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Transaction card feasibility in Missoula Montana.

Christopher M. Johnson
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TRANSACTION CARD FEASIBILITY
IN MISSOULA, MONTANA

BY

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1993

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# TABLE OF CONTENTS

LIST OF TABLES AND FIGURES ................................................................. ii

I. INTRODUCTION .................................................................................. 1
   Background ......................................................................................... 1
   Research Question ............................................................................. 2

II. TRANSACTION CARD EVOLUTION ...................................................... 8
   Preprinted Card ................................................................................ 9
   Optically Readable Card .................................................................. 9
   Magnetic Stripe Card ....................................................................... 11
   Smart Card ....................................................................................... 13
   Super Smart Card ............................................................................ 14
   Optical/Laser Card .......................................................................... 15
   Transaction Card Infrastructure .................................................. 15

III. TRANSACTION CARD TECHNICAL ANALYSIS .................................. 18
   Card Types ....................................................................................... 18
   Long-Term Cost ............................................................................... 19
   Ease of Use ...................................................................................... 22
   Reliability ....................................................................................... 24
   Processing Time ............................................................................... 27
   Capacity .......................................................................................... 30
   Security ............................................................................................ 32
   Ratings ............................................................................................. 37

IV. SMART CARD FEASIBILITY IN MISSOULA ....................................... 38
   Convenience .................................................................................... 38
   Cost ................................................................................................ 40
   Control ............................................................................................. 42

V. CONCLUSIONS .................................................................................. 45
   Options for Implementation ......................................................... 48
   Recommendation ............................................................................ 49

VI. APPENDIX I GLOSSARY OF TERMS ............................................... 51
VII. APPENDIX II BENEFIT PROGRAMS ............................................... 54
VIII. SOURCES CONSULTED ................................................................... 56

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# LIST OF TABLES AND FIGURES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Long-Term Costs</td>
<td>21</td>
</tr>
<tr>
<td>2. Ease of Use</td>
<td>24</td>
</tr>
<tr>
<td>3. Reliability</td>
<td>26</td>
</tr>
<tr>
<td>4. Terminal Read Times</td>
<td>29</td>
</tr>
<tr>
<td>5. Processing Times</td>
<td>29</td>
</tr>
<tr>
<td>6. Data Storage Capability</td>
<td>31</td>
</tr>
<tr>
<td>7. Capacity</td>
<td>31</td>
</tr>
<tr>
<td>8. Security</td>
<td>36</td>
</tr>
<tr>
<td>9. Aggregate Scoring</td>
<td>37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual Operating Costs</td>
<td>41</td>
</tr>
<tr>
<td>2. Five Year Combined Costs</td>
<td>46</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

Welfare programs in Montana are faced with a recurring problem, namely, declining resources in the face of increasing demands for these limited resources. Statutory responsibilities and rising case loads constrain these agencies from cutbacks in all but the most extreme circumstances. As a consequence of this fiscal state, coupled with a desire to innovate in the operation of welfare programs, many agencies such as the Food and Nutrition Service are looking at emergent technologies for answers.

Transaction cards offer the potential to meet two pressing needs: mitigating some of the effects of deep budget cutbacks in the 1980's (i.e. reducing administrative and compliance costs), and reducing the need for beneficiaries to make frequent trips to the welfare office for their benefits. Over the long term there is additional potential to improve service while reducing costs. However, Montana does not have the resources to make expensive forays into uncharted technological waters, and thus it is imperative that problems be investigated thoroughly before proceeding to any testing phase where transaction card delivery systems are put into place. It is the purpose of this paper to aid in this process by reviewing the use of transaction cards and examining the advantages and disadvantages of the various forms presently available and whether the disadvantages can realistically be overcome.
The paper will address which type of transaction card, on the basis of a cost and benefit review, will work most efficiently in the delivery of welfare benefits in Missoula and what obstacles must be overcome to satisfy the requirements of welfare agencies and clients. Intrinsic to a discussion of costs and benefits are aggregate system costs, but "welfare stigma," time spent in obtaining benefits, are also costs which need consideration. Efficiency is paramount in this discussion for the presumed objective of technology is to make less work for staffers and clients in their respective roles. In the Missoula welfare office for example, two staff positions have been lost to budget cuts in just the last three years while case loads have risen 20 percent or more, highlighting the critical need for efficiency in delivery. However, this drive for efficiency must be tempered with the knowledge that welfare programs deliver services by mandate and this delivery cannot be compromised. If transaction cards make beneficiaries' lot worse rather than better, then the viability of transaction card delivery is seriously diminished.

To complete a cost/benefit analysis of transaction card technology as a delivery system, information was obtained from a variety of sources including books, journals, trade publications and personal interviews with individuals actively performing the work of service delivery. Although direct feedback from benefit recipients was hard to come by, since it is difficult to query users on a system they have yet to see, this

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1Information obtained in an interview with Sue Glenn, an employee of the Missoula Welfare Office, on September 10, 1992.
inquiry attempted to include, to the greatest extent possible, their concerns as separate from those of merchants and agencies.

The importance of technology in benefits delivery is illustrated by the following quote from the *Federal Reserve Bulletin*:

In 1990, the federal government paid recipients more than $400 billion in social security and other government benefits, and state-administered programs paid another $95 billion or so. Almost 60% of the federal payments and nearly all of the state funds were disbursed by paper check. To increase the efficiency and minimize the cost of disbursing funds, and to improve the service to benefit recipients, agencies at the federal and state levels are working to move toward electronic delivery of these payments.²

Clearly, there is a massive paper trail circulating through the mail and moving through people's pockets and bank accounts. This "paper money" might be transferred with greater security, heightened speed and increased accuracy using electronic funds transfer (E.F.T.). In particular, given the recent emphasis on government with a human face -- which in this case would mean service in its best and truest sense -- EFT has the potential to free recipients from days wasted in waiting for checks.³ EFT also can reduce the possibility of theft, particularly for the elderly or infirmed who are particularly vulnerable to thievery and fraud. Transaction card technology has potential, but as with any tool, if used improperly or with inadequate training and precautions, it can cause great harm.


This growing reliance on electronics brings with it concerns which must be addressed before global (i.e., beyond trial or demonstration) adoption can proceed in Missoula. A prime concern which agencies will have to address is the question of privacy. It will soon be possible to develop a total computer composite of an individual as a consumer, worker and citizen. As is evidenced by the history of Social Security numbers, it may not take long before efforts are made to expand the scope of the original program. In the case of these individual data records, the stakes are much higher when one considers how much information can potentially be disseminated to unintended recipients. An example of improper transfer would be the release of an individual’s mental health records to a prospective employer. The potential for compromise that exists with these records highlights the danger that accompanies new technology. Electronic funds transfer (EFT) using transaction cards is not something that should be implemented at will; preparation for the ramifications of this technology must be made in advance.

Transaction cards are a specific application of technology, that has managed to allay these concerns so far. These cards are being used, as they have been in France, England and Japan, to perform monetary transactions electronically -- thus eliminating the need for currency or coupons. Included within this definition are subtypes of cards such as magnetic stripe cards, smart cards, super-smart cards and optical cards, each of which can be used to complete a transaction. Briefly, magnetic stripe cards are typified by the cards currently used by credit companies and automatic teller machines (ATMs); smart cards have a memory capability through an embedded
microprocessor chip; super smart cards have a chip and can handle interactive functions -- a micro mini computer in essence; lastly, optical cards use laserdisc technology to function. Each type of card has advantages and disadvantages, and these characteristics will be examined in greater detail later to determine suitability for Missoula.

It has already been established by the Food and Nutrition service, in their study with Abt Associates, that nationwide implementation of transaction cards for delivery of food stamps is feasible given the resolution of cost constraints. In addition to Food Stamps, several other expenditure programs could benefit from transaction card delivery or other electronic delivery. Of the top ten domestic expenditure programs, seven involve some sort of transfer to beneficiaries. These transfers could readily be made more quickly and with greater security using electronic funds transfer (EFT). With EFT, either on-line (connected directly to a central computer) or off-line (operating independently of a central computer), welfare agencies will soon be able to enter a new era in how they serve their clients.

Consequently, there is a need to examine the subject carefully before harnessing its potential.

