

DISCRIMINATING CUSTOMERS THROUGH PRACTICES OF CRM WITH THE APPLICATION OF DISCRIMINANT FUNCTION ANALYSIS

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Abstract: *Customer Relationship Management (CRM) is a broad concept for retaining, creating and expanding customer relationships in banking sector. The overall strategy of relationship marketing is to effectively manage the customers of the organisation. CRM enables to anticipate, understand, manages, and personalises the requirements of customer. Today, many business organisations such as insurance companies, banks and other service providers realize its importance. They also understand the potential of CRM which help them to attract new customers and retain existing ones which maximize their lifetime value. The current marketing scenario the CRM viewed as the process of acquiring customers with understanding their needs, wants and demands. The specific strategy of CRM approaches is find the current expectation and requirements of new customers in segmented market. It is also a process which invites total commitment on the part of the entire organisation regarding relationship strategies. So the researcher has taken to the study discriminating customers through practices of CRM with the application of discriminant function analysis. For the empirical investigation the data collected from 384 respondents through self administrated questionnaire. In order to cluster the respondents on the basis of CRM practices discriminant function analysis employed. The result of DFA (Discriminant Function Analysis) customer knowledge dimension is the best predictor for evaluating the CRM practices in banks.*

Keywords: *Customer Relationship Management, Banks, Discriminant function analysis, Relationship Marketing, Customer Satisfaction, CRM Practices*

INTRODUCTION

Customer Relationship Management (CRM) is a wide business strategy, it's enhanced to reduce the overheads and boost profitability by solidifying customer commitment. A successful customer relationship management focuses on indulgent the wants and desires of the customers and is achieved by insertion these desires at the heart of the corporation by integrating them with the business strategy, people, technology and commerce processes. At the mind of a perfect CRM strategy is the creation of common value for all the parties concerned in the business process. On the other hand, CRM in banking industry is exclusively special from other sectors, because banking industry is solely related to financial services, which needs to generate the belief among the people (Rao & Rao, 2016). Later than 1991 many foreign banks entered into Indian retail banking zone with weighty investments in technology for giving tremendous customer services. Now a huge segment of the urban inhabitants requires minimal time and space for its

banking requests. It is very essential to bring lively changes in CRM practices of banks in present (Limbad, 2015). The present day CRM includes developing customer base, so the bank has to pay sufficient attention to enhance customer base by all means, it is possible if the presentation is at satisfactory level, the existing clients can suggest others to have banking connection with the bank he is in service. Hence the bank has to implement lot of pioneering CRM to arrest and hold the customers. Banking zone is a customer-oriented service where the customer is the KEY hub (Sanjay Kanti Das, 2012). Therefore the Research is needed in such sector to be aware of customers' need and attitude so as to build a long affiliation with them. So this research revision was undertaken to be acquainted with the CRM practices. It may also useful to describe the relationship between CRM (customer relationship management) practices and discriminating the customers through CRM practices in Indian banking Industry. In current circumstances the banking sector is grooming up with new technologies and

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applications. The benefits are establishment to attain the large pool of customers. Now the banking is also stirring towards individual marketing. So the topic materialized is “Discriminating the customers through practices of CRM”.

STATEMENT OF THE PROBLEM

Banks play an important role in modern era. Every person in the society must be treated as a part of banking sector. Bank activity is not only to maintain customer account, accepting deposit from customers, providing loans, and advances to the customers, but also, they will come forward to satisfy their customers on the basis of their wants and needs. It is not an easy task to satisfy the customers because their expectations vary from time to time. Therefore, it is a challenging task of the banks to satisfy their customers. In order to satisfy the customer the bank should adopt CRM strategies and its practices. Then only, the bank will understand the customers' expectations and will fulfill the customers' wants and needs without any delay. Thus customer centric approach insists the banks to adopt relationship management strategy and practices. The relationship building strategy and practices is universally-accepted goal of marketing. The CRM is believed as business strategy that enables the legal customer base. The organisation gets more benefits from CRM by understanding the customer needs, wants and demands, retaining the customer through better service, attracting new customers and retaining the lapsed customers, increasing the profitability and cutting-off the cost spent for customer management. Nevertheless today technologies impart the bank strategy approach especially on relationship strategy. As a result, the bank viewed the CRM practices strategy and practices as “benefit-profit task”. Therefore this study is undertaken in a manner to investigate the practices of bank in respect of “Customer Relationship Management”. And so, the following research questions encourage the researcher to focus on

1. How the CRM practices are discriminated from state of the art with customer's mind.
2. Which dimension of CRM, namely customer acquisition, customer response, customer knowledge, customer information system and customer value evaluation system, is highly discriminated in the customer's perspective.

