A BUSINESS CASE FOR ATM'S: DETERMINING STRATEGIC VALUE

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DETERMINING STRATEGIC VALUE

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Meridian Bancorp has successfully employed a state-of-the-art assessment technique to measure the payoffs from its investments in automated teller machines (ATMs). The new technique, called "business value linkage impact analysis," (BVL) uses statistical data to substantiate the linkage between information technology investments and their bottom line impacts. Joseph Pendleton III, senior vice president and manager of Meridian's electronic banking operations, wanted to determine whether ATMs contributed to increased branch market share and under what circumstances these effects were realized. The results of a recent study conducted at the bank in consultation with researchers from the graduate business schools at Carnegie Mellon University and New York University showed that deposit market share effects do indeed exist, but under a limited set of circumstances. In this article, we briefly review the background of this new approach to information technology performance assessment and discuss how Meridian used this new technique to obtain evidence in support of specific ATM investments.

Origins of BVL impact analysis

The rationale behind the new approach is that traditional analyses provide inadequate measures of the strategic benefits of information technology investments. For example, traditional cost-benefit analysis cannot fully quantify the indirect benefits so it fails to reflect the full value that ATMs can provide to a bank. Bank managers were interested in determining if the deployment of ATMs explained part of Meridian's deposit market share. It was widely believed that the effects of ATM deployment were reflected in the bank's operating results but no specific numbers could be isolated for use in cost-benefit calculations. BVL impact analysis was developed for precisely this kind of situation: to evaluate the impact of strategic investments in information technology.

BVL impact analysis was created to satisfy financial managers who wish to quantify the total return from their information technology investments[1-3]. Return is traditionally expressed as tangible return, i.e., directly measured benefits less costs. But information technology investments frequently involve intangible or indirect benefits, and may be just one of many interrelated factors responsible for overall cost reduction, direct revenue increases or gains in market share. Total return, then must include both tangible and intangible benefits if it is to reflect the actual business value of an investment. Thus, we need a means to quantify the intangible benefits portion of the following cost-benefit analysis equation:

Total Return = Tangible Benefits + Intangible Benefits − Costs

Experts in the field have suggested many methods for justifying information technology investments. Warren McFarlan of Harvard University has written that successful decision making must include an appraisal of both the operational and strategic benefits of information technology investments. David Norton of Nolan, Norton and Co. proposed examining the "strategic interlock" between the output of a specific strategic business unit and corporate goals in determining the optimum level of information technology investment. Paul Strassman, a leading MIS consultant, advocates a measure of payoff, referred to as "return on management capital," which relates corporate business results to the level of investment in information technology, expressed in terms of total management costs. Other assessment methods provide a means to calculate efficiency ratings between selected enterprise-level measures as outputs, and information technology investment levels as inputs. Such analyses help managers compare whether some parts of the bank are as efficient as others in the conversion of investment to value.

Little attention, however, has been given to confirming whether causal relationships exist between information technology investments and strategic benefits. BVL impact analysis offers a rigorous technique to measure the total business value resulting from information technology.

The question of ATM business value

ATMs provide customers with a convenient way to do banking. Specifically, their availability and convenience may induce depositors to open accounts and leave deposits with a bank. This can lead to improved market share for those

