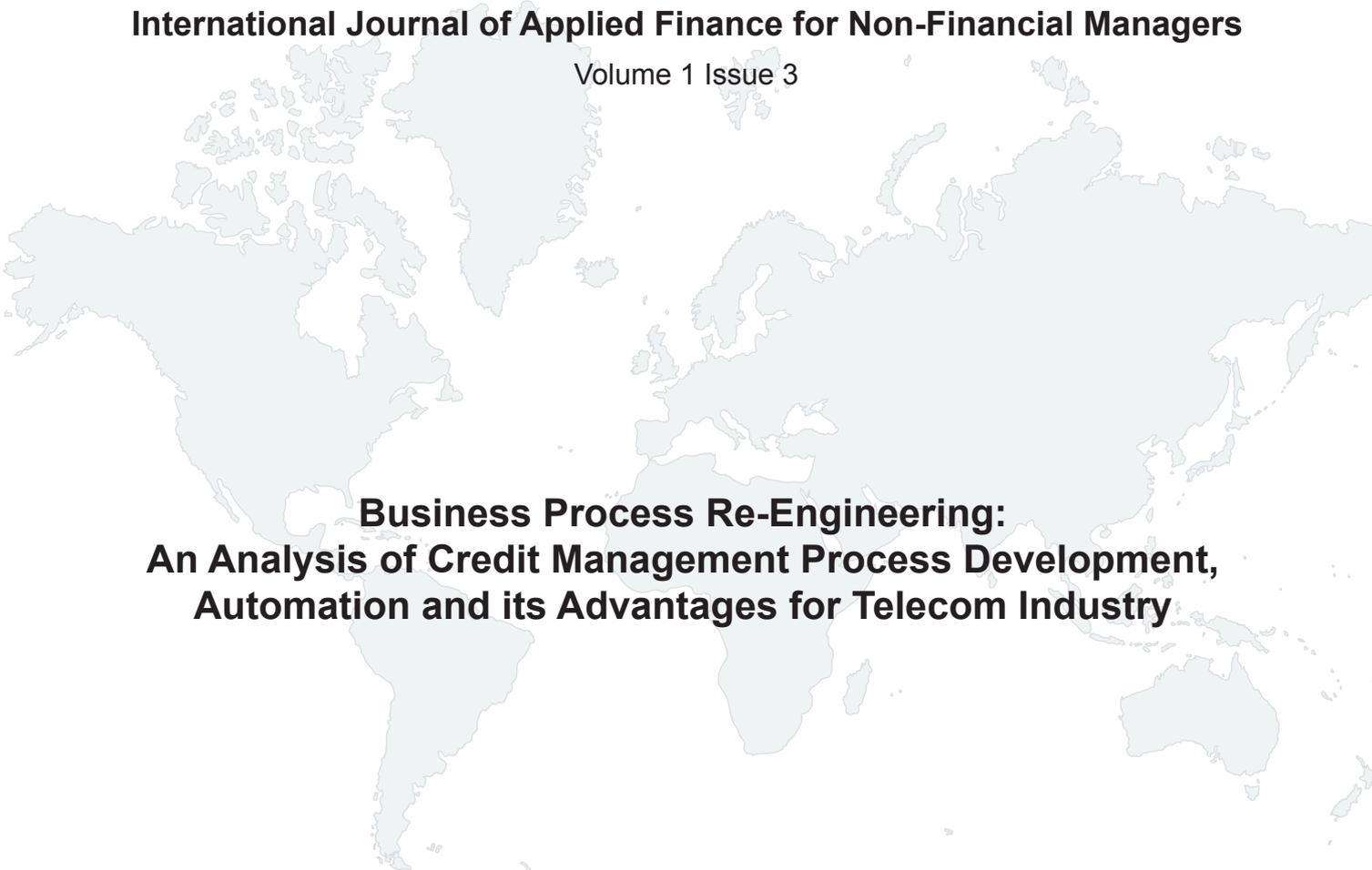


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**Business Process Re-Engineering:
An Analysis of Credit Management Process Development,
Automation and its Advantages for Telecom Industry**