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5 Robert J. DuMouchel, "The 50 Largest Domestic Assistance Programs in FY89, by Funds outlayed or credited." Table 3 in *Government Assistance Almanac* (Detroit: Omnigraphics, 1991), 507.

The welfare system, as the end user of this technology, is far from being homogenous. The diversity in programs requires some awareness of the key characteristics of individual programs to lay the basis for a fuller understanding of how these traits might manifest themselves in an EFT system. Generally, welfare includes programs such as Aid to Families with Dependent Children (AFDC); Food Stamps; Women, Infants and Children (WIC) -- a nutrition program, and others which aim to serve those who fall below the poverty line through direct transfers of cash, goods or services. For the purposes of this paper, only the primary welfare programs operating in Montana will be examined, so welfare would include Montana's general assistance program as well.

Welfare programs, regardless of their scope, share a rigid focus on ensuring that ineligibles do not fraudulently or mistakenly receive benefits, and that the benefits be processed and delivered in conformity with strict guidelines and statutes, to prevent diversion or fraudulent receipt of benefits. This focus on fairness and cost control through access control in contrast to meeting beneficiary needs is a common complaint directed at welfare agencies. Transaction cards promise to help mitigate this criticism by providing enhanced service to recipients. If transaction cards are to be useful though, they must "deliver the goods." Any proposal for utilizing transaction cards must contain as a guiding principle that service is not interrupted.

Testimony to the potential of transaction cards is not hard to find. In New York City, after implementing a system to electronically deliver cash and coupons, "[n]inety-four percent...of the recipients in the pilot [project] preferred it to the check
Based system. For the vast majority, transaction cards offer the promise of better service in the near future.

Bearing this potential in mind, this paper will consist of five chapters. The second chapter will chart the evolution of the transaction card from its origins until today. Chapter 3 will examine the costs and benefits of the various transaction card systems. The fourth chapter will review the applicability of the preferred system in Missoula. The final chapter will summarize the analysis and attempt to make a recommendation for transaction card benefits delivery locally.

CHAPTER 2
TRANSACTION CARD EVOLUTION

Transaction cards hold forth the promise of aiding welfare agencies in their efforts to grapple with the resource shortfalls that have become all too common of late. However, before any serious discussion of the various card types can begin, it is instructive to review their genesis. Since any decision is likely to involve tradeoffs, a knowledge of the alternatives is necessary for sound decision making; hence this discussion of the characteristics of the various types of transaction cards. This chapter will chart the development of the cards and introduce distinguishing characteristics of each card type.

The growth curve for transaction cards has been a steep one according to Jerome Svigals, publisher of Smart Cards and Comments: "It took fifteen years - from 1965 to 1980 - for the first magnetic stripe cards to be accepted by the major credit card companies." According to Svigals, more than 1.1 billion magnetic cards were put into circulation between 1980 and 1990 worldwide. With this proliferation, transaction cards increasingly appear to be the payment system of the future.

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2 Ibid.
The first generation of transaction cards consisted of a number imprinted onto a plastic card. A manual imprinter, in combination with carbonized forms, imprinted the account number onto the forms to complete the transaction. This method suffered was slow to complete, the carbonized forms were easy to damage or misplace, and proper crediting of the purchase could take months. Security was also a problem, since there was no way to validate the transaction quickly.

The second generation of transaction cards attempted to address these shortcomings through the addition of an optically readable number in addition to the imprinted number. This feature allowed cash registers equipped with scanners to read the numbers directly, thereby reducing processing time. This improvement increased reliability and security as well. Subsequently, scanner-based transaction technology has been refined to the point that it can read universal product codes (UPC) on groceries and other items. This development is important to the Electronic Funds Transfer (EFT) movement because it enables retailers to accelerate transaction times and reduce costs. The combination of scanners and optically readable account numbers set the stage for digital transaction capability.

Utilizing digital technology more effectively and efficiently has been the hallmark of the third stage in the evolution of transaction cards, which occurred through the replacement of the optically readable numbers with a magnetic window capable of holding small amounts of encoded identification and account information.
The creation of the magnetic stripe allowed credit companies, banks, and others to begin EFT. Banc One in Ohio was one of the first to put this technology to work using it to create Automatic Teller Machines (ATMs) in the early 70's. According to Institutional Investor, Americans have more than 150 million cash cards in their wallets. Given the proven utility of these cards, it is not surprising that welfare agencies consider transaction cards to be an attractive delivery system.

As the number of magnetic stripe cards in circulation has grown so have the applications for them. In France the cards are used for an array of municipal services including libraries and admission to public swimming pools. In Japan, Australia, Great Britain, Germany and Ireland, "magnetic money" in the form of prepaid cards are sold for face value and then debited as used, now serve as a means of payment for vending machines, public telephones and transportation services. In fact, the astronomical growth in Japanese card use has prompted the government to recommend measures to protect consumers who use magnetic money instead of the

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4Ronit Addis, "Will greenbacks become museum pieces?" Forbes, 30 May 1989, 262.


6Ibid.

7"Prepayment to Nirvana," The Economist, 18 November 1989, 90.
real thing. If the experiences of consumers in Europe and Japan are any example, the growth in card applications is a harbinger of things to come.

American card utilization of transaction cards by commercial firms has been considerable. While governments have been slow to adopt card applications due to pre-existing financial constraints, vigorous promotion by issuers and easy acceptance by consumers and retailers has led to utilization on a massive scale. For some users it is mere convenience: being able to make purchases around town or around the world without having to carry cash makes spending easier (and easier to rationalize) all of which has been realized through computer technology. Digital transactions using magnetic stripe cards, in comparison to the alternatives of cash or checks, are quick, reliable and secure. For whatever reason people have begun to use the cards, the result is clear -- convenience leads to acceptance.

Transaction cards have evolved beyond the magnetic stripe in recent years by integrating portable microprocessor capability into existing digital capacity while decreasing size and cost. The fourth generation of transaction cards are the smart cards (the English equivalent for 'carte a memoire'), so named because they have an internal memory thanks to an embedded microprocessor. These cards can hold three

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8Ibid.

9This ease of painless and invisible spending is a concern of welfare agencies who fear that recipients might deplete their benefits much faster in this manner. One potential response is to place controls within the central system which limit benefit drawdown to prevent exhausting benefits before the end of the month.

10Roy Bright, Smart Cards, 9.
typed pages or 4800 characters, as opposed to the maximum of 226 characters on a
magnetic stripe card.\textsuperscript{11} The greatest enhancement of smart cards is their ability to
perform transactions without interacting with a central computer. This self-contained
feature means that smart card transactions are far less vulnerable to delays caused by
system downtime. Moreover, they cost less to operate than stripe cards by not
requiring expensive system central processor time. Although their initial costs are
high, in the long run smart cards cost less to operate.\textsuperscript{12} Smart cards have an
additional feature which magnetic cards do not, namely the ability to authenticate not
only the card itself, but the user of the card. This security feature, once fully
utilized, will sharply decrease the frequency of fraudulent transactions.\textsuperscript{13}

In the medical field for example, pharmacists are testing a smart card that
carries a patient's complete medical records so that a pharmacist can obtain a profile
in less than a second.\textsuperscript{14} With pharmaceuticals this profiling is particularly necessary
to ensure that patients do not receive incompatible medications. In a related
development, Health and Human Services Secretary Louis Sullivan has called for a
national medical card that he believes "will save time, personnel, forms and other
administrative charges, which could be of tremendous benefit."\textsuperscript{15} In sum, to quote

\textsuperscript{11}Didier Martres, "Le Smart Card," \textit{Canadian Banker} 83 (January/February 1989): 27.

\textsuperscript{12}Andersen Consulting, \textit{State of Wyoming Feasibility Study}, Exhibit...

\textsuperscript{13}Ibid.

