

An Incident Management System for Debt Collection in Virtual Banking

Sareh Saberi*

Department of Computer Engineering, Science and
Research Branch,
Islamic Azad University,
Tehran, Iran

Seyyed Mohsen Hashemi

Department of Computer Engineering, Science and
Research Branch,
Islamic Azad University,
Tehran, Iran

Abstract—An astonishing peak volume of bad loans in most countries, including Iran, is one of the latest manifestations of deep disorders which inhibited banking system from performing its main duty to promote development plans over a long period. Main mission of banking system is to link savers and those economic actors who need financial facilities. Banks, as intermediaries, receive interest from the second group and pay interest to the first group. During the last 10 years, millions of people have been controlling their financial lives online in the developed markets. Counters of access to electronic money and electronic wallet have increased currently. Bad loans increase as more facilities are provided for customers. Therefore, a mechanism is required for debt collection without any need for physical bank and improvement of this process using incident management system.

Keywords—virtual banking; debt collection; incident management

I. INTRODUCTION

Currently, information technology is known as an integral part of all industries and areas of activity. Few areas of industrial, commercial and service activities can be found which do not require IT to achieve their goals. Banking industry is one of the main economic activities in which IT is widely used as a key element. In current banks, IT is blood in vessels of the bank; all banking activities are through this context. Part of financial resources of banks and financial and credit institutions, which are granted to recipients of facilities, is in the form of bad loans. This group of customers discourages re-granting of financing facilities and ideal banking services to customers. Credit risk has been always a threat to banking activity. The risk of non-repayment of loans taken from banks is always considered as bad loans in financial headlines. Thus, banks have been always concerned with observation of bad loans to granted facilities. According to the studies conducted, if this ratio reaches 20%, it will be a risk for the bank. Using data analysis, this study develops a system which can improve debt collection and return these financial resources to the banking industry [1, 2, 3].

Information Technology Infrastructure Library (ITIL) is a systematic approach to quality of IT services. Details of the most important processes of an IT organization such as task list, instructions and responsibilities provides a basis to accommodate needs of various organizations. Development and dissemination of this approach provided useful guidelines

in many fields which resulted in growth and development of IT organizations. In simple terms, ITIL can be considered as a standard in the field of IT, while the reality is that ITIL is not a standard [4, 5].

II. DEFINITION OF INCIDENTS

Modified ITIL terminology defines incident as any event that is not part of a standard operation and cause service interruptions or reduced quality of the service. The purpose of ITIL is to achieve normal operation in the shortest possible time with minimal effect on trade or user by spending an affordable cost. Incidents may occur due to certain or uncertain reasons and they are recorded eventually to control problem management in Known Error Database. Incidents result from underlying IT problems and errors. The cause of incidents may be known and clear and may not need any investment in terms of time of cost for identifying. These incidents may lead to an application for maintenance, a physical presence at the site, or a change request to remove error. Where an incident is raised to be seriously and vigorously pursued or several events similar to an incident are observed, a problem could be recorded as a solution to all cases in the system. A problem may not be recorded until several similar problems are reported. Management of a problem is different from management process of an incident and it is done by different employees; for this reason, it is controlled by problem management process. When a problem is identified, the problem is recognized as a problem. Once the cause of an incident is detected, it becomes a detected error. Finally, a change request may be created for changing the system or eliminating the detected error. This process is covered by a change management process. Note that, request for an additional service is not recognized as an incident; instead, it is called a change request [4, 6].

III. INCIDENT MANAGEMENT BASED ON ITIL

Purpose of incident management is to restore normal servicing operations at minimum time possible and to minimize effect of hazards and inconsistencies in commercial operations. Normal service operation here is defined as a service operation within limits of the service level agreements. In other words, incident management is a part of the IT service management. Its primary goal is to restore normal servicing operations at minimum time possible and to minimize its negative effects such as lack of servicing in commercial operations. Incident refers to any event which is not routine

component of a service and may stop the service or reduce quality of the service. Process management monitors processing, allocates resources to different layers of this process, insures the updated database, and uses these tools efficiently; other responsibilities of management include planning and reporting [7].

IV. COMPARISON OF SERVICE DESK APPLICATIONS

To evaluate features of different service desks in order to identify characteristics of incident management, these applications are compared in terms of three following companies which annually report experiences of customers with available applications.

A. IDC MarketScape

- Leader: ServiceNow, BMC Software.
- Major Player: CherWell Software, CA Technologies, IBM, HP.
- Contenders: LANDESK, ZOHO
- Participants

B. Gartner

- Leader: ServiceNow, BMC Software
- Challengers: CherWell Software, CA Technologies
- Visionares: Landesk, Axios Systems
- Niche Players: FronRange, IBM, EasyVista, HP, ManageEngin, SysAid Technologies, TOPdesk, Hernbill

C. Forrester

- Leader: SysAid Technologies, CherWell Software, ServiceNow.
- Strong Perfomers: EasyVista, FronRange, Zendesk, TOPdesk, Vivantlo.
- Contenders: Landesk, Axios Systems
- Risky Bets

By comparing features, it is concluded that a full service desk should have following characteristics: Mobile, Web-Based, Alert/Escalation, Asset Management, Asset life Cycle Management, Automated, Assignment/Routing, Contract Management, Work Flow, Customer DataBase, Customer Self Service Ticket Management, Knowledge Base, Reporting, Incident Management, Problem Management, Change Management, Configuration Management, CRM, SMS, Social Media Integration Surveys & Feedback, Live Chat, Email Integration, Community Forums, Telephony [8, 9, 10].

