

Information System for Customer Solvency Evaluation in Providing Funding

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Summary: The article presents a summary of practical experience with creation of a specific system for automation of the evaluation process of customer solvency in providing funding.

The specifics of the financing from non-bank institutions and the specifics of the process of evaluating the customer solvency are reviewed by focusing on the ability to automate the process. The activities and the extent in which they may be or should be automated are analyzed.

The article examines the design of an automated system for assessing solvency by covering the possible approaches for designing the information system which would result in creation of a usable system.

Each of the proposed approaches for the design is presented also by potential forms of its development. Parts of a real developed system for evaluating the solvency are presented in the article. In these parts the analyzed and summarized approaches are actually implemented to a certain extent.

Key words: Evaluating of solvency, automation, technology, system, design, interface.

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1. Funding by non-bank financial institutions

In the past few years a rapidly developing market segment of non-bank financial intermediaries is observed. This is closely associated with changing the financial behavior of the households in Bulgaria. As a solution for a current financial problem more often they use short funding. Larger share of the total financial indebtedness of households is formed by the funding of citizens, financial leasing and consumer lending by non-bank companies.

Non-bank institutions, as the term itself indicates, are institutions financing customers, but don't have a Bank status. In general, these companies provide funds for financing from other sources. Funding from non-bank institution is more often a preferred alternative of the traditional bank credit. On the market this service is available in a variety of offers. These offers are mainly in the so-called. "Commodity" loans, which cover the cost of purchasing goods, but no cash is involved. Usually the owed money is

transferred directly to the store from which the purchase is made. After that the loan is paid in directly to the financial institution. Besides this the financial institutions also gain popularity on their standard customer loans (providing cash).

Funding provided from non-bank institutions is distinguished by several characteristics that define very important aspects which automation processes in such companies must take in mind.

Funding from non-bank institutions has the following features regarding the basic parameters of financing: the loan period, the amount of financing and cost of the credit.

Loans from non-bank institutions are usually for a short period and for not significant amounts. The cost of credit in these cases is higher than the proposed financing by banks in the country, however, this type of lending is quite popular. This popularity is not accidental. It comes from simplified procedures for application and granting of credit and the rapid service of non-bank companies.

This makes the non-bank financing more accessible because:

- faster information gathering for the financing (in fact this information is everywhere, particularly in stores);
- eased solvency requirements for customers and different approach for risk assessment;
- the shorter period for obtaining a solution to the financial problem;
- simplified procedures for applying for and granting of credit.

All this determines the specific customer group that uses this type of service. Non-bank financial institutions have different customers, different markets and different ways to manage their products, compared with banks. Their customers are strongly defined and most often they are not and can not be banks customers. Customers of non-bank institutions are often people who have difficulties to prove sufficient income, and to provide the necessary documents and have no lasting financial interest, but an ongoing financial problem.

2. Risk features in non-bank funding

Non-bank institutions are preferred to banks, because they (non-bank institutions) grant loans easily. Analysis and observations in a company from this sector show that increasing the number of customers, due to facilitation of the application conditions, leads to a serious increase in the number of concluded and serviced contracts in the company. However, this poses very acute the problem with the loss¹ of the company. This is why it is essential to refine the system for customer selection without being in prejudice of the winning liberality.

Just the easy accessibility to the services of these companies leads to significantly increasing the risk. One of the instruments, which offsets any exceptional situations and losses is the high cost of the credit. But although banks overwhelm non-bank institutions over this indicator in similar services, non-bank institutions are preferred by citizens.

The second instrument for reduction of the risk for these companies is the application

¹ Loss is an index showing the percentage of contracts that are not serviced regularly by customers or are fraud.

of good solvency evaluation system and avoidance of potentially risky customers. In every company there is one solvency system represented by a set of rules for evaluation and decision making. The experience in the specific non-banking institution, however showed, that such system of risk assessment has two aspects in itself: financial management and informational.

The first aspect is related to the establishment of rules from specialists in the field of risk management. The second one is becoming more clearly distinguishable and with high importance for implementation of the system of rules. It is associated with seemingly trivial and not specialized activities such as gathering the necessary information and providing it to the credit expert for decision making.

Solving the information problem is often reduced to designing and creating an information system with one purpose – to automate the process.

