

**DELIVERY SYSTEM INDUSTRIALIZATION STRATEGIES
OF AMERICAN RETAIL BANKS FOR 1990**

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Abstract

The expected changes over the next three years in the delivery activities of American retail banks is the central theme of the present paper. Industrialization in the context of delivery activities is defined as the substitution of employee contact with customers by technology and systems. This paper measures changes in industrialization by anticipated shifts in the delivery channels most emphasized by American retail banks for the delivery of typical banking services. It provides a picture of American retail banks' future plans for industrialization. Three clusters of plans are uncovered. The results suggest that banks industrialization changes are the result of strategic moves more than the results of compelling industry forces.

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This paper continues the examination of service delivery systems² in accordance with the conceptual framework described in Huete (1987) and findings of Huete and Roth (1988a, b). Throughout this paper, service delivery system design is considered relative to both the level of industrialization involved in the delivery activities and the types of banking services provided.

Huete (1987) presents a matrix that can be used as a conceptual framework for analyzing delivery system design as customer knowledge, service complexity, and characteristics of delivery channels evolve. The matrix was based on an emerging body of literature in service operations management to capture the changes taking place in the delivery system of service firms. Huete and Roth (1988a) discussed the variations in banking services according to: 1) the type of delivery channel emphasized by the bank for its primary market, and 2) the span of distinct delivery channels through which the service contents are available to its customers. Huete and Roth (1988b) identified three clusters of retail banks, each cluster characterized by a distinctive type of service delivery system design strategy.

Retail banking was chosen as a research site because it offered a unique opportunity in which to test hypotheses related to the delivery system design framework developed in Huete (1987): the retail banking industry is at a crucial stage in its evolution, rapid deregulation and technology development are forcing banks to compete more aggressively, and fundamental changes are occurring in the way banking services are distributed to customers. Banks are investing heavily in their delivery systems to improve the quality of their services, and are reemphasizing their retail business. In an industry in which product differentiation is low and distribution represents 45-80 percent of operating costs, retail banks have to improve delivery channels as competitive weapons (Chandler, Goodrich, and White, 1984).

¹ The data for this research was obtained from the Financial Service Research Project, a collaborative study between the Boston University School of Management and the Retail Financial Services Group at the Bank Administration Institute. For further information on the project contact Aleda V. Roth, Principal Investigator. The analysis and interpretation of data in this report is the author's own.

² In the terminology we use in this paper, service content is *what* is delivered to a customer (e.g., cash advances, financial planning, etc.), while the delivery channel is the sociotechnical system *through which* a service content is delivered to a customer (e.g., tellers, ATMs, etc.). Normally it entails back-room, front-office and customer operations. A service delivery system comprises the set of delivery channels of a service unit.

While cost reduction is still an important factor behind delivery channels changes, the practitioner literature emphasizes that delivery channels can be a valuable instrument for attracting and retaining customers (Friars, Gregor, and Reid, 1985). For example, many bank offices have been re-designed and re-scaled with an emphasis on self-service banking³ for traditional teller services and for faster, more personal handling of complex transactions.

Patterns of planned changes in industrialization are used as a basis for classifying retail banks into new homogeneous clusters. By means of clustering techniques, retail banks will be grouped according to the magnitude of change in their industrialization plans. It is shown that certain patterns of industrialization change are related to certain managerial concerns faced by retail bankers.

Three major research questions will be explored bearing on the industrialization of service delivery system:

- 1) For the same service content scales, is there a difference between the industrialization levels that retail banks currently use, and those they plan to emphasize in 1990? If so, what is the direction and magnitude of this change?
- 2) Do the industrialization plans of the individual banks tend to cluster into groups, each cluster representing a different type of industrialization change pattern? Are size or market orientation variables associated with the different clusters? Are the delivery system design clusters of banks that were developed in Huete and Roth (1988b) more likely to be associated with the various industrialization plans?
- 3) Do managerial concerns differ according to industrialization change patterns? That is, are there sets of managerial concerns typically associated with changes in the delivery system structure of retail banks?

We put forward the following hypotheses of planned changes in the level of industrialization of retail banks' service delivery systems:

Hypothesis 1: For each category of banking service contents, the planned industrialization level for 1990 is higher than the current one.

Hypothesis 2: Retail banks with the same future industrialization change pattern will be more similar in size, demographic and geographical markets, and in delivery system design than retail banks with different patterns.

Hypothesis 3: Retail banks with the same future industrialization plans will have similar managerial concerns. Banks with different industrialization approaches will have dissimilar managerial concerns.

³ Banks like Lloyds and Barclays in Britain are turning over to customers a much larger proportion of floor space, at the same time introducing stand-alone cash/deposit/information machines. See "The Image-Makers get Down to Banking," *Business*, April 1987.

Data and Methods

Sample

The research report in this paper is based on data gathered from American banks concerning the current status of traditional banking service content, delivery channels, and industrialization plans. The 1987 Retail Banking Delivery Systems Survey from which this paper draws its data was specifically designed to provide insight into how senior retail banking and operations executives are responding to delivery system challenges they face and to test hypotheses proposed in this paper. This section summarizes the research methodology of the project that is discussed at length elsewhere (Roth and Van der Velde, 1988).

In relation to the sample design Roth and Van der Velde (1988) report that a probability sample of 1,244 retail banks was chosen from the FDIC Call Report tapes of approximately 16,000 commercial banks in the United States as of January, 1986. To maximize the chances of obtaining information on the forces that influence the design of delivery systems, the universe of banks was stratified into five groups by asset size: less than \$100 million, \$100-\$499 million, \$500-\$999 million, \$1-\$3 billion, and over \$3 billion. The objective of the sampling plan was to obtain an established minimum number of responses in each asset size category.

The overall response rate was slightly less than 10%, yielding 117 usable surveys. In view of the considerable length and complexity of the survey, this response rate is considered to be fair. The results are comparable with the response rates generally obtained in studies using similar populations.⁴ Roth and Van der Velde (1988) report that the survey respondents are biased towards industry leaders, regardless of asset size.