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Objectives

1. Introduction to credit management processes.
2. Outline the advantages of credit management automation and integration with OSS/BSS.
3. Development of algorithm for credit revision and rating based on customer payment history.
4. Discuss the implementation strategies for the process and algorithm

Abstract

The objective of this paper is to understand the credit management process followed in the industry it further explores how a streamlined credit management process can help overcome the telecom frauds that has been causing great concern to the industry .The scope of the article spans the entire credit management process with suggested improvements, explaining the basis for the same and providing justification. The article is intended for an audience that consists of professional business/IT analysts from financial, telecom ,banking and other related industries. A knowledge and understanding of various business processes is expected. The article starts with a brief analysis of Telecom fraud. The article then analyses the sub processes within the credit management process and the management techniques to be employed to achieve the tasks. The procedure that may be followed for automating the credit management process and the integration that a credit management system requires with different OSS/BSS systems that it interacts with. Finally, the article discusses a unique credit revision algorithm, its implementation technique, advantages that it offers if employed. The paper also presents a method by which scenarios for collection can be varied in accordance with customer category and rating and introduces an entity called payment history and explains how it may be used in scenario allocation, what are the methods and strategies involved in allocating a payment history to an account etc.

Brief Overview of Telecom Fraud

Fraud is one of the major areas of concern for telecom industry surveys including the latest conducted by CFCA reveal that the telecom frauds are on a rise annually. This is a world wide phenomenon.

The latest survey indicates the losses to be in the range of \$35bn-\$40bn.The latest survey puts telecom fraud losses at a level much higher than the previous survey conducted four years back which put annual fraud related losses to the industry at \$12bn.

This calls for a world wide awareness and information sharing among the telecom operators. Telecom fraud can be defined as use of telecom products and or services with no intention payment.

In the recent survey 80% of the telecom companies responding said that fraud losses have increased..45% of the respondents confirmed that telecom frauds trended up in their own company.

There by companies adopted to different methods of tackling the same. One is the use of specialized IT systems like Fraud Management System. This tool employs customer

data obtained from survey and generates rules for fraud detection based on customer line usage variations, percentage of allocated credit used and other parameters. Based on the analysis that is carried out by the system the customers are classified at different risk categories.

An effective credit management system is required to deal proactively with telecom fraud and check the fraudulent customers.

Credit management system may be defined as a set of processes which deal with customer rating ,credit allocation, credit revision and re-rating and collection scenario definitions.

The Credit Management Process

The credit management process deals with billing, reconciliation and dunning. It also undertakes customer status assessment and rating through credit verification ,customer classification and credit limit allocation. There are various sub processes within the credit management process. They are:

1. Credit Verification.
2. Customer Segmentation.
3. Credit Allocation.
4. Usage Monitoring.
5. Bill Dispatch.
6. Reconciliation.
7. Bill Collection.
8. Credit Revision.
9. Portfolio Management.
10. Report Generation.

The Credit Management Process Automation

To overcome the threat posed by fraudulent customers it is desirable on the part of firms to automate the credit management process. This is very much true as the volume of business grows, the number of customers acquired by the firm runs into tens and millions and this is coupled with complex product and services packages that the firm offers to the customers and the different kinds of billing and payment options provided to customers with service level agreements. Once the customer agrees to subscribe for the service/services, his details viz, name and address, telephone number/numbers allotted, product (a bunch of services for a particular customer category is termed as a product in billing system) suite selected, payment mode, payment option, bill cycle etc are entered in the CRM(customer relationship management).The customer details viz. id, category, credit rating ,credit allowed, payment mode, bill cycle and billing frequency, credit verification details etc are entered in the billing system. Here is a brief description of some the terms mentioned above.

Customer Categorization

Categorization is essential in order to facilitate the creation of appropriate scenarios for credit verification ,collection and dunning(Dunning is nothing but a process of

scenario allocation for different customer categories). There can be sub categories within these categories.

Every customer acquired by the firm falls into one of the following categories.