Hence the prime objective of the study is to analyse discriminating customers through practices of CRM in banks.

REVIEW OF LITERATURE

In order to fill the existing gap the researchers need to collect some relevant reviews in customer relationship management. After the self-scrutiny, the selected reviews were exhibited by the researchers.

Akroush, Dahiyat, Gharaibeh, and Abu-lail (2011) have undertaken a study drawing the systematic outline of CRM in each phase. The study findings indicate that the bank does not follow any recovery activities to regain the customers; on the other hand the bank maintains technology support system to raise customer satisfaction

Yao and Khong (2011) articulated brief as well as logical outline of CRM initiatives. The result indicates that the moderator effects are not as strong as expected. Further the researcher recommends the customer representatives who play the most important role in communicating with customers. The bank develops customer-oriented design to empower both, customer as well as employees.

Tahir (2011) in his article titled, “A preliminary analysis of CRM practices among banks from the customers' perspectives” reported about CRM practices among banks from the customers' perspectives. This study is significant to banks as they get information on what items are important to customers so as to maintain the relationship. From the customers' view, they know that banks are providing excellent services to maintain and strengthen their relationship. The study is important to understand the perceptions of the customers so as to adjust and modify items that are important and not.

Sadek, Yousef, Ghoneim, and Tantawi (2011) revealed that the components of the CRM namely key customer focus, CRM organisation, technology based CRM, and knowledge management have a significant positive impact on customer satisfaction and customer loyalty in commercial banks.

Alsmadi and Alnawas (2011) indicate that the CRM concept did not seem to be well incorporated in the business strategy of most Jordanian banks and financial institutions.

Namjoyan, Esfahani, and Haery (2013) examine the effects and performance of CRM in bank. The prime objectives of this study are to analyse the effects of bank marketing performance through customer relationship management. In order to collect the data, a self-administrated questionnaire has been used. Validity of this questionnaire has been examined through Kendal coefficient. This value is 0.75 for this questionnaire and confirms its validity. The findings of the study evident to us the CRM implementation influences marketing performance.

The study by Simo and Bregasi (2013) focuses on how the CRM strategy has developed during these years in the banking sector in Albania and how banks and their staff understand, implement or develop effective CRM strategies. The authors' approach is that customer satisfaction, customer retention, implementation of hardware and software and procedural transparency are main factors taken for consideration in empirical investigation.

METHODOLOGY

The researchers have collected both primary and secondary data for this study. The primary data of this study were collected from the customers of both private and public sector banks in Virudhunagar District. For that, a separate pre-tested schedule was constructed and collected to bring out opinion of the customers about the banking services and their relationship with banks.

The secondary data are those data which are already collected by someone else. The researchers have collected the secondary data from the records of commercial banks, journals, bulletins, banking studies and so on.

Data Collection Instrument Validation

The face and content validity of the instrument is evaluated with a panel of experts. The panel consists of two Associate Professors, who are well-versed in marketing and consumer behaviour, research supervisor, and two externals from banking institution. The panel members are asked to offer recommendations about the scale items adopted for the study from past literature. After availing panel members' opinion the researchers have made appropriate changes in the scale item in the latent construct which is measuring the CRM practices. After the panel recommendation, the data collection instrument reliability and validity are measured through pre-test. The pre-test was conducted with 40 respondents. The internal consistency of the scale measurement Alpha value found to be .784 to .924. This indicates a good internal consistency of scale item used for this study.

Sampling Design

The banking customers are large in number and it is not feasible to collect the data from all the banking customers from the study area. Therefore, it is decided to apply sampling technique to study the current problem. The *www.samplesurvey.com* is used to identify the sample size. According to this website, 384 is identified as appropriate sample size.