For the purposes of this paper, a reduced sample of 90 banks was used in the analysis due to problems of missing data. Based on special analysis, the reduced sample data used in the study does not appear to be different from the full sample along several important variables (see Table 1). Thus, there is no evidence that any systematic bias was introduced by the exclusion of cases with missing data.

Table 1

Sample Characteristics*

	Full sample (n=117)	Study Sample (n=90)
<i>Total assets</i>		
- Assets greater than \$1 billion	38	36
- Assets lower than \$1 billion	62	64
<i>Primary demographic market</i>		
- Mass consumer market	29	30
- Middle consumer market	42	42
- Upscale and small business market	29	28
<i>Primary geographical market</i>		
- Local markets	76	79
- Not-local markets	24	21

* All figures are percentages.

⁴ See Greenberg, Barnett A., and L. Harris, "Consumer Banking in the United States: The Service Delivery Gap, Special Report No. 220", The Harris Group Management Consultants, The Economist Publications Limited, New York, 1987, p. 1.

A questionnaire was mailed in March 1987 to top retail banking executives (typically, the retail unit's vice-president of operations) to capture information on the forces that influence the design of delivery systems. The questionnaire was modeled after the Manufacturing Futures Project Survey conducted annually since 1983 by Boston University, INSEAD and Waseda University. It was developed by the authors, and benefited from inputs from the Bank Administration Institute and other colleagues. It included multi-item instruments to measure the variables of interest for the research. The questionnaire has been pre-tested with banks from the Boston area to ensure completeness, relevance and feasibility.

The survey procedures included advance notice letters announcing the survey to the sampled banks sent two weeks before mailing the survey itself; two follow-up mailings at approximately two week intervals followed by telephone calls to non-respondents; manual coding and verification of all survey items;⁵ and a review of the tabulations before data analysis to check for accuracy and consistency.

Variables and measures

Most of the variables used in this chapter were described in detail in Huete and Roth (1988a, b). In Huete and Roth (1988a), eight scales representing broad categories of service contents⁶ were derived. The service content scales were designed to be mutually independent; i.e., knowledge of a retail bank's industrialization on one scale produces no additional information about the bank's industrialization score on any other scale. These scales will be used for statistical tests of the hypotheses of this paper.

The paper does introduce several new variables, however. For each banking service content scale, measures of planned changes in industrialization are developed. These variables are constructed by subtracting the industrialization score developed in Huete and Roth (1988a) from similar variables referring to the planned 1990 industrialization score.

Data for the 1990 industrialization scores on each service content were organized on the basis of answers given to two questions in the questionnaire (see Appendix A). The banking executives were asked to indicate the one delivery channel which is expected to receive the greatest emphasis in 1990, in terms of managerial attention and resources deployed, for the bank's target market. They were asked to give a response to each of the 21 banking transactions listed in the matrix.

The second question seeks similar data regarding the handling of 15 customer inquiries related to banking products (see Appendix B). Respondents were asked to indicate which delivery channel they planned to emphasize in 1990 for the handling of customer inquiries for their target market.

⁵ In addition, each questionnaire underwent a computer consistency and edit check. All discrepancies and selected item non-respondents on the surveys were followed up by mail and telephone calls to the respondent. All updates were applied to the final database.

⁶ Each scale describes a set of service contents that are almost always clustered together (e.g. depositary transactions is the scale representing the banking services "withdrawals of checking accounts," "withdrawals of savings accounts," "deposits of checking accounts," "deposits of savings accounts" and "cash advances").

The variables used to test Hypothesis 1 were the 1987 and 1990 banking services' industrialization scores. The variables measuring changes in the level of industrialization of banking service contents were used as a basis for classifying banks into homogeneous clusters.

Several variables were used to test for possible matches between industrialization plan clusters and variables such as managerial concerns, market orientation, and bank asset size.

This paper also employs the set of eight individual variables developed by Roth (1988), which represent sets of current managerial challenges related to delivery systems design. Respondents were asked to rate each of the 37 managerial concerns using a seven-point scale, ranging from "no concern" to "critical concern." While the original survey contained 37 items (see Appendix C), Roth (1988) reduced the set through factor analysis to eight reliable scales tapping key areas of managerial focus. Details of the various indicators representing the scale and the assessment of reliability (Cronback alpha values) are provided in Appendix D.

This paper also uses two sets of three variables each related to targeted demographic markets and delivery system design clusters; and two sets, each with two variables, to deal with geographic market and bank size. Each of these variables were previously discussed in Huete and Roth (1988b).

