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IMPROVEMENT OF AN INFORMATION SYSTEM IN FUNCTION OF BUSINESS QUALITY

Abstract: *This paper describes the development of an information sub-system for tracking users of the public company Parking Service Kragujevac. Processes and activities that take place in this subsystem are complex and for their conducting are responsible more organizational units. Information system model is treated with plenty of precision that could be used for preparation of programming task for software solution and its implementation. This model can serve as a basis for further development of integrated information system of the company. It can be concluded that the considered solution provides a significant contribution to improving the business quality of the company.*

Keywords: *Information System, Software, Quality*

1. INTRODUCTION

One of the unavoidable elements of any company operations is the implementation of information systems. Numerous authors emphasize the necessity and importance of proper implementation of information systems [1] - [3], which undoubtedly improves the quality of the entire business [4] - [6], highlighting [7]: "The importance of system quality, information quality and systems success has been recognized by many researchers as key ingredients in developing a competitive advantage. New scales and measures, along with continued research into organizational effectiveness and user satisfaction are needed."

Figure 1. shows relationship of many factors of Information Systems Effectiveness.

In this paper is made an attempt for improvement the information system of the public company Parking Service Kragujevac. Improvement is reflected in the formation of segment of tracking user cases which will be used as part of future integrated information system of Parking servis Kragujevac.

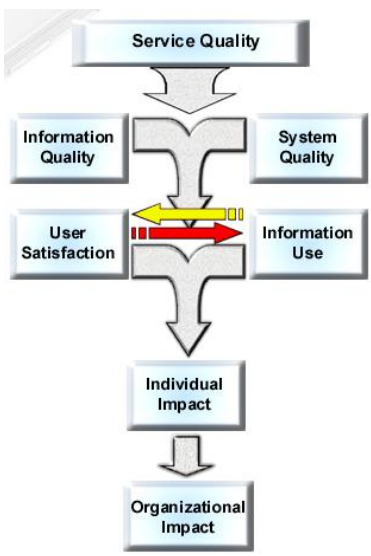

Figure 1. *Information Systems* Effectiveness [7].

Establishment of this an information subsystem is an upgrade of the existing

information system in this company.

Application model, presented in this paper, is based on the MS Access platform [8] - [10]. The reason of this platform is primarily reflected in the the size of the company and the scope of operations for which is intended.

The presented model is an integral part of the overall information system. Results of analysis of information flow, in operations of the company, allowed the generation of a database schema with the complex structure of relational model of entities [11] - [15].

This paper presents the problems of information flow in the segment of subject tracking. The automation of this segment increase the quality level of operations of the company, which is the main objective of the presented solution.

2. ANALYSIS OF INFORMATION SYSTEM

System of automatic parking payment is an information system which is based on the tracking process. Figure 2 shows the context diagram, which includes input, output documents and information, and the control mechanism.

Input consists of the following documents:

- Warning of the supplement ticket
- An order for the removal of improperly parked vehicles
- Invoice for the client

Output consists of the following documents:

- Archived case
- Different types of standard and specific reports

The mechanism consists of:

- Registrar - performing case processing and archiving
- The lawyer - who performs processing of legal documents

Controls that are the basis for carrying out activities:

- Relevant legislation in the field of procedural law
- Relevant legislation in the field of transport
- Relevant legislation in the field of administrative law
- Local government decisions (decisions and orders)
- Information about the owners of the vehicles of the traffic police (Ministry of Interior of Republic of Serbia)

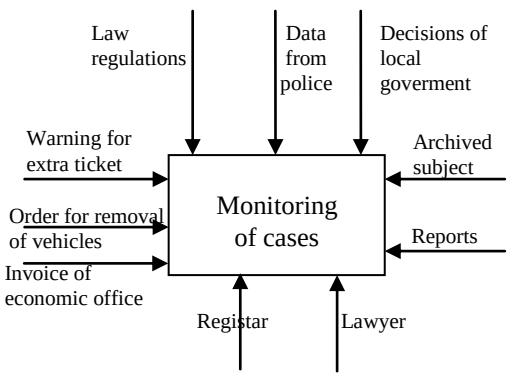

Figure 2. *The context diagram for monitoring of cases*

The final output from the process of case tracking are archived cases. The tree of overall activities is shown in Figure 3.

SMS allows users to send SMS messages with the registration number, as a content of the message. In this way a vehicle can park anywhere in the relevant areas. The system also informs the user about the completion time for parking. The controller on the field may at any time, for each vehicle, to see whether it met the requirement for use of parking space or not. At a time when the user, according to sent SMS message, receives a return message, confirming the success of collection (which only takes a few seconds) from that moment can use the parking services. Five minutes before the expiration of the paid parking space, the user is alerted about the expiration time.