Figure 1
Meridian Bancorp's Business Value Linkage for ATMs

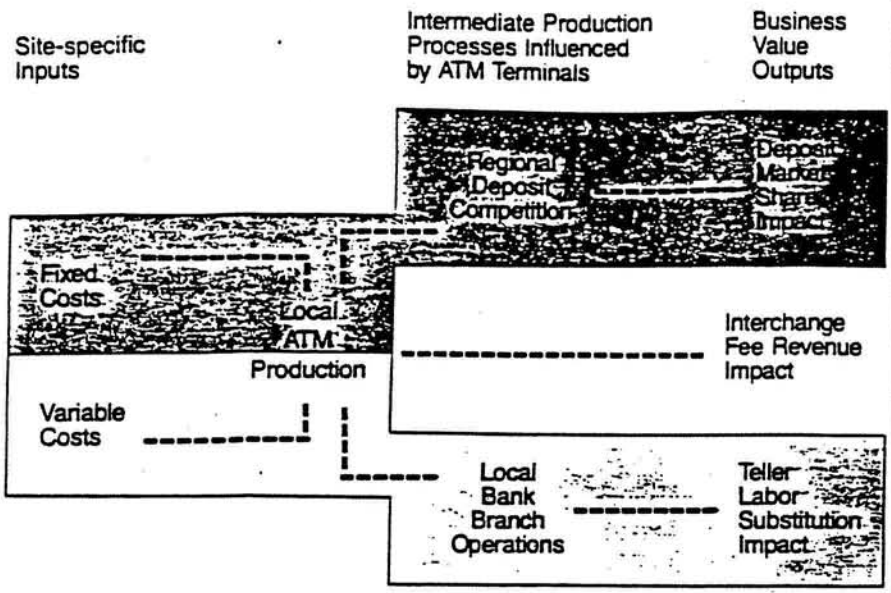
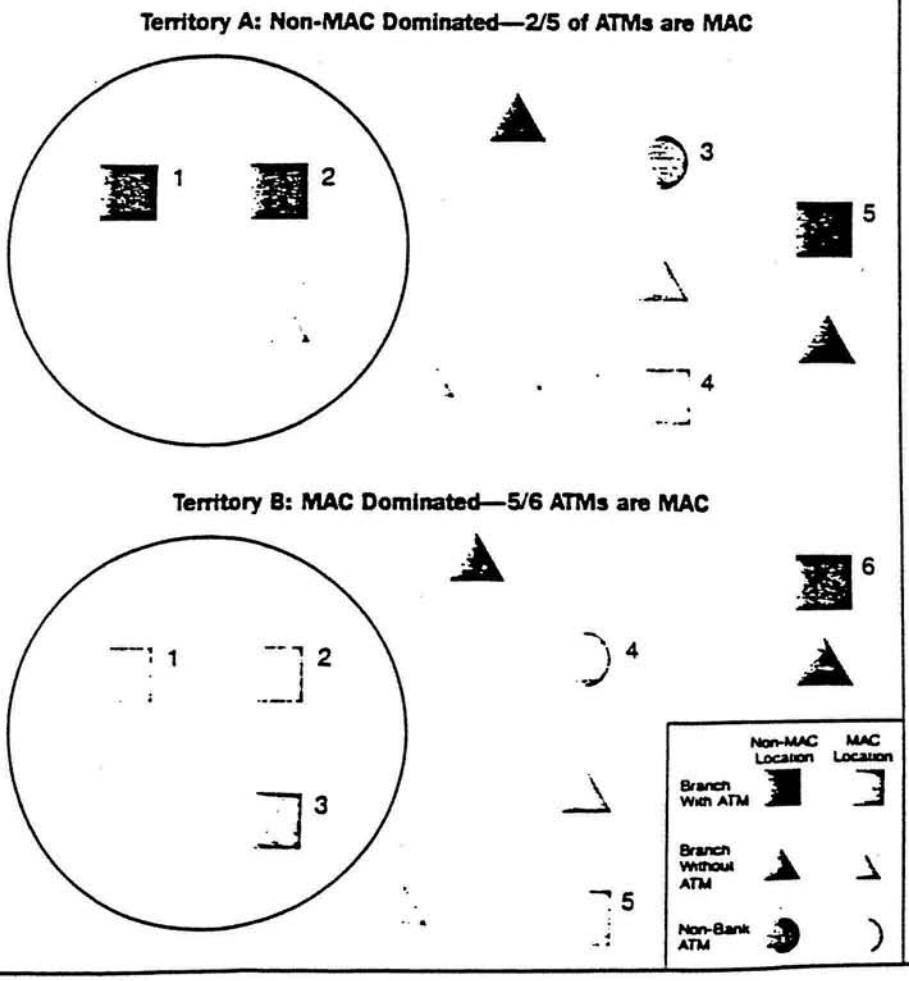


Figure 2
A Comparison of Branch Operating Territories



banks that choose to invest in ATMs. Teller costs can also be reduced, because most ATM transactions substitute for teller labor.

But do ATMs really represent a strategic information technology? Do they have the potential to influence the competitive balance in a retail banking market? If they do, what kinds of market conditions are conducive to ATMs having special strategic value? How would an electronic banking manager be able to detect these effects and use this information to convince senior management of the profit contribution resulting from the ATMs? If there is a positive impact on a bank's market share or profitability, then BVL impact analysis can be used as a tool to quantify the effect of ATM deployments.

Carrying out a BVL impact analysis involves three phases:

1. Defining business value linkages
2. Collecting data and performing the BVL impact analysis
3. Interpreting the results and calculating dollar estimates of business value.

We now turn to a discussion of how this was done at Meridian Bancorp.

Phase one: defining a business value linkage

Project participants first must define the set of potential business effects that the bank's investment in information technology is expected to have. These effects are described in the context of other productive processes operating inside the bank and in its business environment. A business value linkage is defined as the entire set of relationships between economic inputs (e.g. labor, materials, capital, and investment technology) and outputs (e.g. cost reduction, increased revenue, and improved market share.)