\textsuperscript{14}Carol Ukens, "Smart Card's arrival heralds shape of things to come," \textit{Drug Topics} 136

\textsuperscript{15}Ibid, 18.
Dr. Horst Bottge, "[i]n spite of the [cost] drawback, the one conclusion that stands out is that the chip technology is able to fulfill all prerequisites necessary to offer in the future even more efficient solutions."16

As microprocessors have shrunk and information capabilities increased, it soon became feasible to install keypads on the smart card. This enhancement, which led to the fifth generation of card evolution -- the super smart card, was based on the capability super smart cards have to perform interactive functions. The super smart card strongly resembles the magnetic stripe card with the notable addition of a numeric keypad on the back. As a result of enhanced circuitry and the addition of a numeric keypad, the super smart card is slightly thicker than smart cards, but only marginally. Thickness is a concern for issuers bent on ensuring that the cards fit into American wallets like any other card. This keypad allows the card itself, through connection to other computers, to function as a terminal. By eliminating the need for a cumbersome terminal, the super smart card opens up the possibility of reduced costs as terminals become redundant and central computers virtually obsolete for electronic transactions. In spite of the additional memory, super smart cards retain the ability to store data under normal use for three years.17 The ability to work both on-line and


17Hardy Tichenor, Einar Asbo and Gretchen McCoy, "Visa SuperSmart Card Applications and Technology," published in Proceedings of the International Conference on Smart Cards 2000: The Future of IC Cards Laxenburg, Austria 19-20, October 1987, ed. by
off-line in performing interactive functions currently performed by micro-computers is the prime attraction of the super smart cards. Someday consumers will be able to check their bank balance, order flowers, check what is playing at the theater, and pay the electricity bill -- with one stop.

The downside of these super smart cards, and to a lesser extent smart cards as well, is their cost to manufacture. Super smart cards cost around $40 to make, compared with $6 for a smart card and $1 for current magnetic stripe cards. Worse yet for high-tech aficionados, the smart card terminals currently sell for about $1200. While it is likely that these costs will decrease substantially as production gears up, "Someone -- retailers, card-companies or consumers -- will have to bear that cost."

One additional card type mentioned in Chapter 1 is the optical card. This type of card relies on information imprinted onto the card surface. Information retrieval is accomplished by a reader scanning the surface of the card to obtain the desired data.


18 The difference being whether or not the terminal which reads the cards is connected directly to a central computer. For further explanation refer to the glossary.

19 Carol Ukens, Drug Topics, 18.

20 "Young and in debt," The Economist, 27 August 1988, 71.

21 Ibid.

22 Ibid.
Although this type has not received much attention as a prototype delivery system, the growth of compact disc technology means that much of the manufacturing acumen is extant. However, it is likely that this technology will be surpassed in the near future as the price of manufacturing smart and super smart cards falls, and consequently few writers in the field have been paying it much attention.

Before the de-facto standard can move toward smart cards though, a sound business case will have to be made to justify not only abandoning the current magnetic stripe system which works well, but the expenditure of millions of dollars necessary to adopt and implement the new standard. Who will bear the lion's share of implementation costs: consumers, merchants or issuers? Magnetic stripe card implementation costs have largely been passed onto retailers in the form of a service charge known as a discount rate.\(^23\) Increased utilization of smart cards, and ultimately super smart cards, will come when consumers, issuers and retailers, can all benefit financially and in heightened convenience from implementation. Given the 15-year growth curve described by Mr. Svigals, it seems unlikely that the fourth and fifth generation cards will see widespread utilization before the middle of this decade. Once smarter cards are adopted as the standard, usage is likely to grow quickly as with magnetic stripe cards.\(^24\)

\(^23\)While these costs may be passed on indirectly to consumers, they are invisible to the customer except in the rare cases where the accepting entity assesses an additional charge to cover the discount rate.

\(^24\)This assumption is dependent on two factors: first, that the price of cards and ancillary equipment falls significantly, and second, that banks and other issuers adopt these cards as an
In Missoula, transaction card benefits delivery will be contingent upon the existence of a suitable commercial Point of Sale (POS) network on which to piggyback. While a network exists nationally for magnetic stripe cards, market penetration is limited in Missoula, particularly in grocery stores. At present, only the two Buttreys stores in Missoula have transaction card capability. Moreover, Buttreys still uses carbonized-form imprinting which precludes, or at least negates the advantages of, electronic-based cards. Considering a significant portion of welfare benefits are for food only, it is vital for electronic benefits transfer (EBT) that grocers in the Missoula area accept transaction cards as a routine payment method.

Card acceptance is crucial to electronic benefits transfer. It is pointless to invest in a system that no one uses. While it is difficult to judge popularity of a payment system a priori, the lack of point of sale (POS) terminals in stores suggests either a lack of demand or a lack of interest. In either case, the outcome is the same: the necessary terminals for EBT are not in place in Missoula. Merchants will not invest in the equipment without a reason, namely high usage patterns, and so far Missoulians have not demonstrated one. The resultant lack of a POS infrastructure, and its ramifications to EFT will be discussed in greater detail in Chapter 3.

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international standard. If both of these factors are realized as they were with stripe cards, then a proliferation is probable.

25This statement does beg the question, "which comes first, the demand or the supply for the demand." However, unless retailers have a strong reason to install terminals, such as competition or at the impetus from one of the credit card systems, they will refrain from doing so.
In the next chapter transaction cards will be analyzed using discrete comparison criteria. These criterion will then be tabulated onto a table from which a transaction card recommendation for Missoula can be made.
CHAPTER 3
TRANSACTION CARD TECHNICAL ANALYSIS

Transaction cards are being examined closely by welfare agencies faced with the task of maintaining benefits for rising caseloads with fewer resources. In recognition of this potential, several states such as Pennsylvania, Wyoming and Maryland have put transaction card delivery systems into place. The Kennedy School of Government nominated Wyoming for an award recognizing innovation in government, for its electronic benefits transfer (EBT) project using smart cards. Transaction cards also have negatives associated with their use, the most prominent of them being cost, but usability is also a concern.

This chapter will review the various transaction card systems and attempt to reach an opinion on which type would be best in the Missoula county operating environment. Each card type will be evaluated using six criteria for assessment in relation to the others. From that review, a card system will be identified as the most ideal based on the criteria. The following chapter will assess the recommended card type for feasibility. The six card evaluation categories are: processing time, capacity, reliability, security (which encompasses multiple aspects), long-term cost and ease of use.

There are four card types that agencies might employ in a benefits transfer system: the magnetic stripe card, the optical card, both of which are on-line (that is
connected to a central computer for transaction completion), and the smart and super
smart cards that work off-line (without such a connection). Of the four, the stripe
card enjoys the widest usage although the Casper, Wyoming, Women, Infants and
Children (WIC) demonstration project uses smart cards to deliver benefits.¹ Super
smart cards, due to their relative newness, have not yet been mass marketed; optical
cards, because of uncertainty about their future, have yet to see significant utilization
either. While these four have unique traits, they each must meet certain criteria to be
considered viable.

The first factor by which these cards should be judged is their long-term cost.
Given that electronic benefits transfer (EBT) has only been in existence for about
eight years, and has only been actively studied for less than three, the phrase long-
term must be loosely applied. However, even without an abundance of empirical
study, a position can be taken. For example, magnetic stripe cards cost about $.80 to
make, optical cards about $1.50,² smart cards about $7.50, and super smart cards
about $30 to manufacture.³ In addition, terminals that read stripe cards cost about

¹Alan D. Moire, Final Evaluation Report: The Electronic Benefits Transfer
Smartcard Pilot Demonstration Project in Casper, Wyoming, a report conducted under
a cooperative agreement between U.S. Department of Agriculture, Food and Nutrition
Services and Wyoming Department of Health, WIC Program (Cheyenne: December,

²Roy Bright, Smart Cards: Applications, Principles and Practices (New York:

³Andersen Consulting, State of Wyoming EBT Feasibility Study, Exhibit I-K

19
$470,\textsuperscript{4} \text{approximately } $600 \text{ for optical cards, and roughly } $1000 \text{ for smart and super smart card reading terminals.}^5 \text{ Several factors may influence these costs estimates in the future. First, as cards see more use, the cost of smart cards and smart card reading terminals may fall through increased economies of scale. The cost of installing terminals for all card types may fall as more retailers unilaterally install card reading cash registers (P.O.S. -- Point of Sale terminals). It is difficult to forecast reliably whether, and when, these events might occur, but if they do, they will alter existing projections.}

Decisions must be made based on what is known. The cost forecast in the Wyoming study, based on an operating environment similar to Montana’s, with validation from the Reading, Pennsylvania trials -- allows such a cost evaluation can be made.

