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THE DELTA E-COMMERCE CONNECTION: PRELIMINARY FINDINGS

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ABSTRACT

A USDA Fund for Rural America project is creating economic opportunities for small agricultural and rural businesses in the Lower Mississippi Delta by assisting in e-commerce business development. Select rural businesses are provided technical support in web site development, marketing strategy formulation, electronic retailing services, and space on a secure server for one year. Businesses retaining web sites after this time assume responsibility for maintaining and funding the site.

Characteristics of rural businesses adopting e-commerce are compared with those not adopting. Preliminary results suggest the amount of time invested in initial web site design, satisfaction with design, economic benefits from owning a web site, and number of levels traveled in the e-commerce roadmap (a measure of technological progress) as determinants of success. These findings will assist in selecting and guiding participant involvement to maximize the likelihood of success.

Rural communities, defined as including "open country and settlements with fewer than 2,500 residents" (U.S. Census Bureau 2003), continue to lag behind the national average in terms of income, education, and use of technology (Congressional Rural Caucus 2003). Currently, rural communities encompass 75% of the land and 17% of the population in the United States (U.D. Department of Agriculture 2003). Rural Internet use is approximately two-thirds of current urban use and technologies such as cable modem and DSL are significantly underserved in these areas (Congressional Rural Caucus 2003). Access to education and financial assistance in electronic commerce (e-commerce) technology has the potential to strengthen these traditionally weaker economies. E-commerce is defined as buying and selling via the Internet.

E-commerce technology allows smaller businesses to compete with larger corporations by overcoming obstacles with the aid of the Internet (Abate and Moser 2003; Dutta and Evrard 1999; Poone and Swatman 1999; Riggins 1999). However, adoption rates are lower and most failure in e-commerce business has been with the small to mid-size businesses (Foong 1999; Paper, Pedersen, and

Mulbery 2003; Van Beveren and Thomson 2002). Possible inhibitors include insufficient experience, expertise, and resources (Cragg and King 1993).

There are several distinct advantages to both buying and selling on the Internet. For sellers, e-commerce technology allows more information to be gathered on customers. Businesses can then identify specific customer needs to better target marketing and advertising efforts (Vrechopoulos, Siomkos, and Doukidis 2000). E-Commerce then offers small businesses the ability to sell products or services in a global marketplace 24-hours a day, seven days a week. Costs can also be minimized as physical store locations are not always necessary and labor costs can be reduced with the automation of online transactions (Barton 2003; Chen and Ching 2002). Traditionally, printed materials and postage have been cost prohibitive for smaller businesses. With the Internet, online catalogs and digital photographs can greatly increase exposure without the incremental increase in costs (Lal and Sarvary 1999). A professionally designed web site can make a small business appear dominant online. A large business can also appear smaller and cater to more specific customer needs. From a consumer standpoint, search costs are lowered and there is access to stores at all hours and locations (Roberts, Xianzhong, and Mettos 2003; Schimmel and Nicholls 2003).

E-commerce also has disadvantages that must be overcome. For consumers, credit card risk, information security, social aspects gained from traditional shopping, and the inability to try on, taste, touch, and smell items before purchase are a few of the disadvantages of shopping online (McFarlane, Chembezi, and Befecadu 2003; Roberts et al. 2003; Schimmel and Nicholls 2003). From a seller's perspective, price competition is higher and the lack of face-to-face customer contact makes company goodwill more difficult (Riggins 1999).

Successful e-commerce businesses require a new business strategy (Chen and Ching 2002; Murray and Narayanaswamy 2003). Abate and Moser, 2003, list the following steps for building an e-commerce web site: business planning, creation of online content, hosting online content, marketing the web site, collecting and recording customer orders, processing payments, and fulfilling orders. Successful sites are generally easy to navigate, load quickly, attract targeted customers, and have an easy to remember domain name (Abate and Moser 2003). Collaboration between computer programmers, artists, and marketing and business experts can fully encompass these areas (Paper et al. 2003).