The experience in such a company showed that the automation of the whole process is much larger task than it seems to be, contiguous to the creation of a system for artificial intelligence. Therefore an analysis of the overall process of risk evaluation was made, clearly limiting what activities and to what extent they can be automated so that the credit expert can obtain sufficient and not speculative information for the decision making process.

3. Risk evaluation process in non-bank institutions

The customer solvency evaluation in the particular non-bank company is related to the collection of information for the

customer in various aspects, obtaining computable values that define some state and decision taking.

The most common form of this process is presented in the Figure 1.

For some of these activities an automated solution can be provided, but others remain a priority and are of the responsibilities of certain employees.

Not every activity can or should be automated. Beyond this presentation remain activities like applying for funding and checking credit history, which generally are adequately structured and determined and allow high level of automation.

Particularly in connection with the evaluation of solvency and automation of this activity is of interest the tasks of gathering additional information and evaluation of the information in both its senses – classification and receipt of additional indicators. Decision-making is a task that can be automated, but an assessment was made that this is a heuristic process (with many exceptions and special effects) and because of that automation of the evaluation process is seen as a creation of a solution supporting decision-making not "taking" the decision.

3.1. Features of the gathering information process

Gathering information on the basis on which to assess the solvency of the loan recipient is a process which is characterized with that that the information must be collected quickly and operatively.

Collecting information is an activity directly related to working with customers and influencing the time to complete the application procedures. Although this looks

like a seemingly trivial problem its key spot as the first critical time process requires finding information presentation and a solution to show:

- Critical attitude in relation with the time to perform a job;
- Correctness in terms of working with clients i.e. collecting only the admissible information, without taking advantage of the customer's desire to become a client of the company.

Another feature of this activity is that it has strong operational nature. This means that data is collected at the time of customer

application and decision-making should be possible in a short time. This efficiency is essential, since the competitiveness of non-bank institutions to the bank ones increases with the offering of easier and faster procedures for allocating funds.

In practice, data collecting is a process of performing validation tasks, the results of which must be registered and evaluated.

