are the companies who interact with consumers and the money that they spend. With a credit card, card issuers grant consumers lines of credit, which is the provision of money with the expectation of future payment and authorize transactions after they are processed. This agreement between the cardholder and the card issuer allows the holder to make purchases with the card while promising to pay the issuer back in addition to interest owed. With debit cards, card issuers solely serve to maintain the consumer’s account

\(^2\) [http://www.cardfellow.com](http://www.cardfellow.com)
and authorize transactions. Card issuers then profit from debit cards, as they gain interest on the funds that consumers hold in their accounts. As of 2011, the biggest companies in this field in order of decreasing market share were: American Express, Chase, Bank of America, CitiBank, and Capital One³.

**Acquiring Bank (Merchant Card Processor)**

The acquiring banks serve to maintain the accounts of the merchants, allowing the businesses to accept credit and debit cards. After a transaction is made the acquiring bank sends information about the consumer’s card to the card network. If the transaction is a PIN debit transaction, the information is sent to the merchant card processor before routing it to the card network. The acquiring bank is sometimes in charge of bundling all of the fees for the merchant and the resulting funds are distributed amongst the parties involved in the transaction.

**Merchant**

The merchant, also referred to as the business, is the party charging the consumer for a purchase. The merchant can range from a small business to a large franchise and it is the goods or services provider. Merchants can rely on cash and/or EFT systems to handle payments.

**Consumer**

The consumers are the final component of the system. They are the cardholders who store their funds in an account for use of a debit card or who receive a line of credit from a card issuer that allows them to make purchases using credit and accept liability to the card issuer as a result.

**Transaction Processes and Fee Structures**

Based on the type of transaction taking place (credit vs. debit) the funds involved exchange hands through different components of the system. Here we give a brief overview of the fees involved for the major card issuers and networks for credit and debit transactions.

**Transaction process for Credit cards**

The following points outline various steps that each component of the financial system undergoes after a transaction is made.⁴ ⁵ The steps are summarized in Figure 2:

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³ [http://www.niisonreport.com](http://www.niisonreport.com)
⁴ [http://www.cardfellow.com](http://www.cardfellow.com)
⁵ [http://www.electronictransfer.com/blog/merchant-account-questions/information-on-credit-card-interchange](http://www.electronictransfer.com/blog/merchant-account-questions/information-on-credit-card-interchange)
1. As a consumer presents his or her credit card information to merchant to make a purchase, the merchant’s POS system forwards the request to their bank (the acquiring bank). The acquiring bank sends the transaction to the card networks that charge a small *Interchange Fee*.

2. The card network then sends the transaction to the customer’s issuing bank where they will either approve or decline the transaction based on the sufficiency of funds in the consumer’s account.

3. The issuing bank charges a small fee known as the *Merchant Discount Fee*, out of the transaction. The issuing bank then sends the remaining funds (minus the fees) to the merchant’s POS system and the acquiring bank.

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All transactions are recorded by the respective participants for bookkeeping. While the authorization of the transaction is almost instantaneous, depending on the card networks and card issuers involved, this whole process can take anywhere from two to thirty days. The upper end of this range is caused by merchants batching their transactions; meaning that they don’t send their transactions along to the card network until they have built up a large number of transactions.

With credit cards, there will always be a delay in payment to the merchant after a transaction (varies with the issuer). For example, Visa has a delay of approximately 3

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6 Nilson Report, February 2011

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days, MasterCard has a 2-3 day waiting period, and American Express has an average delay period of 3-7 days.\textsuperscript{7,8}

**Credit Card fee structure**

There are different fees that a merchant has to pay during the transaction process.\textsuperscript{9,10} These include fees to the issuing banks as well as the card network. These, along with any fixed or recurring cost of the POS system comprises the total fees assessed to a merchant during a card-based transaction (Table 1)

*Merchant Discount Fee:* This fee is levied by the issuing bank on the merchant. Expressed as a percentage of the transaction value and a fixed dollar amount, the merchant discount fee is a large fraction of the total fees.

*Interchange (Reimbursement) Fees:* This fee is levied by the card network on the merchant. Also expressed as a percentage of the transaction value and a fixed dollar component, interchange fees are often a smaller than the merchant discount fee. This fee is in exchange for the card network’s services in processing the transaction.

<table>
<thead>
<tr>
<th>Merchant Fees per Transaction</th>
<th>Card Network</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Visa</td>
</tr>
<tr>
<td>American Express</td>
<td>N/A</td>
</tr>
<tr>
<td>Chase</td>
<td>1.84% + $0.45</td>
</tr>
<tr>
<td>Bank of America</td>
<td>2.17% + $0.51</td>
</tr>
<tr>
<td>Citibank</td>
<td>1.74% + $0.44</td>
</tr>
<tr>
<td>Discover</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 1. **Fees assessed in a Credit Card transaction.**\textsuperscript{11,12}
Transaction process for Debit cards

Charges incurred vary greatly when comparing a credit or a debit charge, though the transactions roughly follow the same path. Once a consumer makes a purchase, their card’s data is entered into the merchant’s payment system at the POS. This data is sent to the merchant’s acquiring bank, which routes it through the payment system to the card network. The card network then sends the information to the issuing bank, which verifies the transaction and performs either of two tasks:

1) Debit the consumer’s account if PIN debit was selected
2) Credit the consumer’s account if they used a credit card or chose Signature debit.