V. VIRTUAL BANKING

In a virtual bank, customers and users are the same and both use banking services vie internet. Important efforts have been made for virtual banking worldwide. Statistics released by the International Monetary Fund indicate that virtual banking is mostly used in Austria, Finland, Korea, Singapore, Spain, Sweden and Switzerland where more than 75% of banks

deliver internet services. In America, those banks providing internet services possess more than 90% of assets of banking system. Although most customers have accounts in banks providing e-banking services, only 4% of them are customers of these banks. There are few virtual banks in the world; by 2001, there were only nine virtual banks with independent charter and almost 20 virtual banks with special trademark in America and two virtual banks in Asia and several virtual banks in European Union [11, 12, 13].

VI. DEBT COLLECTION

According to the latest information and formal and informal interviews, there is 800 thousand billion tomans cash operating in Iran, of which 150 thousand billion tomans as bad loans has not been returned to the banks. Portfolio of bad loans shows that about 60% of these loans are doubtful headings. Statistical analysis suggests that more than half of the portfolio of bad loans is in disposal of few people (not more than 100 people). Therefore, the crisis in bank liquidity cycle is an uncommon problem which needs to be addressed. By definition, bad loans are divided into two groups of current and non-current loans. Current loans refer to those loans that two months have passed their due date. These loans are traced in banks as current heading. Non-current loans include past due, overdue and doubtful headings. Time is involved in definition of these headings. By definition, those loans that more than two months and less than six months have passed their due date are past due loans. Overdue loans are those loans that more than six months and less than eighteen months have passed their due date. Doubtful loans are those loans that more than eighteen months have passed their due date [1, 3].

VII. METHODS

Using UML concepts, Activity Diagrams are depicted for traditional debt collection, electronic debt collection and the suggested system by using features of incident management system and results of comparison of the best service desks as well as features of virtual banking to suggest the virtual debt collection process.

VIII. TRADITIONAL DEBT COLLECTION

Three categories of information are required for filing:

- Information of loans including the type of contract signed by the customer at the time of receiving loans
- Type of collaterals and guarantees received from the customer at the time of receiving loans
- Full information of the debtor including ID, addresses, work, email address and contact information

Once this information is imported to the debt collection system, it is analyzed and separated. Then, the file is referred to a debt collection expert who sends a text message to cellphone of the debtor recorded in the file. The text message is determined by consulting with legal department. In a stepwise fashion, the text message gradually becomes a warning. As an important principle in debt collection, leverages are intensified gradually on the debtor to repay debt (Figure 1) [14,15].