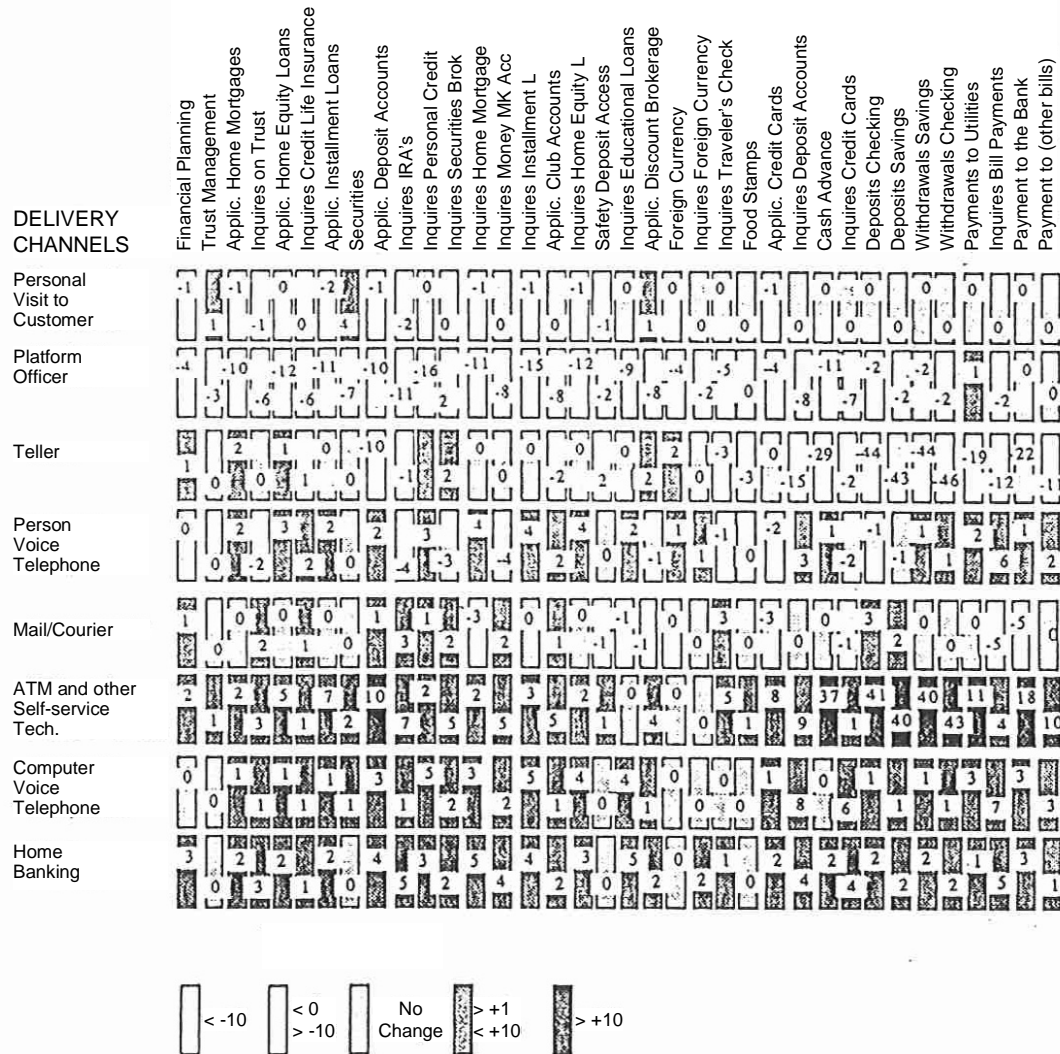
Data Analysis and Results

Changes in industrialization of service delivery systems

Hypothesis 1 is concerned with the question of whether the industrialization level of banking services planned for 1990 is higher than the 1987 level. The results of this analysis are presented in Table 2 and in Figures 1 to 3.

Figure 1

Planned Change in Emphasis in Matched Pairs of Delivery Channels and Banking Services Between 1987 and 1990



^a The figure in each cell indicates the change, from 1987 to 1990, in the number of banks emphasizing a particular service encounter.

Figure 1 displays the general matrix developed in Huete (1987) and used in Huete and Roth (1988a). This matrix indicates the change, from 1987 to 1990, in the number of banks in our sample emphasizing a particular service encounter.⁷ The number appearing within each cell of Figure 1 shows the difference (positive or negative) between the number of banks planning to emphasize that particular service encounter in 1990 and the number that were emphasizing that service encounter in 1987. For example, the box representing the service encounter "financial

⁷ A service encounter is defined as a service content paired with a delivery channel. A service encounter is to a service firm and its customers what a "product" is to a manufacturing firm. In retail banking, a service encounter is sometimes termed an "offering." An offering is, therefore, the banking service content plus the delivery system channel.

planning delivered through the delivery channel platform officer” shows -4. This means that, based on managers’ current plans, the number of banks emphasizing that particular service encounter will decrease by four between 1987 and 1990.

Figure 1 shows a clear shift towards more industrialized service encounters. Employee-contact delivery channels (visit to customer, platform officer, teller and telephone) will lose ground, on average, to self-service technology-based delivery channels like ATMs, computer voice and home banking. This shift results in a depopulation of the service encounter region located around the upper right-hand corner, with a population increase around the lower left-hand corner.

This shift towards increased industrialization was hypothesized based on the conceptual framework presented in Huete (1987). The area around the upper right-hand represents the use of an expensive delivery channel for a fairly simple service content. From a delivery perspective, this is uneconomical and bankers seem to justify it less and less. By contrast, the area around the lower left-hand corner represents the delivery of a service content that requires high customization using technology-based self-service channels. Bank managers are projecting that by 1990 such delivery channels will provide banking services in which customer requests can be varied and less routine.

Table 2 lists the ten retail banking service encounters exhibiting the greatest loss in population together with the ten service encounters exhibiting the greatest gains.

Table 2

Service Encounters Exhibiting Greatest Change between 1987 and 1990

Greatest losses		Greatest gains	
Withdrawals Checking + Teller	-46	Withdrawals Checking + ATM	43
Withdrawals Savings + Teller	-44	Deposit Checking + ATM	41
Deposit Checking + Teller	-44	Deposit Savings + ATM	40
Deposit Savings + Teller	-43	Withdrawals Savings + ATM	40
Cash Advances + Teller	-29	Cash Advances + ATM	37
Payment to the Bank + Teller	-22	Payment to the Bank + ATM	18
Payment to Utilities + Teller	-19	Payment to Utilities + ATM	11
Inquiries Personal Credit + Platform	-16	Payment to (other bills) + ATM	10
Inquiries Deposit Accounts + Teller	-15	Applic. Deposit Accounts + ATM	10
Applic. Club Accounts + Platform	-15	Inq. Deposit Accounts + ATM	9

Most of the items in the first column of Table 2 are routine service encounters in which the customer requests can be standardized and made predictable in some degree. In the next few years, the delivery channels for these systems will undergo an extensive shift from tellers or platform officers to ATMs.

It seems that banks plan to rely increasingly on self-service technology-based delivery channels to cope with the customer contacts generated by routine transactions (e.g., deposits). These changes will leave the banks with more direct contact capacity to cross-sell other bank services.

Service contents industrialization changes

The preceding section was devoted to the changes in industrialization levels of banking services considered individually. Now these changes will be analyzed in the context of the scales developed in Huete and Roth (1988a).

Table 3 shows the means, standard deviations, and significance levels of a paired two-tailed t-test across the eight banking services content scales for 1987 and 1990, respectively. Each scale showed a statistically significant difference⁸ among the paired scores. This indicates that the expectation of higher industrialization levels for delivery activities is not limited to a few banking services but rather is common to all of them, a finding corroborated by Roth and Van der Velde (1988ab).