In Virudhunagar District, there are 8 taluks. Among these, there are 16 public sector banks and 13 private sector banks having a total of 191 branches doing banking business. The researchers have selected 48 respondents from each taluk and the sample respondents are identified through judgment sampling method. The detailed sampling methodology is shown in Table 1.

Table 1: Taluk Wise Distribution of Sample Customers

S.No.	Taluks	Total Branches (in No's)	No. of Respondents
1	Aruppukottai	16	48
2	Sivakasi	49	48
3	Srivilliputtur	22	48
4	Sattur	14	48
5	Kariapatti	7	48
6	Rajapalayam	40	48
7	Tiruchuli	16	48
8	Virudhunagar	27	48
	Total	191	384

Source: Computed Data

DATA ANALYSIS AND FINDINGS OF THE STUDY

Discriminant Function Analysis

The researchers have applied the discriminant analysis to find which factor absolutely predicts practices followed by the banks in respect of CRM. For that purpose each dimension of CRM practices such as Customer Acquisition, Customer Response, Customer Knowledge, Customer Value evaluation, and Customer Information System has been treated as independent variable in discriminant analysis. The thumb rule while applying discriminant analysis is that the dependent variable should be nominal or ordinal scale with two parameters like Yes / No, Satisfied / Dissatisfied and Very high / Very low. So, the metric score is recorded with two factors namely High practitioner and Low practitioner. To obtain two distinct parameters (High/Low) adding up all the factors in CRM dimension, and also adding the score of each dimension is separately for individual respondents. Table 2 reveals the Mean and Standard deviation values of the dependent and independent factors used in the analysis.

Table 2: Mean and Standards Deviation Values of Predictor Variables

CRM Dimension	Mean value	Standard Deviation
Customer Acquisition	20.32	4.94
Customer Response	29.34	5.84
Customer Knowledge	31.36	5.24
Customer Information System	34.64	6.12
Customer Value Evaluation	28.76	4.68
Total score of all the dimension	144.48	19.01

Source: Computed Data

Table 2 reveals mean and standard deviation values of CRM practices dimensions; Customer Information System dimension's mean value is 34.64 followed by Customer Knowledge (31.36), Customer Response (29.34), Customer Value Evaluation (28.76), and Customer Acquisition (20.32). It is clear that most of the respondents' opinions towards CRM practices are highly influenced by Customer Information System dimension and least opinion is Customer Acquisition dimension.

As said earlier in this section, the researchers classify the respondents over all opinions in respect of CRM practices classified into two different factors namely High Practitioner and Low Practitioner. To get this, the average minimum score of all the statement in entire dimension is 42 and maximum score is 210. So the average cutoff point to classify the variables is obtained by adding the minimum and maximum score to get the cutoff point. Finally the average workout value is 126, so the respondents those score is less than 126 would be classified as low practitioner otherwise high practitioner. Table 3 shows the re-coded information about the respondent's opinion towards CRM practices in banks.

Table 3: CRM Practices in Banks

Particulars	Number of Respondents	Percent
High Practitioner	324	84.38
Low Practitioner	60	15.62
Total	384	100

Source: Computed Data

Table 3 shows 84.38 percent of the respondents are in the title of High Practitioner and the remaining (15.62 percent) of the respondents are Low Practitioner.

Functions of Discriminant Analysis

In social science research, the reason for applying discriminant function analysis or discriminant analysis is to predict the group membership of interval or nominal variables. The procedure of DFA (Discriminant Function Analysis) begins with known observation of the collected data (observed value of this scale). As the final result after applying discriminant analysis, the researcher is able to get the group membership of the predicted model. The predicted model group membership classification lays on the equation of the discriminant function analysis. Discriminant function analysis makes the researcher to identify and discriminating the variables/statements based on the opinion of samples in the collected data. The mathematical form of the discriminant analysis model is:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

where, Y = Dependent variable

b_s = Coefficients of Independent variable

X_s = Predictor or Independent variable

The method of estimating b_s based on the principle that the ratio of 'between group sum of squares' to 'within group sum of squares' be maximised. This will make the groups differ as much as possible on the values of the discriminant function. After confirming the estimated model of DFA the co-efficient of independent variable (b) is used to compute the score of discriminant analysis (y). The discriminant score is obtained by substituting unstandardised co-efficient value of the independent variable with its raw data. In general, there is lot contradiction in using unstandardised co-efficient value. The discriminant function analysis test uses both co-efficient for different connotations of the researcher assumption. Widely the unstandardised co-efficient is used to develop the DFA equation; on the other hand the standardised coefficient value is used as "structure matrix". It draws the attention of the researchers to clear which instrumental variable (I.V.) highly influences in set of observation. By using SPSS, the discriminant analysis has been applied. As a matter of fact, the survey contained 384 observations, all observation used to build the model. There is no holdout and training sample was performed.