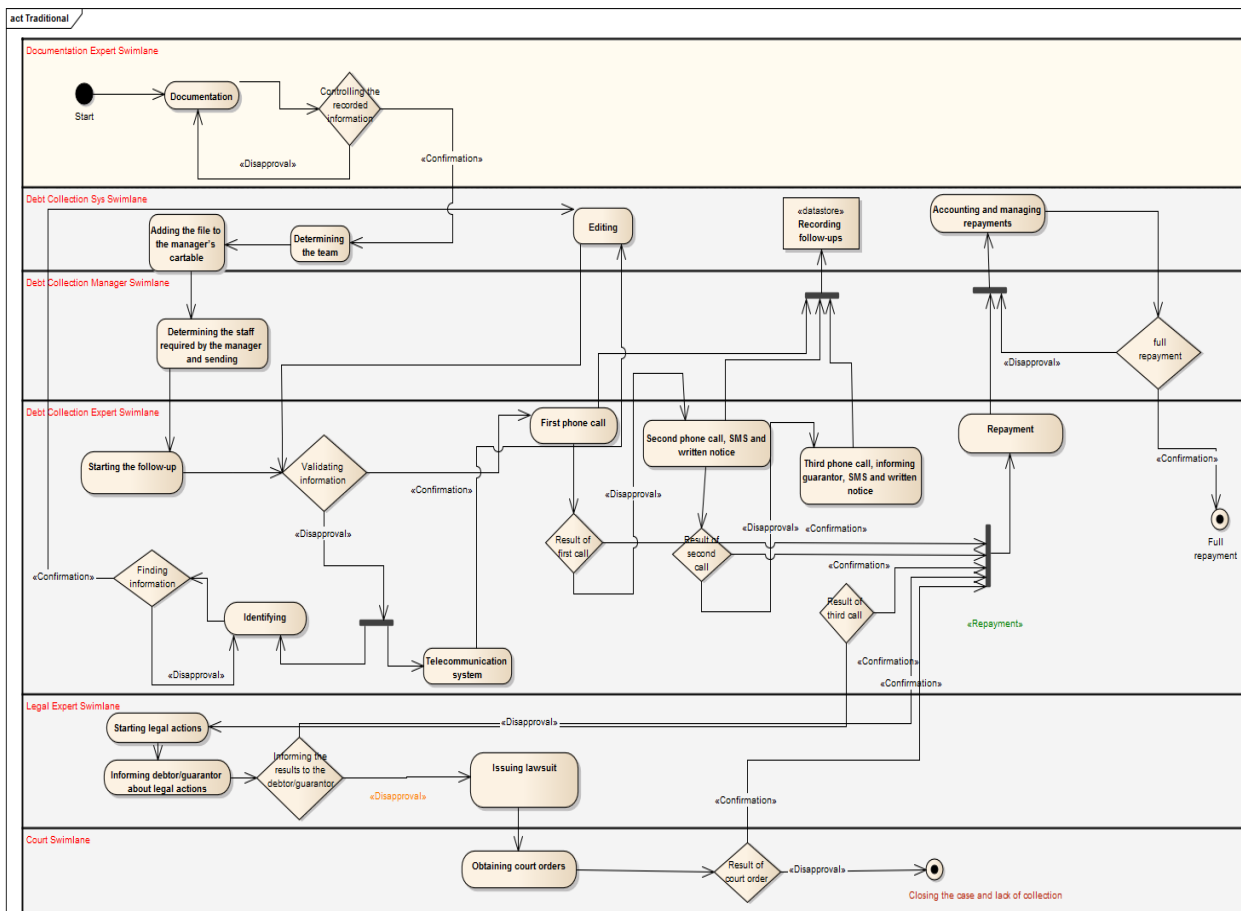


Fig. 1. Traditional Debt Collection Activity Diagram

IX. FIRST IMPROVEMENT USING VIRTUAL BANKING FEATURES, ELECTRONIC DEBT COLLECTION SYSTEM

The process starts with visiting the website and filling the application forms to obtain loans. The qualified applicant is asked to upload the scanned documents. Then, the uploaded documents are evaluated in terms of accuracy and adequacy. Validation starts by reviewing the documents and available information. Validation eventually leads to credit rating, based on which bank credit committee decides whether to grant the

loan. All records of BadPay saved in this database are considered as input for validation. By analyzing validation information, the customer will be informed if the loan is not to be granted. Otherwise, the customer is informed after the loan is deposited in customer account. The customer is informed of amount and due date of the first installment. Once the loan is deposited, the system starts accounting and payment management. If the installments are not paid in the determined due date, debt collection experts make the first follow-up contact (Figure 2).