After authorization, the information is sent back through the system to confirm the purchase. See Figure 3 below for an illustration on the payment chain.

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Figure 3. Transaction payment processing chain for debit cards

Within this system, fees are higher for credit card transactions, as the issuing bank is adding fraud and risk protection services. Even though signature debit transactions involve the issuance of a line of credit, the transaction still processes as a debit card and the transaction amount is deducted from the consumer’s account within a few days. The consumer cannot keep that transaction amount in their balance for a month like they can for a credit card transaction. Since the timeframe that the issuing banks have extended that line of credit is drastically shorter with debit card transactions, the risk the issuing bank is smaller and the fee they assess to the merchant is smaller. Consequently, since debit charges involve smaller fees than credit cards, they are preferred by small businesses.
Debit Card fee structure

Charges between signature debit and PIN debit are the same for major card issuers due to the passing of the Durbin Amendment, which was an addition to the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. This amendment drastically cut fees that large card issuers, with total assets greater than $10 billion, could charge on debit card transactions. Within a debit card transaction, the fees per component are shown below (Table 2).

<table>
<thead>
<tr>
<th>Group</th>
<th>Fee Type</th>
<th>Rate</th>
<th>Flat Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card Issuer</td>
<td>Interchange Fee</td>
<td>0.05%</td>
<td>$0.22</td>
</tr>
<tr>
<td>Card Network</td>
<td>Assessment Fee</td>
<td>0.11%</td>
<td>N/A</td>
</tr>
<tr>
<td>Card Network</td>
<td>Network Access/Data Usage Fee</td>
<td>N/A</td>
<td>$0.0185</td>
</tr>
<tr>
<td>Card Network</td>
<td>Settlement Fee</td>
<td>N/A</td>
<td>$0.0025</td>
</tr>
<tr>
<td>Card Network</td>
<td>Other Fees (International, Integrity, etc...)</td>
<td>Misc.</td>
<td>Misc.</td>
</tr>
<tr>
<td>Merchant Card Processor (Acquirer)</td>
<td>Markup</td>
<td>Misc.</td>
<td>$0.0025</td>
</tr>
</tbody>
</table>

**Table 2. Fees Assessed in a Debit Card Transaction**

Debit vs. Credit – Their difference and impact on the system

Debit and credit based transactions have a few key differences that determine the way they impact the financial system. While a credit transaction is a consumer’s promise to pay back the card issuer, a debit transaction involves a direct funds transfer from the consumers account to the merchant. All transactions are sent through a card network like Visa or Mastercard, but credit transactions have added fraud and risk protection from the card issuers due to the issuance of a line of credit. Furthermore, credit transactions are more costly to the merchant, since card issuers have a higher risk in the transaction.

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14 Feefighters.com

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Consumers have the choice to use either a credit or a debit card. In a credit based transaction, failure on the consumer’s part to pay back the issuer within a given time frame will result in interest charges. On the other hand, when using a debit card the consumer has the decision to perform a signature based transaction, which acts like a credit transaction, or a Personal Identification Number (PIN) based transaction, which acts like a debit transaction in which case the funds are directly withdrawn from the bank. However, credit cards offer rewards such as cash back or frequent flier miles on every purchase that debit cards do not.

**Consumer Trends and Statistics**

**Credit card market share**

The following graphs (Figure 4) give an overview of the major companies in the credit card industry and their varying market shares\(^\text{16}\). Visa has the big lead as a card network and gains a large advantage when making deals with card issuers. MasterCard mainly gains business for their combined credit card and debit card services.

![Market Share of Credit Card Companies](Image)

**Figure 4. Market share of credit card companies\(^\text{17,18}\)**

While American Express doesn’t have a large share in the debit card market, they hold large portions of the card network and card issuer markets. Not only do they have cards that have the issuer and the network as American Express, but they also use their card network service in conjunction with other card issuers like Bank of America and Citibank. Even the smaller card issuers find their niches in the market, and companies with a plethora of other services back them all.

\(^{16}\) Cardhub.com  
\(^{17}\) http://www.cardfellow.com  
\(^{18}\) Feefighters.com

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Consumer preferences and spending habits

According to a 2010 survey by the Federal Reserve Bank of Boston, consumers actually prefer to pay using debit and credit cards as opposed to cash and checks. On average consumers own between three to four credit cards and one debit card, typically owning multiple credit cards for their different rewards programs and because not all credit cards are accepted everywhere. Comparatively, consumers see the need to have a debit card due to the convenience over small-ticket (low cost) cash transactions. Using a debit card also allows consumers to budget expenses immediately after spending and they do not see any need to own more than one debit card like they do for a credit card.

Due to a consumer’s likelihood of carrying a card, small business owners could potentially increase their revenue by 23% by accepting payments from cards. Some consumers may not always carry cash around, for using a card instead is much more convenient.