The following table, and subsequent rating tables will use a scoring system with four being the best, or highest, ranking and one being the worst, or lowest, ranking. In Table I, the ranking is based on the following criteria: cost of terminals, cost of cards, cost of system operations, personnel (to operate and train other operators and users) and maintenance costs. Stripe cards have the lowest terminal costs, lowest per-card manufacturing costs, and as a consequence of their extensive usage require less training for personnel. The stripe card does require on-line

\begin{footnotesize}
\begin{itemize}
\item Special terminals, which do nothing more than read stripe cards and validate the transaction, leaving the actual totalling and record-keeping functions up to a separate terminal, can be obtained for around $80.
\item Ibid.
\end{itemize}
\end{footnotesize}
computer time, which is expensive, but one central computer for $1000 and 20 terminals at $80 apiece is still cheaper than 20 independent smart-card terminals at $1000 apiece. Smart cards, once their hardware prices decrease sufficiently will become the least-cost option, but at this time they remain prohibitively expensive to use. Finally, optical cards, as an on-line system, are likely to encounter costs similar to those of stripe cards with the important distinction that hardware to read optical cards would be expensive until significant usage levels had been achieved. However, given the existence of parallel technology in compact discs, this cost could fall quickly. Consequently, optical cards receive the second highest ranking. Smart and super smart cards receive the lowest rankings due to their current high costs. While it is likely that the order of this table will change in the future, no one can predict just when that will take place and to what degree the relative costs will fluctuate. For the purposes of this paper, costs reflect current pricing, and thus stripe cards receive the highest ranking.

TABLE I

LONG-TERM COSTS

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<thead>
<tr>
<th>Magnetic Stripe Card</th>
<th>Optical Card</th>
<th>Smart Card</th>
<th>Super Smart Card</th>
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<tr>
<td></td>
<td>4</td>
<td>3.5</td>
<td>3</td>
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In the Andersen Consulting study their analysis uses probable five-year costs for each card system; included in their analysis are telecommunications, administration, maintenance, hardware and other miscellaneous costs. Cost forecasts are based upon current costs.
As the table reflects, the magnetic stripe card is the least cost alternative, due in large part to their existing market penetration. In time however this order may change, as hardware costs fall sufficiently to enable smart cards to overcome initial costs and reap the benefits of vastly reduced telecommunications and central computer costs.

The second evaluation factor is ease of use. Ease of use is indicative of the ability of the users to obtain benefits, or information from the cards in a timely, accurate, and convenient manner. For benefit recipients, once trained in card usage, the card itself becomes secondary to the operating system governing the usage of a particular card type. The card is merely a tool, like a check or currency, with which financial transactions are made. Therefore, each card type will only be as easy to use as the designers of the operating system software (computer programs) make them. If a particular system renders a card difficult to use, and benefits inaccessible, it is a simple matter to modify software to meet client needs. In this regard, from a client’s standpoint, the cards themselves must be equivalent in ease of use.

Merchants, however, are not so indifferent. Ease of use in their experience does have importance and meaning. The operating system as well as the actual card affects merchants and other acceptors. Currently, the vast majority of payment systems (both credit and debit) use stripe cards to perform transactions. Consequently

7If future distribution nets rely upon existing electronic transfer systems, customizing features for public assistance recipients may prove difficult, depending on the ultimate card type selected.
merchants are familiar with stripe cards and the devices associated with their use.®

Smart cards on the other hand would pose special problems unless all issuers switched to them simultaneously (which seems highly unlikely). Smart cards would be new to most merchants, requiring additional training and reconciliation (the time needed to process transactions in the back office and register those transactions with the proper agency) time. In essence, they would be a costly duplication since existing stripe networks would remain in place alongside smart cards. As a result, smart and super smart cards would be less easy to use than stripe cards.

Ease of use is equally important to welfare agencies who must deal with the cards on a daily basis. These users, like the clients they serve, can obtain a system that is easier to use by changing the software which governs them. Here again, ease of use is relating the usefulness of the operating software which governs the cards, instead of the cards themselves.

Table II reflects this fact: that the distinguishing factor is not the card itself, but rather the operating system which governs its use. As optical, smart and super-smart Cards, are indistinguishable from each other on their own technical merits when ease of use is being considered they receive the same score. Stripe cards on the other hand are currently in wide use, and from the merchant standpoint, it is easier to continue using an existing, successful, system than to try and adopt a new one

Such devices which enhance ease of use are ZON (which are used in combination with manual cash registers) machines and terminals with a built-in stripe reader which enable the merchant to avoid the laborious hand entering of the sixteen digit card number, and automatically dial-up a central computer to validate the transaction.

23

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altogether. Consequently, stripe cards receive the highest rating from the merchant perspective.

**TABLE II**

<table>
<thead>
<tr>
<th>EASE OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Stripe Card</td>
</tr>
<tr>
<td>Optical Card</td>
</tr>
<tr>
<td>Smart Card</td>
</tr>
<tr>
<td>Super Smart Card</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3.5</th>
<th>3.5</th>
<th>3.5</th>
</tr>
</thead>
</table>

The rationale behind Table II is that since the cards are virtually identical to the end user, and it is upon their operating software that distinctions are made, all of the cards are equal. However, since stripe cards are also the de facto standard at the time that this paper is being written, logically they would be the easiest type for merchants to use due mainly to the existence of a proven infrastructure to accommodate these cards, and the familiarity of merchants in using this infrastructure.

Following ease of use as an assessment criterion is the reliability of the various card systems. This reflects the summation of two separate evaluation elements. The first is the susceptibility of the cards themselves to malfunction or damage. The second is the propensity of the operating system governing the cards to break down or slow down during peak usage times.

System inoperability, the second category, by being a software and hardware (computers, terminals etc.) function means that some problems encountered by cards have nothing to do with the card itself but are external in their causality. However,
because of the unique technical requirements of each card, the operating system is specific to each card type, and thus system inoperability does reflect card-based traits.

The on-line cards (stripe and optical cards) are the most susceptible to system inoperability. Because of their dependence on a central computer to process the transaction, if the central computer fails, if phone lines are occupied, or if an unanticipated volume of users crowds the system, on-line systems will fail. Additionally, stripe cards are especially vulnerable to magnetic fields that can erase the stripe window and render the card useless. Although anyone who has used a stripe card during the Christmas shopping season can attest to these situations, they are also rare and should not be seen as an overwhelming negative to be associated with this card type.

The off-line cards however, have the good fortune of not needing to interact with a central computer to process every transaction. From a reliability standpoint, this makes this type of card advantageous. As for the physical reliability of the cards, according to Roy Bright in *Smart Cards: Principles, Practice and Applications*, the off-line cards equaled the standards set for stripe cards in virtually every test. By avoiding the complications of network operations, off-line cards attain higher reliability than off-line cards.

Table III incorporates these characteristics in assigning the highest scores to off-line cards and lower scores to on-line cards. From a purely logical standpoint,

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machines with only one part, the off-line cards, have fewer pieces subject to failure, than the on-line cards with two or more pieces involved in the transaction. Off-line cards also avoid the problems that accompany phone line usage. For these reasons off-line cards receive the highest score.

**TABLE III**

<table>
<thead>
<tr>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Stripe Card</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

This table reflects the fact that while network problems are infrequent they always seem to come at the most exasperating times -- primarily peak usage times. Consequently, a system that can avoid this particular headache is certain to be preferable to one that is vulnerable to it.

As the previous two categories have alluded to, the abilities of a system interacting with a transaction card are extremely important components in a total assessment of a card's viability. The next two factors address this point directly. They are: processing time, which is a function of how fast a transaction takes place,

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$^{10}$Although reliability for these cards is as yet unknown due to the lack of study, if an extrapolation is made from the reliability of compact discs, which is very high, then it can be presumed that optical cards will be reliable.

$^{11}$According to Roy Bright, in early testing the cards were found to be as reliable and durable as stripe cards with two notable exceptions: bending, which chips cards are particularly vulnerable to; and humidity, which is also damaging for chip-based cards. Subsequent technical literature makes no mention of these problems however.

26
start to finish; and capacity, which is the amount of information that can be carried by a card.

Processing time, in the case of on-line cards, is almost entirely dependent upon the capability of the system. Off-line cards on the other hand, by not having to reach out to a central computer to enable the transaction, can avoid time spent in dialing and transmitting. Card capacity is important as stated earlier, since systems are predicated on the type of card with which they will interact. Capacity ultimately foreshadows the possibility of system downtime due to excess system demand.