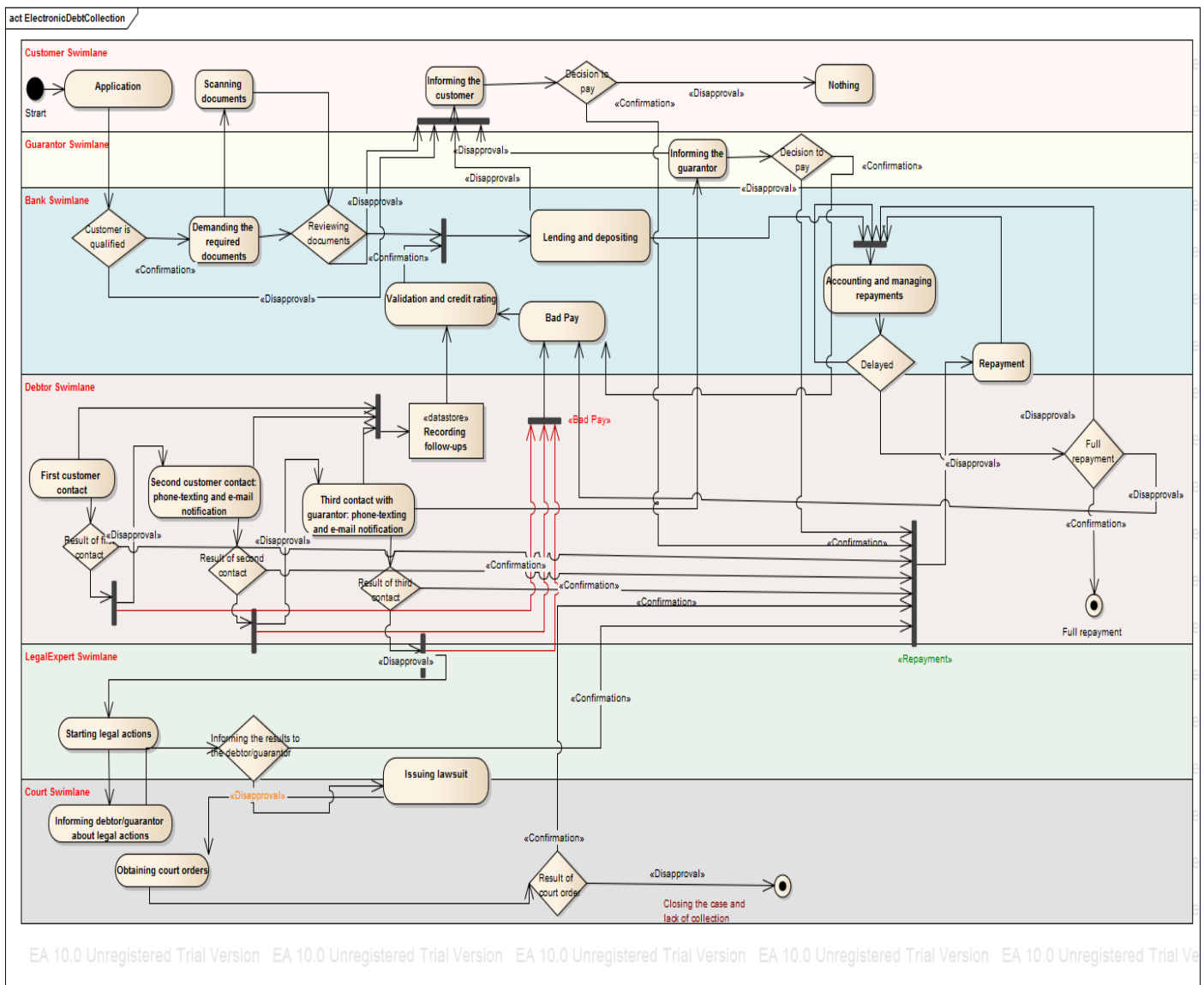


Fig. 2. Electronic Debt Collection Activity Diagram

X. THE SUGGESTED METHODOLOGY

A. Incident Management System for Debt Collection in Virtual Banking

The operation starts with visiting the website and filling the application form. The application form contains information on type of loan, rate of interest, ID and claimed collaterals. The system makes decisions automatically and online by considering customer choices, information and documents by connecting to central databases such as Document Registration Organization to investigate property collaterals announced, Civil Registration Organization to investigate claimed information and Telecommunication Organization to investigate contact numbers and addresses as well as BadPay output which is explained below. The customer is rated through BadPay outputs and payment behavior of previous loans using Knowledge Base feature of Service Desk. The output is compiled in a Black List of people who are not qualified and do not have collaterals. Once the information is

received, the system makes decision on the granting the loan. If the loan is allowed, the requested amount will be directly deposited in account of the applicant. The customer is informed of deposition, repayment period, due date of the first installments, and amount of installment. Moreover, the system informs the customer upon depositing the loan. If the applicant is not qualified, the system will inform the applicant via email and SMS. Systemic operation of accounting and repayment management starts once the loan is deposited. In fact, on time repayment is monitored in the system. At each stage of due date, lack of repayment is recorded as Badpay in this system. All Badpay records are analyzed in a database called as customer payment behaviors, containing a history of customer actions and reactions in repayment; for example, the database shows repayments after stages of follow-up. Based on these records, decisions are made on granting loans and follow-up operations of debt collection. One requirement of loan is guarantor(s). Informing system is applicable for the guarantor in the next stages. If the customer does not repay upon the first

due date, accounting system and repayment management and the follow-up debt collection systematically start to work using repayment behavior of customer. The first follow-up is through phone call using IVR which informs legal consequences of non-compliance with repayment obligations. The system extends the deadline for repayment and studies customer behavior in the extended period. If the customer does not repay at the deadline, it will be recorded as a Badpay and the system starts the next stage to continue follow-up. Next follow-ups involve phone calls, SMS and email. In case of repayment at any follow-up stages, it is recorded in the accounting system and repayment management; otherwise, the second Badpay is recorded for the customer. At the third stage of follow-up, the system informs both customer and guarantor about legal consequences of the guarantee. If the guarantor does not respond, the system records Badpay for the guarantor. If the third follow-up does not lead to repayment, the system will refer the file to the legal follow-up department. From the beginning, the customer and the guarantor are informed of

legal actions. The deadline is extended to one week; in case of non-repayment, the file is referred to the judicial authorities for follow-up by calculating interest, fines and debt to the date. This stage involves issuing of a lawsuit by sending information to online system of judicial authorities and court's decision and ultimately issuing the definitive execution to force the customer or the guarantor to repay the debt. All repayment procedures ultimately lead to complete repayment of the debt. In each stage of follow-up, the debtor may attempt to pay off debts, which is done in repayment process. In addition, payment management and accounting system constantly monitors the customer's account. According to central bank laws, lending becomes difficult and even impossible to individuals and guarantors in the banking network. By linking to judicial systems, this can lead to automatic issuing of travel bans. Some of banking services may be discontinued later. For example, Shetab network services may be disrupted or money transfer may not be available (Figure 3).

