

Impact Of Website Usability On Performance: A Heuristic Evaluation Of Community Bank Homepage Implementation

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ABSTRACT

Many businesses are now using Internet websites as a competitive tool to attract new customers, improve service quality, and boost overall financial performance. Recent studies have identified a number of website development and evaluation guidelines required to enhance the effectiveness of these new technologies in achieving these goals. One of these guidelines relates to the importance of website usability in improving business performance. To achieve this goal, a unified measure of web usability is developed using a number of relevant guidelines, which were initially proposed by Nielsen and Tahir (2002), and then the estimated index is used to measure its impact on community bank performance. Results based on a multiple regression model show that banks with higher usability score perform significantly better than those with lower score.

Keywords: Community banks, online banking, website usability index, heuristic evaluation, financial performance.

INTRODUCTION

Innovations in financial and information technologies, deregulation of the banking sector, and the increasing popularity of online banking services are redefining the interface of the commercial banking industry. These developments have increased the competition particularly from large commercial banks in small business lending markets, which were primarily served by community banks (1, 6, 7, 11). For instance, while only 46 percent of the community bank executives considered large regional and national banks as their primary competitors in 2001, this figure increased to 68 percent by 2007 (12). Most community banks are now offering a variety of electronic banking products and services, in particular Internet banking, as a strategic measure to withstand competition and maintain market share (2, 12, 32).

Initially, community banks were using websites as a multimedia tool to disseminate bank information such as branch locations and operating hours, available services, and bank policies (2). Currently, a majority of community bank websites are transactional and offer numerous products and services such as electronic checking, online bill pay, and balance transfer capabilities. Moreover, these web savvy banks are investing in information technologies as well as designing websites to attract new customers and improve overall service quality (11, 12, 32).

Effective communication and information management is critical for electronic banking applications because users are often overwhelmed by homepages that do not clearly convey their message (25). If users cannot understand the bank's homepage in about 15 seconds, they abandon the site and turn to other sites that are more usable (19, 25). Websites should be designed to make it easier for customers to find information about the bank, the existing product/service options, and how the service mix is different from the competition. The abundance of

service choice and the ease of going elsewhere with just a click are putting pressure on designers to improve web usability (19, 25, 32). Further, Web users form their expectations for usability based on the usability of the best of all the other sites that they visit (21). This is true even in the banking industry after the deregulation act as many types of financial institutions are aggregating an array of overlapping services, especially on their Web sites, in an attempt to attract and retain customers.

Usability is generally defined as a multidimensional property of a user interface described by five attributes - *learnability, efficiency, memorability, errors, and satisfaction*. A system with a higher learnability attribute is easier for the user to learn, navigate, and perform required operations. An efficient system is designed to support higher productivity levels, while a system with higher memorability attribute values is easier to remember. The error attribute property describes websites designed so that users make fewer mistakes while using the site. The satisfaction attribute measures the aesthetic features that make web use pleasant, which improves overall customer satisfaction (15, 19, 24, 31).

As the Internet is a continuously evolving system, webpage design norms for usability are not yet well established (19, 23). Recently, Nielsen and Tahir (26) developed a comprehensive list of guidelines (113 items) to improve website usability. Although these guidelines are not applicable to all web implementations, they provide basic guidelines for developing a functional website. In fact, important web features applicable to the banking sector can be selected from the list (table 1) to evaluate a bank's homepage.

Usability guidelines listed in table 1 fall under five different categories - communicating the site's purpose, communicating information about the company, content writing, revealing content through examples, and archives and accessing past content. The study considered in this paper uses this subset of categories relating to communication and content as these address how the design of the homepage targets end user's cognitive reaction to the page. In other words, these attributes directly measure how easy it is for a user to comprehend the purpose and functions of the entire website. The remaining categories are focused upon aesthetics and navigation for the most part – while important in their own right for branding and task completion, these are not within the bounds of the study presented herein.

Recent studies (2, 12) show that Internet banking activities have a positive impact on a banks' financial performance. However, none of the existing studies have examined how website usability impacts a bank's financial performance. To mitigate this gap in the literature, this study develops a comprehensive measure of web usability (user experience in interacting with the bank website) using data gathered from bank websites. The estimated index is then used to measure the impact of web usability on bank performance.