In the case of processing times, little comparative study has been done with on-line versus off-line counter processing times. The data that is available does indicate that with both stripe cards and smart cards, payment time is reduced noticeably.

In the Reading, Pennsylvania study using stripe cards, researchers found that EBT cards added nearly 24 seconds to the standard (cash) time for payments completion.\(^\text{12}\) This is comparable to Food Stamp coupons which required an extra 21.8 seconds and checks which necessitated an additional 40 seconds of payment time.\(^\text{13}\) However, since the hardware, the merchants, and the cards differed from those used in Wyoming, a comparison between the two studies’ results must be made with caution.


\(^{13}\)Ibid.
Dr. Moore's WIC smart card study, in Wyoming, produced findings that confirmed the trends identified by the Reading study. It should be noted though that WIC transactions are far more complex than the Food Stamp transactions used in Pennsylvania, and consequently increase payment times. In Wyoming, Dr. Moore found, that checks were significantly slower than cash which is consistent with the Reading findings. He also found that WIC benefit cards were faster than Food Stamps and other charge cards; the latter result being the most significant of the two. Since the charge cards referenced by Moore were magnetic stripe cards, indistinguishable from those used in the Reading project, this result can be used as a loose surrogate for a head to head comparison. In the Casper, Wyoming environment, approximating that of Missoula, smart cards had the lowest payment times (mean value of 27.3 seconds for smart cards versus 74 seconds for stripe cards).

These findings show first that EBT is within existing payment time ranges. As the Casper results suggest, it does make a difference which card type is used.

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15 Ibid.

16 Moore does not expand upon the methods used by grocers in charge payments.

17 Ibid.
TABLE IV

TERMINAL READ TIMES

<table>
<thead>
<tr>
<th>Magnetic Stripe Cards</th>
<th>Optical Cards</th>
<th>Smart Cards</th>
<th>Super Smart Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 seconds; requires more time in 20% of attempts</td>
<td>1-2 seconds, although less with newer terminals</td>
<td>150-300 nanoseconds</td>
<td>150-300 nanoseconds</td>
</tr>
</tbody>
</table>

If Dr. Moore findings are combined with the read times of Table IV, an assessment of overall processing times can be arrived at.

TABLE V

PROCESSING TIMES

<table>
<thead>
<tr>
<th>Magnetic Stripe Card</th>
<th>Optical Card</th>
<th>Smart Card</th>
<th>Super Smart Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

In TABLE V, the higher rankings for smart and super-smart cards reflect their faster read times, reduced payment times and lack of central system requirements. These features also render off-line cards virtually immune to downtime or slowdowns. On-line cards on the other hand, are slower due to inferior technology.

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18 Read times refers to the time it takes a terminal to read, or obtain information from the card. Table data obtained from "The Future of Transactional Card Technologies," Optical Information Systems (July/August 1989): 201 and Chris Terry, "Technology Update -- Smart Cards are getting smarter and faster," EDN (March 16, 1989) 71.

19 If an individual terminal fails, customers can easily be redirected to alternate terminal. If a store's entire cash register system fails all transactions become...
and are vulnerable to central system problems. From a time standpoint, off-line cards simply require less.

Capacity, as the second of the two factors relating system performance and card capability is a static measure. Card capacity refers strictly to the amount of information that a card can store. This information can take many forms such as transaction data, health records, security encoding or a multitude of other information. It is important to note though, the greater the memory capacity of the card itself, the fewer demands placed upon a central computer for assistance.

On-line type cards are penalized here as well for their dependence on a central computer. While it is certainly possible to design an overall system with sufficiently powerful features to ensure no slowdowns or downtime results, the cost would be prohibitive.
As TABLE VI shows, the optical card has the ability to store the greatest amount of information. It can do so by using the majority of the card surface area as a storage location. Other cards use surface area for a variety of functions such as holograms, labels, and other preprinted information that take away from available space. Smart and super smart cards also have embedded chips that trade space for the ability to perform transactions without a central processor.

<table>
<thead>
<tr>
<th>Magnetic Stripe Card</th>
<th>Optical Card</th>
<th>Smart Card</th>
<th>Super Smart Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>226 characters in an alphanumeric array</td>
<td>2 Megabytes or 800 pages of text, 60 pages of graphics or combination</td>
<td>Up to 256 Kilobytes or 100 pages of text, graphics or sound</td>
<td>Up to 256 Kilobytes or 100 pages of text, graphics or sound</td>
</tr>
</tbody>
</table>

The off-line cards seem poised with the best mix of ability and potential to deliver in the future. Lastly, stripe cards are increasingly being surpassed by newer and better cards.

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designs in off-line cards. It is only a matter of time before they are dropped as the standard in favor of smart or even super smart cards.\(^2\)

The final component in the assessment of a preferred card standard is the aspect of security. Security means different things to the various participants in electronic benefits transfer. To clients it connotes the ability to obtain their benefits safely and without fear of loss. To merchants it means the assurance that purchased items are approved from the outset and that such purchases will be followed by prompt and accurate payment. For welfare agencies, security carries the concern that only eligibles are using benefits, that diversion and losses are reduced or eliminated if possible, and that accurate controls are maintained.

In the Maryland SecureCard project a need identified by researchers was the fear that many recipients had of having their benefits stolen from their mailbox.\(^3\) Consequently, many recipients spent a day or more waiting in their homes for their checks. Clients also expressed a fear of being robbed on their way to and from cashing their checks. Electronic benefits transfer (EBT) addresses this fear by eliminating insecure paper from the process. With benefit cards, the only way that

\(^2\)From a technological standpoint it is clear that off-line cards are superior. However, the cost difference in favor of stripe cards means that decisions will favor them until production costs fall sufficiently to close this differential.

benefits can be accessed is with the card and the recipient's personal identification number (PIN).

The security of benefits offered by benefit cards is assured, regardless of card type used. However, levels of protection do vary from card type to card type. Stripe cards have extremely limited security capabilities, yet loss rates experienced with this type of cards have been found to be acceptably low. Stripe cards though are relatively easy to forge by anyone with inexpensive equipment. While this type of fraud appears to be uncommon, it is a concern. Optical cards, offer enhanced security by storing a complex, and more difficult to reproduce, identification algorithm. Smart and super smart cards have the ability to validate the identity of the card user, in addition to being able to authenticate the actual card -- as a check against counterfeiting.

Merchants also expressed concerns in both the Maryland and Reading studies. As gatekeepers for determining purchase acceptability in the Women, Infants and Children (WIC) and Food Stamp programs it is in their best interests to have a system that can validate a purchase automatically. EBT provides this and relieves checkers and store managers of this onerous task.

Payment turn-around times, using electronic transmittal, were vastly accelerated in the Reading, Pennsylvania and Casper, Wyoming, programs. This time reduction is partially attributable to the integrity of the transaction, which reduces the levels of review necessary before payments are released. According to the Food and
Nutrition service, 2.5 Billion paper coupons, are counted at least a dozen times.$^{24}$ Payments were usually credited into retailers' accounts via electronic funds transfer (EFT) within 48 hours via the Federal Reserve's automated clearinghouse system.

From the merchant's perspective, there is also no appreciable difference in card security as it affects their operations. The on-line and off-line cards, while offering differing levels of security, all provide assurance levels well within acceptable loss parameters.

Welfare agencies have a substantive interest in the security of the various card types. This interest consists of their aversion to loss, fraud and preventing ineligibles from obtaining benefits. Compounding their concerns are recent policy initiatives emanating from the Federal Reserve regarding Regulation E.

Currently, welfare agencies are exempt from Regulation E that governs the behavior of financial institutions regarding electronic funds transfer (EFT). This exemption is under review, prompting nervous handwringing from agencies. The regulation limits customer (or beneficiaries') exposure, or potential liability to absorb losses, in the case of theft or fraud. Welfare agencies are concerned that they will be faced with a major cost increase if they are forced to assume liability and re-issue

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$^{24}$Gary Anthes, Food Stamp program soon to be electronic, *Computerworld* 26 (January 13, 1992): 51.
Many have said that if forced to honor Regulation E that they would dissolve their EBT programs and return to manual processing.

From the agency perspective then, here is a run-down on the security attributes of each card type. Magnetic stripe cards, as stated previously are secure, and are easy to cancel if lost or stolen. However, stripe cards do not have the ability to store an entire line-item listing of a purchase. If agencies wish to monitor on an individual item basis, they would have to institute a separate and more cumbersome procedure to derive that information.