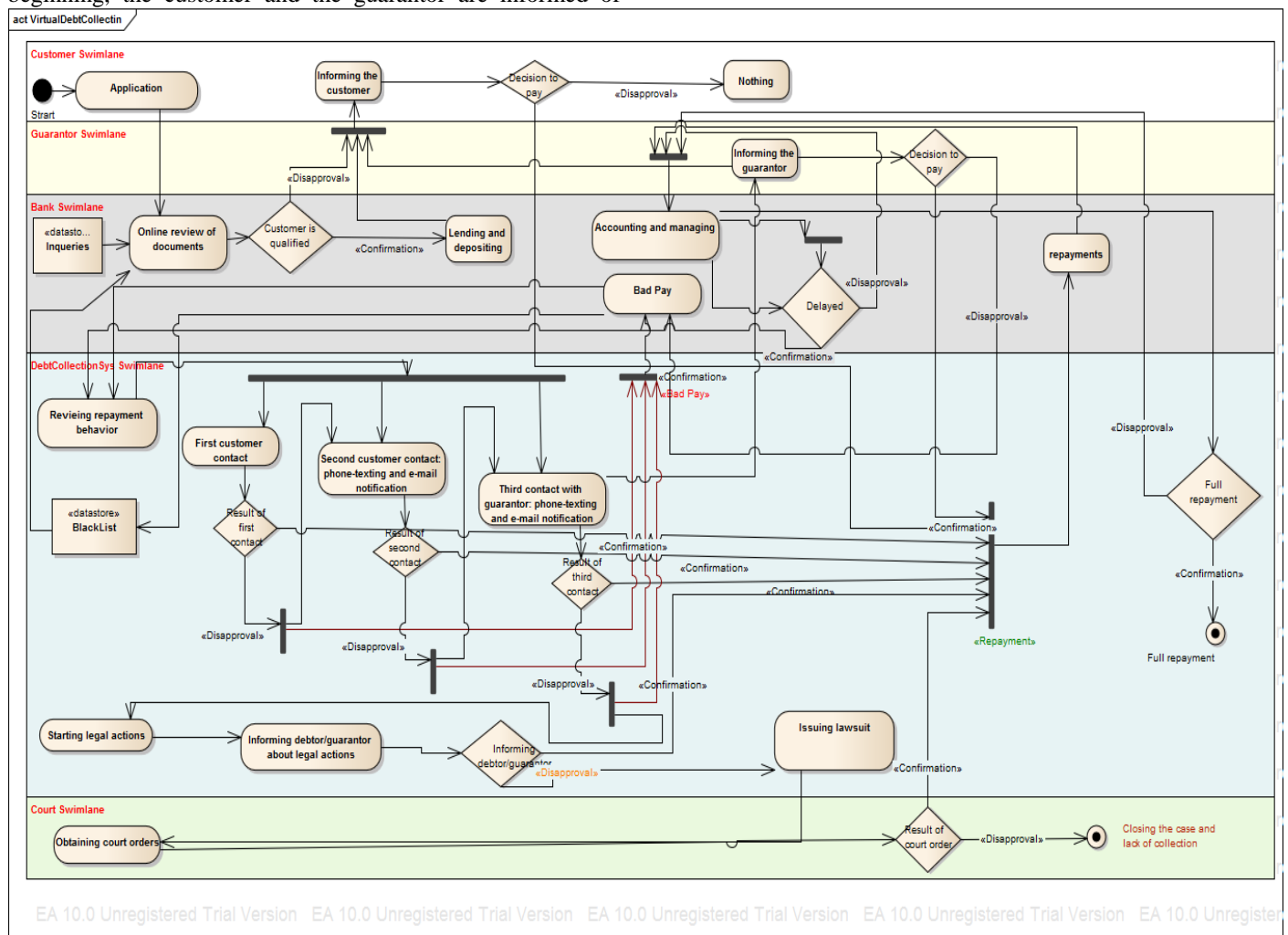


Fig. 3. Incident Management System for Debt Collection in Virtual Banking Activity Diagram

XI. SYSTEM EVALUATION

A. Measurement of Effectiveness

An inclusive study is required to evaluate systemic improvements done. The figure below determines logical chain of this study:

- 1) *Information*
 - Easily received and processed information
 - Easily validated information
- 2) *Customer satisfaction*
 - Customer self-validation
 - Easy lending
 - Transparent informing
 - Access to sufficient information at any time
- 3) *Debt collection process*
 - Reduced costs of ineffective follow-ups

- Improved repayment behavior for satisfaction
- Completed database of non-creditworthy customers and prevention of next bad loans

XII. MEASUREMENT OF CUSTOMER SATISFACTION BY KANO MODEL

Results of the survey of 100 customers analyzed by Kano model show that customers are most concerned with attractive factors followed by must-be and basic factors considered in virtual banking. The lowest score given by respondents to the questions F16 and F23 results from their lack of understanding of the menus; this can be attributed to the fact that respondents had no experience with the real website and only considered the simulated scenario. In conclusion, the results show that customer satisfaction with attractive, must-be and basic factors increases overall satisfaction of users; positive responses are expected from repayment behavior of customers (Table 1 and 2 and Figure 4) [16, 17].