REVIEW OF LITERATURE

As the web continues to mature as a competitive tool for business applications, there is a growing need to understand the relationship between web usability and business performance. Much of the prior research has viewed the website development from a set of usability factors (4, 5, 9, 10, 14, 15, 19, 25, 27, 29). However, there has been a limited research examining the impact of website usability on business performance (16, 18, 31, 32). In the evaluation of e-commerce projects the firm level performance factors typically used as metrics are return on investment (ROI), cost benefit analysis (CBA), and net present value (NPV) calculations. However, these metrics may not be precise enough to evaluate e-commerce implementations. It is often suggested to employ other measures that are strategic in focus (18) or provide better measure of overall business performance such as return on assets (2, 12).

For community banks, using technology instead of personal contact presents a serious challenge as these local banks have traditionally based their business model on relationship banking. A number of recent studies have examined the role of technology in improving efficiency and productivity in the traditional relationship banking model of community banks (1, 2, 12). Other studies have examined the technology adoption issue from a customer perspective by focusing on issues related to privacy, transaction and information security, website quality, customer satisfaction, loyalty, and trust in the online relationship banking environment (10, 17, 22, 23, 33).

Although there is general lack of research in establishing the relationship between web usability and performance, recent studies have observed that community banks with extensive online banking services tend to perform better than those with a limited web presence (1, 2, 12). These results indicate that online banking is an important strategic option for competitive positioning of community banks. The implementation of a wide array of web-based products by community banks allows these financial intuitions to compete for customers that may traditionally be outside the “local” market (12).

However, the impact of websites and Internet banking applications on the banks’ performance can be expected to be even more pronounced in the long-run if these website become more user focused (friendly). A more usable website can attract and retain customers in the long-run thereby increasing revenues, reducing customer support costs, and increasing profits (19, 32). As the number of banks offering online banking services increases, competition is bound to increase and banks will have to focus on the design of their websites as well as online banking applications to endure competition and sustain revenue generation. At the strategic level, web site usability is a prerequisite for a firm’s success because a website cannot attract users unless they can navigate the site easily (25, 32).

As competition in online banking market increases web usability is becoming increasingly important. For firms that rely on online transactions, usability is critical because customers cannot execute a purchase unless they find the product they are looking for (24). From the customer perspective, the Internet experience is an empowering event where a customer can make a purchase or leave the site for a competitor with just a click (32).

In the network economy, the Web site is a firm’s primary interface to the customer (21). Web design needs to cater to the general user that has limited experience with online activities. Rarely can a site be successful if it targets only to the most advanced Web users (20, 24). Design flaws and non-standard interaction sequences lead to lost customers and sales (21, 23, 24). Branding and unique design of Web sites may give a temporary advantage, but usability is critical for a sustained advantage. As more sites recognize the importance of simplicity and user-centered design features in earning customers’ business and loyalty, the usability barrier will dissipate (24).

Community banks do not have the scale and resources to match large commercial banks in terms of investment in information technology and online product offerings. However, website design and usability has the potential to act as an equalizer of competition (22) putting community banks on an equal footing with larger commercial banks. Therefore, community banks should emphasize the usability of their Web site as a competitive banking tool.

METHODOLOGY AND DATA

A combination of primary and secondary data is used to examine the impact of web design features on a community bank’s financial performance. A number of steps are taken to obtain the primary data on web usability. First, a subset of 32 items described by Nielsen and Tahir (26) that are appropriate for the banking industry and reflect the extent and intensity of web usability were selected (see Table 1 for complete item listing). Second, a random sample of 55 community banks with online services and operating in one of the five Midwest states (Iowa, Minnesota, Montana, North Dakota, and South Dakota) or in Texas in December 2005 was drawn. The states in the upper Midwest and Texas are the regions with the largest concentration of community banks in the U.S. This region also forms a contiguous market that is relatively isolated from larger banking centers that contain regional or national banks, which would confound the analyses. Third, the sample bank’s websites are evaluated using a four point evaluation scale (see Table 2) for each usability attribute or feature. Fourth, a unifying usability index is created by adding item scores and dividing it by the total number of attributes chosen (32).