Optical cards, which use an algorithm to assure transaction authenticity, can be bolstered by increasing the complexity of the formula. Further, these cards can store the lengthy data files created by an itemized listing of each purchase or transaction made with these cards.

Off-line cards are the most secure card type in commercial application at this time. Not only can they validate the transaction through a personal identification number (PIN), but they also can perform fingerprint checks, retinal scans and even vein mapping as additional security features. These cards also can present an itemized listing of purchases upon request and can store an up to date authorized items listing to ensure that all items are approved before the purchase takes place. This is of great benefit to agencies trying to reduce diversion or bartering of benefits.

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26Ibid.
to circumvent existing controls. For these reasons off-line cards, from a security standpoint, are the best alternative for agencies.

**TABLE VIII**

<table>
<thead>
<tr>
<th>SECURITY</th>
<th>Magnetic Stripe Card</th>
<th>Optical Card</th>
<th>Smart Card</th>
<th>Super Smart Card</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

The scoring for **TABLE VIII** reflects the increase in card features corresponding to the age of each card's technology. The newest cards, with greater memory and processing capabilities, can employ increasingly sophisticated defense mechanisms which, in turn, is represented by the scoring of **Table VIII**.

**TABLE IX** on the following page reprises the scores for all the factors and the sums up total marks for each card type. Of particular note are the differences in scoring for the smart and super smart cards. The primary difference between the two at this time is cost, and as time passes this spread is likely to narrow.
TABLE IX

AGGREGATE SCORING

<table>
<thead>
<tr>
<th></th>
<th>Magnetic Stripe Card</th>
<th>Optical Card</th>
<th>Smart Card</th>
<th>Super Smart Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-Term Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process. Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td>16</td>
<td>19</td>
<td>21.5</td>
<td>20.5</td>
</tr>
</tbody>
</table>

The old adage "never be afraid to buy the best, you’ll never regret it" appears true in transaction card technology. While each of the card types have particular advantages and disadvantages, it is their mix of these characteristics that reflects their suitability for Missoula. Based upon aggregate scoring, the highest score was for smart cards, reflecting the fact that overall they are the most technically suitable for Missoula. To reiterate: just because smart cards were the highest ranked does not automatically mean that they are the best for Missoula. The smart card must also meet the test of delivering convenience, at a neutral (that is equal to manual delivery) cost, while offering full controls to supervisory personnel. The next chapter will discuss the feasibility of smart cards on this basis.
CHAPTER 4
SMART CARD FEASIBILITY IN MISSOULA

When the stakes involve millions of dollars, it is not enough to simply be the best by some arbitrary standard. In the case of public assistance benefits, performance -- being able to follow through and meet expectations -- is everything. According to the standards established in the previous chapter, smart cards appear to offer the best features for instituting an electronic benefits transfer (EBT) system. This chapter will discuss whether smart cards can make the leap from theory into practice.

For the purposes of this section, smart cards will be evaluated on the basis of convenience, cost, and control. The comparison standard is the existing delivery system -- manual processing.

Convenience in this context refers to an increase in the ease of access to benefits and an elevated level of beneficiary safety in obtaining benefits. After all, it makes no sense to invest in a system that is unusable or is rejected by clients. A key component in their convenience will be the availability of 24-hour grocers and ATMs that will accept smart cards. If people can only go to banks to access benefits, this will sharply reduce the convenience of the cards. At the time that this paper was written, no smart card facilities existed in Missoula. This fact creates a problem for planners: not only do they have to consider the cost of converting to EBT, but also
the cost of installing terminals in stores and financial institutions to ensure that recipients have convenient access. According to federal Food and Nutrition Service rules, stores that derive more than 15 percent of their business from Food Stamps are required to have card-reading equipment on every check-out lane.1 As one might expect this is certain to drive up costs enormously, even with an anticipated decrease in terminal costs as economies of scale begin to lower prices.

Using the experience of credit and ATM cards as an indicator of things to come with smart cards, once the infrastructure is in place, electronic funds transfer (EFT) seems poised to offer heightened convenience for recipients. With AFDC checks for example, recipients are constrained by the availability of enterprises to cash their checks, and the costs imposed upon them if they do not have a bank account. With transaction cards, even the initial trip to the bank to cash the check is eliminated as funds are automatically deposited into special accounts that recipients can draw upon immediately. No longer would recipients have to worry about their safety or the security of their benefits while they carry funds with them. Transaction cards eliminate this fear. Transaction cards also allow clients to access their benefits, once the infrastructure is in place, 24-hours a day. However, since the infrastructure is not in place at this time, the test of convenience cannot be met.

1Alan D. Moore, Final Evaluation Report, 104
Since meeting the test of increased convenience cannot be assured without a large-scale investment in infrastructure, and given Montana's budget woes, this investment seems highly unlikely to happen in the near-term. If smart cards are to be viable in Missoula, retailers and financial institutions must unilaterally begin installing terminals to allow a smart card EBT system to meet the convenience test. Without this action, smart cards cannot pass this test.2

The second test that smart cards must pass is that of cost. According to the Andersen Consulting study for the State of Wyoming, given anticipated price decreases, this can be met. In their study, Andersen Consulting concluded that off-line transaction cards, namely smart cards, are less expensive on an ongoing annual basis than existing manual delivery systems; even at existing prices.

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2In all fairness, no transaction card system could entirely meet this test at this time since there are virtually no POS locations in Missoula's grocery stores, and other key destinations where recipients obtain and use their benefits.
The problem though, is the high one-time price tag for a smart card system. Before leaving the question of cost altogether, mention must be made of the fact that in none of the existing studies have electronic transfer costs been lower than those of manual delivery. In the Reading, Pennsylvania, on-going pilot, the gap between electronic and manual delivery has been closed from some six dollars per month to

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3Andersen Consulting, *State of Wyoming EBT Feasibility Study*, 1-D.
less that 20 cents per case month. However, the gap remains leaving EBT more expensive than manual delivery.

Closer to Missoula, in Wyoming, Dr. Moore found that initial results delivering WIC benefits using smart cards had yet to bear out the predictions of Anderson Consulting. According to his report which was based on usage by 1300 individuals he found that while it cost Wyoming $1.86 to deliver WIC benefits by check for one month using smart cards it cost $2.67. It should be noted however, that the total cost difference between the delivery methods was a mere $295. The problem remains that the gains achieved through EBT are much higher in terms of improved quality of service rather than in dramatically reduced costs.

So smart cards are unable to meet the cost test either. Until the costs of hardware decrease to a level that transaction card based delivery is cost-neutral, in comparison with manual processing, smart cards are infeasible from a financial standpoint.

Lastly, smart cards must provide overseeing personnel the ability to approve transactions according to established rules as well as the ability to cancel, modify and otherwise interact with the cards on an inexpensive and efficient basis. In short, the

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6Ibid.
cards must provide equal or superior control capability as compared to manual delivery systems.

Smart cards pass this test through their inherent ability to work both off-line and on-line. If, for example, a card was lost, the responsible agency would simply have to send a command telling all terminals to decline the card. Through these means agencies have a loss and theft defense.

Smart cards, capable of storing the details of every transaction for an extended period, allow both agencies and consumers to recall details of transactions conveniently. For WIC and Food Stamp authorities, this feature is integral to making sure that benefits are only being expended on approved items. Moreover, by tying the transaction record to an itemized listing of items, diversion (buying unapproved items with or without the checker's knowledge) becomes nearly impossible. Bartering remains a problem, since there is no control over purchases once they leave the store. However, it is a more difficult proposition for a client to find someone, for example, who wants to trade eggs for unapproved items.

In addition, smart cards expand the frame of control for agencies by relieving them from the tedious task of manually issuing coupons and checks every month. By updating a client's authorization to participate (ATP) file, a computer can automatically transmit the necessary information to the card the next time it is contacted.
From the control standpoint; smart cards appear to meet the requirements of agencies. Unlike, the previous two categories, those of cost and convenience, smart cards are able to deliver heightened control capability.

