CRM System as a Necessary Tool for Managing Commercial and Production Processes

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Abstract **– The implementation of specialized software in the business supports the processes related to production and employees' activities, and those providing quick access to the necessary information between branches. The need for better business management and closer interaction with customers via the internet underpins the modern CRM systems development. Detailed research of existing CRM systems has established the necessity to design and implement a modern system specialized for the needs of agricultural machinery users in Bulgaria. The report presents a CRM system developed to facilitate information exchange, rapid customer service, synchronization of activities in order to increase agricultural machinery sales with better marketing.**

Keywords **– CRM, e-management, information systems, databases, CRM modules.**

1. Introduction

In recent years, the internet environment has had a huge impact on businesses in terms of interacting with customers and maintaining loyal relationships with them [1]. With the development of computer and mobile technologies, business management has improved significantly. Nowadays, devices prove to be among the most effective tools for communication between people, especially during the Covid-19.

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Modern users prefer that information can be accessible from anywhere – offices, cars and restaurants as well as from any device – desktops, laptops and smartphones. Modern information systems must also meet these user requirements [2].

Paper records are gradually being replaced by electronic resources, which significantly improves the speed of searching for the required information and more optimal systematization during retrieval of such information when needed from all kinds of devices – computer and mobile.

Until 7-8 years ago, most companies did not have uniform standards for information exchange on the internet. Information was shared via email, social networks, communication apps and file servers. Each company's data was stored in different file formats, on different media and in different locations in folders or as email attachments. Information security and protection was not at the required level. This was not an effective way to manage information. Information management means handling a large amount of electronic and paper documents directly related to business processes on a daily basis. Such functionality enables convenience and mobility for users, while on the other hand posing a potential security risk. The danger lies in the fact that unregistered devices can access information from the internet [2]. Figure 1. illustrates an implementation of information management system, providing optimization at different managerial levels.

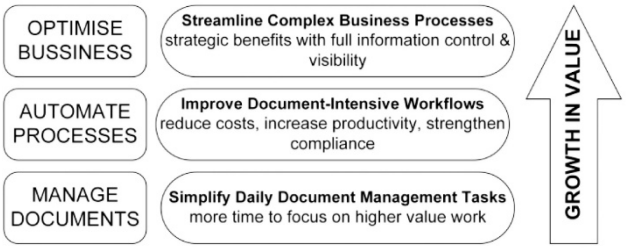

Figure 1. Levels of information management and optimization [2]

Competitiveness in the market and achieving high sales results are among the top priorities for companies. Building innovative and advanced software systems could help companies gain competitive advantages.

In this regard, the leading industries and fields of IT are coming together to improve company operations, marketing management and the relationships between customers - businesses.

The need for a dynamically continuous process of searching and developing new products or services continuous and dynamic process is of utmost importance for companies to maintain a competitive advantage over their rivals. For a company to be competitive and establish itself in the market, it is necessary to form sustainable and long-lasting relationships between customers and companies. The main task of companies is to attract new and retain existing customers, which is essential for greater success in business. In this regard, software companies are developing innovative desktop and mobile customer relationship with management systems called Mobile Customer Relationship Management, M-CRM. More and more companies are implementing Customer Relationship Management (CRM) systems to improve their management and create better quality and long-lasting customer relationships [1].

The last 4-5 years have seen increased use of websites and applications, both static and dynamic, including CRM systems implemented with modern programming and web technologies unlike two decades ago. According Varbanov and Filipov, common practice nowadays is to have systems that are able to support multiple users at the same time. High traffic systems usually rely on fast load, a good look and feel for the end clients [3].

Customer Relationship Management Systems are commonly used mostly in organizations and enterprises and are seen as application software whose main purpose is to facilitate the organization and management of relationships with current and prospective customers. CRMs also find successful application in non-profit scientific organizations such as universities and other higher education institutions, thus contributing to a higher competitiveness associated with scientific publications and research experience of faculty and scholars [4].

The topic of the present paper is related to the development of a web-based CRM system that would facilitate a company in performing specific tasks. Recent years have witnessed the development of businesses related to agriculture and particularly farming, which is indication of closer relations between producers and traders. Thus, the implementation of a CRM program/system in agriculture and especially in farming should help in strengthening the relationships between customers, technology and processes.

The important customer-oriented processes are “face-to-face with the customer”, cross-functional CRM processes, macro-level processes and management processes. In CRM, the governance process is of particular importance. It links to market data and contributes in improved interaction with customers by promoting a good buyer-seller relationship aimed at exchanging products and services for cash or data [5].

Knowing customers' needs and preferences is key to good customer relationship management, customer service and customer retention in the future. CRM systems help organizations interact with customers by creating a database of their profiles and specific needs. Their implementation is an indicator of increased success in sales and customer service as well as information exchange among employees.

Last but not the least, the economic crisis caused by Covid-19 has impacted various industries and production areas worldwide, which has inevitably affected trade, particularly demand, supply and deployment of various goods and services. During the pandemic, the internet was used as the main medium and means of communication. This only indicates the need for rapid development and implementation of CRM systems to help businesses [6].

For a better presentation of the process of building the developed CRM system and its capabilities, a scientific approach has been applied and the paper is organized into the following structure. In the second section, current publications on e-management and integration of CRM systems in business are studied in detail. Section 3 presents the design process of a specialized CRM system for agricultural machinery. The following section 4 is focused on the main functionalities included in the designed and developed web-based CRM system. Section 5 presents the details of the database structure and some of the programming code. The next section describes the usability and application of the presented CRM. Conclusions are drawn in section 7.