Figure 2 and 3 help to visualize the planned changes. Depository transactions, with a projected increase of almost 50%, will overtake bill payments as the most industrialized service scale. It should be noted that the four scales representing inquiries are located in the center of Figure 2 while scales representing transactions split between the highly industrialized (depository transactions and bill payments) and the highly personalized (applications for loans and asset transactions).

Table 3

Means, Standard Deviations, and Significance Levels of Industrialization Scores across Service Content Scales^a Overtime, 1987 and 1990

	Scale Means		pb
	1987	1990	
1. Applications, for loans	2.18 (.66)	2.63 (1.35)	.001
2. Asset transactions	2.29 (.59)	2.70 (1.19)	.000
3. Asset inquiries	2.38 (.88)	2.90 (1.51)	.000
4. Protection inquires	2.58 (.53)	2.86 (.98)	.002
5. Credit inquires	2.62 (.98)	3.32 (1.81)	.000
6. Account inquires	2.89 (1.01)	3.67 (1.72)	.000
7. Depository transactions	3.21 (.90)	4.76 (1.44)	.000
8. Bill Payments	3.79 (1.08)	4.55 (1.46)	.000
Overall industrialization score	2.74 (.51)	3.39 (1.08)	.000

^a Standard deviations are in parentheses.

^b Paired two-tailed t-test.

⁸ At the .001 level.

Figure 3

Industrialization Scores of Banking Service Content Scales, 1987 and 1990

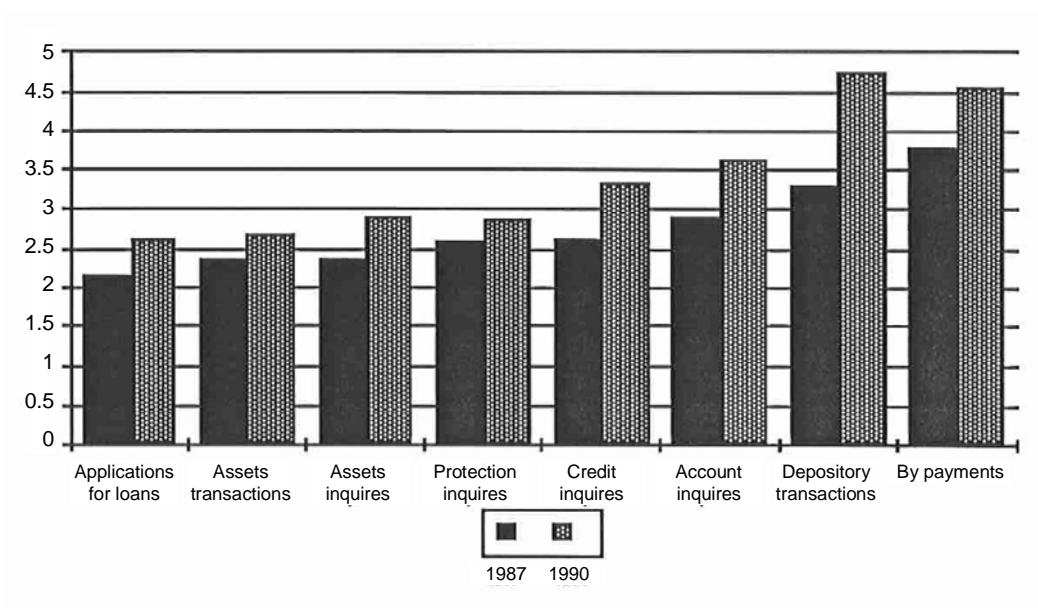
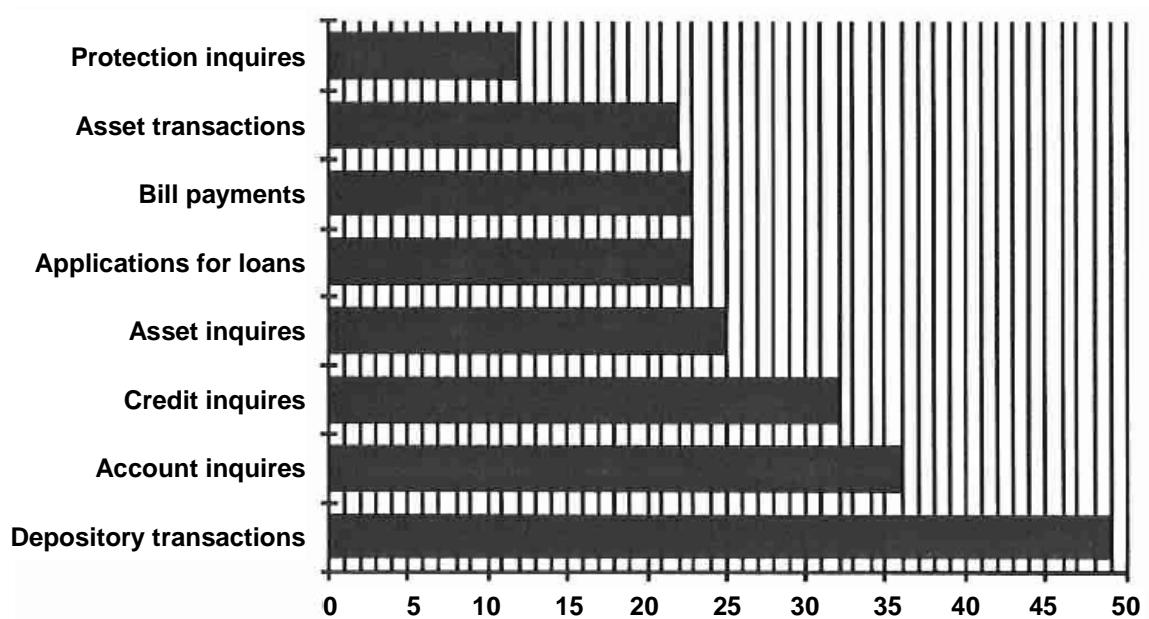


Figure 4

Percentage Increase in Industrialization of Service Scales (1990 vs. 1987)



Although high industrialization levels may be a key element in processing certain transactions and handling routine inquiries, the evidence shows that “high-touch” personnel will remain an essential part of establishing initial customer relationships (e.g., applications for loans) and for serving certain kinds of accounts (e.g., those with an asset base).