Smart cards present the necessary mix of ingredients in a transaction card to be successful in the Missoula environment. They are fast, inexpensive to operate, can hold large quantities of information, and do not fail under ordinary use conditions. They also allow agencies full control over their use and with sufficient infrastructure, greatly increase the convenience of those using the cards. In a perfect world smart cards would be the delivery system of choice, unfortunately, by being more expensive and less convenient than manual systems, smart cards are practically, as opposed to technically, infeasible. The next chapter will discuss these conditions and offer a summary.
CHAPTER 5

CONCLUSIONS

The point behind EBT is to make less, rather than more, work for agencies. At the same time, electronic benefits transfer (EBT) must not adversely impact existing service levels. If anything, EBT should enhance them. Additionally, EBT gives clients an incentive to use EBT through simplified use, heightened benefits access (when fully implemented), and ideally, reductions in welfare stigma. However, EBT is far from being the magical solution that it is often envisioned as. At this point EBT is still more expensive than manual delivery and is not truly convenient in that there are few outlets for potential EBT users to employ their cards in Missoula. EBT does have promise, but until the current fiscal situation changes, it will remain a promise unfulfilled.

As was discussed in the previous chapter, from a technical standpoint, smart cards are superior to other existing transaction cards. Smart cards also have the potential to lower costs for welfare agencies while affording agency personnel the ability to maintain or improve upon their existing service. What smart cards are unable to provide at this time is convenience at a reasonable cost. From an operational standpoint they are cost effective but once one-time costs are added to the equation, smart cards become infeasible given extant circumstances.
However, the good news is that cost is the primary stumbling block. If an agency wanted to pursue this program, the issue of one-time costs is, for the most part, the primary obstacle to implementation. No matter how an agency proceeds though, costs must fall before EBT will approach viability. Roy Bright postulates that

FIGURE II

Five Year Combined Costs
Operating and Initial Costs

Legend
- Off-line
- On-line
- Manual Processing

Five Year Costs
Optimistic 5 Year Costs
the following must occur to realize any smart card predictions (and the cost savings that accompany their realization):¹

- resources necessary to match supply-side investments will be forthcoming;
- favorable trends in the semi-conductor technology cost/performance ratios are maintained;
- new applications will continue to be 'discovered' at their present rate.
- at least 50 percent of the population of current and on-going trials are converted into full-scale commercial implementations.

These conditions are important for electronic benefits transfer. Unless commercial applications expand as they have in France, particularly, where 20 million cards are in use currently, costs will not decrease sufficiently to make smart cards viable.²

Basically, there are two roads toward implementation: one is to simply wait until costs have diminished through declining hardware prices, until start-up can be funded the through annual operating savings generated by using EBT. This route is contingent on all of Bright's assumptions being fulfilled and being fulfilled in such a way that it propels hardware prices downward. However, as Figure I² showed, under "Optimistic Assumptions," even after accounting for a tremendous fall in computer equipment prices and including operating savings, a gap of over three million dollars remains. Without the assumption of drastically falling prices, according to research performed by Andersen Consulting, under current cost


²Ibid, 151.

³Figures for Figure II generated from *State of Wyoming EBT Feasibility Study*, I-F,G; "Optimistic 5 Year Costs" are predicated on a 42% decrease in terminal and card costs. 42% represents the approximate decrease in the price of a 386SX, 25Mhz computer, which would be used as at platform for EBT, in the past 24 months.
projections, the break even point for cost-neutrality between an EBT system using smart cards and existing manual processing is in excess of seven million dollars. As the table shows, their study, which is based on an operating sample similar in size and scope to Missoula's, indicates that implementation could be prohibitive. Given that operating savings only amount to some $50,000 per annum, it would be some time before the three million dollar gap could be closed and EBT initiated.

However, there is another way. An agency could also turn to some external body to finance all or part of the start-up phase. This external body could be governmental, such as the state or the federal government, or non-governmental, such as the Ford or McCarthur foundations. Ideally, an entity, or a combination of entities, would recognize the merit, and uniqueness of this project, and would be willing to underwrite it.

For this to happen the agency would have to embark on a time-consuming, and potentially fruitless mission to research, solicit and then lobby some external organization to deliver this money. The odds of success in a venture such as this are low, particularly when discussing governments, and the amount of staff time necessary to pursue this means is enormous.

Ultimately, this is a decision that the agency director, in concert with the governing board of the agency, must take after careful consultation. However, if an agency is serious about making EBT happen in Missoula, this is one way to achieve it.

\footnote{Andersen Consulting, \textit{State of Wyoming EBT Feasibility Study}, I-G.}
This of course, brings this paper back to the beginning: there is no point in delving into EBT without an assurance that it will be beneficial for all parties. Smart cards, when costs have fallen sufficiently, should provide an excellent means of delivering benefits.

Although a stripe card EBT system could be developed in a short period of time given the market penetration that credit and debit cards have made, Missoula authorities would be foolish to adopt antiquated technology as their standard. Instead, they should follow the recommendation of Anderson Consulting which argued for maintaining EBT "readiness." Anderson Consulting, at the conclusion of the executive summary of their report for Wyoming pointed out that although there are no financial benefits for the State of Wyoming to proceed today with EBT, the State should plan to implement EBT in the future when costs for hardware, software and telecommunications service may have decreased.

The report notes that if "an off-line environment is cost-effective in comparison to an on-line environment, then [Wyoming] should develop a statewide roll-out plan with off-line technology." The same recommendation holds true for Missoula as well. To the extent necessary to maintain readiness, Missoula should pursue smart card EBT without actually implementing it. In this manner, once the conditions are auspicious, roll-out will be greatly simplified, particularly since it is a question of "when EBT" rather than "if EBT."

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5 Andersen Consulting, State of Wyoming EBT Feasibility Study, I-F.
6 Ibid
7 Ibid.
If the judgement of the agency director is that the benefits of EBT are sufficient to warrant further consideration of this concept without waiting for diminishing costs to allow implementation, then the path ahead becomes much trickier. Pursuing external sources of capital to implement such a program is extremely ambitious. The success will depend in large part upon the ability of the agency to gain broad support from those affected by the program and to emphasize the uniqueness of such a system so as to attract the attention of a major financial backer.

EBT has vast potential to deliver service improvements for agencies, recipients and for those redeeming benefits. Technology though, is not always an easy thing to transmit to people unilaterally. Education and a generous amount of training will be necessary ingredients in any subsequent EBT program. EBT may have the power to take agencies as far as they wish to go; the question is how hard will they push the vehicle to get it started.
APPENDIX 1

GLOSSARY OF TERMS

AUTOMATED CLEARING HOUSE (ACH) - A way to reach deposit accounts to add or subtract values without needing to be directly connected with them.

AUTOMATIC TELLER/TICKETING MACHINE (ATM) - A device that dispenses various material (money, stamps, coupons, etc.) when activated by an acceptable card. The ATM may also receive and collect information or take deposits.

AUTHORIZATION - Response by or on behalf of the Issuer to permit a card or card account to be used.

CARD - A device with which to access the System. Cards are usually plastic and meeting carefully defined Standards for size and encoding of magnetic stripes, etc. When dealing with EBT, a card can have special meanings such as Smart card, decrementing value card (Debit card), or non-standard magnetic stripe card.

ELECTRONIC BENEFITS TRANSFER (EBT) - The use of electronic technology to complete some or all of a benefit program's functional requirements. EBT may involve computers, a variety of cards or types of cards, electronic funds transfer techniques, point-of-sale terminals. ATM’s or other types of terminals, and software sufficient to complete the EBT process without the loss of program integrity or recipient confidentiality.

ELECTRONIC FUNDS TRANSFER (EFT) - Officially, the use of electronic impulses to replace all or part of Items as defined in Articles 3, 4 and 8 of the Uniform Commercial Code of the U.S. Unofficially, the use of techniques and terminals such as the ACH, ATM’s, POS and wire transfers to replace paper handling.

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**ENCRYPTION** - The translation of data into unintelligible forms to prevent interception or snooping and the resultant loss of privacy and security.

**FAULT TOLERANCE** - Techniques that allow redundancy for computers or system parts. The use of Fault Tolerance helps assure greater availability of the total system by providing multiple operational units; in the event that one fails others are available.

**HARDWARE** - Those items such as computers, monitors, terminals, modems and other associated equipment which are fixed and tangible as opposed to "soft;" see **SOFTWARE** also.