1. Residential Customer.
2. Small / Medium Enterprise Customer
3. Large Enterprise Customer.

Credit Rating: Based on the type of customer a credit rating is given to him which is done following a credit verification process. Based on the credit rating a credit limit is allocated to him.

Billing Frequency: Depending upon the type of customer being acquired a billing frequency may be provided viz. monthly, bimonthly etc. helps in better administration of accounts.

Billing Cycle: Depends upon the date in the month the bill is to be paid by the customer.

Customer Verification and Rating: A credit rating is assigned to each customer following the credit verification process credit rating determines the credit allowed to the customer.

Credit Limit: Is the amount that the customer is allowed on line usage crossing which the usage monitoring scenarios will be executed.

The Collection Process

The collection process consists of the following steps

1. Usage Monitoring
2. Balance Verification
3. Bill Dispatch
4. Reconciliation
5. Credit Collection/ Scenario Execution
6. Agency Allocation
7. Agency Management

The automation of the above described credit management process and integrating the resulting system with OSS/BSS, and FMS(fraud management system) provides the following advantages.

1. Process Streamlining.
2. Effective and Guaranteed Execution of the dunning and usage scenarios.
3. Aids and Enhances fraud detection.
4. Creates a mechanism which provides information for credit revision and rating of customers based on the payment pattern.
5. streamlines the agency portfolio management and usage monitoring processes.
6. The Usage Monitoring Process can be enhanced through automation by integrating it with OSS/BSS .doing so enhances usage fraud detection by raising an alarm automatically whenever an account usage exceeds the preset threshold. This alarm may be used trigger dunning scenarios.
7. Provides accurate information for FMS to detect usage based and other collection related frauds.
8. The integration with FMS facilitates a flow of data and information that can help predict fraud and perform credit risk analysis of new customers
9. Effectively handles a large number of customers simultaneously.

Data Flow

OSS/BSS-CREDIT MANAGEMENT SYSTEM: Customer data.

CREDIT MANAGEMENT SYSTEM-OSS/BSS: Scenario execution details, revised credit limit.

CREDIT MANAGEMENT SYSTEM-FMS: Scenario execution details, revised credit limit, payment history.

CRM-CREDIT MANAGEMENT SYSTEM: Pending service issues.

CREDIT MANAGEMENT SYSTEM-USAGE MONITORING: data required for scenario execution.

USAGE MONITORING-CREDIT MANAGEMENT SYSTEM: data required for scenario execution.

OSS/BSS-USAGE MONITORING: Customer details.

USAGE MONITORING-FMS: Scenario execution details.

CRM-FMS: Customer service details.

OSS/BSS-FMS: Customer details.

CREDIT VERIFICATION-CREDIT MANAGEMENT SYSTEM: Credit verification details of the customers.

CRM-IVR: Customer Interaction.

The Usage Monitoring Process

Usage monitoring can be described as a process where in the customer is monitored for the usage of his line on a continuous basis. A credit limit is allocated to him based on the customer category that he falls into. The customer is also set a threshold on usage say 75% of the credit limit allocation. Once this threshold is crossed dunning scenarios are executed for the customer.

The process starts with generation of daily usage reports from the switch. Usage monitoring is usually done based on customer category .That is for customers belonging to two different categories the dunning scenarios would be different:

A typical usage monitoring process consists of the following steps:

1. Reminders
2. Long distance barring
3. Notice
4. Out going barred
5. Agency referrals

A typical usage scenario with an event weightage depending on its priority is shown below.

Table 1: Usage Scenarios

SINO	EVENT	W'tage
1	REMINDERS	3
2	LDB	5
3	NOTICE	6
4	OGB	7
5	AGENCY	9

Reconciliation Process

Following the dispatch of bills collection process is undertaken to clear the bills. The details of bill payment, like date of receipt of amount balance due and other aspects needs to maintained. Even this data is important, as it is used by three processes payment history calculation of a customer, credit limit revision and fraud detection, prevention and control.

A scenario is a set of events. Each event in the scenario is to be allocated a weightage as will be discussed further. While executing usage monitoring scenarios the following logic should be applied.