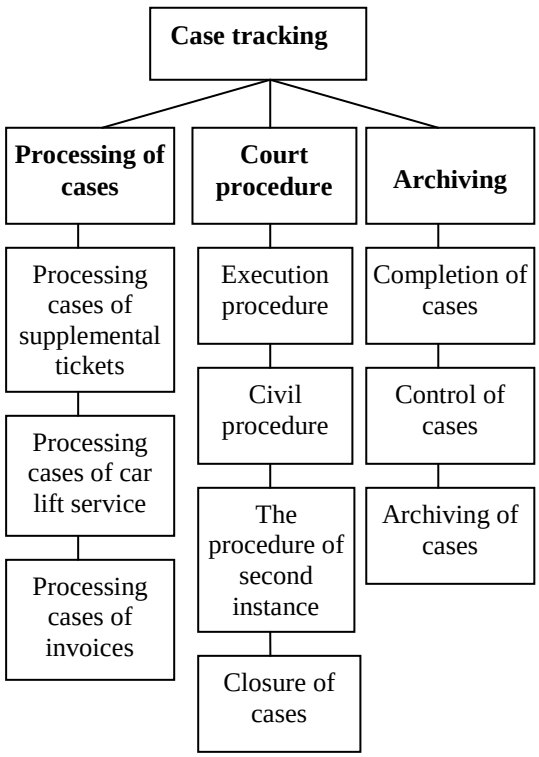

Figure 3. *The tree of activities "Case tracking"*

If the user fails in any way to pay for use of parking spaces (using the SMS system or by parking tickets), the controller issues extra ticket.

An action that precedes the formation of physical document - supplemental ticket, is the automatic generation of supplemental from in the SMS system, with sufficient information for identification of the supplemental ticket. Some of the data are generated by the system automatically and some controller must enter manually. Based on data from the SMS system, related to the supplemental ticket, controller forms a physical instance of the document, formed in three samples. A copy of the document is placed by controller to the vehicle with the purpose of informing, the other copy shall be submitted to the Department of Legal and General Affairs in the archives. The third copy has controlling character and remains in the original block, which is stored at the controller who issued the ticket.

Supplemental ticket is uniquely identified by a serial number, or in the terminology of the company: The number of supplemental ticket. Number of supplemental ticket consists of six digits with a range from 000001 to 999999. For each zone there is a range of charity cards which are issued, so we have:

- Zone 0 - range from 000 001 to 499 999
- Zone 1 – range from 500000 to 699999
- Zone 2 – range from 700000 to 999999

It is the responsibility of the inkasant on the field to issue a supplemental ticket whose number is within a certain range, depending on the zone.

If the customer fails to pay, according to supplemental ticket, within a specified time (by the decision of the Assembly of Kragujevac, that period is 21 days), automatically is created a document called the warning. It specified the elements that are already on the supplemental ticket, and new elements. In particular, it is noticed that costs are 20% of the amount of supplemental ticket, added to the basic amount of the debt or the price of supplemental ticket. On the warning is also printed form of General payment, so the user can use it for payment. The deadline for the portion of debt, according to warning, is 8 (eight) days from the date printed on the notice and specified in the text of the notice. The warning shall be printed in duplicate. Unique identification of warnings is by the number of supplemental card, or by account number, identified by the supplemental ticket. The warning also receives an internal number, with controlling character.

If the user does not pay the required fee in time, two alternative procedures are carried on. If the user (or the registration

number which is in charge) has a case (ie, there are previous offenses under the registration label) a copy of the warning is physically connected to the existing case (hereinafter referred as a case). If there are no previous violations by that registration number, it is formed a new physical item. It contains all the documents (supplemental tickets, warning and other documents) that are essential for understanding the overall picture of the case. This picture is required for the subsequent process of prosecuting. The case is formed according to the registration mark, which means that a case refers to only one registration number. Cases are referred by the combined code, and in the terminology of the company, by a number. Format is as follows:

BN / Y - V

where:

BN – basic number. This is the number which specifies sequence of some initial value (usually 00001) and onwards up to a maximum value of the 99999. The main number for each year sets of the beginning.

Y – the calendar year in which the case is formed. Length of two characters, formed by the last two digits of the calendar year.

V – version of the case. If the registration number, which form a case has no previous cases, made out to that registration number, and by the same owner, the case gets version 01. If there are previous cases for that registration number, and by same owner, and while these previous cases are sued or archived, newly formed case gets version 02. If, for a given registration number, there are previous cases, with a link to the previous owner, and now to another owner with the vehicle of the same registration number, it is forming a case with version 01 (case also gets a new base number and year).

One registration number can have multiple cases, because a vehicle for the considered period may have multiple owners. An owner can be prosecuted by a period, but if afterwards again fouls, can get a supplemental card, and thus the warning. This form a new subject by the same registration number. It will deal with the same base number and the year, but will have a version number of one greater than the last.