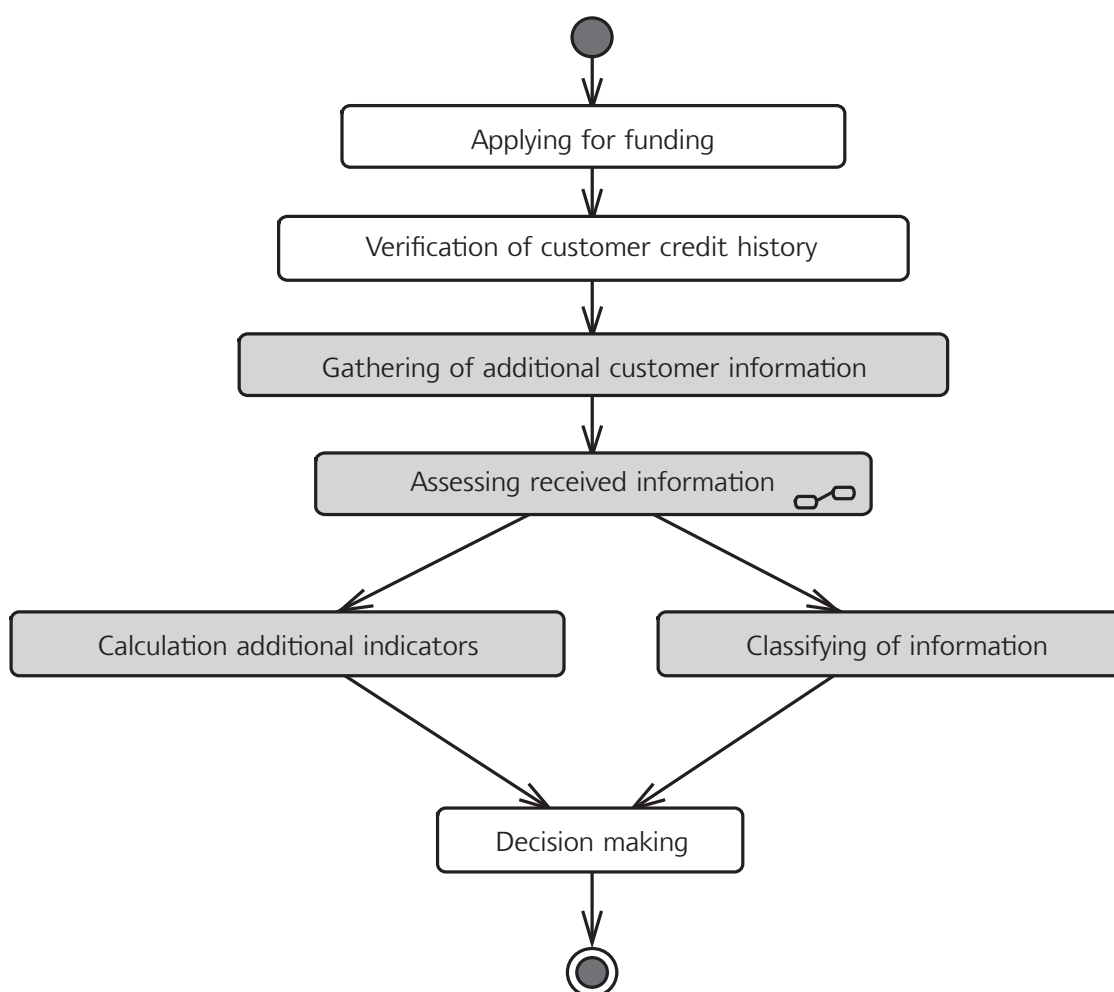


Figure 1. Risk evaluation process

3.2. Features of the information evaluating process

The process of evaluating the information is also distinguished by two very important features.

The first one, which was observed in the specific company and assessed as a very important direction in search of a solution is that evaluating information is an **adaptive process**.

Due to simplified procedures for granting funds non-bank institutions are more and more preferred over banks and their contingent expands increasingly, benefitting from their services. More and more people quickly get acquainted with the procedures and specifics of the different options. This requires a risk assessment to be enriched with new rules by collecting new information and gaining more and more different indicators to assist decision-making.

The calculation of additional indicators is also a task that requires tuning. I.e. the same methods of calculation but implemented on different close values or other restrictive conditions. This allows to quickly adjust existing algorithms to new requirements to 'strengthen' or 'weaken' customer requirements.

The diverse customer group, requires the application of different approaches in dealing with them and assessing the solvency. Customer group can also be divided into many and different sub-groups, mainly by the potential risk each sub-group hides.

Obviously the system of rules can not be developed and applied for all customers.

It is differentiated for different customer groups according to their credit risk.

The system of rules for evaluation is enriched by defining different profiles of customers to determine what rules and restrictive conditions to be implemented and monitored for each customer. This allows a two way assessment: once when the client is associated with a group and a second by evaluating the additional data, already collected.

Non-bank companies offer their customers a wide variety of services (forms of financing). The risk assessment of these services also differs and this requires that the developed system can be adapted to the appearance of new products offered by the company.

So, the adaptability of this process can be defined in several ways:

- Adaptability in terms of diversity of data collection;
- Adaptability in terms of diversity of profiles of different customer groups;
- Adaptability regarding the evaluation of the information. This includes the possibility that the same data may receive different interpretations according to the current company strategy;
- Adaptability in terms of restrictive conditions in the calculation of indicators;
- Adaptability to new financial services offered by companies.

The process of evaluation also has **heuristic** nature, related to the fact that the collected information should be properly classified in terms of whether it could lead to an exceptional situation for the company (obligations uncollectability) or is acceptable to it.

4. Main objective of building automated information system for evaluating the solvency

There are three important features which 'lead' to the creation of the IT solution: *efficiency, adaptability* and *heuristic nature* of certain activities.

How do they affect on the demand of an IT solution?

This is not just for designing and implementation of an automated information system, but for finding a systematic solution which can cover most aspects and to "*react*" and *reflect the company's policy regarding its clients*.

The analysis in the specific company allows defining some basic points of the concept of such a system.

5. System for automation of the evaluation of credit risk

The design of such a system may begin with answering the three basic questions:

How the adaptability to be affected?