1. Care should be taken to see that usage events and dunning events do not occur simultaneously
2. If two events occur simultaneously the event with a higher weightage has to be executed
3. There should be synchronized information exchange between credit management (dunning scenarios) and usage monitoring system.

Usage monitoring events are prioritized as above but the interval between the events is dependent on the customer category. It may also be noted that many of the usage monitoring events are essentially the same as dunning events but they differ in interval between events time of allocation and number of events per scenario. The events have been configured so that usage frauds may be detected.

The Payment History Table

Table 2: Payment history

Payment history id	Event	Weightage	Cumulative
0	Pre due date	1	1
1	On due date -Reminder	2	3
2	Post due date -Reminder	3	6
3	Soft Letter	4	10
4	Long Distance barring	5	15
5	OGB Notice	6	21
6	OGB	7	28
7	Agency referral notice	8	36
8	agency-Level 1	9	45
9	tsp	10	55
10	agency-Level -2	11	66
11	disconnection notice	12	78
12	legal	13	91
13	write off	14	105

Every event in the scenario is accorded a weightage. The weightage is based on the event priority. Every event in the scenario is scheduled to be executed at a particular

point in time based on its priority. Event priority is assigned and can be reconfigured. Besides according the weightage, each event in the scenario is uniquely identified by its payment history id. we will discuss the payment history id in detail in the following section. dual identification of events helps in reconfiguring the scenarios with respect to customer payment pattern and the customer category.

Payment History ID:

Every event in the table is uniquely identified by its payment history id. As an account progresses through collection different events are executed from the scenario assigned to it. At some point of time say after the execution of certain number of events in the scenario the customer pays the bill amount. At this point of time the id of the event that has been executed for him is his payment history id which suggests to the management that the customer pays up after executing so many events in the scenario.

Scenario Creation Rules:

1. An account may enter collections through line usage above the preset threshold before the billing period in which case usage monitoring scenarios are applicable or through non payment of bills on due date by which dunning scenarios are applicable. In that case it should be checked to see whether any of the usage scenarios events have already been executed for the account i.e if the account is already in collections due to usage exceeding threshold.
2. check the account type and category.
3. apply appropriate scenarios.

Scenario Creation Logic:

Every account that progresses to collections has a particular scenario attached to it that guides the execution of events for that account. The scenario attached to an account is dependent on the customer credit category and customer payment pattern which is given by the average payment history. Scenario selection for an account may be automated following these steps:

1. configure the events for the scenario.
2. check for service issues from CRM.
3. assign an interval for scenario revision .Say three months.
4. log the cumulative weightage for each account as it completes its collection.
5. take the average of cumulative weightage for three months.
6. round it off to the nearest integral value available in the table.
7. from the scenario table select the payment history id which corresponds to the deduced cumulative weightage.
8. this will be the payment history id for the account as it progresses to collections for the next three months.
9. now, a combination of this payment history id and customer credit category may be used to arrive at a collection scenario for him.

Ex-supposing that an accounts payment pattern is as follows:

Month1-on ogb notice-cumulative weightage-21.

Month 2-on ogb-cumulative weightage-28.

Month 3-on receiving soft letter-10.

Average cumulative weightage for three months= $(21+28+10)/3=19.6667$. Nearest cumulative weightage integral value available in the table is 21,the payment history id corresponding to 21 is 5 as seen from the event table above. This will be his PH ID. Now supposing that the customer credit category is say 3 then a scenario may be

selected where in the events and intervals are configured for a combination of ph id=5 and category=3.

The Variation of Payment History:

The following graphs indicates variation of payment history of a small cross section of customers from a particular segment.