2. Related work

In today's market economy, information management of enterprises as well as customer information are important for their survival. It is a well-known fact that customer needs are rapidly changing and becoming more diverse. In this regard, it is necessary for companies to have a good customer and product data management system in order to ensure their faster establishment and longer life on the market [6]. Competition and customer acquisition are the most important in business.

Managers must have their own strategies and advantages to make a company's business successful. Customers usually do market research on products and compare their prices before making the final purchase decision.

The implementation of CRM systems in various industries in recent years has greatly facilitated the operation of modern businesses. CRMs help to stimulate purchases and are now contributing to increased e-commerce sales as well as reduced costs for businesses.

Companies need computer processing of large volumes of customer data, for transactions in the purchase of goods and archiving. In this regard, companies usually use Electronic Customer Relationship Management Systems to facilitate their workflow and optimize the handling of information in the database. Electronic Customer Relationship Management systems, E-CRM, include techniques and mechanisms for online service, business operations, data collection and management using web application sites or e-mail [7].

Each company conducts specific activities and needs a system which has been developed to suit its needs and, where possible, be oriented to the internet environment. Numerous electronic systems of this type exist.

The use of e-commerce in agriculture is associated with the purchase and/or sale of agricultural products, machinery or services. This is important in expanding the market for agricultural businesses and farms, particularly for rural people. In Fig. 2. a Use Case Diagram of the main participants is presented – Buyer and System Administrator with their respective activities available in the Buying Module is presented [8].

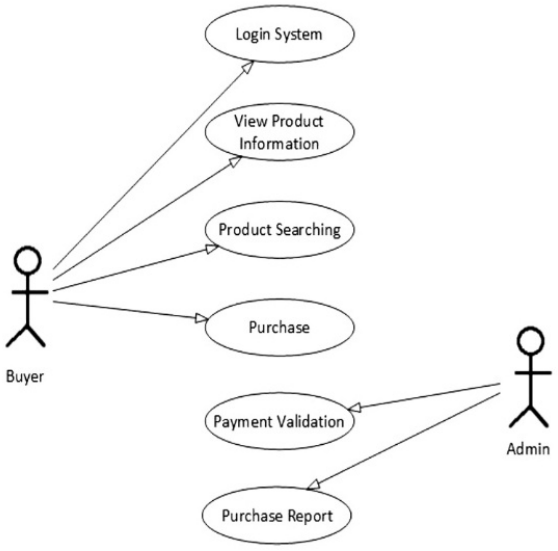

Figure 2. Buying Module – Use Case Diagram [8].

From the farmer's perspective, e-commerce is the activity of selling and buying agricultural products via the internet, including the use of a mobile device [9]. There are two main modules for e-commerce in agriculture, the Buying Module and the Selling Module.

As a result of the use of e-commerce in agriculture, economic development in the agricultural sector is increased, information flow is accelerated and the process of industrialization in agriculture is promoted [8], [10].

Popular methods that are applied in e-commerce of agriculture are Business to Business (B2B), Farmer to Customer (F2C), Farmer to Association to Business (F2A2B), Online to Offline (O2O), Business to Business to Customer (B2B2C) [10].

In the course of the conducted research and analysis, some more well-known web-based and desktop CRM applications have been considered so that they can be analysed and compared according to different criteria [11], [12], [13], [14].

Some disadvantages of these systems can be mentioned: unintuitive options, a large size of the systems, a long time to load an operation, bugs found in the system, insufficient speed, messy menus, lack of a search engine, etc. Such negative elements were avoided when developing and publishing the web-based CRM module described in the report.

The system described in the report has been developed in accordance with the research done on applicable and popular CRM systems.

A number of discussions and interviews with potential clients were conducted in the planning of key functionalities of the CRM system. In the conducted interviews, the most commented option was 'reconfiguring of resources', namely 'processes' related to customer service, improvement of organizational abilities, adaptation and adjustment of companies to CRM software with the purpose of enhancing organizational abilities and social networking capacity [15].

As a result of the interviews, key activities related to resource configuration (Fig. 3.), social networking relationships and customer market orientation were identified as a basis for good practices and the introduction of modern ways of managing businesses.

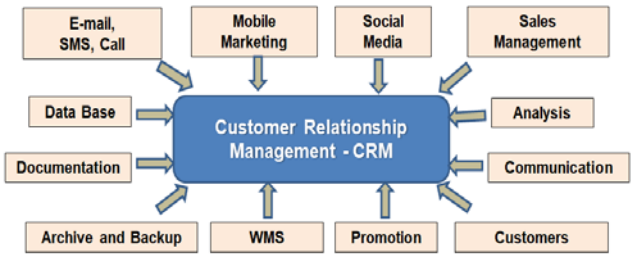

Figure 3. Schema of CRM system

According to Matraeva et al. (2022), [16] small enterprises have been forced to rapidly achieve a new level of digital maturity – through special awareness into the ineffectiveness of existing business process management models and the formation of a corporate knowledge system. At the next pandemic driven stage, small businesses needed a functionality that was uncommon to them – reporting on business process performance considering visualization [16].

The reconfiguration of resources should be done company-wide, across the different departments and with all employees that should work together as a team.

The integration of a CRM system would lead to better organization for a company, if employees engage in new ways of working, including electronically. By implementing a CRM, companies can automate organizational procedures and employees can have time to focus on more creative activities. This will allow companies to be more innovative in offering new products and to be better oriented in the market.

The role of managers is particularly important in improving the level of trust in employees. It is a fact that when a new software resource or technology is introduced, employees initially find it difficult to adapt and work with it. The management aims to stimulate employees in adopting new business models and encourage them to use the software. That is, the role of management is crucial in holding meetings and discussions with employees. For a successful advantage in the market, companies need to rely on good practices in training their employees for faster and easier digitization and digital transformation of data [17].