TABLE I. CUSTOMER SURVEY

	Question	Class	Dislike	Live with	Neutral	Must be	Like	Total
F1	Meeting customer information needs in relation to types of lending contracts	Attractive	1	0	2	12	35	230
F2	Satisfaction with informing process	Attractive	1	2	11	25	11	193
F3	Providing sufficient information through alarms in the customer profile	Attractive	3	2	15	22	8	180
F4	Usage of promotions and forgiveness of crimes and satisfaction	Attractive	0	0	23	10	17	194
F5	Customer opinion about reduced cost of commuting due to the new method	Attractive	1	0	16	19	14	195
F6	Supporting views and reforms	Attractive	1	3	12	22	12	191
F7	New information	Attractive	1	5	19	16	9	177
F8	How lack of validation impairs customer intention	Attractive	1	1	3	32	13	205
F9	Lack of information about debt collection process has an effect on customer satisfaction	Attractive	2	2	1	29	16	205
F10	Lack of promotions and motivations (informing, forgiveness, commuting cost)	Attractive	0	1	1	38	10	207
F11	Easy communication and access to customer service	Basic	2	2	5	26	15	200
F12	Easily met customer expectations from menus	Basic	1	1	9	28	11	197
F13	Ability to search information	Basic	1	3	4	36	6	193
F14	Accurate presentation	Basic	1	2	3	38	6	196
F15	Help tables and content menus	Basic	0	2	18	24	6	184
F16	What do you think if the menus are removed?	Basic	3	1	3	11	11	113
F17	Do you agree with removal of the search feature?	Basic	0	1	3	21	25	220
F18	How would lack of help tables be effective on easy access?	Basic	4	4	3	22	17	194
F19	How do customers with bad loan evaluate the new debt collection system?	Indifferent	0	1	3	34	12	207
F20	Suitable and sufficient resolution of webpages	Indifferent	2	1	6	40	1	187
F21	Ability to monitor the status of any pending case online	Questionable	0	0	8	38	4	196
F22	Overall satisfaction with virtual debt collection services	Questionable	0	2	23	15	10	183
F23	Ability to show user's position on the website	Questionable	10	14	16	8	2	128
F24	Logical structure of information provided	Questionable	0	2	10	32	6	192
F25	Information is available on the site until needed	Questionable	3	5	9	28	5	177
F26	Statement of information along with their details	Questionable	2	3	7	23	15	196
F27	Satisfaction with responsiveness and support	Reverse	0	0	12	37	1	189
F28	Satisfaction with continuous collection and follow-up services	Reverse	0	0	11	16	23	212
F29	Ability to monitor credit rating and systemic self-evaluation and customer satisfaction	Must-be	2	1	7	20	20	205
F30	Online monitoring of bad loans and installments and customer satisfaction	Must-be	1	1	14	18	16	197
F31	Ensuring that the data imported by the user is stored and maintained	Must-be	0	0	5	42	3	198

F32	To display load time and system response	Must-be	0	1	11	22	16	203
F33	User help	Must-be	0	8	16	20	6	174
F34	Updated information	Must-be	3	5	10	21	11	182
F35	How important is the outdated information?	Must-be	1	3	10	35	1	182
F36	How effective is the lack of load display and system response on satisfaction?	Must-be	3	2	4	36	5	188
F37	What do you think if data security is not guaranteed?	Must-be	0	1	3	39	7	202

TABLE II. CLASSIFICATION OF QUESTIONS BASED ON KANO

	Dislike	Live with	Neutral	Must be	Like
Attractive	0.02	0.03	0.21	0.45	0.29
Basic	0.03	0.04	0.12	0.52	0.24
Indifferent	0.02	0.02	0.09	0.74	0.13
Questionable	0.05	0.09	0.24	0.48	0.14
Reverse	0	0	0.23	0.53	0.24
Must-be	0.02	0.05	0.18	0.56	0.19