Adaptability in terms of diversity of data collection may be solved as the data is considered dilatable set of characteristics. This means that in the designing phase of the system such structures should be provided that can add new data, without entailing any changes in the database and user interface system. Conventional methods for design a database like columns of concrete essences is not a good approach since it does not allow easy expansion

of the system. This means that classical horizontal design should be replaced with a more abstract method. The process of data collection can be examined as a more general process of inspecting the customer and registering results without taking any interest in their specific context. This is how the data collection, as a process, becomes a sequence of check-ups (document check-ups, asking additional questions, etc.) and registering their results.

One interesting aspect should be taken into account when choosing a solution. Results gathering would be completely nonsense if they can not be used. Also there should be provided a sufficiently good structured presentation for the gathered results so that the results can be used for summaries, counting, aggregation, etc.

Adaptability in terms of evaluating information involves giving different assessments for the same data according the current policy of the company. In formal, for this feature of the process to be reflected in the system, the results of the check-ups (or data which is registered) should be classified. This classification involves the evaluation in terms of acceptability of the resulting values.

To ensure **adaptability in terms of diversity of profiles** of different customer groups the previously described approach is the right approach because it will allow the adding new profiles. The application of this approach allows designing templates for checking customers. Templates are a set of controls orientated for specific customers (not all). The classification of a customer to a particular risk group, leads to the collection of an exact set of data for this customer.

The design of a template should reflect not only the account of the client, but to the combination of an account and a specific product offered by the company. This is necessary since the proposed financial services also have varying degrees of credit risk, which must be taken in mind. Thus the process is adaptable in terms of the set of financial services offered by the company.

The accuracy of the creation of such accounts is a task for the competent employees in the company. The more accounts with varying degrees of risk there are, the more accurate assessment can be done.

Achievement of adaptability in terms of restrictive conditions when calculating the indicators is very typical place in the system for implementing the so-called data driven mechanism for creating algorithms. High adaptability can be achieved if all these algorithm evaluations (and we can call them like that because in practice they are indirect evaluations which are using data from other already made evaluation) are presented as general algorithms that use values (control calculation, etc.) that are described externally and by their change to 'manage' the direction of implementing the algorithm and for obtaining values.

Therefore, to realize an information system which automates and assists the process of evaluating the solvency, it is needed to:

- Implement unconventional design in order to obtain dynamic data structures;
- Use data driven programming, which can allow changing the logic (algorithms) without changing the programming code.

6. Implementation of the system for evaluating the solvency

In the particular non-bank financial institutions such a system is implemented as a part of a larger IT solution.

In its implementation the above findings act as a base for the concepts for designing and programming.

6.1. Set of verifications

The main concept of this system is to define the set of verifications that is available for editing and expanding from the user.

All verifications from the set must have the necessary minimum of data shown in Table 1.

These ideas were realized in the following structure of relational database (Figure 2).

An example of this nomenclature content is presented in Table 2.

The user has to fill in the nomenclature all possible results of an inspection and to ensure that they are mutually exclusive. The system demands for each verification to be registered at least 1 result of type "acceptable". This way nomenclature of the verifications can be used for the purpose of registration of additional customer data on its request for funding without forcing aggravation of the mechanism of consultation and without impose revising of the system. This means that through the implementation of this basic requirement an expand the information system is achieved which goes outside of the context of evaluating solvency by the providing of an interface to record data for the client and its request, needed at the moment, specific and unexpected in the initial implementation.

Table 1. Necessary minimum of data to describe a validation

Attribute	Description/Purpose
Name	Short name, which will be used by the users.
Type	There are two major groups "registrational" and "algorithmic". This classification differs verifications in those who only collect data i.e. they are only registered, and those who have a specific algorithm, which receive new values.
Client Type according to the credit risk	The client type represents the different client profiles. This feature helps to create templates for evaluating the solvency of the customers by their group.
Type of financing (service)	The type of the service (consumer financing, financial leasing, etc.), for which the current verification is made for.
Short description	
Active	All verifications can be excluded from the process without damaging the existing data on it. This is to provide greater flexibility.
Possible results.	<p>In order to provide opportunities for summaries there is a defined set of possible outcomes for each. In terms of assisting the process of decision-making each of these results is defined as "acceptable" or "exception". In the particular company exceptions are signal for a potential problem and the reach of a decision is only possible after consultation or this leads to suspension of the process and rejection.</p> <p>When a result is registered it gets a characteristic of what action should be done. The set of actions is final, clearly defined and allows to be used to achieve greater control within the user interface. Possible actions are: "no reaction", "error and refusing to record data", "warning", "imposing a requirement for further consultation", "level of competence of the coordinating employee".</p>