Wilks' Lambda

In order to validate the discriminant model the researchers should initially start with the results of Wilks' lambda test. The Wilks' lambda test measures the significance of the contribution of the discriminant model. The value of Wilks' lambda is between 0 and 1. The value of lambda close to zero indicates that significance of the contributed model is more perfect. The test value of Wilks' lambda follows the chi-square statistic. The corresponding p value is less than the threshold value ($P < 0.05$). It represent the model is valid.

Table 4: Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-Square	Df	Sig
1	.599	194.310	5	.000

Table 4 shows the significance of the discriminant model. The value of Wilks' lambda i.e. 59.9 percent of the variables are not explained by the group differences. Therefore the researchers conclude that there is a statistically significant discriminating power in the variables included in the model. Hence the researcher further analyses the other tests for effectiveness of the model and to develop the discriminant equation.

Table 5: Classification Results^{a,b,c}

		Practice	Predicted Group Membership		Total
			High Practice	Low practice	
Original	Count	High Prac-tice	323	1	324
		Low prac-tice	15	45	60
	%	High Prac-tice	99.7	.3	100.0
		Low Prac-tice	25.0	75.0	100.0
Cross-validate-d ^a	Count	High Prac-tice	322	2	324
		Low prac-tice	17	43	60
	%	High Prac-tice	99.4	.6	100.0
		Low prac-tice	28.3	71.7	100.0

a. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b. 95.8% of original grouped cases correctly classified.

c. 95.1% of cross-validated grouped cases correctly classified.

Table 5 shows the classification results of discriminant model. Overall 95.1 per cent of the cases are correctly classified in the model.

Eigen Values

The eigen value is the measure of canonical correlation of the discriminant function. Canonical correlation is the cross covariance matrix. It indicates a function that discriminated well. The eigen values describe the effectiveness of discriminant function. The canonical correlation is the multiple correlations between the predictor and the discriminant function. The eigen values are presented in Table 6.

Table 6: Eigen Values

Function	Eigen Value	% of variance	Cumulative %	Canonical Correlation
1	.669 ^a	100.0	100.0	.633

First 1 canonical discriminant functions were used in the analysis.

An eigen value indicates the proportion of variance explained. A large eigen value is associated with a strong function. A high correlation indicates a function that discriminates well. The present correlation is .633, the square of the canonical correlation is .400, which means 40 percent of the variance in the discriminating model in a prospective group High practitioner/Low practitioner is due to the changes in the five predictor variables, namely Customer Acquisition, Customer Knowledge, Customer Retention, Customer Information System, and Customer Value evaluation.

Canonical Discriminant Function Co-Efficient

These unstandardised coefficients (b) are used to create the discriminant function (equation). It operates just like a regression equation. The discriminant function coefficient (b) and standardised form (beta), both indicate the partial contribution of each variable to the discriminate function controlling all other variables in the equation.

Table 7 presents the unstandardised canonical co-efficient of the discriminant model. The purpose of unstandardised canonical function co-efficient is estimating the mean score between the groups.

Table 7: Canonical Discriminant Function Co-Efficient

	Function
	1
Customer acquisition	.532
Customer response	.416
Customer knowledge	.392
Customer information system	.671
Customer value evaluation	.521
(Constant)	-9.805

Source: Computed data (Unstandardised co-efficient)

Each ratio's discriminant score would be computed by entering the raw data for each of the variable in the equation. Since the predictive equation is being constructed, the unstandardised canonical coefficient will be used to construct the discriminant function as follows:

$D = -9.805 + .532 (\text{customer acquisition}) + 0.416 (\text{customer response}) + .392 (\text{customer knowledge}) + .678 (\text{customer information system}) + 0.521 (\text{customer value evaluation})$

Standardised Canonical Discriminant Function Co-efficient

The standard canonical discriminant co-efficient can be used to rank the importance of variables in the analysis. The interpretation of standardised canonical discriminant function co-efficient is just like rotated matrix in factor analysis. The co-efficient score is predicted value of linear regression using standardised co-efficient value. The high value of standardised co-efficient is more influencing instrument variable from the group.