American banks' industrialization strategies

The third part of this paper is devoted to clustering retail banks according to the distinctive type of industrialization change over the next three years. Given the resultant clusters, their relationship to bank size, market orientation, and managerial challenges is explored.

The banks of the sample were grouped by means of a hierarchical clustering routine. Eight configuration variables were used to define homogeneous sets of plans related to the level of planned change in the industrialization of banks' delivery channels configuration. These variables measure a retail bank's projected industrialization changes over each of the eight banking services scales developed in Huete and Roth (1988a). To measure pair-wise similarities, the average between-linkage method of clustering was used (Sneath and Sokal, 1973), together with a vector cosine similarity matrix for each of the variables of configuration. A three-cluster solution was selected, based on an analysis of solutions ranging from two to six clusters. The distribution of observations in the three clusters was 24, 26 and 38.

Table 4

Clusters With Respect to Service Content Changes (Clustering Attributes)

Design Configuration Variables	Cluster I Nº Change (n=38)	Cluster II Selective Change (n=26)	Cluster III Global Change (n=24)	F-Value* (p=probability)
<i>1. Change in depository transactions industrialization</i>				
Cluster mean	.11	2.76	2.46	F=129.4
Cluster effect ^a	-1.42	+1.23	+.93	p=0.000
<i>2. Change in applications for loans industrialization</i>				
Cluster mean	-.05	-.12	1.86	F=30.79
Cluster effect	-.50	-.57	+1.41	p=0.000
<i>3. Change in bill payment industrialization</i>				
Cluster mean	.04	1.04	1.60	F=15.78
Cluster effect	-.74	+.26	+.88	p=0.000
<i>4. Change in assets transactions industrialization</i>				
Cluster mean	-.02	.18	1.15	F=17.44
Cluster effect	-.38	+.18	+.79	p=0.000
<i>5. Change in credit inquiries industrialization</i>				
Cluster mean	.08	-.29	1.94	F=21.33
Cluster effect	-.57	-.36	+1.29	p=0.000
<i>6. Change in assets inquiries industrialization</i>				
Cluster mean	-.02	-.01	2.10	F=45.14
Cluster effect	-.56	-.58	+1.52	p=0.000
<i>7. Change in protection inquiries industrialization</i>				
Cluster mean	.04	-.04	1.08	F=18.54
Cluster effect	+.26	-.34	+.78	p=0.000
<i>8. Change in account inquiries industrialization</i>				
Cluster mean	.21	.15	2.25	F=27.65
Cluster effect	-.54	-.560	+1.50	p=0.000
<i>1987 Industrialization score</i>				
Cluster mean	2.78	2.66	2.85	F= .99
Cluster effect	-.01	-.10	+.08	p=0.41
<i>1990 Industrialization score</i>				
Cluster mean	2.82	4.51	2.30	F= 37.39
Cluster effect	-.60	-.15	+1.10	p=0.000
<i>Percentage increase 1990 vs. 1987</i>				
Cluster mean	1.26	22.77	59.88	F=87.41
Cluster effect	-22.34	-.90	+36.27	p=0.000

* The F value is a test of mean equivalence.

^a The difference between the cluster's mean and the overall mean.

These three clusters are described in Table 4, in terms of the mean scores and cluster effect for each of the variables. Note that the 1987 overall industrialization scores for the three clusters is almost identical while the 1990 industrialization scores shows wide differences across the clusters. This means that banks with currently similar industrialization levels are planning very different industrialization changes over the next three years.

A significant variation was found in the mean values of the eight design configuration variables for the three clusters. We summarize below the characteristics that are significantly different at the .05 level or less for the three clusters.

Cluster I: No Changes in Industrialization Planned (38 banks)

This cluster contains retail banks that are planning little or no changes in the level of industrialization of their service delivery systems.

Cluster II: Selective Changes in Industrialization (26 banks)

This cluster is characterized by its selective approach to industrialization. It has the highest industrialization increase in the depository transactions category and a very high increase in the bill payments category. For the other six service content scales they plan no significant changes for 1990 over 1987.

Cluster III: Global Changes in Industrialization Planned (24 banks)

This cluster has the highest overall 1990 industrialization score (4.51), the highest overall percentage increase (59.88%), and the greatest percent increase in industrialization score for all types of banking services except depository transactions. The scores for industrialization change, as measured by the cluster effect, are especially high for three of the four scales pertaining to inquiries (credits, assets and accounts) and for loan applications. This indicates that these banks are seeking a competitive edge by industrializing service encounters having to do with more complex banking products like loan applications and inquiries regarding credit, assets, and accounts.

The data shown in Table 5 pertain to matches between the industrialization plans clusters and a selected number of exogenous variables. This table compares the size, market orientation and delivery system design approaches of the three industrialization plans clusters. Note that the data does not confirm Hypothesis 2.

None of the chi-square values of Table 5 were significant at the .05 level or below. The results indicate that industrialization plans represented by the clusters are not associated by differences in size, market orientation or delivery system design.

Table 5

Differences between Clusters With Respect to Assets, Market and Delivery Design Characteristics

	Cluster I (n=46) N° Chance	Cluster II (n=21) Selective Chance	Cluster III (n=23) Global Chance	X²
<i>Bank size</i>				
Percent ^a of cluster members with assets valued:				1.88 (p= .39)
Less than \$1 billion	48	29	17	
More than \$1 billion	34	31	39	
Cluster average (percent of total)	43	30	26	
<i>Primary demographic market</i>				
Percent ^a of cluster members targeting				6.07 (p= .19)
Mass markets	50	19	15	
Middle markets	50	43	32	
Upscale and small business	52	22	19	
Cluster average (percent of total)	43	30	26	
<i>Primary demographic market</i>				
Percent ^a of cluster members targeting				2.00 (p= .36)
Local markets	46	28	21	
Nonlocal markets	28	39	42	
Cluster average (percent of total)	43	30	26	
<i>Delivery system design cluster</i>				
Percent ^a of cluster members with delivery system designs:				4.81 (p= .30)
Low industrialization-low span	48	34	18	
Low industrialization-high span	38	19	43	
High industrialization-high span	40	30	30	
Cluster average (percent of total)	43	30	27	

* A row percentages add to 100%.