Table 2. Nomenclature of validations - example content

Type of financing	Type of client	Check	Result	Type of result	System action
All	All	Length of service	Up to 1 year	Exception	further consultation
All	All	Length of service	Up to 10 years	Acceptable	-
All	All	Length of service	11 to 20 years	Acceptable	-
All	All	Length of service	above 20 years	Acceptable	-
All	All	Check up with NSSI	Insured	Acceptable	-
All	All	Check up with NSSI	Uninsured	Acceptable	further consultation
All	All	Check up with NSSI	Self insuring	Exception	further consultation
All	all	Check up with NSSI	No data	Missing data	Warning

Algorithmic evaluations (related to the calculation of some indicators) will also appear in the nomenclature in order to allow the user to adjust the actions of the system. This is the first form of implementation of management through data (data driven),

which allows the result to be interpreted in a certain way (Figure 3).

The second instrument for managing the algorithms in the evaluation system is the choice of their implementation. In

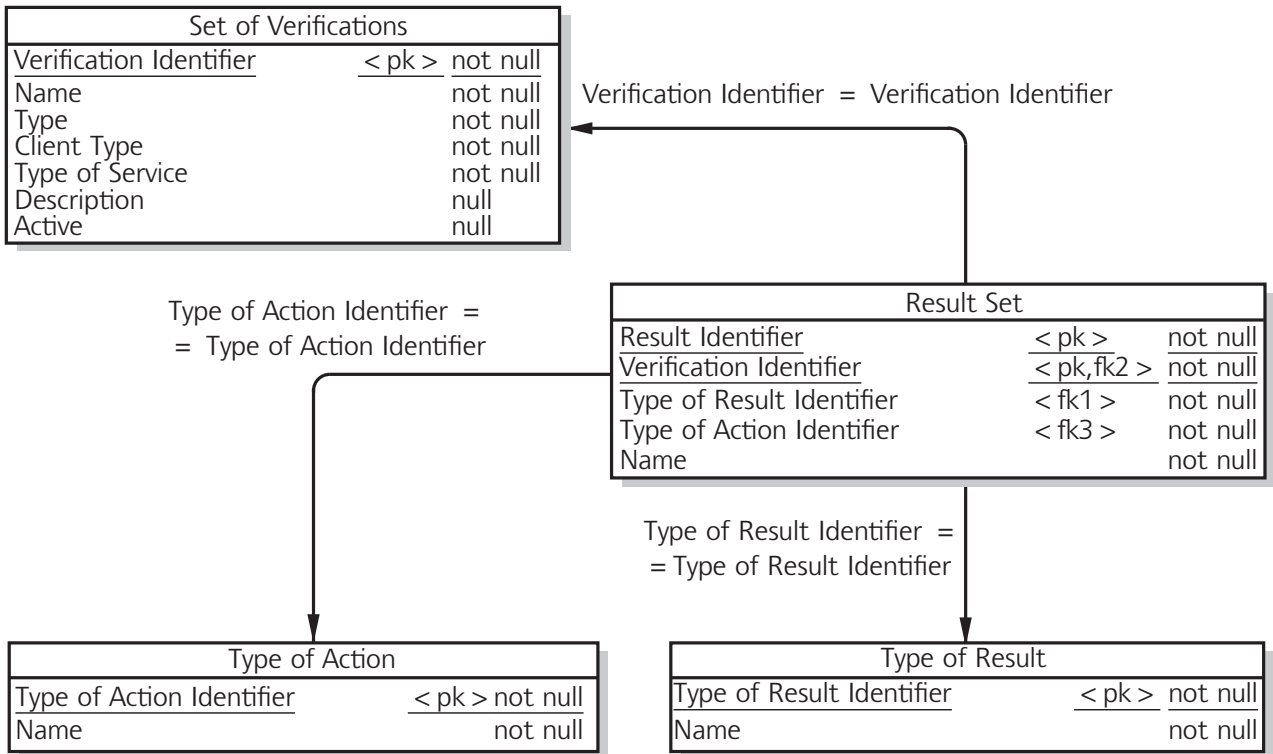


Figure 2. Nomenclature of validations – relational structure

this case the algorithmic evaluations are implemented as stored procedures in the database. This is not a random choice. In this case the logic of these calculations was taken outside the application, which made the application lighter and the system much more flexible when it comes to changing the algorithms (which happens often in terms of adapting the rules of evaluation).