User demographics

There are widely different usage statistics between different age groups as well as ethnicities. Credit cards are marketed to young adults, especially university students that are planning to graduate or enter the work force. On average, a consumer adopts their first credit card at the age of 21. However, 39% of students entering college as freshmen already own a credit card primarily because it is useful to make large purchases, spend on living expenses, and handy in the event of a financially demanding emergency. Furthermore, in 2008 half of all college undergraduates had four or more credit cards. Credit card usage was also seen to increase with age. In 2008, 63% of consumers between 25-34 years old used a credit card, while 80% of consumers 65 years and older used one. Of the 65 years and older age demographic, 47% had used a debit card in 2008. Two trends are noted from these statistics. One such trend is with the older population being more likely to use a credit card. A possible reason for this is that credit cards offer financial security and measures to prevent card fraud. Additionally, debit cards are much newer than credit cards, and hence were not adopted as much by those that are now 65 years and older.

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19 The Survey of Consumer Payment Choice," Federal Reserve Bank of Boston, January 2010
20 https://www.chasepaymenttech.com/accept_credit_card_payments.html
21 http://w.monerisusa.com/payment-processing-services/benefits-of-credit-cards.aspx
Cardholder Usage Trends

In 2006, 65% of the card-based purchase volume occurred via credit cards\textsuperscript{24}. This number has been decreasing ever since due to an increased usage of debit cards (Figure 5). Nevertheless, the total amount of credit card usage has increased over time due to the increasing number of people with access to credit cards.

Recent regulations have capped the amount that card issuers can charge per debit card transaction. Consequently, card issuers are now pushing for a high volume of small-ticket transactions to serve as a replacement for cash based purchases. They are also pushing for the use of PIN debit instead of signature debit. In 2009, card networks were charging 55 cents on average for a transaction, but this number has declined to approximately 24 cents after the passing of the Durbin Amendment.\textsuperscript{25,26} Even though the card networks are charging less, merchants still have the option to charge the pre-regulation amount.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{U.S. Debit Card Circulation.png}
\caption{Debit card circulation trends\textsuperscript{27,28}}
\end{figure}

\textsuperscript{25} http://money.cnn.com/2012/05/03/smallbusiness/retailers-debit-cards/index.htm
\textsuperscript{26} https://www.pulsenetwork.com/pulse/public/about/pulse-news/press-releases/2012/debit-issuer-study.html
\textsuperscript{27} Visa.com
\textsuperscript{28} Mastercard.com
Implications of the traditional card banking system

The research presented highlights unique opportunities for businesses to alter their cost structure while potentially driving revenue and adding value to their internal mechanics. Many parties are involved behind the scenes in every card swipe and some technologies have different structural organization than others. The exchange dynamics can be altered depending on the technology and whether it facilitates the point of sale or acts as a replacement for it.

Technology decisions need to be made with strong consideration of what type of cost structure would be most advantageous for the specific business. For example, smaller ticket transactions would benefit from a flat percentage while large transactions would incur less cost with a per transaction fee. Multiple variations of these exist in every platform with potential alternate agreements available within an individual technology. In addition to this, target consumer spending habits and demographics should be studied and met with the appropriate transaction type and technology to maximize revenues while minimizing costs.

In the next section, specific alternative technologies will be looked at much more closely and evaluated on their convenience, technology, security, and costs. It is important before reading the next section to evaluate the desired performance and functionality along with cost breakdown. Viewpoints and unique experiences from local small businesses will also be provided.
Alternate Technology Analysis

Since many different technologies exist that can be used as part of the EFT network in place of the traditional card swiping machine, it is critical to define what exactly alternate technology is. For purposes of this paper, alternate technology is defined as new payment systems that are gaining market share within EFT network. All alternate technologies are categorized one of two ways: they either involve the use of a mobile system as the POS or at the POS. If the mobile technology is used as the POS, it may or may not alter the banking system. If it alters the banking system, the providing company will directly charge the merchant per transaction and will handle any charges associated with the EFT network behind the scenes. One example of this technology is Square, which charges merchants 2.75% per transaction and replaces the traditional banking system from the viewpoint of the merchant. On the other hand, if the technology does not alter the banking system, it will serve to only record transactions and still requires the use of a merchant-prepared banking system. The other category for alternative technology involves the use of a mobile device at the POS. This type of technology will modify the user experience by altering the way a payment is made. An example of this technology is LevelUp, which allows users to pay merchants via an application. It is common for alternate technology to fall under both categories for usage as and at the POS.

Alternate technology based transactions rely on a variety of technologies to record payments. One such technology is Near Field Communication (NFC), which involves the use of a chip that is embedded in phones and plastic cards, like debit, credit, and reward cards. The phone or card must be placed, or “tapped” against the reader, which can either be a dedicated card reader or a NFC capable phone. NFC has a short range of approximately 1-2 inches, and is often referred to as “contactless” technology. Another technology being used is QR codes, which are similar to barcodes except that they contain information over 2 axes instead of 1. Phone cameras and other alternate technologies can scan these codes, which contain payment information unique to the card the customer chooses to use. Some technologies require the merchant to scan the QR code that the customer has on their phone, while others require the customer to scan the merchant’s QR code and make the payment through the application interface. Some alternate technologies even use geo-location based services to collect payments from customers. Typically, the customer will walk into the business and make a purchase, having already downloaded the merchant-compatible mobile application. At the POS, the merchant will use their phone’s GPS to scan the nearby location for customers, and upon asking the customer their name, they can select them from their list and charge them. Finally, the customer will receive a notification on their phone to accept the purchase.
Existing alternate technologies

A list of current alternate technologies was compiled, and each technology was classified based on whether or not it altered the banking system (Figure 6). Six technologies were then selected based on the current market trends and what they offered.