Figure 2: Payment history

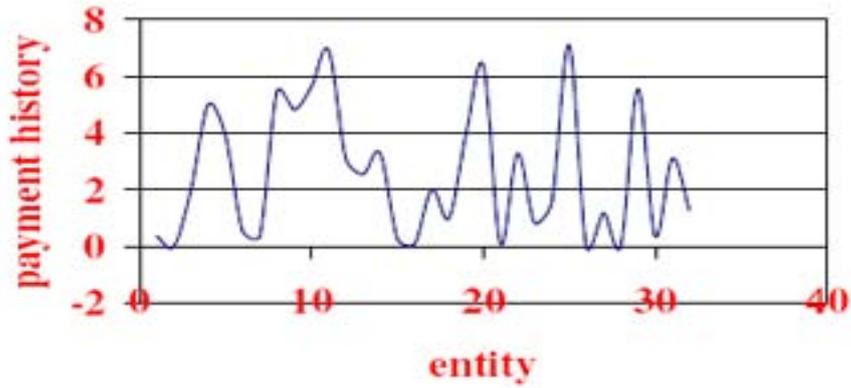


Figure 3: Payment History Variation

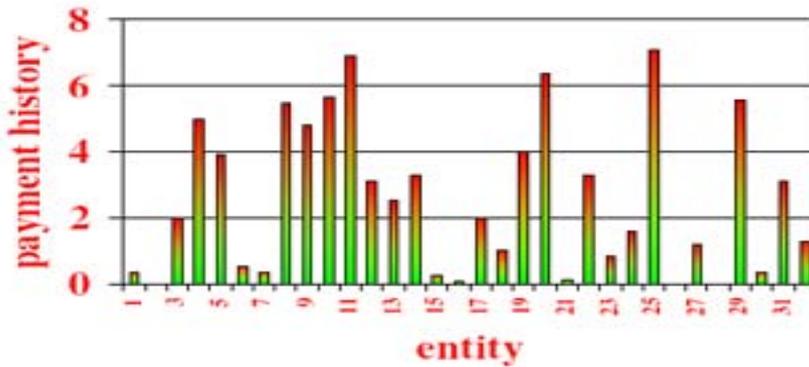


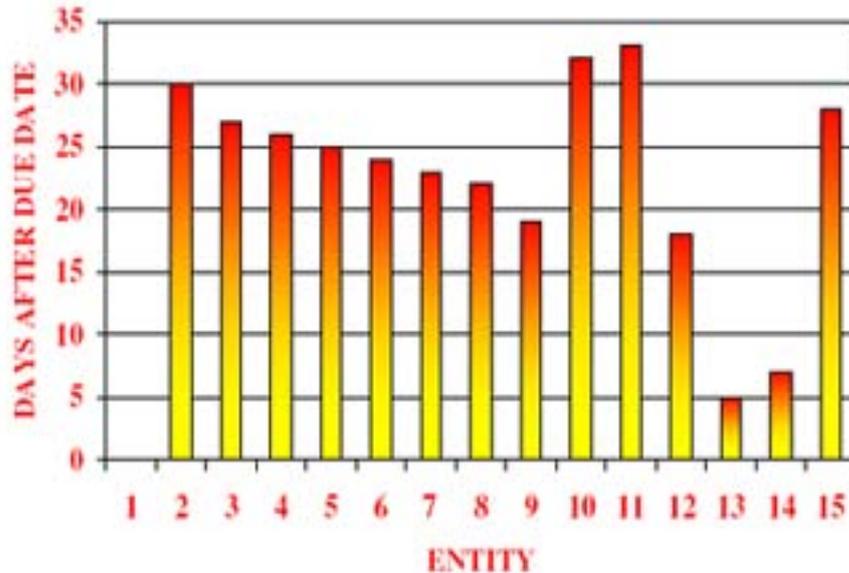
Table3: Time Variation of Payment History of Customers

ENTITY	MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6	MONTH 7	MONTH 8	MONTH 9	MONTH 10
1	1	1	1	0	0	0	0	1	0	7
2	1	7	0	0	0	2	6	0	0	2
3	2	7	7	0	0	0	0	0	2	0
4	0	0	0	0	0	0	3	7	7	1
5	0	1	1	0	6	0	0	2	2	0
6	2	7	0	0	0	7	0	0	0	1
7	1	0	0	2	0	2	2	3	0	1
8	2	1	0	0	1	0	0	7	1	0
9	1	6	7	0	0	0	4	0	0	0
10	0	0	0	0	2	7	0	7	1	0
11	2	1	1	0	1	7	0	2	1	1
12	0	1	0	0	0	0	7	7	1	1

The above table indicates how payment history of a single entity can vary over a period of time say one year. From the table it can be seen that for some accounts the payment history takes different values in different months starting from 0 up to highest of 7. Again, it is worth while noting that the number of accounts taken is very small and belong to one segment. The above table only suggests how the variation can be in a customer database of Say one million customers.