Through the USDA Fund for Rural America project, assistance in e-commerce business development was created for small agricultural and rural businesses in the

Lower Mississippi Delta region. The grant allowed for educational, financial, marketing, and technical assistance to be administered through Louisiana Tech University. Educational assistance was provided through a five hour seminar in selected rural areas through Louisiana Tech University in collaboration with either Small Business Development Centers or participating university sites. Three modules were presented in the workshop. The first module introduced the concepts and terminology associated with e-commerce. Estimates of software, hardware, and service fees were presented so that the potential e-commerce participant had a clear idea of prices, software, and the work involved. An e-commerce roadmap with five levels of technology adoption was presented to determine where individuals were currently with respect to e-commerce technology and where they hoped to be after participating in the project. Level zero was defined as not having access to an Internet connection or e-mail account. Level 1 was defined as having Internet and e-mail access, with no web site. Level 2 indicated the business had a non-interactive web site, while level 3 indicated an interactive web site with features such as registration forms, dynamic on-line catalogs, and subscription lists. Level 4 involved transactional web site capabilities such as an on-line shopping cart, order tracking, and funds transfer. Level 5, the highest level on the e-commerce roadmap, involved a seam-less, fully-integrated process of tracking inventory and selling on-line (National Institute of Standards and Technology 2003). Some participants hoped only to get an informative web site to supplement existing business practices. Other participants did not have the brick and mortar stores, so a fully transactional virtual storefront was desired.

Module two addressed marketing issues for designing a profitable web site. The days of "build it and they will come" are over, and generating the traffic necessary to induce sales revenue is vital for e-commerce success. The third module involved the design characteristics of web site construction. Specifically, navigation, layout, color combinations, font, placement of text and graphics, load time, browser compatibility, screen resolutions, and shopping cart features were addressed.

The project is currently funded for a four-year period, ending in 2005. Participants enter the program for a one-year period. Currently, the second year has ended and two rounds of businesses have completed the program. Businesses retaining web sites after leaving the program assume responsibility for maintaining and paying for the site.

Adoption of e-commerce technology in this project is defined as businesses retaining their e-commerce presence after their participation in the project ended.

Preliminary data provided insight into characteristics of successful e-commerce adoption in an effort to bring a more focused selection of applicants into the program to maximize the development of rural e-commerce businesses.

Hypothesized characteristics of successful adoption include the amount of time invested in initial web site design, satisfaction with design, economic benefits gained from owning a web site, and number of levels traveled in the e-commerce roadmap (a measure of technological progress) as determinants of success. Information was gathered on each of the 13 participants finishing the project. Web site information, such as number of hits, number of visitors, and type of website developed was gathered as well.

In Louisiana, there are high levels of DSL and cable modem broadband as compared to states with similar demographic characteristics (Louisiana Economic Development 2004). BellSouth and CenturyTel are currently the largest providers of telephone services to provide DSL. Throughout the state a T1 business internet connection is available, but cost prohibitive in many rural areas. The cable modem broadband requires cable services that are not available in many rural areas in the state. With the onset of satellite television, the likelihood of rural markets receiving cable is slim. It is very cost prohibitive for cable companies to expand into these rural communities. The cable modem broadband is largely available in the southeastern corner of Louisiana and in pockets throughout the rest of the state. The greatest potential for the future of rural areas in Louisiana is wireless broadband (Louisiana Economic Development 2004).

Data and Methods

Two survey instruments were made available to all seminar participants desiring to participate in the e-commerce program. An initial survey was conducted when a participant in the seminar applied for technical assistance. Business information, computer experience, and biographical information were obtained. These criteria were used to determine which businesses had the potential to benefit from e-businesses. The second survey was conducted on-line after the participants finished their one-year tenure in the Delta E-Commerce Connection project. Questions concerning traveling time for technical assistance, time spent developing the web site, and profit and sales differences since developing an on-line presence were assessed. Levels of satisfaction, agreement, and importance were obtained with respect to communication, location, web site features, and competence with

technology were recorded as well.[1] The initial survey had a 100% response rate as it was part of the application for admission into the program. The exit survey had a 92% response rate as it was voluntary and not all participants successfully made it through the one year program. Of the participating businesses, 69% were product-oriented, and the remaining 21% were service-oriented. The analysis of the data was done using SPSS version 11.5 (SPSS Inc. 2003). A one-way ANOVA was used to determine various levels of statistical significance between adopters and non-adopters for business demographic features, level of internet use, time spent traveling and developing web site, correspondence preferences, and scaled items pertaining to satisfaction, importance, and agreement levels. Chi-squared tests were used for business demographic features and correspondence preferences.

Results

Each business was determined to be either successful (adopters) or unsuccessful (non-adopters) based upon the continuation of the web site after project completion. Approximately 54% of the businesses maintained an e-commerce presence. Of these e-commerce businesses, 43% were service-oriented, while 17% of the non-adopting businesses were service-oriented, as opposed to product-oriented. Service-oriented web sites included livestock auctions, dog breeders, animal trainers, and health care services. Product-oriented web sites included gift items, chemical sales, garden art, farm products, clothing for elderly healthcare needs, wildlife game calls, jewelry, and glass artists.