This phase, when properly executed, requires a significant effort from the managers involved because the business value linkage describes intermediate processes that are key to the economic success of the firm. Later, in Phase Two, statistical tests are used to either confirm or invalidate the proposed BVL. The extra upfront effort put into defining the BVL helps make subsequent analysis of the results more meaningful for managers.

Meridian Bancorp managers selected two information technology variables believed to increase the attractiveness of a branch: presence of an ATM on the

branch premises and ATM network membership. These information technology variables were linked to direct revenue and market share effects as illustrated in Figure 1.

The bank's fixed costs covered the ATM equipment and its installation, network membership fees, occupancy and line charges. Variable costs were for ATM maintenance, the cost of funds, cash stocking trips, and other international transaction processing costs. The sum of these fixed and variable costs constituted the cost term in the total return equation described above.

The bank received an interchange fee when competitors' customers used the bank's ATMs. In addition, the bank paid a fee when its customers used any competitor's ATM. The net value of these fees was a direct benefit (or cost) resulting from the ATM investment.

Market share improvement and teller labor efficiency, on the other hand, are not observable as a direct result of ATM deployment. Though these effects represented the bank's desired strategic outcomes, they could only be measured as components of intermediate production processes. Once quantified using econometric techniques in Phase Three, these indirect benefits were then included in the final computation of total return from the bank's automated teller machine investment.

Phase Two: data collection and BVL impact analysis

Once the business value linkage has been defined, Phase Two begins. This phase involves collecting data on the target information technology variables along with descriptive data on other key factors contributing to the economic outputs being analyzed. Econometric models are then used to determine whether there is evidence that the information technology variables have an impact on observed economic results.

Data were gathered for more than 500 banking locations in southeastern Pennsylvania. This region was subdivided into 54 branch operating territories, each defining the competitive environment of one or more Meridian branches. For each branch operating territory the total number of branches with and without ATMs, and the number of ATMs in non-bank locations were tallied. ATM network membership was also recorded because Meridian managers felt that this service contributed positively to market share. The Meridian branches with ATMs were all linked to the MAC ATM network, at that time the larger of two networks operating in that part of Pennsylvania. Branch operating territories with two-thirds or more MAC machines were termed "MAC dominated territories." An illustration comparing two branch operating territories is presented in Figure 2.

The differences between the two operating territories depicted are encircled. Territory A has five ATM locations, with two connected to the MAC network (unshaded). According to Meridian's definition, two-thirds must be MAC-locations, and therefore, this territory was considered "non-MAC-dominated." In Territory B, two MAC branches acquired ATMs and one non-MAC branch loses its ATM. Here five of six ATM locations are connected to the MAC network, making it MAC dominated. Subsequent results showed that MAC membership in a non-MAC-dominated territory, such as Territory A, was an important competitive feature.

Data on demand and savings deposit market share were obtained, along with a variety of other descriptive dimensions for each branch. Four classes of predictor variables were identified by managers: type of institution (commercial bank, mutual savings bank, savings and loan); non-physical branch characteristics (high interest rate, branch age, branch name recognition); physical branch characteristics (walkup window, driveup window, number of platform stations); information technology variables (presence of ATMs at a branch, ATM network membership).

These predictors, representing qualitative and quantitative factors, were chosen based on the experience of Meridian's managers. With the exception of the information technology variables, most of the others had previously been explored in research literature on bank branch performance. The information technology variables were the target variables of the study, included to determine their strategic impact on deposit market share.

The variables were used in an econometric model designed to reflect a competitive banking environment. The model, which was estimated on a PC/AT class microcomputer, describes the attractiveness of a branch's features as a "gravitational" force. Each feature functions to sustain current customer deposits and accounts, and draw new deposits away from competitors. Branch attractiveness, then, was summarized by Figure 3.

This model indicates that the demand (or savings) deposit market share of Branch #101 is a function of its design

Table 1
Summary of BVL Impact Analysis Results for Market Share

Description of Region	Branch is a Member of MAC Network	Branch Deployed an ATM
Philadelphia Center City (MAC Dominated Territory)	No Significant Deposit Impacts	No Significant Deposit Impacts
Other Territories Dominated by MAC Network	No Significant Deposit Impacts	No Significant Deposit Impacts
Territories Not Dominated by MAC Network	Increased Market Share of Demand & Savings Deposits	Increased Market Share of Savings Deposits Only

Figure 3

$$\text{Retail Deposit Market Share of Branch \#101} = \frac{\text{Relative Attractiveness of Branch \#101's Features}}{\text{Aggregate Attractiveness of All Competing Branches' Features in Territory}}$$

choices divided by a function of the design choices of all bank branches operating within the same local territory in which branch-to-branch competition occurs. With respect to ATM services, the model provides a means to predict incremental market share based on the characteristics of its ATM services as compared to the characteristics of ATM services offered by all participants in a given territory. The model also recognizes that ATMS are not the only determinant of branch market share.