Table 8: Discriminant Function Co-efficient Structure Matrix

	Function
Particulars	1
Customer knowledge	.648
Customer value evaluation	.646
Customer response	.624
Customer information system	.558
Customer acquisition	.535

Source: SPSS Output

Based on the coefficient value, the researchers rank the relative importance of predictor variable. Table 9 provides an index of the importance of each predictor through standardised regression coefficient.

Table 9: Ranking of the Predictor Variables

Ranking of the Variable	Predictor variable
1	Customer knowledge
2	Customer value evaluation
3	Customer response
4	Customer information system
5	Customer acquisition

Source: Computed data

From Table 9, it is evident that the co-efficient value of Customer knowledge dimension is higher than the other predictor variables, followed by Customer value evaluation,

Customer response, Customer information system and Customer acquisition. The coefficient value of predictor variable used in the model is more than 0.3, therefore all the factors influence CRM practices.

Functions at Group Centroids

The discriminant analysis helps the researcher to compute the mean discriminant score of the high practitioner and low practitioner separately. The study was conducted on 384 observations. Using the estimated discriminant function, discriminant analysis score is calculated for each respondent. If the score is higher than zero, the respondents are treated as highly satisfied group; whereas and if less than zero they are grouped under dissatisfied group. Table 10 presents the mean discriminant score of each group.

Table 10: Functions at Group Centroids

Practice	Function
	1
High Practice	.351
Low practice	-1.895

Unstandardised canonical discriminant functions evaluated at group means.

Table 10 shows the mean discriminant scores of the high practitioner and low practitioner groups separately. The value of function at group centroids can be used for designing a decision rule to classify the respondents' opinion into CRM practices high practitioner and low practitioner. Respondents whose discriminant score is greater than zero would be classified as a High practitioner, where as the one whose score is less than zero would be classified under Low practitioner group. This works out to be -1.895 for a Low practitioner group and .351 for High practitioner.

If the size of the sample for the two groups is the same while estimating the model, the cut-off score used for classification in to High/Low practitioner classification can be obtained by taking the average of the two – group centroid.

The average works out to be $[(324 * .351) + (60 * -1.895)] / 384 = 0$. It is shown in Fig. 1.

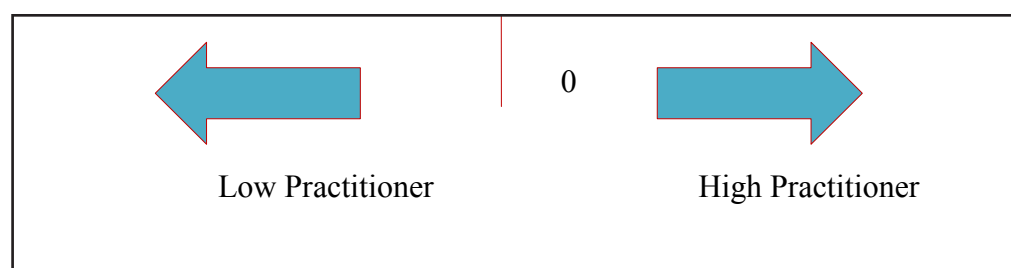


Fig. 1: Classification of Cases using the Discriminant Function

The discriminant score for each of the respondents has been computed and, as already mentioned, if the discriminant score is greater than 0, the respondent is classified into the high practitioner group, otherwise into the low practitioner group. Table 11 shows the classification of employees as per discriminant function with original classification of respondents with regard to CRM practices.

Table 11: Classification of Respondents opinion with Regard to CRM Practices

S. No	Particulars	Number of Employees		Differences
		As per Original Opinion	As per Discriminant Function	
1.	High Practitioner	324	323	1
2.	Low practitioner	60	45	15
	Total	384	368	16

From Table 11, it is evident that there is less chance of high practitioner group respondents falling to low practitioner group because the difference is 1. On the other hand, out of 60 low practitioner group respondents, 45 respondents remain in the same group, remaining 15 may move to high practitioner after the findings of discriminant function analysis.