Time in business, business location, number of people employed, and pre-e-commerce profit and sales were not statistically different for adopters and non-adopters of e-commerce. However, adopters were in business less time than non-adopters, employed fewer people, and began the program with fewer sales and more profit than unsuccessful participants (Table 1). Every adopter had access to a computer, used a business computer, and had access to the Internet, with only 83% of non-adopters having each of these. The adopters tended to have the infrastructure in place to begin work on their end of the project more handily than non-adopters.

[1]A copy of the survey instruments can be obtained from the authors upon request.

Table 1. Business Characteristics of Adopters and Non-Adopters Participating in the Delta E-Commerce Connection (DECC) Project.

Characteristics	Adopters Mean	Non-Adopters Mean	Overall Mean
Service-Oriented Businesses (%)	43.00	17.00	31.00
Time in Business (years)[a]	2.14	2.67	2.38
Business Location[b]	1.17	1.83	1.77
People Employed[c]	1.00	1.17	1.08
Pre-E-Commerce Annual Sales[d]	3.29	3.83	3.54
Pre-E-Commerce Annual Profit[e]	3.57	2.60	3.17

[a]Time in Business: 1 = less than 2 years, 2 = 2-5 years, 3 = 5-10 years, and 4 = 10+ years

[b]Business Location:1 = home, 2 = outside home, 3 = both

[c]Employed People:1 = 1-10, 2 = 10-50, 3 = 50-100, 4 = over 100

[d]Annual Sales: 1 = $0-1,000, 2 = $1,001-5,000, 3 = $5,001-10,000, 4 = $10,001-100,000, 5 = $100,001-500,000, 6 = $500,001-1,000,000, 7 = $1,000,001-2,000,000, 8 = over $2,000,000

[e]Annual Net Profit: 1 = Lost money, 2 = $0-$1,000, 3 =$1,001-5,000, 4 =$5,001-10,000, 5 = $10,001-100,000, 6 = $100,001-500,000, 7 = $500,001-1,000,000, 8 = over $1,000,000

Business owners maintaining an e-commerce presence checked their e-mail account daily, while businesses not maintaining a presence checked e-mail slightly more than once a week. Potential reasons for this include adopters treating the web site as a component of their business, not to be neglected, while non-adopters thought of the web site as a secondary presence. Approximately 86% of adopters used the internet to make purchases before entering the program, while only 67% of non-adopters had made purchases on-line, indicating a strong e-commerce presence from the consumptive side. Adopters outpaced non-adopters with respect to on-line business research and on-line banking by 33% and 24%, respectively, again indicating that the more technically savvy were more likely to succeed (Table 2).

Table 2. COMPUTER USAGE FOR ADOPTERS AND NON-ADOPTERS PARTICIPATING IN THE DELTA E-COMMERCE CONNECTION (DECC) PROJECT.

	ADOPTERS	NON-ADOPTERS	OVERALL
CHARACTERISTICS	MEAN	MEAN	MEAN
Computer access (%) . . .	100.00	83.00	92.00
Business computer (%)	100.00	83.00	92.00
Internet access (%)	100.00	83.00	92.00
Frequency of email check[a]	3.29	2.50	2.92
Purchase on-line (%) . . .	86.00	67.00	77.00
Internet research (%) . . .	100.00	67.00	85.00
On-line banking (%) . . .	57.00	33.00	46.00

[a]Frequency of email check:1=less than once a week, 2=once a week, 3=daily, 4=more than once a day

It is important to note that adopters did have less travel time for technical consultation and visited the project director 3.3 times on average in person, while the unsuccessful business had an average of 2.4 visits. Adopters had easier access to help, but also had more time invested in the e-commerce business overall. In web site development, adopters spent an average of 8.12 hours gathering images, 18.29 hours gathering written content for the web site, and 18.43 hours writing content for the web site. In contrast, non-adopters spent an average of 1.4 hours gathering images, 2.1 hours gathering written content, and 1.6 hours writing content. Successful adopters also communicated their satisfaction more than non-adopters by recommending a seminar to others 71% to 40%, respectively. On average, adopters requested a visit from the Delta E-Commerce Connection to their site in 43% of the cases, with only 20% of non-adopters requiring a personal visit. This additional connection perhaps allowed for a more complete understanding of the business and perhaps additionally to a more tailored web site design specific to the needs of the business. There was a statistically significant difference in e-mail and fax use among participants in the program. Adopters not only had more contact than non-adopters, but used technologically driven medium to correspond as well. For instance, adopters sent images and other documents by e-mail as attachments, zipped up large files for electronic transfer, and uploaded files to a server for download.

