Miroslav MRÁZ[1], Pavol FINDURA[1,3], Oľga URBANOVIČOVÁ[1], Ivan RIGÓ[1], Peter BAJUS[1], Tomasz DRÓŻDŻ[2], Pawel KIEŁBASA[2]

Slovak University of Agriculture in Nitra, Faculty of Engineering, Department of Machines and Production Biosystems Nitra, Slovakia (1)
University of Agriculture in Krakow, Faculty of Production and Power Engineering (2)
Faculty of Agriculture, University of South Bohemia in České Budějovice (3)

doi:10.15199/48.2020.01.49

Development of the web application by the information system for data processing and documentation on selected farm in agricultural production

Abstract. *The aim of the thesis was to create a web application using the information system to facilitate the creation of documentation and record management on the selected farm. In this work we focused on development of web application with support of information system AgroCont, from ISAT, s.r.o. in farm Dolný Lopašov. The ASP.NET technology was chosen for the development of the web application. In this work we described the components of the chosen technology (eg Visual Basic .NET, HTML, JavaScript, AJAX, SQL etc.) and also the steps of the life cycle of the web application creation. We have created three core modules that are focused on recording worksheets, agronomic documentation and managing individual records. Using the web application, it is possible to use these modules on all platforms anywhere (eg Android, IOS, Windows, etc.), only through a web browser and internet connection. All created records are linked to the AgroCont information system and can be further used eg. for wage creation or as a basis for in-house analyzes.*

Streszczenie. *Celem badań było stworzenie aplikacji internetowej z wykorzystaniem systemu informatycznego ułatwiającego tworzenie dokumentacji i zarządzanie dla przedsiębiorstwa rolnego. Aplikacja internetowa została wytworzona w technologii ASP.NET przy wsparciu systemu informatycznego AgroCont, z ISAT, s.r.o. i zastosowana w gospodarstwie Dolný Lopašov. W artykule opisano komponenty wybranej technologii (np. Visual Basic .NET, HTML, JavaScript, AJAX, SQL itp.) oraz trzy podstawowe moduły, które koncentrują się na rejestrowaniu arkuszy roboczych, dokumentacji agronomicznej i zarządzaniu poszczególnymi rekordami. Aplikacja internetowa pracuje na wszystkich platformach w dowolnym miejscu (np. Android, IOS, Windows itp.), które maja połączenie internetowe. Wszystkie utworzone rekordy są powiązane z systemem informacyjnym AgroCont i mogą być dalej wykorzystywane np. do tworzenia płac lub jako podstawa wewnętrznych analiz. (**Opracowanie aplikacji internetowej do przetwarzania danych i dokumentacji dotyczącej wybranego gospodarstwa w produkcji rolniczej).***

Keywords: ASP.NET, web application, agriculture, information system, creating documentation
Słowa kluczowe: ASP.NET, aplikacja internetowa, rolnictwo, system informacyjny, tworzenie dokumentacji

Introduction

At present, a strong development of information technologies has a strong impact on the economic environment and the quality of information systems affects the competitiveness of each company and clearly belongs to the strategic factors of their expansion [1]. The web application is an application running on the server with which the user communicates with the client on his / her computer, which is most often a web browser [2,3]. ASP.NET is a collection of features and objects that allow you to create websites that work on the server. From its results, the server compiles the HTML code of the resulting page and sends it back to the browser. It then displays the client's selected page. It is therefore a standard client / server principle [4,5,6]. The basic objective of IS is to provide clear communication between individual components, including feedback of information, both from the internal and external business environment [7,8,9]. There are indeed a large number of information systems at present. Many authors have tried to classify them. The problem is that what was up to date a few years ago, at the time of the classification, may not be up to date. Another problem is that individual systems are interconnected, that is, one type of information system can be in multiple categories at once [10]. Enterprise Resource Planning (ERP) can be defined as an integrated software system that is used to plan and manage all enterprise resources and activities [11]. Key features of ERP include the ability to automate and integrate key business processes, functions and data across the enterprise [12].

Materials and methods

My work is focused on the development of web application using the information system AgroCont from the company ISAT, s.r.o., where we designed concrete modules for creating documentation and administration of the company in the farm Dolný Lopašov. The agricultural cooperative was established in 1955 and manages the land of 1491 hectares. Of these, 111 hectares are forests. Other areas of the cooperative grow mainly wheat, barley, oilseed rape, corn and sugar beet. Using the web application and its individual modules, we can create long-term records and keep them under control. Designed web application modules that are linked to the AgroCont IS:

- records of work sheets,
- agronomic evidence,
- enterprise management online.