In order to analyse respondents opinion towards CRM practices bank wise classification is made. Table 11 shows the bank wise classification of respondents with regard to respondent's opinion on CRM practices.

Comparison of Banks on the basis of opinion towards CRM Practices – Application of Chi-Square Test

In order to compare the banks with respondents' opinion on CRM practices followed by the banks, the researchers have classified the opinions gathered from respondents in the title

of CRM practices with two different aspects namely High practitioner and Low practitioner. Based on difference in respondents' opinions due to type of bank, the hypothesis that "there is no difference between type of bank and respondents' level of opinion on CRM practices" has been framed.

The type of bank and respondents' level of opinion on CRM practices are presented in Table 12.

Table 12: Level of Opinion on CRM Practices

Particulars	Level of Opinion on CRM practices		Total
	High Practitioner (percentage to total)	Low Practitioner (percentage to total)	
Public bank	156 (40.6)	36(9.4)	192
Private bank	168(43.8)	24(6.2)	192
Total	324(84.4)	60(15.6)	384

Source: Computed data

Table 12 indicates the respondents' opinion towards CRM practices with banks sectional classification. In public banks, 9.4 percent of the respondents opine their banks follow low practices towards CRM, while the result comes to be 6.2 percent in private banks. Whether the opinion differs significantly due to banking sector is tested with Chi-square test that has been applied by using SPSS. The chi-square test statistics are presented in Table 13.

Table 13: Chi-square Statistics

Particulars	Values	Result
Chi-square	28.44	Significant
Df	1	
Significant level	0.042	
Phi-coefficient (sig.)	0.724 (0.041)	

Source: SPSS Output

The chi-square test value is 28.44. The significant p value is less than the threshold value of 0.05. Therefore the framed hypothesis has been rejected by the researchers. Hence there is a significant difference in the opinions of respondents towards CRM practices with banks. The phi-coefficient value is 0.724, which means 72.4 percent variables are associated with each other.

FINDINGS OF THE STUDY

Through application of discriminant analysis, it is revealed that the co-efficient value of customer knowledge dimension is higher than other predictor variables followed by customer value evaluation, customer response, customer information system, and customer acquisition. The coefficient value of predictor variable used in the model is more than 0.3, therefore the entire factor influence CRM practices.

RECOMMENDATIONS

The research finding clearly shows the CRM practices followed by the bank in the study without prior knowledge of the customer. On the other hand developed and developing CRM strategies in banks before the implementation the bank should implement staff relationship management for effectiveness of the CRM practices result.

In the dimension of CRM practices, Customer Acquisition is the process of acquiring new customer or converting existing prospect into new customer. Most of the respondents in this dimension felt disagreed with customer acquisition dimension statements. So the bank should concentrate more on this dimension. Also this dimension is one of the best predictors of CRM practices construct model. If the bank concentrates more on this dimension, it is possible to understand customer business problem.

The banks should involve in the development of customer resources which include training, seminar, workshop, credit facilities campaign, employment generation and also in the development of human resources, so that customers can be motivated to eagerly involve in banking business.

The bank should have a thorough understanding of feelings of their customers. If the customer feels like the same, they may very loyal otherwise they leave it from the customer database.

CONCLUSION

In banking business there is no physical asset which changes hands. It is only the transfer of "service", which takes place in the form of relationships. Banks have a clear hallucination of their desired planned position; they want the ability to

differentiate their brand and products through superior customer service, and to drive effective sales through a customer entire portfolio. Every industry in India is moving from product to customer centric approach, because customer is the focal point of any business. Higher profitability can be achieved through long-term relationships. The banking industry is not an exceptional one. Due to poor customer loyalty and arrival of new banks, bankers are offering new services with higher service quality to their customer. So retaining and maintaining existing customer is very challenging for the bankers. The banks take many efforts to educate their customers about CRM because CRM is an effective tool in supporting and boosting services in the era of hypercompetitive world. For this there is a great need of CRM in banks.

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