The case is archived after the completion of the process of prosecuting, because the conditions are fulfilled - that all the warnings are paid or canceled. The case is formed only when the subject is formed first. The condition for the existence of a case is the existence of at least one warning for a given registration number.

There are also cases formed on the basis of an order for removal of illegally parked vehicles - items of "Lift-car" service. There are also cases, formed in case of default debtor's obligations of Parking service - invoicing cases. For all three types of cases marking system is the same, except that the content of these documents is different.

Cases of 'Lift-car' services are labeled as cases for supplemental ticket. These type of cases also has information of the vehicle owner.

Invoicing cases do not have registration number, as a holder, but they have the same user as a person. Required information is a unique identification number for physical persons or registration number for legal persons. It is necessary, for harmonization between these two types, to establish an internal code, by which would be uniquely identified individuals.

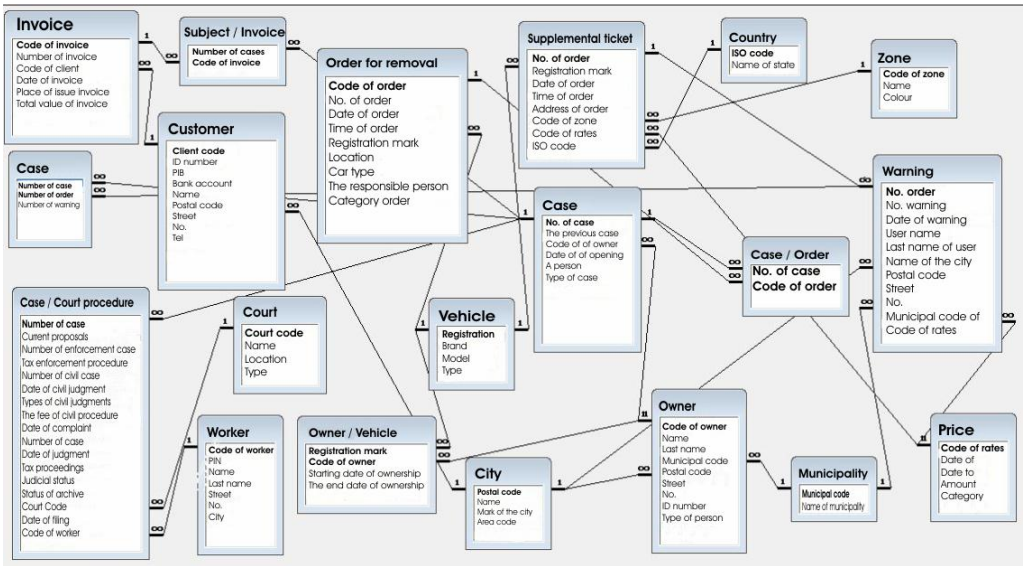

Figure 4. Database relational model

From the above, there are three types of cases:

- Cases of suplemental tickets - a warning
- Cases of 'Lift-car' services
- Cases of invoices

The process of forming cases is completed by this, and continues the process of prosecuting, according to the case. The beginning of the process of prosecuting is formation of the document for execution. By it will be submitted cause for complaint, as well as any evidence upon which the proceedings were instituted. Court within seven days should give a decision, confirming or rejecting states in the proposal. If the respondent initiated a complaint before the court, the procedure is renamed in the litigation. Upon completion of civil procedure the court issues decision. By it, a statement of either party is accepted or rejected. If the accused is guilty, it is ordered him to pay the required amount. Upon payment of the requested amount, it is archived item that was the basis for initiation of litigation.

3. THE COMPUTER SUPPORT

Development of an application is performed based on previously generated database schema, Figure 4. This activity is implemented through the following phases:

- Defining queries on the database
- Defining the appearance of forms
- Defining reports
- Development of VBA modules for complex tasks

Since the application performs in a small business organization, MS Access is a satisfactory platform, where would be particularly highlighted following characteristics:

- Simplicity of use and implementation
- Ability to establish and manage a database appropriate to the volume of business
- The availability and affordability of user and IT personal.
- The ability to connect a database with other tools, MS Office

package, which enables analysis of the results obtained in them.
- Many features of this tool in a simple way allow implementation of a system upgrade.

For each table are designed forms for input of basic data:

- Price - the codebook of prices
- Supplemental ticket - records of suplemental tickets
- State - the codebook of states
- Invoice - records of invoices
- City - the codebook of cities
- Customer - the codebook of clients
- An order for removal - records of orders for the removal of improperly parked vehicles
- The warning - a warning records
- Municipalities - the codebook of municipalities
- The subject - records of subjects
- Invoices by subject – records of invoices which are part of a case
- Orders for removal per case - records of orders for removal according to a case
- The warning- per case - records of warnings according to a case
- The accused cases - records of defendants
- Court - the codebook of courts
- Employee - the codebook of employees
- Owner - records of owners
- Vehicle - records of vehicles
- Zone - the codebook of zones
- Period of ownership - Records of time during which owner of a vehicle owned the same vehicle

Figures 5 - 7 shows some of the forms for input data into the developed application solution.