Secondary data on financial variables was downloaded from the FDIC website (www.fdic.gov). Specifically the FDIC Reports on Statistics on Depository Institutions (RSDI) and Summary of Deposits (SOD). These data describe the financial and operating characteristics of the community banks located in the study sample. Furthermore, the FDIC provides a complete set of financial statements for all reporting banks, from which loan and deposit amounts, physical capital figures, employee information and financial capital values were ascertained.

Empirical Model

Once the comprehensive web usability index is calculated using primary data collected from each representative bank website, its impact on performance can be evaluated by estimating a multiple regression model. The relationship between the financial performance of commercial banks and the variables of interest is specified as:

$$\begin{aligned}
 ROA = & \alpha + \beta_1 Urban + \beta_2 BHC + \beta_3 Equity + \beta_4 Fee + \beta_5 Depi + \beta_6 Exp + \beta_7 Nlon \\
 & + \beta_8 Rcap + \beta_9 Blon + \beta_{10} \ln Asset + \beta_{11} Ux + \beta_{12} Ux^2 + \beta_{13} (Blon * Ux) \\
 & + \beta_{14} (Asset * Ux) + \varepsilon_i
 \end{aligned}
 \tag{1}$$

where *Asset*= natural log of the bank's total assets (thousands of dollars) per branch, *Equity* = total equity capital/bank assets, *Depi*= interest bearing deposits/total deposits, *Urban*=metropolitan area, *BHC*=member of multi-bank holding company, *Exp*=total non-interest expenses/net revenue, *Nlon*=net loans and leases/deposits, *Rcap*=total risk based capital ratio, *Fee*=non-interest income to earnings ratio, *Blon*=noncurrent loans to loans ratio, *Ux*=web usability index, *Ux*²=squared term for web usability index, *Blon*Ux* = interaction between non-current loans ratio and usability index, and *Asset*Ux* = interaction between the variable *Asset* and Usability index. The variables used in the financial performance function (equation 1) have been used in prior studies of bank performance (2, 3, 8).

In addition to the web usability index (*Ux*), a number of control variables that account for the impact of revenue structure, equity capital, deposit structure, bank location, association with multi-bank holding companies, costs of asset acquisition, loan to deposit ratio, risk factor (of loans) , bank size, and loan quality are included in equation (1). In this relationship, the impact of *Fee* and *Equity* variables, *a priori*, are expected to be positive because banks that can generate more non-interest income per asset or those with readily available equity capital are likely to achieve higher ROA. On the other hand, firms with a higher proportion of interest bearing deposits, that are located in metro areas, associated with the multi-bank holding companies, with higher non-interest expenses to revenue ratio, and those with a higher proportion of risk-based capital ratio are expected to be less efficient than other banks.

While the impact of the non-current loan ratio, which reflects the proportion of under performing loans, is expected to be negative, bank size (*Asset*) and web usability variables are expected to have a positive impact. However, the total effect of these variables on performance is not obvious from the relationship specified in equation (1). Since these variables include interaction and secondary effects, partial derivatives should be analyzed to determine the total effect. Once these parameters are estimated, a single variable t-test and a joint test based on log likelihood ratios can be constructed to evaluate the impact of individual correlates and the combined effect of more than one correlate, respectively.

RESULTS

Summary statistics presented in Table 2 show that most sample banks are located in metro areas (76 percent), are associated with multi-bank holding companies (56 percent), and are able to maintain a relatively lower non-current loans to total loans ratio (0.6 percent). These findings are consistent with prior bank performance studies (3). In terms of web usability guidelines, the sample average is 79.6 percent which falls into the second category (50-80 percent) of design metrics. For banks in this category, Nielsen and Tahir (26) suggest that the firm should start a web redesign project in an effort to develop a new or more current homepage.

Multiple regression results indicate that the first two variables, which measure bank location (*Urban*) and the bank's association with a multi-bank holding company (*BHC*), have no impact on community bank performance (Table 3). Almost all coefficients, except for these two variables, are significant ($p < 0.05$) and maintain the expected signs. The coefficient of determination, which measures the overall model fit, is also relatively high (0.812) for a study based on cross-sectional data. As expected, community banks with higher ratios for non-interest revenue to total asset (*Fee*) and equity to asset (*Equity*) perform better than those with lower ratios. Moreover, banks with

higher cost or risk-based capital ratios such as interest bearing deposits to total deposits (*Depi*), non-interest expenses to total revenue (*Exp*), and total risk-based capital ratio (*Rcap*) tend to perform poorly.