We used ASP.NET to create a web application and we used the Visual Basic.NET programming language with HTML code elements and SQL database system to develop the system functionality itself.

After the successful implementation of the proposed solutions, which we focused on in the previous experimental work, the source code was tested on real data of the agricultural enterprise PD Dolný Lopašov, which uses the information system AgroCont from the company ISAT, sro. SPU in Nitra, Department of Machines and Production Biosystems and outputs were consulted with specialists of ISAT, s.r.o. The AgroCont program, which can be seen in fig. 1, is a comprehensive agrarian information system, which was developed directly in the conditions of primary agricultural production meeting all established requirements of the CCTIA and the EU. With AgroCont we are able to collect and control long-term records and information on material flow and work operations in agro-commodity production. In a simple way, individual data is recorded directly during the production process without any unnecessary and laborious administrative burden. At the

same time, the program also checks the input data at the time of entry. The program can be linked to economic programs and wages.

It serves for long-term record of consumption of fertilizers, seeds, chemical preparations and other important information and obligations stated in good farming practice. It is based on the use of traditional documents, which are adapted for use in electronic form to meet all the requirements for keeping prescribed documentation for EU control bodies.

The program consists of the following modules, which are

Modul AgroDoc – agronomic evidence,

- Modul AgroMat – agro-material,
- Modul EuroDot – cash flow,
- Modul FarmCont – farm control.

Fig.1. Information System - AgroCont

Active Server Pages (ASP) from Microsoft allows you to create websites with dynamic content. An ASP page is basically an HTML file with embedded portions of VBScript or JavaScript that are executed on the server side. ASP enables easy creation of browser-based client applications. ASP.NET is a sophisticated version of ASP that solves many of the original problems. It is not intended to replace ASP, but both technologies can coexist on the same server. An important point is that ASP.NET (fig. 2) delivers higher performance, which is striking compared to ASP pages that are interpreted with every page request. In the same case, the web server caches the compiled ASP.NET pages, and consequently subsequent requests to the ASP.NET page are handled faster than the first request.

Fig.2. Information System - AgroCont

ASP.NET makes it easy to write pages that display forms in a browser, which is convenient for use in an intranet environment. While form applications provide a richer user interface, they are harder to maintain because they run on many different computers. Therefore, they were preferred in cases where it was necessary to ensure a rich user interface and effective technical assistance was available. SQL (StructuredQueryLanguage) is a non-procedural, in other words declarative, language used to communicate relational databases. It is the most widespread language by which we can create database queries and serve to process and maintain databases [13]. SQL is made up of a language structure that consists of several parts (fig. 3):

- DDL - DataDefinitionLanguage
- DQL - DataQueryLanguage
- DML - DataManipulationLanguage
- DCL - DataControlLanguage

Each of these parts performs a specific task, the first part is used to create a database, the second supports the functions of reading data from the database. Add, delete, and change data in database supports third language. Using the last one we can create controlled access to data in the database. Such databases could be used in many research i.e. such as [14,15].

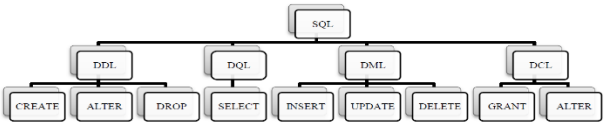

Fig.3. Structure of SQL

Results and discussion

Based on the proposed modules, we have created the web application (fig.4) and we tried to implement all the elements of the system to meet the requirements of the user as well as ISAT, s.r.o.

The individual system modules have been programmed so that the user can easily record all the required information that is linked to the AgroCont information system. Using SQL Server databases, we were able to create a current system environment that allows us to use all the necessary data using only an Internet connection and a web browser. As a result, we are able to use the web application on any device, whether it be a mobile phone, a laptop or a tablet, which was our goal.

MODUL AGROCONT – AGRONOMIC EVIDENCE

This module was created based on the analysis of the IS AgroDoc module (fig.5), we tried to implement all parts into the web application to create agronomic records, and thus ensure the possibility of creating agronomic records on the enterprise.