“The effect that comes with that a tool to define different interpretations of entries is given to the users and at the same time the interpretation of a given algorithm can be changed with ease” is related with achieving greater flexibility of the system in relation with the change in the company’s requirements and market. A tool which can adapt the system without any revising was given to its developers. This is how the application became a “customer” for data, which comes from the execution of the verifications, and doesn’t “care” for the current realization.

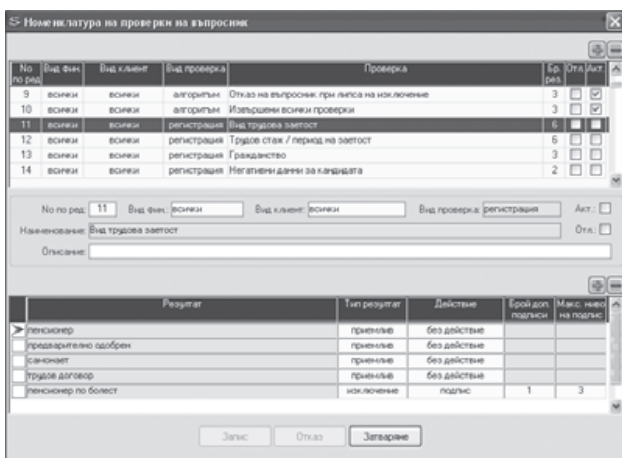


Figure 3. Nomenclature of evaluations – User Interface

The third instrument through which data driven programming was used to the limit in that realization is the maintenance of special structures with parameters that are used in the program implementation. These structures are relational tables, which most often describe boundary cases and critical values for comparison (Figure 4).

Parameters		
Parameter	< pk >	not null
Type of Service	< pk >	not null
Type of Client	< pk >	not null
Min Value		null
Max Value		null
Unit Value		null
Description		null

Figure 4. Parameters used to manage algorithms

6.3. Entering customer data

As mentioned earlier for such a system the efficiency is very important in its working process. This puts serious requirements over the suggested interface solutions. They should allow fast data filling and reliable control over the input values to prevent errors on the entry point of the system.

In designing the user interface of the specific information system as a key control for the relevance of data entering a defined template for entering data by type of client and the set of possible results for each check was used. This allowed the user not to have to enter plain text whose subsequent processing is difficult.

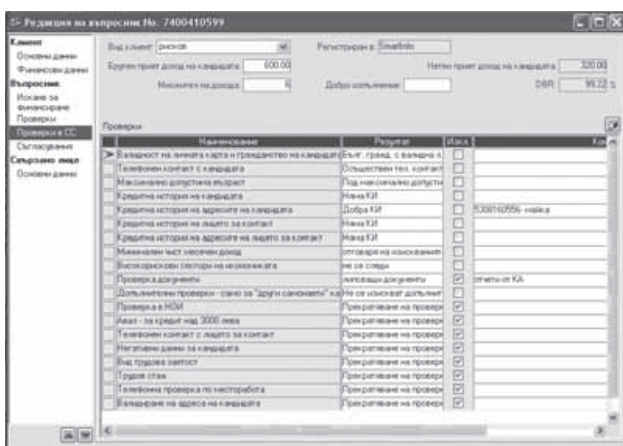


Figure 5. Registering control results – User Interface

This was a determinant factor not only for control, but also for the company efficiency, i.e. a fast form of entering data was offered, in which a competent with the subject employee can register the wanted results, without breaking the company's rules for processing for certain time. This is shown on Figure 5.

6.3. Information evaluation results

Decision making for customer solvency and for approving or discarding his request requires information which should be represented in a summary. This way the company policy is rather to increase its volume as approving more funding requests with low level of loss. Having this in mind, to the employees occupied with the last step of the process are given the collected information in a summarized form and mainly pointing the arising problems (exceptions). For each such problem is given information for the needed action which has to be performed and eventually what extra agreements are needed (which is a specific technology of working in the examined company).