![Diagram of Alternate Technology Classification]

**Figure 6. List of all alternate technologies based on banking system**

Recently, market trends have shown that mobile payments have risen from 18% in 2010 to 30% in 2012. Furthermore, the volume of NFC capable phones is expected to increase to 13% of the total amount of mobile phones in 2014. With the increase in mobile payments and NFC capable phones in the market, it will be advantageous for merchants to have a solution to allow customers to pay with their phones via NFC or some other means.

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One mobile payment solution, Square, processes an annual amount of $6 billion in payments, a major growth since it was founded in 2009. A large number of merchants are beginning to use this technology, and not just small businesses. Starbucks invested $25 million in Square in August 2012, and in November of 2012, all of Starbucks’ 7,000+ locations modified their systems to begin accepting payments using Square Wallet, an app installed on user’s phones that can share card information via QR code or geolocation.

**Top 6 techs in the market**

Various technologies were considered and of those, six technologies were selected for an in-depth comparison. These technologies are elucidated below:

**Square**

Square is an extremely convenient card swiping technology. It is universally acceptable as the iconic Square dongle can be used in any wirelessly capable phone. When registering for Square, anybody can sign up for a free account. What makes Square so enticing to small businesses or individual vendors is that no credit check is required, so it is easy to pick up a Square reader and use it the next day. Square is convenient in that it bundles all of the fees that would typically be assessed to a merchant into one flat fee. Square’s pricing scheme is simple to understand, and this convenience definitely works to its advantage.

Although Square is convenient, it lacks a strong customer support network. Square will only communicate with merchants through email or text, and even then, customer service is not particularly helpful. Square experienced rapid growth in market share, but it neglected its infrastructure such as customer service.

Square payments can work a variety of ways. On the merchant end, the card reader enables any merchant with the ability to accept credit and debit card based purchases. The merchant simply uses a Square app, and they can store the transaction information in the Square database. Merchants can add frequently purchased items to the application to increase the speed of checkout. They also have the ability to send out electronic receipts via text or email to the consumers. Additionally, using the iPad specifically enables merchants to use native software to provide analytics for their business. This application also gives merchants the ability to accept transactions from consumers who wish to key their card information in.

On the other end, consumers can install a Square Wallet application, which allows them to store credit card information on their phone. Then, while at the POS, they can use the application to produce a QR code which the merchant can scan. They also have the
ability to pay through the app using GPS services. The merchant can Geo-locate the consumer and allow the consumer to accept the transaction from their phone.

Square has a few security features in place. For example, data sent through Square is completely encrypted and Square conforms to Level 1 PCI Data Security Standard. Additionally, merchants that use Square can opt to have a PIN to use their mobile application. On the back end, Square lacks the advanced fraud network that issuing banks have built up over time. Consequently, Square is extremely cautious with transactions. If a merchant earns money from transactions past a certain threshold, Square has been known to occasionally hold that money from the merchant for up to a month to ensure that none of the transactions were fraudulent. Square also tracks transaction trends with merchants: if the merchant’s total volume received from transactions spikes during a particular month or if they incur a transaction that is significantly larger in magnitude that other transactions typically incurred, Square may hold the money.

Square offers two basic payment plans. Merchants can opt to pay 2.75% per transaction, or they can offer to pay $275 per month as long as their total yearly revenue is less than $250,000. For any transaction where consumers key-in card information into the merchant’s application, a fee of 3.50% + $0.15 is assessed as key-in transactions involve more risk.

**PayPal Here**

PayPal Here is an alternate technology solution offered by the widely recognized PayPal. PayPal offers merchants a mobile card reader that plugs into the audio jack of a smartphone just like Square. This technology allows merchants to swipe consumer’s credit and debit cards. Like most other card readers, it has the option for consumers to type in their card information instead of swiping, and it lets merchants enter in cash transactions for recording purposes. One unique feature of PayPal Here is that it allows merchants to take a picture of a written check, and it processes it through their system. A downside of the PayPal card reader is that it has been known to have some problems connecting with phones.

All earnings are then transferred to the merchant’s PayPal account, to which the merchant will have to request a funds transfer to have the earnings reach their bank. PayPal does provide merchants with a debit card to quickly access their funds from their account, which is a feature offered by no other competitor. This debit card has 1% cash back, which effectively lowers the total rate merchants pay per transaction as long as they withdraw funds using this card.

PayPal Here accommodates small businesses of all sizes. The merchant application can be downloaded on multiple phones and the card readers are free. This allows a single employer with multiple facilities or with high-throughput to allow their employees
to process transactions using their account. The PayPal Here application also allows merchants to build in shortcuts for frequently purchased items to reduce the total checkout time. Furthermore, PayPal provides various free analytical services for merchants to track transaction histories and business trends.

Consumers also have the opportunity to use PayPal to speed up the checkout time. If they install the consumer application they can use GPS services to pay for transactions where the merchant can confirm the payment by seeing a photo or requesting the name of the consumer. Through system checks like these, the PayPal applications offer secure services on both ends. Since PayPal has been the go-to online purchase agent for quite some time, it has built up quite a secure system and has developed trust from merchants and consumers alike. PayPal securely stores card information for consumers wishing to use the application, and for all transactions that are processed via a mobile card reader, the data transmission is securely encrypted.