This regression model also includes a squared and/or interaction terms for three variables. The interpretation of the coefficients of these variables may not be obvious. However, partial derivatives can be used to evaluate the total effect of these variables on bank performance (Table 4). The estimated derivatives show that the total effect of bank size as measured by average assets per branch ($\delta ROA/\delta Asset$) is significantly positive ($p < 0.05$) implying that large community banks tend to perform better than smaller ones. On the other hand, banks with a higher proportion of non performing loans ratio ($\delta ROA/\delta Blon$) are less efficient than those with a lower proportion of bad loans. As expected, the relationship between bad loans and bank performance is consistent (-1.01).

The last derivative ($\delta ROA/\delta Ux$), which measures the total effect of web usability on bank performance, is also significant and as expected carries a positive sign. These results indicate that as a community bank improves the web usability index from 0 to 1 their financial performance in terms of return on assets may increase by up to 0.52 units. A direct application of this result would imply that starting from zero if a bank achieves a perfect web usability index then its performance would increase by 52 percent.

SUMMARY AND CONCLUSIONS

An increasing number of community banks are adopting web technologies as competitive tools to attract new customers, improve service quality, and boost financial performance. The average variable cost of providing banking services through a bank webpage is much lower than any other distribution channel currently in use. However, it is not clear how Internet banking would affect community banks whose business model is primarily based on relationship banking. If the expectation of attracting new customers and improving the overall customer experience materializes, online banking will certainly improve bank performance. However, offering services through new channels without focusing on improving service quality and web usability may not help in achieving these goals.

A number of procedures were followed to measure the usability of community bank websites and determine how the web quality measure is related to financial performance. First, from Nielsen and Tahir's web usability guidelines, 32 webpage features that are applicable to banking sector applications were selected. Second, a random sample of 55 banks offering web banking services in at least one of the five Midwest states in December 2006 are selected.

Third, the sample bank websites were evaluated using these 32 web usability features using a four point classification scale. The web evaluation data are used to construct a web usability index that measures its impact on bank performance. The results based on a multiple regression model show that an increase in the usability index from zero to 1 would increase financial performance of a community bank by 0.52. In other words, if the average web usability index of sample banks is increased from 79.8 percent to 100 percent, then the average performance of community banks can be increased from 1.30 percent to 1.47 percent.

MANAGERIAL IMPLICATIONS

As the competition in providing banking and financial services intensifies and consumers become aware of service quality provided by different financial institutions, the need for improving web usability will be necessary. Community banks should evaluate their websites from a customer perspective and follow the design guidelines proposed by Nielsen and Tahir for improving website usability and access. The effective design of a firm's website is important particularly for community banks because they may not have sufficient resources to match large commercial banks in IT personnel, investments, and product offerings. However, usability design has the potential to act as a great equalizer of competition (22) putting community banks on an equal footing with larger banks in attracting non-local customers as well as retaining existing customers. Therefore, community banks should implement design practices that maximize the usability of their Web sites as well as supporting the array of Web banking applications currently offered.

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Table 1: Web Usability Guidelines Used in Evaluating Sample Websites