In the development of this part of the user interface, the main purpose was the user

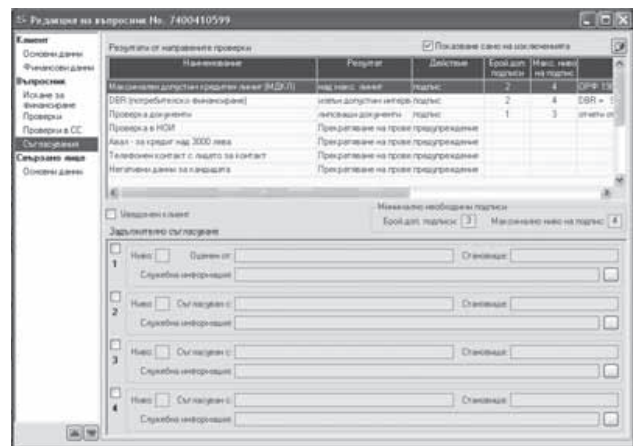


Figure 6. Information evaluation results

to have all the needed information without the system trying to take decisions. This is represented on Figure 6.

7. Conclusion

The developed system is successfully integrated. The integration results are a fact and one of the indicators for this is the significant increased number of examinations executed and almost regularly adding new customer profiles. This is a result from the flexibility of the suggested solution and from the possibility the users to receive various reports for monitoring the process.

As other arguments in favor of the successful progress of the company are the following facts:

- Significantly increased volume of the collected information for one funding request without the need of revising the system.
- Relatively decreased time for processing a customer request, because the norm wanted from the company is the same, but the entered data to be processed is significantly more. As a result from the reports made, 80% from the employees process funding requests in the defined time of and often before it.
- In a long term, an important result from the system integration is the decrease of the personal and general loss.
- Bringing in the possibility for defining different customer profiles made the procedures easier for a separate group of loyal customers, by producing more liberal template for control.

Automatization of the process of evaluating the customer solvency is a possible task. From the point of view of the theory and practice of the information systems solving

such a problem is a challenge which gives many opportunities for applying different techniques for design and technologies for realization. From the point of view of the institutions which invest in creating such systems, solving this task is a necessity, the results from which are clear and lead to significant effect for the companies.

Bibliography

1. Антонова, А., Игва Време за бързи кредити, В. „Капитал“, април 2006.
2. Велев, Д., Е. Денчев, К. Стефанова, В. Лазарова, М. Цанева, А. Мурджева, SOA – основно направление в развитието на софтуерните технологии. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007, с. 78-85.
3. Денчев, Е., К. Стефанова, М. Цанева, Д. Велев, В. Кусимов, А. Мурджева, В. Лазарова, Проблеми и решения при избор на ERP система. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007, с. 183-190.
4. Лазарова, В., Е. Денчев, Д. Велев, А. Мурджева, В. Кусимов, К. Стефанова, М. Цанева, Критерии за определяне на потребителската ефективност на информационните системи в интернет. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007, с. 223-230.
5. Мурджева, А., Разделяне на бизнес логиката в многослойни приложения. Съхра-

нените процедури като средство за реализация на бизнес логика, доклад, „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007.

6. Мурджева, А., Сходство и динамика на информационните обекти. Проектиране на единни релационни структури, студия, Научни трудове на УНСС, 1999.

7. Стойков, И., Кредит от банка или от небанкова институция?, Моите пари, 2006.

8. Мурджева, А., К. Стефанова, М. Цанева, В. Лазарова, Е. Денчев, Д. Велев, Разделяне на бизнес логиката в многослойни приложения и съвременните технологии. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината

на специалност Информатика, С., 2007, с. 231-242.

9. Стефанова, К., В. Кисимов, М. Цанева, В. Лазарова, А. Мурджева, Д. Велев, Е. Денчев, Д. Кабакчиева, Проектиране на център за компетентност по бизнес интелигентност. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007, с. 86-99.

10. Цанева, М., В. Кисимов, Е. Денчев, А. Мурджева, Д. Велев, К. Стефанова, В. Лазарова, Интегриране на бизнес приложения – основно предизвикателство към системното програмиране. Във: „Бизнес информатика“ – сборник доклади от Юбилейна международна научна конференция по повод 40-годишнината на специалност Информатика, С., 2007, с. 215-222. **ИИ**