These are rather surprising results which differ from the results of Huete and Roth (1988a, b) where several matches were found between service delivery system design clusters and similar variables. This means that expected changes in the industrialization level of delivery activities over the next years are found across all the retail banking industry segments. This result suggests that industrialization changes for banks are the result of strategic moves more than the result of inevitable forces.

Discrimination between known groups

Discriminant analysis was used to determine whether the eight scales representing managerial concerns (Roth, 1988) could be used to discriminate between industrialization strategic groups. Discriminant analysis is a technique in which linear combinations of variables are used to

distinguish between two or more categories of cases (Klecka, 1980). It seemed reasonable to expect that the managerial concerns identified by retail banks currently planning industrialization changes would differ from those identified by banks where no changes were being planned.

To find the best set of discriminatory variables, several discriminant analyses were performed involving banks not planning any changes in their industrialization scores (Cluster I) and banks with changes planned (Cluster II and III). The first group was called "non-movers" and the second "movers." From this a single discriminating function was derived. The clusters planning industrialization changes were merged since, in behavioral terms, they were all planning to change their delivery activities, and behavioral differences are required to discriminate between groups (Eisenbeis, 1977).

The analysis followed a process suggested by Rahim (1983), involving a stepwise multiple discrimination analysis on the total sample. The stepwise selection criterion used in the analysis was Wilks' lambda statistic (Eisenbeis and Avery, 1972). To improve the interpretability of the results, a rotated canonical discriminant function using varimax and Kaiser's normalization were used.

Hypothesis 3 predicted that RBUs from the same industrialization plan category would have similar managerial concerns.

Table 6

Discriminant analysis on managerial concerns between industrialization plan groups

Managerial concerns	Mean scores and F-values			Discriminant analysis results	
	Modifiers	Non modifiers	F-values	Standardized coefficient ^a	Canonical correlation ^b
Technology	4.10	3.45	7.24 (p=0.008)	0.6167*	
Capacity	3.61	2.92	6.78 (p=0.011)	0.5695*	
Facilities	3.12	3.00	.13 (p=0.717)		
Cost/measurement	4.84	4.66	.45 (p=0.502)		
Operations	3.50	3.02	3.82 (p=0.054)		
Human Resources	4.46	4.25	.84 (p=0.361)		
Marketing	3.85	3.70	.49 (p=0.485)		
Environmental	4.13	3.86	1.11 (p=0.294)		0.3210*

^a Standardized discriminant coefficients. Significance indicates whether or not a particular managerial concern discriminates between subgroups.

^b Canonical correlation coefficient for the discriminant function. Significance pertains to the correlation itself. * p < 0.01.

The findings in Table 6 partially confirm the hypothesis. The analysis revealed a significant canonical correlation function (0.3210; $X^2=9.24$, $p<0.01$) that discriminated between the two known groups. It yielded significant positive coefficients for both technology (0.6167) and capacity (0.5695) concerns, with negligible coefficients for the other six concern factors. As shown in Table 6, these results suggest that those managers who planned to modify their delivery systems were more likely to indicate as "pressing concerns" the general areas of technology and capacity management.

Summary and Conclusions

This paper provides empirical support of the proposed changes in the "natural matches" of delivery channels and banking services. The natural match was represented on the general matrix as diagonal; it is expected to undergo constant, progressive change as technology develops (see Huete, 1987). The natural match was depicted to follow a predictable evolution, moving downwards. Therefore, more industrialized delivery channels become available for the delivery of service contents, characterized not only by their high potential for standardization but also for services with medium and low potential.

The paper analyzed changes in industrialization in a variety of ways. First on banking services individually considered; second, on banking service content scales; and third, on retail banks as the unit of analysis.

When banking service contents were individually analyzed, the data showed a shift toward more industrialized service encounters. Accordingly, employee-contact delivery channels (visit to customer, platform officer, teller and telephone) showed a decline in importance, while self-service technology-based delivery channels like ATMs, computer voice and home banking will become increasingly common. This shift results in a depopulation of the service encounter region located around the upper right-hand corner of the matrix, with a population increase around the lower left-hand corner. This result was expected based on the conceptual model described in Huete (1987).

The area around the upper right-hand was portrayed in Huete (1987) as representing the use of an expensive delivery channel for fairly simple service content. This is uneconomical. By contrast, the area around the lower left-hand corner represents the delivery of a service content that requires high customization using technology-based self-service channels. Bank managers are expecting that such delivery channels will in the near future provide banking services in which customer requests can be varied and unpredictable; that is, with medium and low potential for standardization. These changes will leave the banks with more employee contact capacity to use for other bank services.

American retail banks' increased emphasis on self-service banking delivery channels (ATM, home banking, etc.) for the next years came as no surprise, as these channels offer very attractive benefits to retail banks. They allow the elimination of front-office employee activities by either transferring them to the back-room or to the consumer.

An important issue for service retail banks is, then, how to involve the client in the service creation process. This involvement may be extended to all stages of the service creation process (Mills, 1985). On the input side, clients can acquire some of the knowledge used in the creation of the service. For example, bank's customers can read written information on the services of the unit, thus reducing the need for face-to-face questions. In the conversion phase, clients may be required to process information by actually choosing among alternatives or to physically execute the activities as is typical in banks, where customers are expected to operate self-service machines. Finally, on the output side of the service creation process, clients may be required to perform task activities after the contact with the banking service unit. For example, clients may be required to develop a system of record-keeping.

The analysis of banking scales industrialization changes showed that expected higher industrialization levels for delivery activities is not limited to a few banking services scales but rather, on average, is common to each. Although high industrialization levels is increasingly a

key element in processing certain transactions and handling routine inquiries, the data show that personnel will remain an essential part of establishing initial customer relationships (e.g., applications for loans) and for serving certain kinds of accounts (e.g., those with an asset base).