Businesses collect, store, access and analyse big data to make better choices about customers, suppliers, employees, logistics and infrastructure. To do this, they use technology called Business Intelligence. Business Intelligence (BI) is seen as a technology and method of managing data to improve the process of making better decisions. Complementing business intelligence and customer relationship management will improve the efficiency of organizations and hence increase productivity and revenue [18].

3. Design of CRM system for agricultural machinery

Customer relationship management systems are designed to organize access to basic information related to a company's core activities – planning, research, sales, support, human resource management, and more. There are two main types of CRM systems according to their purpose – specialized, prepared for the needs of a specific field and customers, and general purpose.

In the first case, the system is designed for the needs of a particular company – the process starts with a preliminary study of the client's needs. A complete project is prepared covering all the company's activities. The future CRM contains only the necessary modules and settings. Various professionals – marketing analysts, salespeople and programmers are involved in the design, creation and implementation process by the contractor.

In the second case, the CRM system is universal and contains many modules that could be implemented for customers from different areas of the economy. One characteristic of this type of systems is that there is no concrete specification.

Unlike the free ones, a precise and specific-to-the-company needs system is developed here – without any unnecessary modules and settings. A study of the customer's needs is carried out and a whole project is prepared. The complete product is provided to the company or firm and installation, setup and full implementation that follow.

Each CRM system is built and designed for a specific company and contains the basic modules such as customer data, market characteristics, human resources, financial reports, sales – orders, production process tracking.

This paper presents the construction of a web-based CRM system that facilitates a company in performing specific tasks. One of the main objectives related to improving the coordination between different units and employees in an electronic environment is achieved, which leads to the faster input, processing and generation of information for agricultural machinery dealers and users.

It is common knowledge that every agricultural enterprise requires effective human resource management and planning in order to retain its employees or recruit new ones. Modern agricultural machinery is seen as an important factor in increasing sustainability, efficiency and competitiveness in agriculture. Agricultural machinery is one of the important factors for productivity in agriculture. Popular agricultural products derived from crop cultivation such as grains, food, fuel, fibers are marketed to meet the needs of consumers [19].

Leading specialists such as economists, marketing intermediaries, salespeople and programmers are involved in the CRM building process. The preliminary design based on a scheme of the main activities of the specific company is of particular importance.

Different options are planned for notifying system users of approaching task deadlines, including sending an automatic email the day before the deadline or a reminder via Google calendar integration.

The CRM system was created for a consulting agency of European projects. Research has been done for a specific project – businesspeople, market, users. They also have a telemarketing company with employees who have to record everything for every call in the CRM system.

According to Zhecheva and Nenkov, there is always room for improvement, from a better analysis of office locations for telecom companies to a more accurate analysis of property price trends for real estate agencies or from better guarantee analyses for product manufacturers to analysis of current topics for television producers. Their research points out that with the power of text analytics, it can be possible for businesses to succeed in this field [20].

Both small and large agricultural companies could use the developed CRM system. As a potential improvement of the developed CRM and the possibility of better business for the companies, the use of the concept related to smart industry, i.e. digitally based industry is recommended. It could be extremely important for the technological development of firms, especially small ones. When companies want to implement a smart industry, they need an IT implementation strategy and justifiable investment.

Here comes the conclusion that inclusion of an appropriate digital ecosystem depending on the size and scope of the business organization is essential for both of it and the partner network in their mutual efforts to create added value in the economy as the digital ecosystem is gradually replacing the supply chain mode [21].

For this purpose, analysis and design methods including input and output phase could be used. The input phase consists of internal business analysis, external business, internal and external IT. The output phase includes the design of IT management strategies, business information systems and IT strategies [22].

4. Functionalities of CRM system for agricultural machinery

The following functionalities are included in the designed and developed web-based CRM system:

- Storage and modification of customer information in the system;
- Storage of contacts for specific customers;
- Storage of person’s contact for specific customer;
- Storage of information about the customer's cultivated crops;
- Storage, editing, comments of tasks or activity for a client;
- Adding and editing of various nomenclature tables;
- Information about forthcoming, expired and completed jobs of system users;
- Ability to inventory all data of the organization using the system;
- Functionality developed for administrators called human resources where employee accounts are managed.

The Agricultural module presented in the report is a small part of the overall CRM system developed. It covers the following functionalities, grouped into categories, which are described in detail below.

4.1. Introduction of a Customer Relationship Management System

Minimal scope and functionalities:

- Manage customer, partner and supplier information;
- Manage channels of interaction with customers, partners and suppliers;
- Management of enterprise marketing activities (segmentation and generation of new leads);
- Manage after sales service (warranty service), customer reference gathering and complaints of management;
- Analytical module – analysis of consumer behaviour
- and accounting system, ED system and other available systems).

4.2. Introduction of a Resource Management System

Minimal scope and functionalities:

- Management of the financial accounting activities of the enterprise;
- Supply chain management;
- Manufacturing process management;
- Sales management;
- Warehouse management;
- Logistics process management;
- The system supports multiple user roles and multiple different users.

4.3. Introduction of the Point-of-Sale-System Module

Minimal scope and functionalities:

- Integration capacity for other enterprise systems;
- Hardware elements included in the minimum scope are:
  - Dedicated POST terminal integrated with inventory management program, fiscal device and bar code reader.
  - Self-service terminal, electronic labelling system.
  - System for automated fiscalization of e-store sales.

4.4. Implementation of a Business Intelligence System

Minimal scope and functionalities:

- Management of the financial accounting activities of data acquisition, extraction and processing functionality;
- Sales analysis;
- Customer, supplier and partner behavior analysis;
- Financial performance analysis;
- Functionality to perform data benchmarking;
- Ability to integrate with other systems in the enterprise (finance /accounting /ERP system /other systems available, if applicable).