Communicating the site’s purpose	
1.	Display company name/logo in reasonable size and location
2.	Show tag line explicitly summarizing what company does
3.	Emphasize what is offered in the website and how it differs from competitors
4.	Emphasize high priority tasks to minimize confusion
5.	Designate one page as official homepage
6.	Don’t use the word “website” to refer anything but the totality of firm’s web presence
7.	Clearly differential homepage from other pages
Communicating Information about the Company	
1.	Group corporate information (e.g., about us and investor relations) in one distinct area
2.	Provide link for items such as “About Us” and other corporate information
3.	Include a “Press Room” or “News Room” link on your homepage
4.	Provide a unified picture of the company in which website is only one touch point.
5.	Provide a “Contact Us” link in the homepage
6.	If a “Feedback” mechanism is used, specify the purpose and how it will be used
7.	Don’t include internal business information
8.	If customer information are collected, provide a link to “Privacy Policy” homepage
Content Writing	
1.	Use customer-focused language
2.	Avoid redundant content
3.	Don’t use clever phrases and marketing lingo that are hard for customers to understand
4.	Use consistent capitalization and other formatting standards
5.	Don’t label obvious contents
6.	Avoid single-item categories and single-item bulleted lists
7.	Don’t break phrases that need to go together in order to be scannable and understood
8.	Use imperative language such as “Enter Zip Code” only for mandatory tasks
9.	Spell out abbreviations, initialism, and acronyms first before using them
10.	Avoid exclamation marks
11.	Use uppercase letters sparingly
12.	Aviod using spaces and punctuation inappropriately for emphasis
Revealing Content through Examples	
1.	Use examples to reveal the site’s content, rather than just describing it
2.	Provide a direct link to the detailed page for examples used in the page
3.	Provide link to the broader category next to the specific example
4.	Differentiate links that provide general information from those that prove details
Archives and Accessing Past Content	
1.	Make it easier to access recently featured items on your homepage

Source: Nielsen, J. and M. Tahir, Homepage Usability: 50 Websites Deconstructed, Indianapolis, Indiana: New Riders, 2002. Some of the categories are paraphrased to fit them in a single row.

Table 2: Usability Evaluation Scale

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1. Does not follow guidelines
 2. Follows guidelines but unsatisfactory
 3. Follows guidelines and needs improvements
 4. Follows guidelines satisfactorily
-

Table 3: Bank Level Sample Statistics

Variable Description	Variable	Mean	Standard Deviation
Return on Asset	<i>ROA</i>	0.013	0.006
Urban	<i>Urban</i>	0.764	0.429
Multi-Bank Holding Company	<i>BHC</i>	0.564	0.501
Equity Capital/Total Assets	<i>Equity</i>	0.092	0.020
Non-interest Income/Earning Assets	<i>Fee</i>	0.022	0.042
Interest Bearing Deposits/Total Deposits	<i>DEPIR</i>	0.803	0.091
Non-interest Expenses/Net Revenue	<i>Exp</i>	0.624	0.123
Net Loans and Leases/Total Deposits	<i>Nlon</i>	0.853	0.196
Total Risk-Based Capital Ratio	<i>Rcap</i>	0.136	0.049
Non-Current Loans/Total Loans	<i>Blon</i>	0.006	0.010
Log(Total Assets/Branches)	<i>Asset</i>	11.037	0.681
Usability Index	<i>Ux</i>	0.796	0.109

Table 4: Parameter Estimates for Bank Performance Function

Variable	Coefficient	t-Ratio
Constant	-0.1024	-1.42
Urban	0.0010	0.89
Multi-Bank Holding Company	-0.0012	-1.18
Equity Capital/Asset	0.1415**	3.06
Non-interest Income to Earning Assets	0.0633**	4.42
Interest Bearing Deposits/Deposits	-0.0180**	-3.25
Non-interest Expenses/Net Revenue	-0.0387**	-8.81
Net Loans and Leases to Deposits	-0.0072*	-2.05
Total Risk-Based Capital Ratio	-0.0692**	-3.55
Non-current Loans to Loans Ratio	-1.0105*	-2.25
Log(Asset/Branch)	0.0116*	1.92
Usability Index	0.2263*	2.30
Usability Index ²	-0.0592*	-2.20
Usability Index*Non-current Loans to Loans Ratio	0.0001*	2.42
Usability Index*Ln(Asset/Branch)	-0.0001*	-1.77
N	615	
R ²	0.812	

*,** Denote significance at 1 and 5 percent level, respectively.

Table 5: Derivative Evaluated at Sample Mean

Derivative	Coefficient	t-Ratio
$\delta ROA/\delta Asset$	0.0115*	1.92
$\delta ROA/\delta Blon$ (Non-performing Loan Ratio)	-1.0104*	-2.25
$\delta ROA/\delta Ux$ (Usability Index)	0.5168*	2.30

*,** Denote significance at 1 and 5 percent level, respectively.