The results also provide a picture of American retail banks' future plans for industrialization. Three clusters of plans were uncovered.

- The first cluster contained retail banks that were not planning any changes in the level of industrialization of their service delivery systems.
- The second cluster is characterized by its more selective approach to industrialization. It has the highest industrialization increase in the depository transactions category and a relatively high increase in the bill payments category. With respect to the other service scales, Cluster II banks show few planned changes in industrialization.
- The third cluster of banks intends to make significantly more industrialization changes across all the banking scales than their counterparts in other clusters. These banks are seeking a competitive edge by industrializing service encounters having to do with loan applications and with inquiries regarding credit, assets, and accounts. These categories of banking service contents are generally regarded as more complex.

The results indicated that industrialization plans represented by the clusters were not associated with differences in size, market orientation or delivery system design. This contrasts with the results of Huete and Roth (1988a) where several matches were found between service delivery system design clusters and similar variables. This implies that expected changes in the industrialization level of delivery activities over the next years are to be selectively found across all the retail banking industry segments. This result suggests that banks' industrialization changes are the result of strategic moves more than the result of inevitable forces.

The paper made use of discriminant analyses to show which managerial concerns were more important for determining differences between those banks that choose to increase their level of industrialization. The analysis revealed that managers who planned to modify the industrialization of their delivery system were more likely to indicate as "pressing concerns" the general areas of technology and capacity management.

Appendix A

Excerpts from the Questionnaire Banking Transactions

Listed below is a retail banking unit's transactions/means of customer interface matrix. The matrix depicts the means by which the customers can interface with the bank to execute particular transactions.

Please address the following 3 questions for each row of the matrix:

- Place an "x" by each means of Interface your retail banking unit currently offers to its customers to execute transactions named in the row.
- Place one "7" (1987) in each row to indicate the *currently most emphasized* (in terms of managerial attention and resources deployed) means of interface to execute the transactions for your primary market.
- Place one "0" (1990) in each row to indicate the *planned most emphasized* (in terms of managerial attention and resources deployed) means of interface to execute the transactions for your target market.

Means of customer interface for the execution of transactions

BANKING TRANSACTIONS	<i>Personal Visit to Customer</i>	<i>Platform Officer</i>	<i>Teller</i>	<i>Person Voice Telephone</i>	<i>Mail</i>	<i>ATM</i>	<i>Other On- premise Self- service Technology</i>	<i>Computer Voice Telephone</i>	<i>Home Banking</i>
<i>Applications (opening and closing of accounts)</i>									
Deposit accounts	[]	[]	[]	[]	[]	[]	[]	[]	[]
Credit cards	[]	[]	[]	[]	[]	[]	[]	[]	[]
Installment loans	[]	[]	[]	[]	[]	[]	[]	[]	[]
Home equity loans	[]	[]	[]	[]	[]	[]	[]	[]	[]
Home mortgages	[]	[]	[]	[]	[]	[]	[]	[]	[]
Discount brokerage	[]	[]	[]	[]	[]	[]	[]	[]	[]
Club accounts	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Withdrawals</i>									
Checking (regular, NOW)	[]	[]	[]	[]	[]	[]	[]	[]	[]
Savings	[]	[]	[]	[]	[]	[]	[]	[]	[]
Deposits	[]	[]	[]	[]	[]	[]	[]	[]	[]
Checking (regular, NOW)	[]	[]	[]	[]	[]	[]	[]	[]	[]
Savings	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Credit</i>									
Cash advance	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Payments</i>									
To the bank	[]	[]	[]	[]	[]	[]	[]	[]	[]
To third parties (utilities)	[]	[]	[]	[]	[]	[]	[]	[]	[]
To third parties (other bills)	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Other</i>									
Financial planning	[]	[]	[]	[]	[]	[]	[]	[]	[]
Safety deposit access	[]	[]	[]	[]	[]	[]	[]	[]	[]
Securities	[]	[]	[]	[]	[]	[]	[]	[]	[]
Trust management	[]	[]	[]	[]	[]	[]	[]	[]	[]
Food stamps	[]	[]	[]	[]	[]	[]	[]	[]	[]
Foreign currency	[]	[]	[]	[]	[]	[]	[]	[]	[]
_____	[]	[]	[]	[]	[]	[]	[]	[]	[]
Check if the means is not currently available	[]	[]	[]	[]	[]	[]	[]	[]	[]

Appendix B

Excerpts from the Questionnaire Customer Inquiries

Listed below is a retail banking product/means of handling customer inquiries matrix. The matrix depicts the means by which the retail banking unit provides information.

In response to customer inquiries, please address the following 3 questions for each row:

- Place an "x" by each means of interface your retail banking unit currently uses to handle customer inquiries related to the product named in the row.
- Place one "7" (1987) in each row to indicate the *currently most emphasized* (in terms of managerial attention and resources deployed) means of interface to handle customer inquiries for your primary market.
- Place one "0" (1990) in each row to indicate the *planned most emphasized* (in terms of managerial attention and resources deployed) means of interface to handle customer inquiries for your target market.

Means of Handling Customer Inquiries

PRODUCT FAMILY	<i>Personal Visit to Customer</i>	<i>Platform Officer</i>	<i>Person Voice Teller</i>	<i>Person Voice Telephone</i>	<i>Mail</i>	<i>ATM</i>	<i>Other On- premise Self- service Technology</i>	<i>Computer Voice Telephone</i>	<i>Home Banking</i>
<i>Transactions Products</i>									
Deposit accounts	[]	[]	[]	[]	[]	[]	[]	[]	[]
Bill payments services	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Credit Products</i>									
Credit cards	[]	[]	[]	[]	[]	[]	[]	[]	[]
Installment loans	[]	[]	[]	[]	[]	[]	[]	[]	[]
Home equity loans	[]	[]	[]	[]	[]	[]	[]	[]	[]
Home mortgage	[]	[]	[]	[]	[]	[]	[]	[]	[]
Educational loans	[]	[]	[]	[]	[]	[]	[]	[]	[]
Personal credit lines	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Assets products</i>									
Money market funds	[]	[]	[]	[]	[]	[]	[]	[]	[]
Securities brokerage	[]	[]	[]	[]	[]	[]	[]	[]	[]
IRAs, Keogh account	[]	[]	[]	[]	[]	[]	[]	[]	[]
Trust management	[]	[]	[]	[]	[]	[]	[]	[]	[]
<i>Other Products</i>									
Traveler's checks	[]	[]	[]	[]	[]	[]	[]	[]	[]
Credit life insurance	[]	[]	[]	[]	[]	[]	[]	[]	[]
Foreign currency	[]	[]	[]	[]	[]	[]	[]	[]	[]
_____	[]	[]	[]	[]	[]	[]	[]	[]	[]
_____	[]	[]	[]	[]	[]	[]	[]	[]	[]
Check if the means is not currently available	[]	[]	[]	[]	[]	[]	[]	[]	[]