4.5. Development of an information storage and exchange management system

Minimal scope and functionalities:

- Centralized management of employees' access to information and its exchange;
- Centralized management of access to information, integration with other systems in the organization structure;
- Availability of a log of user actions (audit log);
- Hardware elements included in the minimum scope:
  - Virtual server for information and data storage and management
  - Physical server for information and data storage and management.

4.6. Implementation of the Warehouse Management System (WMS) Module

Minimal scope and functionalities:

- Inventory management (stocks of material resources, work in progress and finished products);
- Management of reception and dispatch processes for goods, raw materials and supplies;
- Management of warehouse space and logistics areas;
- Functionality to generate reports and analyses for the purposes of planning and management of warehouse activities;
- Ability to integrate with other enterprise systems (financial accounting, ERP, etc.).

4.7. Introduction of Management Module for Production

Minimal scope and functionalities:

- Production process management;
- Product lifecycle management;
- Functionality to generate reports and analyses of manufacturing activity;
- Ability to integrate with other systems.

4.8. Development of an Information Archiving System

Minimal scope and functionalities:

- Analysis and preparation of a plan for archiving the information processed by the enterprise;
- Automatic backup of information from servers/workstations/mobile devices according to the prepared plan;
- Built-in protection against ransomware attacks;
- Ability to integrate with centralized access control (if available);
- Develop procedures for recovering from a backup and conduct a minimum of one test restore;
- Hardware elements included in the minimum scope:
  - Virtual server for storing information or
  - Physical storage server.

4.9. Creating an Online Store

Minimal scope and functionalities:

- A content and product management system that allows the organization to independently make changes;
- Availability of functionality for product filters;
- Availability of functionality for related products;
- Compliance with InfoSec requirements and performed SQL injection check;
- Ability to be multilingual;
- Chat/bot and chat system to communicate with customers;
- Registered own domain;
- Basic SEO built;
- Responsive design;
- Integrated electronic payment system.

5. Database design and structuring

As the number of customers using the services provided by companies and enterprises increases, so does the volume of information that employees must process. Consequently, the databases of any company contain large amounts of data that are confidential and need to be protected by certain security measures. To this purpose, companies use web-based CRM systems to analyze, automate and classify customer information at any time, i.e. 24/7/365 days [23].

The Database First approach was used to design and structure the database we presented. It provides an alternative to the *Code First* and *Model First* approaches to the object data model. With the Database First approach, model codes (classes, properties, DbContext) are created from the project database and these classes become the link between the database and the controller.

Figure 4. shows part of the Farming Module database schema, including the relational links of the tables containing detailed customer information – customer number, customer name, accounts, relationships and contacts, bank accounts, products, etc. The tables are designed with SQL.

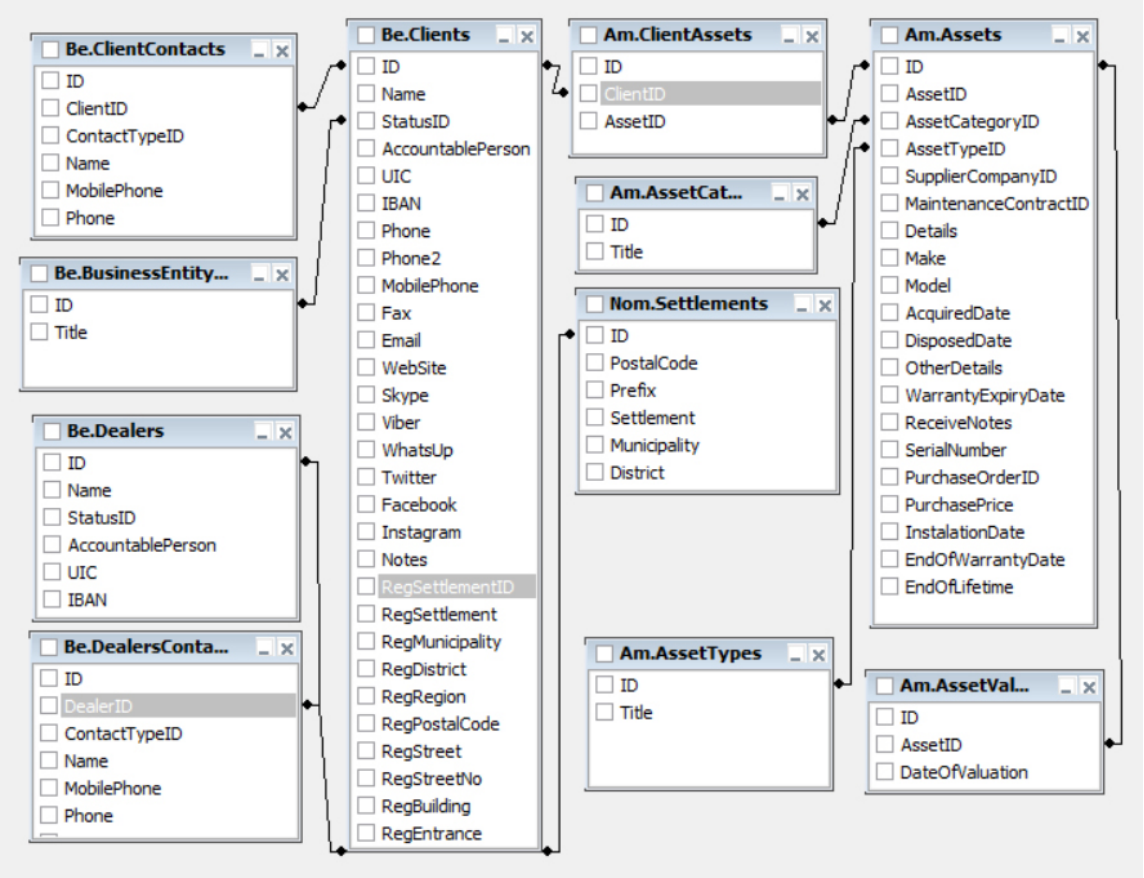

Figure 4. Relational schema of part of the Agricultural Module database

Figure 5. shows the query code whose result is the union of the matching records with several tables presented in the above figure.