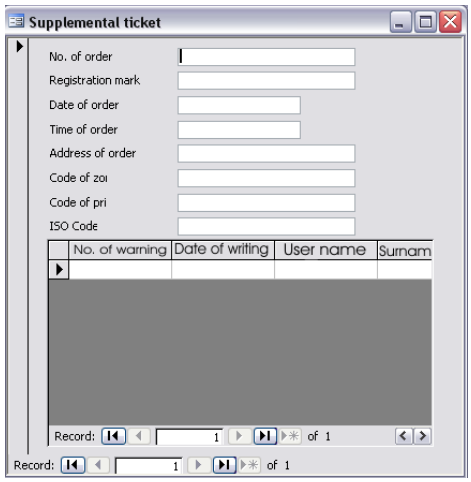

Figure 5. *Form Supplemental ticket*

Based on issued, or created warnings according to suplemental tickets, then order for removal of improperly parked vehicles, and invoices which owed funds, it is formed the subject, or the existing subject complements by documentation. The case contains, besides these basic input documents, also of the additional documents. They specify the facts necessary for their successful monitoring (the owner, the vehicle, restrictions, etc..). A worker on archiving forms a case. Output from this process is formed or processed item that is input to the next process. Also, output are reports which arhivar periodically forms and forwards to management.

Such formed or processed subject becomes a candidate for Court procedure and input into the process of prosecuting. A lawyer has an obligation, based on legislation and information from the police, to take action of prosecuting against a known person. Output from this process is the subject of which was completed the process of charges. Also the output is information of the status of that case, which is given in written form, as well as reports of status of individual cases.

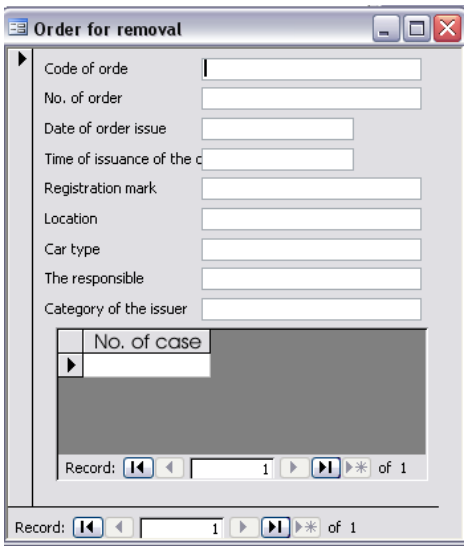

Figure 6. *Form Order for removal*

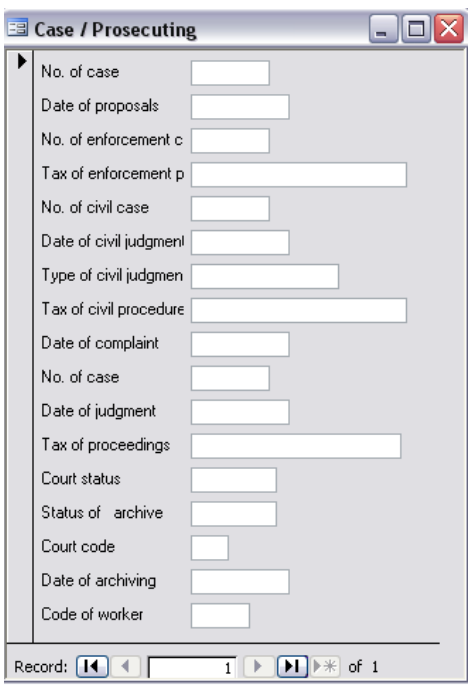

Figure 7. *Form Case/Prosecuting*

Archiving is the last process. The entrance to this process is the subject of information on the status of the case. Archivist is responsible to perform the necessary operations that subject as a whole concludes, on the the basis of the status of the case. It is extracting summary information, and physically store in the archive, ie. puts by the legal term "ad acta."

4. CONCLUSION

This paper presents the analysis of key elements of the promotion of information subsystem Case tracking. Discussed steps of improvement represent a good initial framework for further development and system upgrade. This information system is only a part of an integrated enterprise information system of Parking Service, which shall be developed in stages in future. The presented information system is a good starting point for understanding the current and future needs for information, not only in terms of this information system, but also at the enterprise level.

The goal of the implementation of this information system is improving the quality of operations to a higher level. Automation of operations enables quick response to all activities and demands. The introduction and improvement of information system undoubtedly represents the necessity of business. It can be concluded that the considered solution provides a significant contribution to improving the quality of business of the specified company.

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