PayPal assesses 2.7% for all swipe transactions and 3.50% + $0.15 for key-in transactions. If merchants withdraw funds using the provided debit card, the 1% cash back reduces the effective transaction rate to 1.7%. Merchants have the option to sign up for more advanced PayPal accounts which provide various features for a small monthly fee, but a paid account is not necessary to access the features described above.

**VeriFone**

VeriFone is a well-known provider of hardware that allows merchants to accept card swiping transactions. VeriFone offers many different types of machines for every business need, such as standalone machines that accept card swipes and NFC based transactions and smartphone cases that allow smartphones to scan cards, accept NFC payments, and integrate with smartphone cameras to scan QR codes. VeriFone based solutions are convenient, for they do not require merchants to own a smartphone or iPad, but they easily integrate with those who do. It is important to note that like all other mobile payment solutions, an active internet connection is required, so the standalone machine cannot be used at a remote site.

VeriFone provides secure transaction processing technology, and its mobile based hardware provides software that allows merchants to analyze their business trends and it highly customizable to enhance the consumer experience while checking out. VeriFone software also provides inventory management software for merchants.

VeriFone hardware can cost anywhere between $100 and $400, and it requires that merchants set up a traditional banking system before processing transactions. This solution will require various monthly and annual fees in addition to variable card swiping fees. Because of this, it is not the best technology for small businesses that typically process small-ticket transactions of less than $20. For businesses that already
have a banking system in place and would like to begin accepting different types of payments, VeriFone provides the perfect hardware.

**Flagship ROAMpay**

Flagship ROAMpay provides a simple, reliable card reader that plugs into smartphones and allows merchants to accept card swipes, key-in transactions, and even NFC based purchases if the merchant phone contains the required NFC chip. Like other solutions, ROAMpay offers a highly customizable application interface, can account for cash transactions, calculates tax and tips, and allows merchants to email receipts. ROAMpay provides a free merchant account, but it requires that the merchant applies to begin using the card processing solution.

Flagship boasts an extremely high rate of transaction acceptance, as the software provides a very secure interface along with a secure system for accepting transactions. Money quickly reaches the merchant account within 2 days, and Flagship provides excellent customer support. A key feature of ROAMpay is that it can store transactions while offline and will process them once the internet connection is reestablished, which is not true of many alternate technologies.

Flagship also offers application for consumers, which allow them to store card information in their phone to make payments via a mobile wallet and provide advertisements for businesses and deals to them.

Flagship assesses at monthly fee of $7.95 to use its payment processing services, and it charges $0.19 + 0.38%-1.58% per swipe. For key-in transactions, the rate is bumped up to 1.36%-2.56%.

**Groupon Payments**

Groupon has traditionally offered apps for consumers providing daily deals and advertising for businesses. They have now begun offering a payment processing technology. Groupon Payments offers a free card reader, which can either be a dongle that plugs into the audio jack of a phone or a convenient case that fits around the phone. Both technologies allow merchants to swipe credit and debit cards, and if the consumer has the Groupon application, the merchant can scan a QR code provided by the application.

Groupon provides excellent sales reports, transaction history reports, and analytics for small businesses and Groupon securely processes (in addition to securely processing) all transactions. Additionally, they provide the opportunity for merchants to promote their business and their products to new and returning consumers. If merchants promote their business on Groupon Rewards, they will be subject to a lower transaction fee. Without offering Groupon based promotions, merchants are subject to a fee of 2.2% +
$0.15 per swipe transaction, but this rate can be lowered to 1.8% with the use of Groupon Rewards. Key-in transactions cost a higher rate of 2.3%, which is not affected by the offering of rewards. The only downside of Groupon Payments is that American Express cards are processed at a higher rate than other cards dependent on several factors.

**LevelUp**

LevelUp provides a much different solution than the other alternate technologies described above. To use LevelUp, the consumer must download an application and link their credit and debit cards to it. The merchant has the option to either use their smartphone or a standalone/tablesider terminal to scan the QR code that the consumer displays. The merchant can then enter in the amount for the purchase, and the consumer is notified after the merchant processes the payment.

LevelUp provides merchants with strong analytics and a secure system, and funds reach the merchant account within a day. LevelUp gives merchants the ability to offer rewards to customers, and it also provides merchants the ability to develop advertising campaigns. If the merchant makes a campaign, their transaction processing fee is waived.

Transactions cost 2% to process, which is the cheapest rate assessed to process payments. If the merchant offers a campaign, then the rate is waived. The only catch is that the merchant is charged 40% of the discount value given to new customers. LevelUp by far offers the most attractive offer to merchants, but its main downside is that it requires consumers to download the application. This type of technology will work well with businesses that build relationships with customers and expect them to come back often. However it does present a barrier to businesses with infrequent customers.

Based on the above information, the main aspects of these technologies can be classified and compared as shown below in Table 3. This will help a merchant choose a technology based on its features while allowing comparisons to other options available in the market.