The result of the query execution is the design of new, more optimal tables containing customer information.

```
SELECT *
FROM
  Be.Clients
  INNER JOIN Be.ClientContacts ON (Be.Clients.ID = Be.ClientContacts.ClientID)
  INNER JOIN Be.BusinessEntityStatuses ON (Be.Clients.StatusID = Be.BusinessEntityStatuses.ID)
  INNER JOIN Am.ClientAssets ON (Am.ClientAssets.ClientID = Be.Clients.ID)
  INNER JOIN Nom.Settlements ON (Be.Clients.CorSettlementID = Nom.Settlements.ID)
  AND (Be.Clients.WorkSettlementID = Nom.Settlements.ID)
  INNER JOIN Be.DealersContacts ON (Be.DealersContacts.DealerID = Be.Clients.DealerID)
  INNER JOIN Am.Assets ON (Am.Assets.ID = Am.ClientAssets.AssetID)
  INNER JOIN Am.AssetTypes ON (Am.Assets.AssetTypeID = Am.AssetTypes.ID)
  INNER JOIN Am.AssetCategories ON (Am.Assets.AssetCategoryID = Am.AssetCategories.ID)
  INNER JOIN Am.AssetValuations ON (Am.Assets.ID = Am.AssetValuations.AssetID)
  INNER JOIN Be.Dealers ON (Be.Dealers.ID = Be.DealersContacts.DealerID)
```

Figure 5. SQL query in the Agricultural Module database

After creating the database tables, it is necessary to update the model by executing a script in the console of the development environment (Visual Studio 2019).

For the database itself, an example is given for two of the main tables, 'Activities' and 'Clients':

- Table 'Activities' – this table stores all activities as well as their comments (Fig. 6.).

Field Name	Data Type	Not Null	Unique	Identity	Default Value	Description
ID	int	☑	☑	☑		
ActivityID	int	☐	☐	☐		
ClientID	int	☐	☐	☐		
PostActivityHeaderID	int	☐	☐	☐		
CreatedBy	int	☐	☐	☐		
DealerID	int	☐	☐	☐		
Description	nvarchar(max)	☐	☐	☐		
CreatedDateTime	datetime	☐	☐	☐		
TaskCompletement	bit	☐	☐	☐	0	
PostActionID	int	☐	☐	☐		
CompletionDate	datetime	☐	☐	☐		
EmployeePositionID	int	☐	☐	☐		

Figure 6. Table 'Activities'

- Table 'Clients' (Fig. 7.) – it stores basic information about each client. The Clients' table interface is presented in Figure 8.

PartialView ClientActivities are used to load customer activities, the code part of which is presented in Figure 9.

Field Name	Data Type	Not Null	Unique	Identity	Default Value	Description
ID	int	☑	☑	☑		
Name	varchar(200)	☑	☐	☐		
StatusID	int	☐	☐	☐	1	
AccountablePerson	varchar(100)	☐	☐	☐		
UIC	varchar(14)	☐	☐	☐		
IBAN	varchar(14)	☐	☐	☐		
Phone	varchar(14)	☐	☐	☐		
Phone2	varchar(14)	☐	☐	☐		
MobilePhone	varchar(14)	☐	☐	☐		
Fax	varchar(14)	☐	☐	☐		
Email	varchar(100)	☐	☐	☐		
WebSite	varchar(100)	☐	☐	☐		
Skype	nvarchar(40)	☐	☐	☐		
Viber	nvarchar(40)	☐	☐	☐		
WhatsUp	nvarchar(30)	☐	☐	☐		
Twitter	nvarchar(100)	☐	☐	☐		
Facebook	nvarchar(100)	☐	☐	☐		
Instagram	nvarchar(100)	☐	☐	☐		
Notes	varchar(200)	☐	☐	☐		
RegSettlementID	int	☐	☐	☐		
RegSettlement	nvarchar(70)	☐	☐	☐		
RegMunicipality	nvarchar(70)	☐	☐	☐		
RegDistrict	nvarchar(70)	☐	☐	☐		
RegRegion	nvarchar(70)	☐	☐	☐		
RegPostalCode	nvarchar(6)	☐	☐	☐		
RegStreet	nvarchar(120)	☐	☐	☐		

Figure 7. Table 'Clients'.