Variation in Customer Payment Pattern

Another important aspect that calls for the implementation of a streamlined, automated credit management process is the variation that can be seen in the customer payment pattern. There is no way to predict the payment trend even for a highly segmented customer database. This is because the payment pattern does not seem to have any relationship with bill amount previous payment history, or credit category or any other measurable entity. The below graph depicts that for a small set of customers in a particular segment and billing cycle.

Figure 4: Payment pattern

The above graph indicates that deviation from due date is high for a given customer category and only 6.67% of the customers pay by due date, in the sample used for the analysis. The deviations however can vary from sample to sample and can be less than, equal to or more than the 6.67% obtained above.

Advantages Offered by Automated Credit Management Process

1. Flexible scenario management. For example the scenarios may be made product specific apart from being dependent on payment history id and customer credit category.
2. Uses a mathematical process for payment history allocation and revision.
3. Events may be shuffled and reconfigured depending upon the account.
4. New events may be added and existing events may be deleted.
5. Offers exclusive checking with CRM for service related issues.
6. On integration with FMS (fraud management system) it can offer data for payment pattern analysis as well as provide capability for ascertaining the possible payment pattern for new customers. It also helps the FMS by complimenting its subscription fraud detection capabilities.
7. Dynamic online collection reports for management.
8. No overlapping between dunning and usage scenarios.
9. Dynamic online event scheduling possible.

A sample scenario is shown below:

Table 4: Sample scenario

SI.NO	EVENT	OCCURRENCE
1	TELECALLING	
2	REMINDER NOTICE	
3	HARD LETTER	
4	LDB	
5	OGB NOTICE	
6	OGB	
7	TSP NOTICE	
8	TSP	
9	OCA REFERRAL	
10	LEGAL	
11	W/O	

LDB: Long distance barred.

OGB :Out going barred.

TSP: Total suspension.

OCA: Outside collection agency

W/O: Write off.

Credit Revision and Rating of Customers

As mentioned before customers fall into different categories depending upon their credit verification details. Accordingly there can be top corporate customers, small medium enterprise customers, and residential customers. These customers can be further stratified depending upon their potential. Prior to approval the customers are categorized and assigned a credit limit based on all the above considerations.

By assigning a credit limit to a customer it is implied that he can make calls which bill up to that limit, exceeding which usage events shall be triggered. The credit provision enhances customer retention as well as acquisition. Based on the customer credit category various dunning strategies need to be followed, which result in different scenarios, for different accounts. The credit allotted to a customer may be varied with his payment pattern, for example a customer with fairly consistent on date payment statistic from a lower category may get a higher credit limit, and the reverse may happen for a customer from a higher category with a highly fluctuating payment pattern.