<table>
<thead>
<tr>
<th>Transaction Cost</th>
<th>Technology</th>
<th>Perks</th>
<th>Interface</th>
<th>Security</th>
<th>Support</th>
<th>Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Square</strong></td>
<td>2.75% Cards, Square Wallet (QR, GPS)</td>
<td>Easy to sign up</td>
<td>High</td>
<td>Med</td>
<td>Low</td>
<td>Med</td>
</tr>
<tr>
<td><strong>PayPal Here</strong></td>
<td>2.7% Cards, checks, PayPal (GPS)</td>
<td>1% cash back debit card</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Med</td>
</tr>
</tbody>
</table>
Alternative Transaction Technologies to Augment Cash Registers

<table>
<thead>
<tr>
<th>Technology</th>
<th>Bank dependent</th>
<th>Cards, mobile wallet (NFC, QR)</th>
<th>Inventory management</th>
<th>Offline transactions</th>
<th>Promotions</th>
<th>Consumer Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>VeriFone</td>
<td>dependent</td>
<td>Cards, mobile wallet (NFC, QR)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>ROAMpay</td>
<td>0.38-1.58% + $0.19</td>
<td>Cards, ROAM Wallet (NFC)</td>
<td>Offline transactions</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Groupon</td>
<td>1.8% + $0.15</td>
<td>Cards, Groupon Rewards (QR)</td>
<td>Groupon promotions</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>LevelUp</td>
<td>0%</td>
<td>LevelUp App (QR)</td>
<td>Promotions</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 3. Alternative Technology Comparison

Business and Consumer Preference analysis

It is important to gauge both consumer and business interest when studying the implementation of these alternate technologies. A business has to be flexible enough to apply these technologies, knowing well that they take a detour from the conventional. Beyond a certain point, the decision is completely personal and could entirely depend on the owner’s discretion. Similarly, consumer comfort with these technologies as well as their payment preferences must be considered. A business can potentially choose its preferred method of transaction based on its average ticket price, sale volumes as well as consumer demographics that frequent it. Below, we have considered both these aspects when recommending an alternate technology strategy to a small business.

Consumer Survey Analysis

A ten-question survey was created in order to gauge consumer opinion on alternative technology and spending habits on small ticket transactions of $10 or less. Consumer opinion of small ticket transactions made with a mobile phone application indicated that consumers will not shy away possible alternative technologies. However, according to the survey, just being comfortable with the idea of paying on mobile phones doesn’t necessarily correlate to consumers being comfortable paying on any mobile device. The six main alternative technologies analyzed were as follows:

- Google Wallet
- Paypal
- Square
- VeriFone
- ROAMpay
- Groupon
- LevelUp
Of these technologies, over 90% of the responses for ROAMpay and LevelUp showed consumers hadn’t even heard of these companies. Yet, even with this uncertainty, consumers were mostly indifferent in their comfort level for all of the surveyed alternative technology companies. PayPal and Groupon were clearly the most familiar to consumer with over 95% of the respondents having either heard of or used the technologies.

When asked how the consumer prefers to make his or her small ticket payments, the results were 42% cash, 37% debit, 20% credit, and 1% mobile. Furthermore, it was found that the average amount of money one is carrying at a time is $28. Given that the majority of responders preferred card and that this is an increasing trend, this data indicates the importance of a merchant being able to accept card-based transactions. In doing so, some merchants choose to charge a small convenience fee on all consumer purchases to help balance the fees associated with card transactions. Alternatively, a merchant might give a discount on all cash items after raising all item prices by the same amount. This might be done due to the fact that certain credit card networks do not allow the merchant to charge a convenience fee. This loophole is commonly used and even encouraged by some card companies.

Alternatively, a merchant may charge a checkout fee on credit card transactions only, which is also called surcharging. (Note: checkout fees are different than convenience fees. A checkout fee is simply charged at the checkout of a credit card transaction, whereas convenience fees are charged when paying with credit card is ‘bona fide’ convenience over other forms of payment. Convenience fees are essentially impossible to charge on most face-to-face transactions)\(^{30}\). When surcharging, the merchant must ensure to notify the company of each credit card brand and acquiring bank that it accepts. From there, a merchant must make sure to keep the checkout fee below 4%, along with notifying the consumer that a fee will be assessed on a credit card transaction.

For small ticket purchases, when the consumer was only carrying a card, 76% chose to still pay this convenience fee, guaranteeing the merchant will not lose a significant amount of customers due to charging this fee. Additionally, the amount of revenue lost to consumers can potentially be gained back by the amount of revenue gained from the convenience fee/discount.

It must be noted that this survey was primarily given to undergraduate students, of which 62% were underclassmen. As it was not possible to include the entire population demographics (student and working class) the data may not be completely representative of the population. In particular, the amount of money carried by the consumer could be on the lower end as the students are typically financially constrained. Additionally, payment preferences and alternative technology familiarity

\(^{30}\) http://www.cardfellow.com/blog/checkout-fees-charging-credit-card-fees-to-customers/
could differ. Older age typically indicates more experience with payment for goods. This experience could lead to different opinions, but in order to ascertain its precise impact, the survey would need time and a greater sample size and variation. Due to the limited scope and time restrictions on the survey, this data was not collected. Nevertheless, this survey still provided great insight on consumer opinion and spending habits in a campus town.

Business Case Study Research

The other aspect to be considered was the merchants that would potentially implement these alternate payment technologies. Local small businesses were interviewed in order to gauge their receptiveness and outlook towards these new technologies.