Adopters did notice a statistical difference in post-program sales and profits. It is noteworthy to mention that increases in profit, in some cases, were due to decreases in costs of advertising, mailing, and printing, rather than an increase in sales. This was particularly true with the agriculture auction web site (Table 3). Key factors that successful adopters noted with statistical significance over non-adopters were satisfaction with site design and support location. Adopters felt that they were up-to-speed with the rest of Louisiana with an average rating of 6.86 on a 7 point scale, while non-adopters average rating was a 4.20. This is indicative of the business spending more time on their web site presence, creating less dependency on the Delta E-Commerce Connection.

Table 3. Correspondence and Effort of Adopters and Non-Adopters Participating in the Delta E-Commerce Connection (DECC) Project.

Characteristics	Adopters Mean	Non-Adopters Mean	Overall Mean
Travel Time for Consultation[a]	1.43	1.80	1.58
Number of Visits for Consultation	3.29	2.40	2.92
Time Gathering Images (hrs.)	8.12	1.40	5.32
Time Gathering Written Content (hrs.)	18.29	2.10	11.54
Time Writing Content (hrs.)	18.43	1.60	11.42
Recommended a Seminar (%)	71.00	40.00	58.00
Requested a Site Visit to Business (%)	43.00	20.00	33.00
Correspond by Email (%)***	86.00	40.00	67.00
Correspond by Fax (%)***	43.00	0.00	25.00
Difference in Sales (%)*	71.00	0.00	42.00
Difference in Profit (%)*	86.00	0.00	50.00

[a]Travel Consult (one-way to Ruston office in miles):1=0-30, 2=30-60, 3=60-90, 4=90-120, 5=120-150, 6=150+

*Statistically significant at the 5% level, ** at the 10% level, and *** at the 15% level.

The levels traveled in the e-commerce roadmap, which measured the increase in technological progress, was statistically significant between adopters and non-adopters. Adopters traveled 2.29 levels, while non-adopters only traveled 2.00 levels on average. Adopters generally started at level one and ended between levels three and four, while others started at level zero and ended between level two and three. This result indicates that there is an implied level of technological progress

that must have taken place before venturing into a successful e-commerce business. Also, the willingness to progress further was illustrated by the time spent on the web site development on the part of the business (Table 4).

Table 4. CORRESPONDENCE AND EFFORT OF ADOPTERS AND NON-ADOPTERS PARTICIPATING IN THE DELTA E-COMMERCE CONNECTION (DECC) PROJECT.

		NON-			NON-	
	ADOPTERS	ADOPTERS	OVERALL	ADOPTERS	ADOPTERS	OVERALL
CHARACTERISTICS	MEAN	MEAN	MEAN	MEDIAN	MEDIAN	MEDIAN
Satisfaction with Site Design[a] *	6.00	5.60	5.83	7.00	6.00	7.00
Satisfaction with Support Location[b] ***	6.14	5.60	5.92	7.00	5.00	7.00
Agreed to being up-to-speed with Louisiana[c] **	6.86	4.20	5.75	7.00	4.00	7.00
Levels traveled in E-Commerce Roadmap	2.29	2.00	2.15	2.00	2.00	2.00
Start in E-Commerce Roadmap*	0.86	0.17	0.54	1.00	0.00	1.00
End in E-Commerce Roadmap**	3.14	2.17	2.69	3.00	2.00	3.00

[a]Satisfaction with web site design on a 7-point Likert scale where 1=Very Unsatisfied, 4=Somewhat Satisfied, and 7=Very Satisfied

[b]Satisfaction with support location on a 7-point Likert scale where 1=Very Unsatisfied, 4=Somewhat Satisfied, and 7=Very Satisfied

[c]Level of Agreement of being up-to-speed with Louisiana on a 7-point Likert scale where 1=Strongly Disagree, 4=Somewhat Agree, and 7=Strongly Disagree

* Statistically significant at the 5% level, ** at the 10% level, and *** at the 15% level.

Summary and Conclusions

Success in e-commerce was found to be potentially related to initial technical knowledge, time spent on building and designing the web site, and progress made throughout the program. General business demographics, such as number of employees, size of business, location of business, type of business, and prior business

experience, did not necessarily indicate potential for successful adoption. This is important because new businesses wanting to make an e-commerce presence may not have a perceived handicap relative to established businesses. However, success in e-commerce requires a business to learn about new software and embrace change. Without the desire to be an integral part of the on-line business transition, failure was essentially inevitable. This further indicates that initial technical knowledge levels and business involvement in the program weighed heavier than past business experiences, sales, and profits in determining adoption of e-commerce. Our findings suggest the importance of access to an Internet enabled computer and time commitment by a business as indicators increasing the likelihood of success. Therefore, pre-selection screening should include questions that can gauge a businesses readiness in these areas.

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