Appendix C

Excerpts from the Questionnaire: Managerial Concerns

Listed below are a number of areas of concern which may exist in the retail banking unit: (a) Indicate the extent to which each item is currently of concern to retail bank management. (b) Please also rank the top 5 most pressing concerns as they impact on your ability to compete effectively in your target market (1990). Please scan entire list of concerns. Rank the top 5 concerns from 1 to 5.

CURRENT CONCERNS	Degree of Concern		Rank Top 5 (target market)
	None	Critical	
<i>Operations</i>			
Inadequate retail distribution channel structure	1 2 3 4 5 6 7		[]
Lack of software integration	1 2 3 4 5 6 7		[]
Difficulty in implementing new consumer-based information technology	1 2 3 4 5 6 7		[]
Difficulty in Implementing new consumer-based transaction technology	1 2 3 4 5 6 7		[]
Failing behind in technology	1 2 3 4 5 6 7		[]
Cost of technical personnel to support current distribution channels	1 2 3 4 5 6 7		[]
Excess back-office operations capacity during peak periods	1 2 3 4 5 6 7		[]
Insufficient back-office operations capacity during peak periods	1 2 3 4 5 6 7		[]
Configuration of offices, branches and equipment	1 2 3 4 5 6 7		[]
Poor geographical locations of branch facilities	1 2 3 4 5 6 7		[]
Difficulty in identifying unprofitable offices	1 2 3 4 5 6 7		[]
Operations has difficulty communicating needs to upper management	1 2 3 4 5 6 7		[]
Measurement of customer service quality	1 2 3 4 5 6 7		[]
Overhead costs	1 2 3 4 5 6 7		[]
Integration of operations systems due to merger, acquisition, etc.	1 2 3 4 5 6 7		[]
Excess staffing (front-office) during slack periods	1 2 3 4 5 6 7		[]
Insufficient staffing (front-office) during peak periods	1 2 3 4 5 6 7		[]
Conflicting management priorities Lack of investment in technology	1 2 3 4 5 6 7		[]
Lack of investment in short-term operations improvement	1 2 3 4 5 6 7		[]
Emphasis in cost control	1 2 3 4 5 6 7		[]
<i>Personnel</i>			
Availability of qualified people for jobs	1 2 3 4 5 6 7		[]
Retention of qualified people for jobs	1 2 3 4 5 6 7		[]
Workforce morale	1 2 3 4 5 6 7		[]
Absenteeism	1 2 3 4 5 6 7		[]
Adequacy of management development/training	1 2 3 4 5 6 7		[]
<i>Marketing</i>			
Difficulty in implementing sales concept	1 2 3 4 5 6 7		[]
Too many product/service offerings	1 2 3 4 5 6 7		[]
Difficulty in communicating distribution channels changes to customers	1 2 3 4 5 6 7		[]
Inadequate pricing to meet organizational profitability goals	1 2 3 4 5 6 7		[]
Difficulty in identifying unprofitable products	1 2 3 4 5 6 7		[]
Difficulty in identifying unprofitable customer relationships	1 2 3 4 5 6 7		[]
<i>General Management</i>			
Difficulty in making the decisions to redeploy resources	1 2 3 4 5 6 7		[]
Responding to government regulations	1 2 3 4 5 6 7		[]
Stressful work environment	1 2 3 4 5 6 7		[]
Rapid rate of change in technology	1 2 3 4 5 6 7		[]
Rapid rate of change in consumer demands	1 2 3 4 5 6 7		[]

Appendix D

Managerial Concerns Scales Variables⁹

1. *Technology (0.846)*¹⁰

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- lack of software integration
- difficulty in implementing new consumer-based information technology
- difficulty in implementing new consumer-based transaction technology
- falling behind in technology
- cost of technical personnel to support current distribution channels

2. *Capacity (0.695)*

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following item:

- insufficient back-office operations capacity during peak periods

3. *Facilities location (0.658)*

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- poor geographical locations of branch facilities
- difficulty in identifying unprofitable offices

4. *Cost/Measurement (0.789)*

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- measurement of customer service quality
- overhead costs
- emphasis in cost control

⁹ Source: Roth, Aleda V., "Critical Managerial Challenges in Retail Banking Delivery Systems", Boston University Working Paper, 1988.

¹⁰ Figures in parentheses are the reliability coefficients (Cronbach's alpha) for the respective constructs.

5. Operations policy issues (0.781)

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- operations has difficulty communicating needs to upper management
- conflicting management priorities
- lack of investment in technology
- lack of investment in short-term operations improvement

6. Human resources management issues (0.778)

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- availability of qualified people for jobs
- retention of qualified people for jobs
- workforce morale
- absenteeism
- adequacy of management development/training

7. Marketing issues (0.814)

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- too many product/service offerings
- difficulty in communicating distribution channel changes to customers
- inadequate pricing to meet organizational profitability goals
- difficulty in identifying unprofitable products
- difficulty in making the decisions to redeploy resources
- inadequate retail distribution channel structure

8. Environmental issues (0.769)

Operationalized by means of a seven-point scale referring to degree of concern (ranging from "none" to "critical") for the following items:

- responding to government regulations
- stressful work environment
- rapid rate of change in technology
- rapid rate of change in consumer demands

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