Average Bill Variation

Figure 5: Average Bill

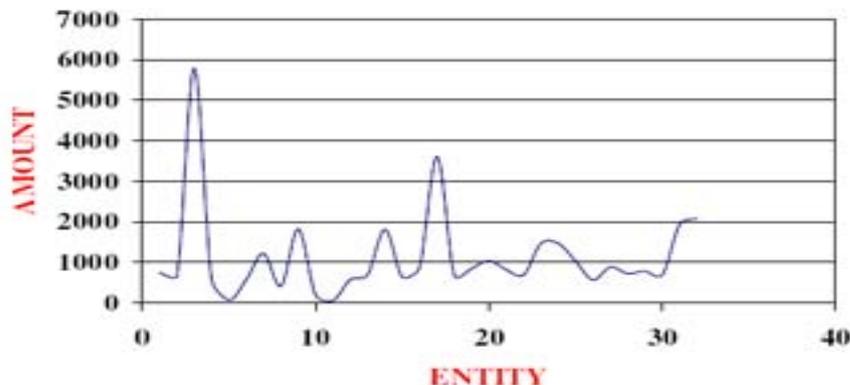
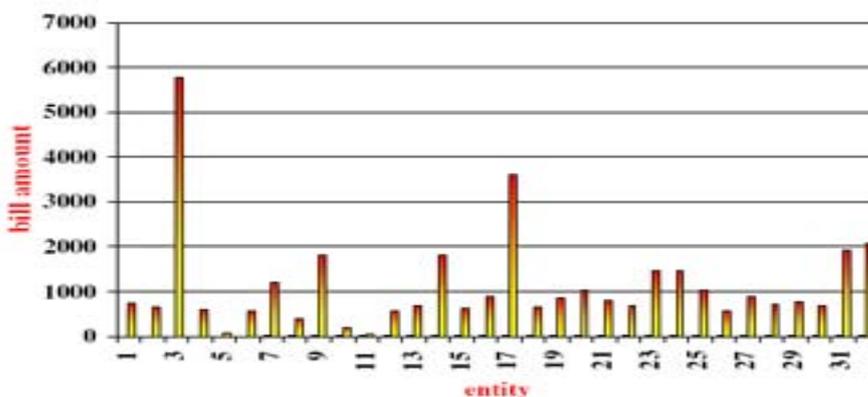


Figure 6: Average Bill Variation



The above graphs depict the variation of average bill within a small cross section of customers belonging to a particular category. It can be seen that the average bill tends to vary very much in spite of the customer cross section being very small and the credit limit allocated to them being the same. This is indicative of the fact that the average bill per cycle of all the customers taken together can show variations that are much more complex than the above sample. This result combined with the fact that the payment history of the customers also varies and does not have any relationship with bill amount makes credit limit revision of customers even more difficult, not to say the fraud prediction and prevention. Thereby a streamlined process is required to revise the credit rating of the existing customers.

The Credit Limit Revision Algorithm

The database of customers is very very large and ever expanding due to the growth in business volumes. Thereby an analysis of payment pattern even after having segmented the customers to different categories is inaccurate without the application of appropriate statistical tools (ex-mean deviation, frequency distribution, etc) depending upon the data distribution and central tendency.

Also to revise the credit limit of a customer various aspects have to be considered, viz credit category, payment pattern, general payment pattern observed within the segment ,services subscribed to, and of course the previous credit limit. With all these factors under consideration a multiplier needs to arrived at using which the new credit limit may be calculated. An equation may be used that takes in to account the variations of all the above mentioned factors.

The Following Rules and Conditions Are Applicable for Credit Limit Calculation:

Rules:

1. Every account is associated with a credit limit based on which it has to fall into one of the categories,say ,A,B,C,D,E,F,G.etc.
2. Credit limit of a person varies periodically thereby there will be movement of account from one credit category to the other.
3. There are several criteria for revision,they are:
 1. Present credit limit.
 2. Payment history.
 3. Average billing.
 4. A constant called multiplier.

Conditions:

1. Credit limit varies inversely as payment history.
2. Credit limit should vary directly with average billing of the account.
3. It should be consistent with previously assigned credit limit.
4. Credit limit is consistent with customer category.
5. New credit limit is a function of average billing of the segment as well.

The Revised Credit Limit Estimation:

1. Select a customer category (say A).
2. Calculate the average payment history of the category, let us call this X.(payment history has already been defined earlier in this paper).
3. Edit the payment history of the account under consideration let us call this T.
4. Now a constant known as multiplier for that category can be calculated as $M = X/T$. Where M is the multiplier.
5. Calculate the average bill of the category(Y).
6. Calculate the average bill of the account (Z).
7. Edit the previous credit limit (L1).
8. If the average bill $\geq 75\%$ of the credit limit then, $L2 = 0.75 * L1 + M * Z/T$. Where L2 is the revised credit limit.
9. If average billing is less than 75% of credit limit then $L2 = 0.75 * L1 - M * Z/T$. Where L2 is the revised credit limit.

Ex-CASE-1:

If an account has an average billing of say, $Z=3200$ If it has an average an average payment history= $T=4$. If the average payment history of the group is= $x=3$.