_Urbana’s Market at the Square_

Urbana’s Market at the Square is a farmer’s market in Urbana, IL, with over 150 different vendors. The outdoor market runs every Saturday from May to November, and then it moves indoors for a monthly market that sees attendance from about 30 vendors. It was during this offseason that vendors were surveyed about their usage or thoughts on alternate technology. Consequently, results may be slightly different if the businesses were surveyed during the regular market season.

Ten vendors were surveyed ranging from bakeries to jewelry and crafts stores and preserved foods vendors. The range of average ticket sizes amongst all of the vendors surveyed was between $5 and $35. A few of the vendors already used Square, and those that did not had considered using some form of alternate technology. Square was the most popular brand of card reader with the merchants having an extremely positive opinion of the card reader and its application. Minimal issues for transaction processing were seen and cellular service outage was not considered a major hindrance in using the technology. Additionally, the application interface proved very intuitive and highly customizable.

Most of these merchants primarily sold their goods through market venues, but one merchant surveyed also sold their goods through a brick-and-mortar facility. This merchant used traditional technology to process card swipes, but resorted to Square while on the go due to the convenience with transportation and the ability to process cards from multiple phones and locations under the same account. Most of these businesses had noticed lost sales due to a cash-only acceptance policy and lots of customers had specifically asked to use cards for high ticket purchases. Some of these vendors had owned a smartphone prior to using Square, while the others who noticed numerous lost sales invested in a smartphone or iPad. Any vendor who began using Square noticed a revenue increase of 20-50% while selling goods at this monthly market. This revenue increase was a result of an increased ticket size as well as a
higher amount of impulse sales. When asked whether these merchants believed if the revenue gain due to card acceptance justified the purchase of a smartphone, only those with an average ticket size of higher than $10 believed it was worth it. The merchants with average ticket sizes less than $10 only used Square if they had already owned a smartphone. While this data was mainly for the winter market, the profit is expected to be higher during summer due to a higher attendance and increased number of sales.

**Coffee Shop Chain**

We studied a small coffee shop chain that specifically targets college students. In previous years the stores used a traditional Veriphone card swipe that was under a contract with a bank. Recently, the shop switched to a Square card reader. This move was done entirely because of the lower costs with Square. The shop pays a flat fee of $125 for the first $20,200 earned in transactions for a given month. After this they pay a per transaction fee of 2.75%. This setup was much more cost effective than their previous method of transaction.

It must be noted that the coffee shop manager did not see high usage rates for Square Wallet feature offered by Square. It was found that when used, it was sometimes more inconvenient. Revenues remained constant over the course of the switch between transaction technologies.

**Paintball Park**

We interviewed the owner of a local Paintall Park who had used multiple transaction technologies. Initially he used a First Data wireless terminal, but the high machine costs combined with excessive monthly fees caused him to look for an alternative. The owner used technologies provided by Square, Paypal, and Go Pay before settling on SalesVU. These mobile technologies gave him a flat percentage fee and the ability to take payments in different locations without a power source. He found SalesVU to be the best offering because of the ability to make transactions offline at the same rate and the suite of inventory management software included.

SalesVU charges the same flat rate of 2.7% per transaction as the only cost. The included software can be utilized to add products and easily choose them when making a sale, instead of typing in the price. Since an individual product is selected when sold, it is easier to manage the inventory.
Cost considerations for Alternate Technologies

As each of technology has a unique financial structure, the fees assessed in each case were plotted against the average ticket price. This provided valuable information in comparing the efficiency of each technology for fixed ticket prices. In order to consider both credit and debit card charges, all fees from the card issuers and networks described previously were averaged. This enabled a side-by-side comparison of alternate technologies with the existing conventional payment methods. This data is compiled in the form of a graph shown in Figure 7.

![Fee Assessment per Transaction Method](image)

**Figure 7. Fee comparisons across all transaction technologies**

From a first glance, it appears that for low ticket transactions (below $10), both credit and debit methods have a much higher fee structure. Technologies such as Square and Pay Pal with a fixed charge (as a % of transaction amount) are cheaper at lower purchase costs. Our region of interest lies in the circled area where the costs from a lot of technologies intersect, as shown in Figure 8.
Alternative Transaction Technologies to Augment Cash Registers

Figure 8. (A) Inset of the fee comparison chart. (B) Fixed costs of technologies

It can be seen that below $15, it is more beneficial to employ alternate transaction technologies instead of credit and debit cards. Rates for debit cards do dip above $15; however credit cards are still too expensive for the given range (and hence not seen on the graph). This is also a simplified inset figure that does not show PayPal here and Level Up as they have a similar trend as Square. The data shown here is on a monthly basis and does not include fixed cost calculations. Figure 9B shows those fixed costs of the technologies being implemented. Since each business is a unique case, these fixed costs were not considered in the calculations but instead shown for the business to make an informed decision regarding the technologies.

