

A multi-objective model of service assignment to bank customers by data mining and optimization via simulation

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Purpose: The main purpose of this paper is to propose a multi-objective model for assigning service/product to clustered customers. The main practical objectives of this model from the perspective of the bank are reduced cost and risk and increased customer satisfaction.

Design/methodology/approach: In this paper, five indicators of recency, frequency, monetary, loan and deferred have been identified and customers have been clustered, accordingly using K-means approach. Then, a three-objective mathematical model has been designed to assign optimal service/product as response to customer. Finally the model has been solved by simulation based optimization.

Findings: In the case study, all information about five characteristics of customers was extracted from the database, 31953 customers were placed in seven clusters and the validity of these clusters was measured. A three-objective mathematical model was designed based on the characteristics of 13 types of bank products/services. Then, the simulation modeling solutions were improved using the simulated annealing algorithm. In this study, Weka and R-Studio, Arena and Longo were used for data mining, simulation and optimization, respectively.

Research limitations/implications: The limitations of this study include inability of simulation instruments for drawing, solving all probable states (more scenarios) and solving the model for those states. It is recommended to develop the mathematical model with respect to customer, so that after problem solving, the bank would be able to make decision on providing services and products to its customers. Simultaneously, the objective functions would be fitted within their most reasonable states and ultimately, using a model, the parameters related to each product can be set for the new customer referring to the bank.

Practical implications: Products/services were assigned according to customer needs in a way that cost and risk were reduced and the utility of assignment was increased through the proposed model and simulating the behavior of each cluster of customers.

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Social implications: Paradigm shift in the banking industry is changing from e-banking to digital banking. In digital banking, assigning/customizing products/services, regarding the needs of customers, is very difficult. The banking industry is not well equipped to respond to the digital banking expectations of most consumers. One of the most important challenges of banks is recognizing customers, clustering and assigning a service/product to each of the different clusters. The main policy in the banking industry is to increase customer satisfaction and reduce cost and risk in sales service. Therefore, each customer should have a dedicated service/product.

Originality/value: In this paper, authors attempted to use one of the clustering approaches in multi-objective programming. In addition, they proposed an approach for assigning product/service to customer by simulating and analyzing the behavior of each customer cluster.

Keywords: Multi objective assignment model, Bank customers, Clustering, Optimization via simulation