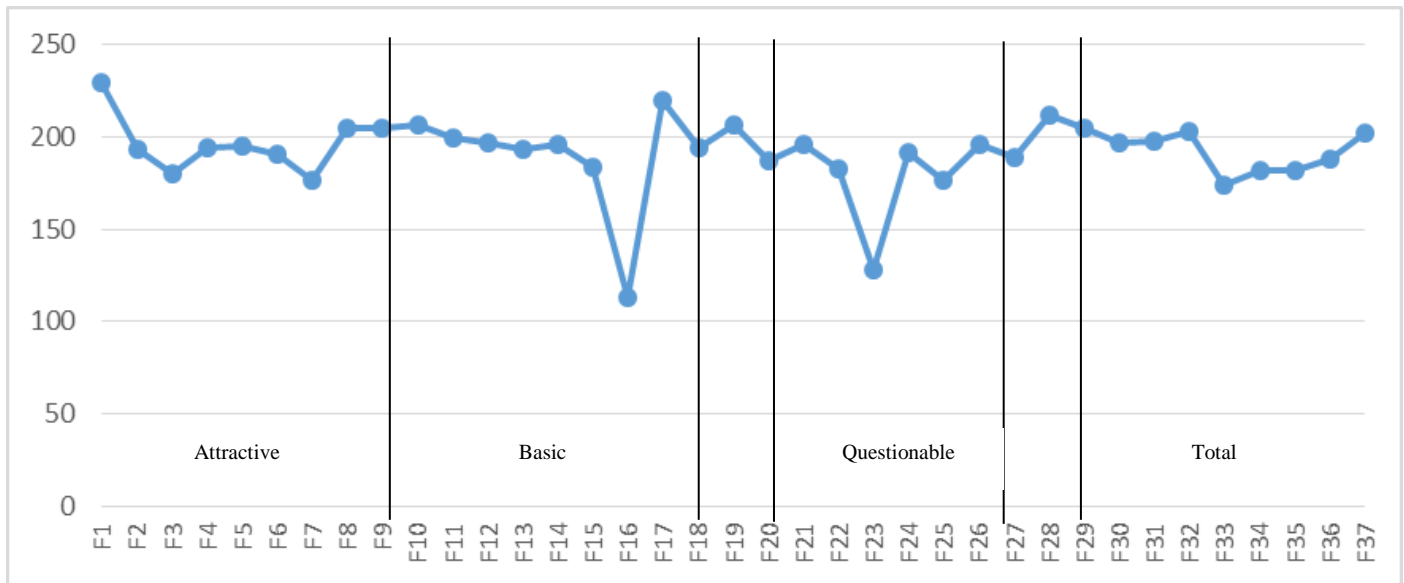


Fig. 4. Frequency of questions based on Kano

XIII. INDICATORS OF EFFECTIVENESS

By determining chain strategies used to create value added, an indicator is defined for each goal; then, methods are developed for calculating these indicators. Thus, summarized steps of this evaluation are determined for effectiveness, path control and tactics to achieve organizational goals. For this purpose, it is essential to recognize scientific and practical concepts for determining the indicators. Using balanced scorecard (BSC), performance evaluation indicators are divided into three categories [18]:

- Key result indicators (KRIs)
- Performance indicators (PIs)
- Key performance indicators (KPIs)

Indicators of debt collection are extracted from activities of a debt collection company as shown in Table 3.

XIV. CONCLUSION

Given that debt collection is based on customer data, precision and accuracy of information is important for this mission. In traditional debt collection, information is recorded

manually as input to the debt collection system; due to the size of information, human error is probable and may disrupt the debt collection process. Moreover, traditional debt collection lacks a database which can convert raw customer data using BadPay records to analytical information based on knowledge management. Moreover, the traditional system cannot monitor customer behaviors in debt collection, on time repayment or follow-up contacts. Consequently, this information gap causes latent costs. Repeated follow-ups extend the debt collection. Losses of delays and follow-ups cannot be estimated easily. Some of the costs such as written notice can be calculated; moreover, costs of each type of follow-ups can be estimated. However, latent cost is the tip of the iceberg. In addition to primary validation, repayment behavior of the customer is evaluated at the time of debt collection. The traditional system lacks this feature. In fact, customer validation prevents bad loans. Written notice requires a large amount of paper, human resources and time; moreover, the customer may not receive the notice. There may be conflicts in contracts and the relevant staff may not notice the conflicts. Traditional system suffers a considerable amount of human error. There are advantages and disadvantages in the electronic system. However, the electronic system has improvements compared to the traditional system.

Advantages of the electronic system include online application for the loan and informing process at different stages. Although the electronic system has been improved, it suffers shortcomings such as time-ineffectiveness and additional process. This system does not allow online validation simultaneously with application. It is time consuming to validate the information claimed by the applicant, because it requires inquiries from the relevant organizations. One advantage of the electronic system is that validation starts with access to the information. However, disadvantage of the system is that the applicant is required to upload the scanned documents and the bank needs to send these documents to the relevant organizations for validation; this prolongs the process. Compared to traditional and electronic systems, an inclusive database and integrated information is an advantage of virtual system. Based on incident management model, virtual banking enables a relatively smart system. In the virtual system, the customer fills the application form containing primary information, type of loans and rate of interest; by connecting to a systematic database, the system extracts and analyzes records of the applicant. To save the costs, the applicant can login to the validation system to know his credit rate and predict agreement or disagreement with his application. The database containing BadPay, BlackList records and the systems linked to DataSharing departments accelerate lending process. This system analyzes raw data and customer reactions to loans and repayments and determines a history of previous loans. For

debt collection, the system finds a suitable method based on behaviors, actions and reactions and makes decisions intelligently. The system suffers no human error in recording the information and the steps are taken rapidly. In virtual debt collection, the system receives personal information, addresses and guarantors and validates them through databases of relevant organizations such as Document Registration Organization, Civil Registration Organization, and Telecommunication Organization. Using central bank database, the customers with BadPay records are alarmed when applying for the loan and validating online. There is no need for prolonged legal process. The files are referred to the court online. In this study, virtual debt collection system was implemented by using features of incident management and service desk. A central database was developed by using mobile base and web base to integrate and validate information using features of virtual banking. Alert and email used to inform debtors save time and cost. Customer database and customer self-service enables customers to validate themselves before applying. Using a history of all banking activities, customers can validate themselves and improve their conditions if they are not qualified. Using knowledge management, previous activities and repayments of the customers can be monitored and used for validation and determination of the warning suitable for the customers. Table 4 and Table 5 summarize advantages and disadvantages of traditional, electronic and virtual banking systems.