Market Perception Map

In order to determine the optimal payment technology for a given company, the average transaction cost and volume of sales must be taken into account. The sale volume (per month) and average transaction cost was plotted for each technology and is shown in Figure 9. Each technology has its own region where it is the cheapest (and most viable) method. At low purchase costs, PayPal Here and Square are the most effective. The reason that the regions are separated by curves and not straight lines is the fixed costs that are associated with some of the technologies. For example, ROAMpay has a small monthly fee that will have less of an effect on the fee per purchase as volume increases. The only thing this does not account for is the popularity of each technology. Square is by far the most popular alternative technology, but it is not the best at each price level. Some of the alternative technologies work best when everyone is using them, but it is very difficult to get consumers to adopt them. For example, in case of Level Up, it is necessary for both consumer and business to have the app in order to make that transaction. Hence, although cheap this is not a practical option for most businesses where the consumer demographics are broad.
Overall, this map along with the fees plotted in Figure 7 can give a business a good idea of whether a particular technology fits in their transaction pattern and if it can be implemented at all.

ROI of alternative technologies for small businesses

As the previous sections have shown, there are avenues that small businesses can explore within which implementing the alternate technology is cheaper than conventional transactions. In order to estimate the actual amount of money saved, we calculated the return on investment (ROI) for one of the more popular and affordable technologies – Square. Table 4 indicates estimates about what ROI a small business can expect based on their monthly revenue. The ROI model assumes that merchants adopt Square to begin accepting cards. This leads to a 25% increase in revenue, and the 2.75% transaction cost applies to the total amount of the merchant’s revenue. Furthermore, the model is based off of the merchants buying a tablet, buying a phone, or already using a phone. In the event that they buy a tablet, costs estimates were based off of a 16GB iPad or equivalent $629 cellular-capable tablet with a $20/month 1GB data plan. In the event that they buy a smartphone, costs estimates were based off of a 16GB iPhone 5 or equivalent $200 smartphone with an $85/month data, talk, and text plan. In the third case, none of the costs of the smartphone or data plan are included, as they were already paying for them before adopting Square. The revenue increase is just a component of the ROI model, as it excludes the cost of any capital.
purchased. Although calculated just for Square, it is possible to create such models for the other technologies as well.

<table>
<thead>
<tr>
<th>Monthly Volume</th>
<th>1 year</th>
<th>3 years</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hardware Acquired or Owned</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buy Tablet*</td>
<td>Buy Phone**</td>
</tr>
<tr>
<td>$1,000</td>
<td>ROI</td>
<td>150%</td>
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<tr>
<td></td>
<td>Revenue Increase</td>
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<tr>
<td>$5,000</td>
<td>ROI</td>
<td>495%</td>
</tr>
<tr>
<td></td>
<td>Revenue Increase</td>
<td>$1,040.08</td>
</tr>
</tbody>
</table>

**Table 4. ROI Analysis for a small business using Square**

*Cost estimates assume the merchant purchases a 16GB iPad or equivalent $629 cellular-capable tablet with a $20/month 1GB data plan.

**Cost estimates assume the merchant purchases a 16GB iPhone 5 or equivalent $200 smartphone with a $85/month data, talk, and text plan.

***Cost estimates assume the merchant already owns a smartphone and pays for a data plan.

Revenue Increase involves dividing the fixed cost of acquired assets by the total time period.

Transaction cost estimates are based off of Square’s 2.75% rate.

ROI model assumes a 25% increase in revenue.

Based on this ROI model, it can be estimated that investment into alternate technology and the accompanying hardware is certainly worthwhile for a small business. Despite smartphones, tablets, and data plans being so expensive, a small business can expect a large increase in revenue of approximately 25% by accepting cards. This revenue increase coupled with the low cost of processing card transactions via Square or other alternate technologies can provide a quick payback and a large ROI for a small business owner. Business owners with as low as a monthly volume of sales equivalent to $1000 will see a large ROI in the short period of one year, and an even higher figure within three years.
Recommendations for small businesses

Given the cost analysis above, there are multiple schemes in which to implement a transaction technology. The four basic cases that are recommended are accepting cash only, cash and cards with a convenience fee, cash and cards with a minimum purchase, and cash and cards without any fees. The merits and demerits of each are shown below and they constitute the final recommendations we have for a business.

- Cash is the most fluid and easily acceptable medium of payment. There are no fees for accepting cash and it is commonly carried.

- Some significant disadvantages are present with only accepting cash. Our research suggested that approximately 60% of consumers prefer to use cards. This represents a large potential revenue stream that is untapped. Additionally, customers are limited by the amount of cash carried with them, versus a much higher limit on cards.

- If cards are accepted in addition to cash, vendors will generate near maximum revenue capture. The drawbacks associated with making this decision are that there are fees associated with accepting cards. These fees vary depending on the transaction technology selected.

- Merchants looking to mitigate these costs have a couple options. One potential avenue is to charge an additional fee to customers using cards. This could offset the transaction fee but could negatively resonate with customers having to pay more than others. Additionally, there is legislation in place that needs to be followed with surcharges depending on the state and transaction technology.

- Another option to cut costs would be to have a minimum purchase amount to use a card. This is the most widely used and accepted method of controlling transaction fees. While some customers may choose not to purchase goods due to this minimum, it is offset by the other customers that purchase a couple extra items to meet the minimum.

Choosing between these options should be evaluated by analyzing the business’ current transaction methods and average transaction price and quantities. The aforementioned cost analysis as well as ROI models can serve as guides towards selecting the appropriate technology for a small business, helping them reduce transaction costs or increase revenue.
Other OTCR Consulting Reports

OTCR Consulting has written other reports on similar topics. These have been listed below.

Small Business Marketing in Champaign-Urbana
May 2013
Notes

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