**INTERCHANGE** - The passage of Authorization requests, transaction records, or information between an Issuer and Acquirer through a Network facility switch.

**INTERCHANGE FEE** - The money paid to a Network facility/ Switch for its services. The term is also used for the Acquirer Fee.

**NETWORK** - An interactive combination of Issuers, Acquirers and a Switch (Network facility) developed for the purpose of completing EFT transactions. Networks have defined participation, liabilities and operations.

**OFF-LINE** - A computer processing environment in which stages of a transaction or session can be completed independently of the other elements in the session or transaction. The words "batch processing" and Off-line have become nearly synonymous, but, in EBT, Off-line often means a situation in which the terminal or Acquirer does not contact the Issuer for an Authorization during the completion of every transaction.

**ON-LINE** - A computer processing environment in which a transaction or session is completed while all elements of the session or transaction are actually linked. A distinction is made between "on-line" and "on-line real-time." In the on-line real-time environment, a session or transaction is fully completed while all elements of the transaction or session are still linked with each other. For example in an EFT Network, an on-line transaction takes place when a cardholder requests and receives Authorization and receives his/her money while all elements of the transaction are in communication. However, in many bank situations, the actual posting of the cardholder’s account is done later. Were the account to have been posted at the moment of the transaction, an "on-line real time" situation would have occurred.

**PIN** - Personal Identification Number. A technique used to assure that the bearer of a Card is the actual cardholder.
POS - Point-of-Sale. The exchange of value for good and services. The term is often used unclearly to mean terminals, value exchange techniques, or when the speaker is unable to describe "what is happening" so he/she describes "where it is happening." To the merchant, POS can include such activities as inventory control and employee management.

POS TERMINAL - A range of devices including electronic cash registers (ECR's), radio frequency devices, small terminals and any other device used to enter an EBT or EFT system at a merchant location.

REGULATION E - The consumer protection statute relating to debit cards. The statute defines such things as required disclosures, receipt requirements, and dispute resolution time frames.

SCANNER - A device resembling a gun or sometimes will be a window built into a counter which emits laser beams to acquire and identify a number or bar-code configuration used in ticketing items or sorting mail.

SETTLEMENT - The process by which funds are transferred between any two points or entities in an EFT network. Settlement may mean crediting merchants for purchases, debiting an Issuer for the activity of its cardholders, or crediting Acquirers or the Switch for the use of the terminals or services.

SOFTWARE - The programs, applications, computer code that allow the HARDWARE to perform functions. Software is what makes hardware useful and useable.

SWITCH - A computer and associated software that allows for the completion of Interchange transactions in an EFT network. The switch keeps track of all transaction activity, the flow of funds among participants, and access to the Network. The Switch keeps a table of all issuers and sends their transactions to the proper Processor for each.

SWITCH FEE - The money paid to the Switch for its services. The term Interchange Fee is also sometimes used or the Switch Fee is a portion of the Interchange Fee.

THIRD PARTY - An entity who provides services to participants in an EFT Network. Often the term is used for a non-bank servicer in a bank Network.

UNIVERSAL PRODUCT CODE (UPC) - A series of bars or stripes which can be read by optical scanners. UPCs are used primarily in stores to rapidly provide item and pricing information and for inventory control. UPCs are also used by the postal service and UPS for sorting mail and parcels.
APPENDIX II

FEDERAL AND FEDERAL/STATE BENEFIT PROGRAMS

TABLE I
DIRECT FEDERAL BENEFIT PROGRAMS

<table>
<thead>
<tr>
<th>Program</th>
<th>Payment Frequency</th>
<th># of Recipients</th>
<th>Annual Amount</th>
<th>Average Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSA</td>
<td>monthly</td>
<td>40.5M</td>
<td>$280.0B</td>
<td>$583.00</td>
</tr>
<tr>
<td>SSI</td>
<td>monthly</td>
<td>5.2M</td>
<td>$19.8B</td>
<td>$317.00</td>
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<tr>
<td>Medicare</td>
<td>varies</td>
<td>34.8M</td>
<td>$113.9B</td>
<td>$273.00</td>
</tr>
<tr>
<td>Civil Service</td>
<td>monthly</td>
<td>2.2M</td>
<td>$31.5B</td>
<td>$1195.00</td>
</tr>
<tr>
<td>VA Comp/Pens</td>
<td>monthly</td>
<td>3.5M</td>
<td>$16.2B</td>
<td>$390.00</td>
</tr>
<tr>
<td>Black Lung</td>
<td>varies</td>
<td>247.9K</td>
<td>$1.4B</td>
<td>$605.00</td>
</tr>
<tr>
<td>RRB Retirement</td>
<td>monthly</td>
<td>604.5K</td>
<td>$5.6B</td>
<td>$756.46</td>
</tr>
<tr>
<td>RRB Survivors</td>
<td>monthly</td>
<td>279.0K</td>
<td>$1.9B</td>
<td>$564.95</td>
</tr>
<tr>
<td>RRB Sickness Insurance</td>
<td>bi-weekly</td>
<td>23.4K</td>
<td>.60B</td>
<td>$264.45</td>
</tr>
<tr>
<td>RRB Unemployment Insurance</td>
<td>bi-weekly</td>
<td>30.0K</td>
<td>.60B</td>
<td>$264.45</td>
</tr>
<tr>
<td>PBGC Insurance</td>
<td>bi-weekly</td>
<td>372.0K</td>
<td>.51B</td>
<td>$343.00</td>
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</tbody>
</table>

### TABLE II
FEDERALLY-ADMINISTERED/STATE-OPERATED BENEFIT PROGRAMS

<table>
<thead>
<tr>
<th>Program</th>
<th>Payment Frequency</th>
<th># of Recipients</th>
<th>Annual Amount</th>
<th>Average Payment</th>
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<tbody>
<tr>
<td>Medicaid</td>
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<td>27.7M</td>
<td>$113.9B</td>
<td>$265.00</td>
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<tr>
<td>AFDC</td>
<td>monthly</td>
<td>21.6M</td>
<td>$20.4B</td>
<td>$389.00</td>
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<tr>
<td>Unemp/Ins.</td>
<td>weekly</td>
<td>3.3M</td>
<td>$25.3B</td>
<td>$163.00</td>
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<tr>
<td>Food Stamps</td>
<td>monthly</td>
<td>22.6M</td>
<td>$17.3B</td>
<td>$352.00</td>
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<tr>
<td>Child Suprt</td>
<td>varies</td>
<td>1.6M</td>
<td>$5.0B</td>
<td>$263.00</td>
</tr>
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</table>
SOURCES CONSULTED

Books


Government Documents


Journals/Magazines

"A Network That Does It All." Chain Store Age Executive, May 1992, 129.


Cohen, Deborah L. "Federal Rule Seen Snarling Welfare-Education Efforts." 
*Education Week*, 26 September 1990, 1, 18-19.

______. "Revised Ruling Eases Way for Coordination of Welfare Funds." 
*Education Week*, 16 January 1991, 22.

Colburn, Christopher. "The changing composition of income transfer programmes: a 

______. "A Public Choice Explanation For the Decline In Real Income Transfers." 
*Public Finance Quarterly* 18 (January 1990): 123-134.


"Council Considers Health Care Availability." *Employee Benefit Plan Review*, March 
1990, 34-35.

Cox, Rebecca. "Smart-Card Marketers Shift Focus In Face of US Banks' Resistance." 


______. "Rural Attitudes Toward Public Welfare Allocation." *Human Services in 
the Rural Environment* 12 (Fall 1988): 11-18.

"Debit Cards, EFT still grasping for toehold." *Chain Store Age Executive*, February 
1990, 67-75.


20-24.


Duffy, Helene and Robert J. Duffy. "National POS." *Bank Administration* 65 (July 


59

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Hammonds, Keith. "The Wolf Comes Knocking At Non-Profit Doors: Private social service providers are feeling the chill wind of recession." Business Week, 5 November 1990, 95,98,102.


"Paperless Food Stamps At An Impasse." Chain Store Age Executive, October 1990, 76, 78.


"Piggybacking Other Services." Chain Store Age Executive, November 1991, 10B, 12B.


Terry, Chris. "Smart Cards are getting smarter and faster." EDN, 16 March 1989, 69-74.


**Newspapers**


"All is not Gold." *The Economist*, 22 March 1986, 67-68.


**Unpublished Documents**