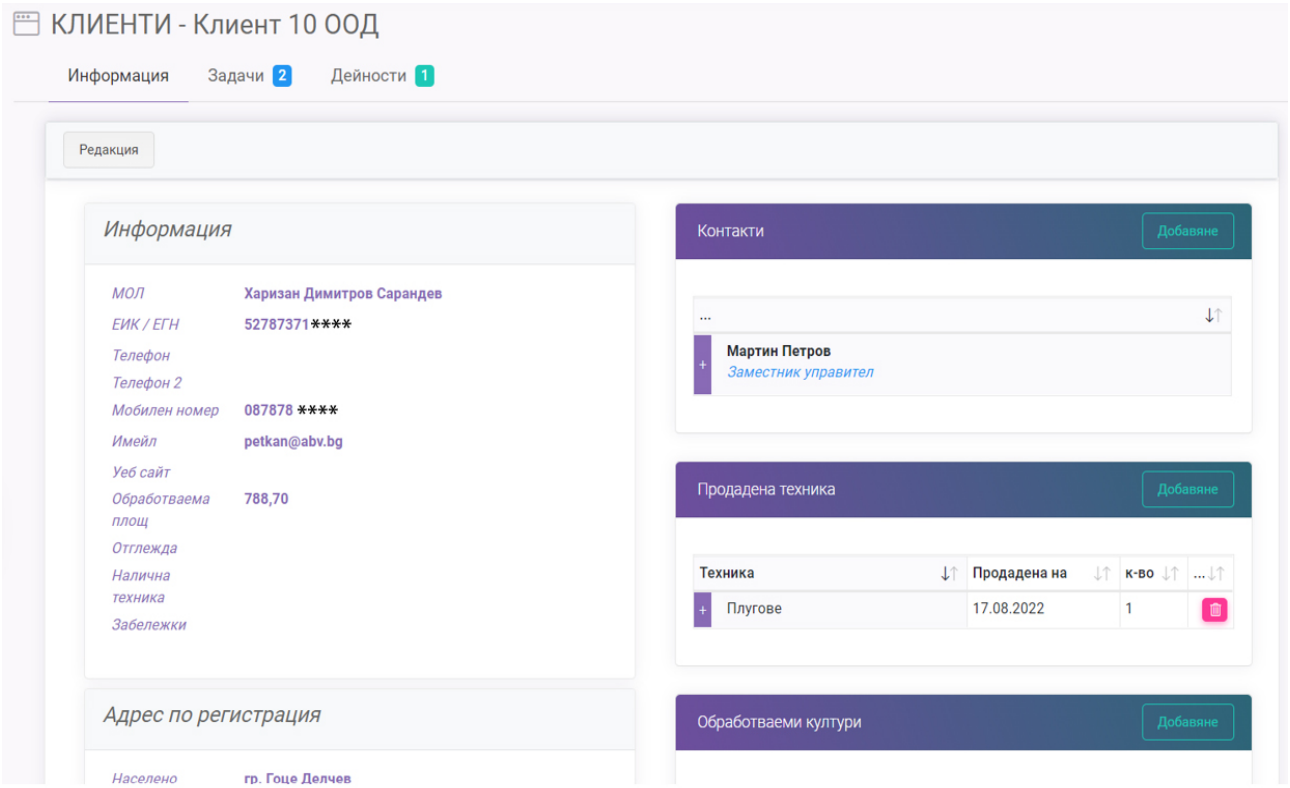

Figure 8. Detailed customer information.

```
[HttpPost]
public async Task<JsonResult> CreateClientActivity([FromBody] Activities activities)
{
    activities.CreatedDateTime = DateTime.Now;
    db.Add(activities);
    await db.SaveChangesAsync();
    return Json(new { success = true, responseText = "Activity successfully saved!" });
}
```

Figure 9. SQL code for customer's activities.

A list of crops and machinery is shown in Figure 10.

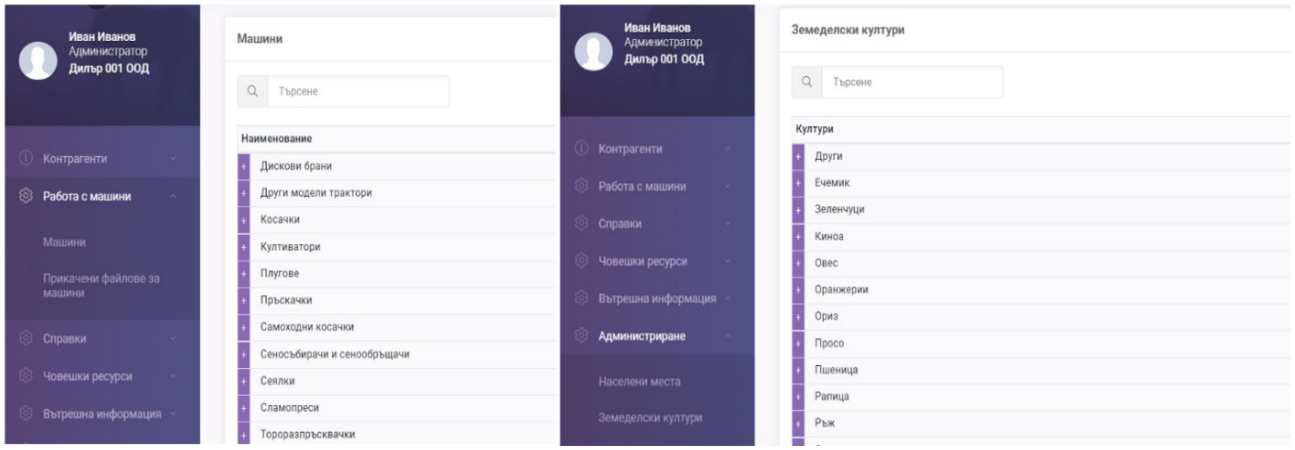

Figure 10. List of agricultural crops and machinery.

To create a new crop, the following method is used and is described by the following code in Figure 11.

```
[HttpPost]
    public async Task<JsonResult> UpdateAgricultures([FromBody] Agriculture agriculture)
    {
        if (!ModelState.IsValid)
        {
            return Json(new { success = false, responseText = "Model is not valid!" });
        }
        Agriculture data = db.Agriculture.Where(m => m.Id == agriculture.Id).FirstOrDefault();
        if (data != null)
        {
            data.Title = agriculture.Title;
            db.Update(data);
            await db.SaveChangesAsync();
        }
        return Json(new { success = true, responseText = "Task successfully saved!" });
    }
```

Figure 11. A method of creating a new agricultural crop.