The overall results suggested that within Meridian's operating territories membership, the regionally dominant MAC: ATM network significantly contributed to market share, but that ATM deployment did not. The estimation model was re-run to examine these results for three different data partitions based on location and ATM network affiliation of the branch, specifically central Philadelphia only, MAC-dominated territories, and territories not dominated by MAC. A summary of these findings is presented in Table 1.

The results showed that Meridian's Philadelphia branches did not benefit from MAC network membership, nor did branches in territories outside of Philadelphia which were already dominated by the MAC network. Bank membership in the MAC network constituted a valuable contribution to market share in territories located outside of Philadelphia that were not dominated by the MAC network. Finally, ATM deployment was found to be a significant predictor of savings deposit market share in the regions not dominated by the MAC: ATM network.

Phase Three: Interpretation of Results and Business Value Calculation

Phase Three of BVL impact analysis attempts to validate the results of the analysis in Phase Two, for the business value linkage proposed in Phase One. The business value implied for the information technology variables is also calculated.

Meridian managers concluded from the test that ATM network membership had a significant influence on business value when it differentiated a branch from others in an operating territory. This explains why MAC: network membership was a significant predicator of market share for branches operating in a non-MAC: dominated territory.

In the early phases of ATM deployment the mere presence of ATMS at a branch may have provided a competitive advantage to the bank. But this advantage seems to have been transient, weakening as competitors responded by deploying ATMS. So when the study was conducted, bank customers in southeastern Pennsylvania were no longer strongly influenced in their choice of a bank, if its branches had ATMS. For competitors, however, there may still be a negative market share effect if their bank branches are not equipped with ATMS.

It is interesting to note that the presence of a branch ATM did affect savings deposit market share in non-MAC dominated territories. Perhaps the presence of ATMS was correlated with another banking service offered to these savings deposit customers, or ATMS differentiated S&L branches from other local competitors in some other way. A BVL impact analysis of ATMS of effects on S&L market share alone can easily be formulated.

Finally, based on the results of the test, the bank concluded that investment in additional ATMS within Philadelphia would not improve deposit market share. The benefits being modeled may have to be explained by more specific ATM-related services (e.g., the kind of services the ATMS actually provide, whether customers have to wait a long time in line, etc.)

BVL impact analysis provides a means to measure the strategic impacts of information technology investments that traditional cost-benefit analysis cannot capture. It was developed for managers responsible for increasingly large budgets as a means to scientifically evaluate the payoff from their information technology investments. The use of BVL impact analysis at Meridian Bancorp showed that MAC: ATM network membership helped to protect retail deposit market share for some of its bank branches. Offering access to the regionally larger shared ATM network, in a territory where this service was not prevalent, produced the largest increases in market share. This was viewed as evidence supporting management's view that MAC: membership can help differentiate a branch's services, and make it more attractive to customers. Other impact analyses failed to support the claim that additional ATM deployment would in itself bring an increase in the size of the deposit market.

BVL impact analysis can also be used to evaluate the influence of other predictors of market share. Huete and Roth[2] showed that "span," the number of delivery channels of a banking service, is inversely related to the specialization of banking service offered. Balance inquiries, for example, were offered through many more channels (high span) than loan applications (low span). If a branch's span of ATM services were viewed as a predictor of value, then BVL impact analysis can be employed to substantiate whether features of an ATM or a particular network make contributions to market share.

BVL impact analysis can also be applied to investigate the contribution to branch market share for ATM deployment in other regions in the U.S. (e.g. California, Texas, Florida, New England, etc.) Variables describing the local population demographics of a region can be used to explain why ATMS seem to have different effects in different geographic areas.

Finally, we would like to point out that BVL impact analysis is not "proof" that linkages exist within a business environment. Instead, it is only "evidence" about the variety of potential strategic effects which ATMS and other information technologies can have. It remains for managers to sort out how the insights they gain can be best used to improve a bank's competitive position.

Footnotes

1) Banker, R.D. and R.J.Kauffman. Strategic Contributions of Information Technology: An Empirical Study of ATM Networks. In Proceedings of the Ninth International Conference on Information Systems. Minneapolis, Minnesota, December 1988.

2) Huete, L.M.and A.V. Roth. Industrialization and Span of Retail Banks' Delivery Systems. 1988. Forthcoming in International Journal of Operations and Production Management.

3) Kauffman, R.J. and C.H. Kriebel. Identifying Business Value Linkages for Production Processes Involving Information Technology. Advances in Working Capital Management. JAI Press, New Haven, CT. 1989. Forthcoming.

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