TABLE III. EFFECTIVENESS INDICATORS OF DEBT COLLECTION IN VIRTUAL BANKING SYSTEM

Type of Indicator	Formula	Effectiveness	Indicator
KPI	Number of complaints (questions with average to weak rating) / total surveys (all questions responded) × 100	Customer satisfaction	Customer satisfaction
Correct information flow and improved quality of customer service increases customer satisfaction in surveys and indirectly influences repayment behavior of customers.			
PI	Total number of follow ups / total number of debtors × 100	Debt collection	Follow-up rate
Through a direct relationship between transparency and facilitated flow of information and increased customer satisfaction, total number of follow-ups directly decreases. Given that the number of files or debtors is constant, the follow-up rate decreases. In other words, lower follow-up is required for collection of bad loans compared to the traditional debt collection system.			
KPI	Number of depositing files / total number of bad loans × 100	Debt collection	Depositing file ratio
Given that a number of bad loans remain unpaid until they are referred to a legal entity, an important indicator must always monitor success rate of pre-legal and post-legal measures. This shows a logical relationship with customer behavior. Even decision on immediate referral to the legal department can avoid excessive time and energy spent on some files by controlling costs. Therefore, regular monitoring of the number of depositing files is important for the bank. Many debtors tend to extend or repay through re-installment. Thus, depositing files involve those who have not yet repay completely and had multiple repayments.			
KRI	Collection rate (RLS) / Total amount of bad loans × 100	Debt collection	Collection to portfolio ratio
Debt collection management calculates the ratio of collected debts to total amount of bad loans. This indicator is very important in financial management, financial statements and generally auditing of the bank. Effect of customer satisfaction which results from facilitated flow of information and quality of the services provided manifests itself in this indicator.			
PI	Number of paid loans / total number of bad loans × 100	Debt collection	Paid loan ratio
Debt collection management requires customers to accept the terms of contracts including rate of interest and penalty and pay their debts completely. Thus, debt collection system requires an indicator for determining completely paid loans. This indicator is successful when numerator and denominator approach to 1. Apart from the amount of debt, this indicator directly refers to the paid loans.			
KRI	Administrative fee of debt collection (phone, SMS, IVR, etc.) / total amount of collected debts × 100	Debt collection/information	Cost to collection ratio
One of the indicators which are directly related to facilitated flow of information and customer satisfaction is the reduced number of follow-ups and consequently reduced costs of these follow-ups. The lower the numerator, the higher the collected debts and profitability will be.			
PI	(Cost of paper + phone calls + SMS + IVR) + cost of staff salary / total organizational expenses	Debt collection/information	Cost ratio
This ratio shows the share of costs to total administrative expenses. It is in fact the bottleneck of organizational expenses and involves those costs which are directly involved in debt collection process.			
PI	The number of referrals to legal department / total number of bad loans × 100	Customer satisfaction	Number of referrals to legal department
PI	Amount of files referred to legal department / total number of bad loans × 100	Customer satisfaction	Amount of files referred to legal department
These two indicators show those customer behaviors referred to legal department for banking contracts or amount of debts. It also indicates decision of the organization to save the time and reduce costs by referring the files to the legal department immediately. On the other hand, this indicator shows effectiveness of pre-legal processes and customer satisfaction indirectly. From a win-win perspective, this indicator reduces costs of legal actions for both customers and the bank. The bank tends to refer less files to the legal department; for this, the bank needs to inform the customer and explain costs of legal actions to the customer.			

TABLE IV. COMPARISON OF DEBT COLLECTION SYSTEMS

	Information recording	Access to previous records	Customer self-validation	Validation	SMS	IVR	Written notice	e-mail	Customer behavior analysis	Integrated information	Online mobile base	Security	Easy access
Traditional system	√	×	×	×	√	√	√	×	×	×	×	×	×
Electronic system	×	√	×	√	√	√	×	√	×	√	√	√	√
Virtual system	×	√	√	√	√	√	×	√	√	√	√	√	√

unfavorable efficiency
Performance nearly as Good
Accuracy action / optimal favorable

TABLE V. ADVANTAGES OF VIRTUAL DEBT COLLECTION

Advantages of virtual debt collection	
Higher profitability	Reduced time of collection
Reduced bad loans	Inexpensive services
No physical money	Continuous smart validation and follow-up
Reduced possibility of misuse	Easy to use
Fast transactions	Higher quality
Record of activities	Accuracy of information
Increased customer satisfaction	Inclusiveness
Full-time services	

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