The method *getAgriculturesForEdit* is used in *AgriculturesController* to populate the data in the modal form (Fig. 12.).

```
public IActionResult LoadAgricultures()
        {
            var draw = HttpContext.Request.Form["draw"].FirstOrDefault();
            var start = Request.Form["start"].FirstOrDefault();
            var length = Request.Form["length"].FirstOrDefault();
            var sortColumn = Request.Form["columns[" +
                             Request.Form["order[0][column]"].FirstOrDefault() +
                                    "][name]"].FirstOrDefault();
            var sortColumnDirection = Request.Form["order[0][dir]"].FirstOrDefault();
            var searchValue = Request.Form["search[value]"].FirstOrDefault();
            int pageSize = length != null ? Convert.ToInt32(length) : 0;
            int skip = start != null ? Convert.ToInt32(start) : 0;
            int recordsTotal = 0;
            var customerData = (from tempcustomer in db.Agriculture
                                select tempcustomer);
            if (!string.IsNullOrEmpty(sortColumn) && !string.IsNullOrEmpty(sortColumnDirection))
            {
                customerData = customerData.OrderBy(sortColumn + " " + sortColumnDirection);
            }
            if (!string.IsNullOrEmpty(searchValue))
            {
                customerData = customerData.Where(m => m.Title.Contains(searchValue));
            }
            recordsTotal = customerData.Count();
            var data = customerData.Skip(skip).Take(pageSize).ToList();

            var result = (from c in data
                          select new
                          {c.Id, c.Title});

            return Json(new { draw = draw, recordsFiltered = recordsTotal,
                              recordsTotal = recordsTotal, data = result });
        }
```

Figure 12. Method to load data for table.

6. Usability and application of CRM

Nowadays, web technologies are widely used in different economic sectors and more and more companies are taking advantage of the services that internet environment offers. Using its opportunities for information exchange, companies not only attract more customers, but also track their user experience – UX when using web applications. In this regard, modern CRMs are being developed as web-based systems and linked to UX that user usability.

The main indicator of success in the implementation of CRM technologies in companies and firms can be the quality of electronic customer relationships and cost reduction of companies. The determinants of good electronic relationships are the communication function, the transaction function and the relational function. They all relate to customer service, ordering and paying via the internet, and customization of web pages [24].

7. Conclusion

For a firm or a company to be competitive in the market it needs to use information technology and automate the processes to manage the activities and operations related to them.

For optimal interactions between employees and individual units and for greater efficiency, it is important for a company to use a Relationship Management System, CRM [25].

The CRM system for agricultural machinery discussed in this report was implemented based on the following factors: analysis and comparison of existing web-based systems, exchange of experience with users and human resources, required machinery, agricultural products and crops.

Through CRM Systems, businesses and enterprises can collect, store and analyze customer data in large volumes. As a result of using CRM systems, companies gain better customer relationships and service, collect customer data from various sources, have better marketing effectiveness and reduce their costs [26].

The primary goal of any reliable CRM system is to be able to provide users with access to necessary customer information on demand, exactly when it is needed. The CRM system model is the preferred information system by companies to manage and run business operations, attract customers, expand the market, increase profits and dominate the market. Better knowledge of customers would allow better service from companies.

This is very important for customer relationship management. Customer relationship management systems provide an opportunity for companies to achieve greater success, growth in today's environment of intense competition and rapid technological development. CRM enables companies to get to know their customers better and build sustainable relationships with them.

Employees and customers, modern technology and processes are included as key components in CRM. Implementing a CRM system in agriculture, and in particular farming, will inevitably strengthen the links between processes, customers and technology, which is an indicator of increased success in sales, customer service and information exchange among employees.

The CRM system described in the report is designed to support the employees of a specific company and to optimally facilitate their work in carrying out their specific duties related to the sale of agricultural machinery. The presented system facilitates employees in the process of searching for specific information about customers or an employee, keeping track of the work of employees in the company and providing transparency in the performance of tasks, which is a good indicator of quality reports and quantity sales for managers and business owners.

With the development of technology, the implementation of software products in companies and enterprises is increasing in order to better organize their activities both electronically and online. Not only do CRMs drive purchasing, but they also increase the proportion of sales in an electronic environment and reduce company costs.

References

[1]. Kamanghad, A., Hashemzade, G., Kazemi, M. A., & Shadnoosh, N. (2019). Assessing the Company's E-Readiness for Implementing Mobile-CRM System. *Journal of Information Systems and Telecommunication (JIST), 1*(25), 65. Doi: 10.7508/jist.2019.01.006

[2]. Đokic, D., Šarac, D., & Becejski, D. (2015). Information Management System based on principles of adaptability and Personalization. *International Journal of Advanced Computer Science and Applications, 6*(7). Doi: 10.14569/ijacsa.2015.060719

[3]. Varbanov, Z., & Filipov, L. (2020). Static generation of websites – positives and negatives. *Balkan Journal of Applied Mathematics and Informatics, 3*(2), 25–30.

[4]. Georgieva-Trifonova, Tsv. (2019). Customer Relationship Management and Data Mining – Motivation and Benefits of their Applying in the High Education Institutions. *Izvestiya. Journal of Varna university of Economics – Varna, 63*(1), 87–100.

[5]. Rababah, K., Mohd, H., & Ibrahim, H. (2011). Customer Relationship Management (CRM) Processes from Theory to Practice: The Pre-implementation Plan of CRM System. *International Journal of e-Education, e-Business, e-Management and e-Learning, 1*(1), 22–27. Doi:10.7763/ijeeee.2011.v1.4

[6]. Tien, N. H., Diem, P. T., Vu, N. T., Nhan, V. K., Bien, B. X., & Hung, N. T. (2021). The strategy of CRM system development at Mega Market Vietnam. *International journal multidisciplinary research and growth evaluation, 2*(4), 802-806.