Let the credit limit allocation be $L1=Rs\ 4000$.

Now, $3200 > 75\%$ OF 4000

We have,

$$L2=0.75*L1+0.75*3200/3=3800$$

Which may be reduced to the amount above.

CASE-2:

Supposing a person has an average bill less than 75% of credit allocated:

Let The credit limit allocated be=Rs.4000

Av. Bill =2200=Z.

Let the account have an average payment history=5.=T

Let the payment history of the category to which the customer belongs be=3=X

$$L2=0.75*L1-M*Z/T.$$

$$M=X/T=3/5=0.6$$

There fore, $L2=3000-264=2736$.

This may be further rounded off to 2500.

Note:

*In the above formula averages are calculated using the frequency distribution that could best determine the central tendency.

*also in the above example taken the bill of 3200 is well above 75% of the above taken credit limit of say 4000 there logically as well as empirically there cannot be much variation from the credit limit assigned that is it is needless to allocate a different credit limit to the account.

Advantages of Credit Revision Algorithm

1. The algorithm takes into account all factors that has to be considered while revising the credit limit.
2. It also takes into account the fact that the credit limit revision is category specific.
3. mean score of every entity is taken to to consider the volume of data being handled.
4. The algorithm uses a multiplier which changes dynamically changes with the payment history of the account.
5. the algorithm arrives at a score for credit that is logically consistent with the existing payment pattern of the customer.
6. The algorithm is easy to understand and apply.

The above tool thus makes the task of periodic revision of credit for the customers easier.

Advantages of Using Credit Limit Revision Algorithm In Telecom Industry

A detailed study of customer payment pattern variation conducted on data obtained from operations of the firms show that (as illustrated graphically before) less than ten percent of the customers stick to the due date. There is a widespread tendency among the customers to default. The study also reveals the great variations in payment date by individual customer over a period of time. All these factors underline the need to vary the customer credit limit allocated and scenarios in accordance with his payment pattern. This helps the Telecom industry in the following ways:

1. It can help periodically reassess the credit category of a customer and allocate a new credit limit to the customer.
2. The data may be fed to CRM, FMS, etc which may use and apply this data to the market research data to predict the occurrence of fraudulent customers and to assess the possibility of churn among the existing customers.
3. The algorithm results may be used to reallocate the scenarios for the customers.

The algorithm for credit limit revision has been arrived at after obtaining the operational data. Thereby it can be said that this suits the telecom industry.

How to Implement the Same?

The Payment History

The calculation of payment history takes customer payment pattern as input. Another input required is the time period for which the revision is to be done say once in three months, once in six months depending upon the policy and procedures followed by the operator. This input is usually available from OSS/BSS. Thereby in order to aid the calculation of payment history the credit management system needs to maintain a table which continuously logs the scenario event at which payment is made each and every time from the OSS/BSS. Besides the output payment history should feed:

1. credit revision algorithm.
2. FMS.
3. OSS/BSS

This is one aspect that needs to be taken care of while designing the system.

Credit Revision Algorithm

The credit revision algorithm requires previous credit limit, payment history of the account, average bill of the account, average payment history of the group which the account belongs to. These inputs are usually available from OSS/BSS, credit verification and CRM modules. The output that is revised credit limit has to flow to OSS/BSS, and FMS. System design should incorporate this also.

A feasibility study may be undertaken to assess the integration points and the access the system requirements for the implementation of credit management system. Based on this the integration strategies need to be formulated for integration with different systems. Besides its application in the above mentioned process automation credit revision algorithm may be reused and applied in areas say network traffic analysis and other applications where statistical tools may be required.

Conclusion

A system of credit management designed this way helps solve many of the problems related to subscription fraud, usage fraud etc faced by the companies over different industries. Besides it also streamlines the process for the management. The process may be useful for many other industries apart from telecom namely Finance, banking and securities and where ever credit transactions are involved. Integration with FMS only enhances its fraud detection capabilities. The Credit revision algorithm presents a

unique approach towards credit revision, and can be modified and applied to various other types of statistical analysis.

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