[7]. Anaam, E. A., Haw, S.-C., & Naveen, P. (2022). Applied fuzzy and analytic hierarchy process in hybrid recommendation approaches for E-CRM. JOIV: *International Journal on Informatics Visualization, 6*(2-2), 553. Doi: 10.30630/joiv.6.2-2.1043

[8]. Delima, R., Budi, H., Andriyanto, N., & Wibowo, A. (2018). Development of purchasing module for Agriculture E-Commerce Using Dynamic System Development Model. *International Journal of Advanced Computer Science and Applications, 9*(10). Doi: 10.14569/ijacsa.2018.091012

[9]. Wang, J., Zhu, X., & Zhang, C. (2016). Models of China's E-Commerce in the Agricultural Sector: An Exploratory Study. *International Journal of u- and e-Service, Science and Technology, 9*(4), 389–400. Doi: 10.14257/ijunesst.2016.9.4.38

[10]. Jia, H. (2017). Discussion on the construction of agricultural e-commerce mode. In *2017 International Conference on Economics, Finance and Statistics (ICEFS 2017)*, 556-561. Atlantis Press. Doi: 10.2991/icefs-17.2017.78

[11]. The Business Platform for Growth-Focused Managers. (2022). Composity. Retrieved from: https://composity.com [accessed: 03 December 2022].

[12]. ERP, CRM, Sales, Purchasing, Warehouse and Finance. (2022). Retrieved from: https://prim.bg/ [accessed: 12 December 2022].

[13]. Free online workspace for your business: CRM, tasks, online meetings, and more. (2022). Retrieved from: https://www.bitrix24.eu/ [accessed: 02 January 2023].

[14]. Zoho CRM: Top-rated Sales CRM Software by Customers. (2022). Retrieved from: https://www.zoho.com/crm [accessed: 31 December 2022].

[15]. Pedron, C., Picoto, W., Colaco, M., & Araújo, C. (2018). CRM system: The role of dynamic capabilities in creating Innovation Capability. *Brazilian Business Review, 15*(5), 494–511. Doi: 10.15728/bbr.2018.15.5.6

[16]. Matraeva, L. V., Vasiutina, E., & Korolkova, N. A. (2022). CRM Systems for Small Businesses: The Role in the Digital Transformation and New Opportunities During COVID-19. *TEM Journal*, 138–149. Doi: 10.18421/tem111-16

[17]. Chatterjee, S., Chaudhuri, R., Vrontis, D., & Jabeen, F. (2022). Digital transformation of organization using AI-CRM: From microfoundational perspective with leadership support. *Journal of Business Research*, *153*, 46–58. Doi: 10.1016/j.jbusres.2022.08.019

[18]. Yusof, N. A., Zainuddin, N. M. M., Hassan, N. H., Sjarif, N. N. A., Yaacob, S., & Hassan, W. H. (2019). A Guideline for Decision-making on Business Intelligence and Customer Relationship Management among Clinics. *International Journal of Advanced Computer Science and Applications*, *10*(8). Doi: 10.14569/ijacsa.2019.0100865

[19]. Alreshidi, E. (2019). Smart Sustainable Agriculture (SSA) Solution Underpinned by Internet of Things (IoT) and Artificial Intelligence (AI). *International Journal of Advanced Computer Science and Applications*, *10*(5). Doi: 10.14569/ijacsa.2019.0100513

[20]. Zhecheva, D., & Nenkov, N. (2022). Business demands for processing unstructured textual data – text mining techniques for companies to implement. *Access Journal – Access to Science, Business, Innovation in the Digital Economy*, *3*(2), 107–120. Doi: 10.46656/access.2022.3.2(2)

[21]. Petrova, M., Popova, P., Popov, V., Shishmanov, K., & Marinova, K. (2022). Digital Ecosystem: Nature, Types and Opportunities for Value Creation. In : Rodionov, D., Kudryavtseva, T., Skhvediani, A., Berawi, M.A. (eds) Innovations in Digital Economy: Third International Scientific Conference, SPBPU IDE 2021, Saint Petersburg, Russia, October 14–15, 2021, Revised Selected Papers, 71-85. Cham: Springer International Publishing.

[22]. Fajrillah, A. A., Lubis, M., & Pasa, A. R. (2022). Towards the smart industry for the sustainability through open innovation based on ITSM (Information Technology Service Management). *International Journal of Advanced Computer Science and Applications*, *13*(6). Doi: 10.14569/ijacsa.2022.0130619

[23]. Shaqrah, A. (2016). Cloud CRM: State-of-the-art and security challenges. *International Journal of Advanced Computer Science and Applications*, *7*(4). Doi: 10.14569/ijacsa.2016.070405

[24]. Gharaibeh, N. K. (2015). Enhancing CRM business intelligence applications by web user experience model. *International Journal of Advanced Computer Science and Applications*, *6*(7). Doi: 10.14569/ijacsa.2015.060701

[25]. AbdulQadir, A. (2017). A new model of information systems efficiency based on Key Performance Indicator (KPI). *International Journal of Advanced Computer Science and Applications*, *8*(3). Doi: 10.14569/ijacsa.2017.080313

[26]. Suoniemi, S., Zablah, A., Terho, H., Olkkonen, R., Straub, D., & Makkonen, H. (2022). CRM system implementation and firm performance: The Role of Consultant Facilitation and user involvement. *Journal of Business & Industrial Marketing*, *37*(13), 19–32. Doi: 10.1108/jbim-08-2021-0380