Thanks to this module, we can record the consumption of fertilizers, seeds, chemical products and other important information and duties in good farming practice using a mobile phone, tablet or computer, through a web browser and the Internet. It is connected with the AgroCont IS, thanks to which we can download and modify the created records in electronic form so that it meets all the requirements for keeping the prescribed documentation for the EU inspection bodies.

MODUL TECHNOLOGICAL RECORD

The module is used for the online creation of a statement of work, it is a basic statement that the company is obliged to use and is used to help in managing and recording the work of each company. With this report we can record long-term records of individual workers and their daily work operations and material flow, which help us eg. wage creation, or as input data used for in-house analyses (fig.6). With this module we can create an online report anywhere, so we always have up-to-date information on all work operations.

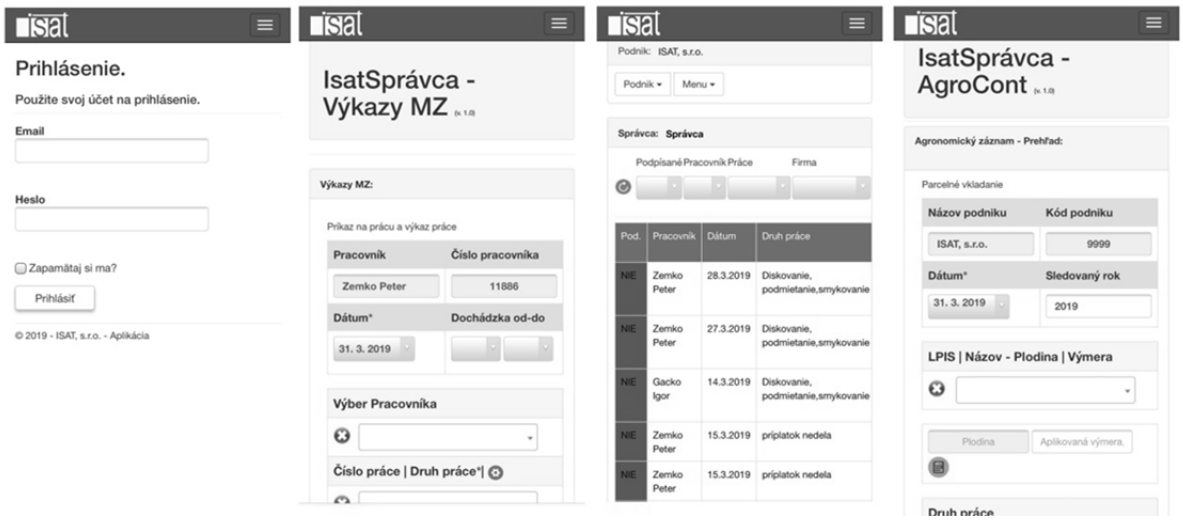

Fig.4. Web application module preview (custom)

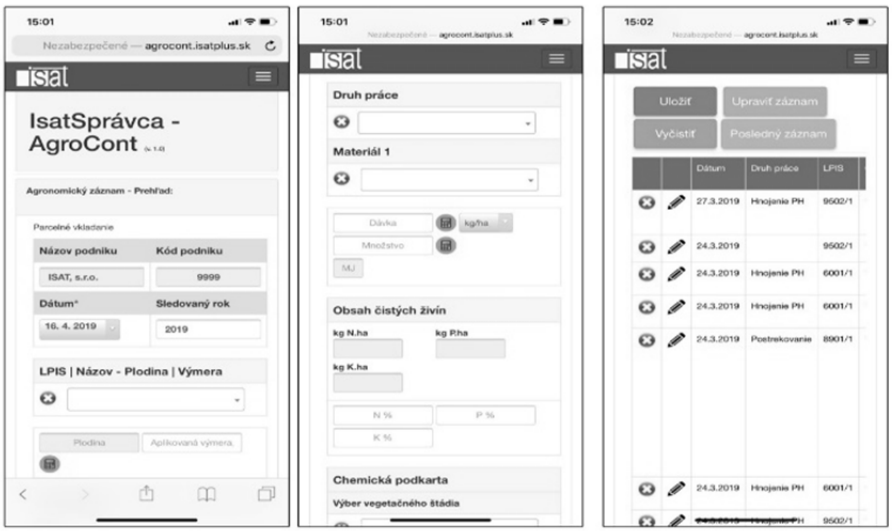

Fig.5. Modul AgroCont

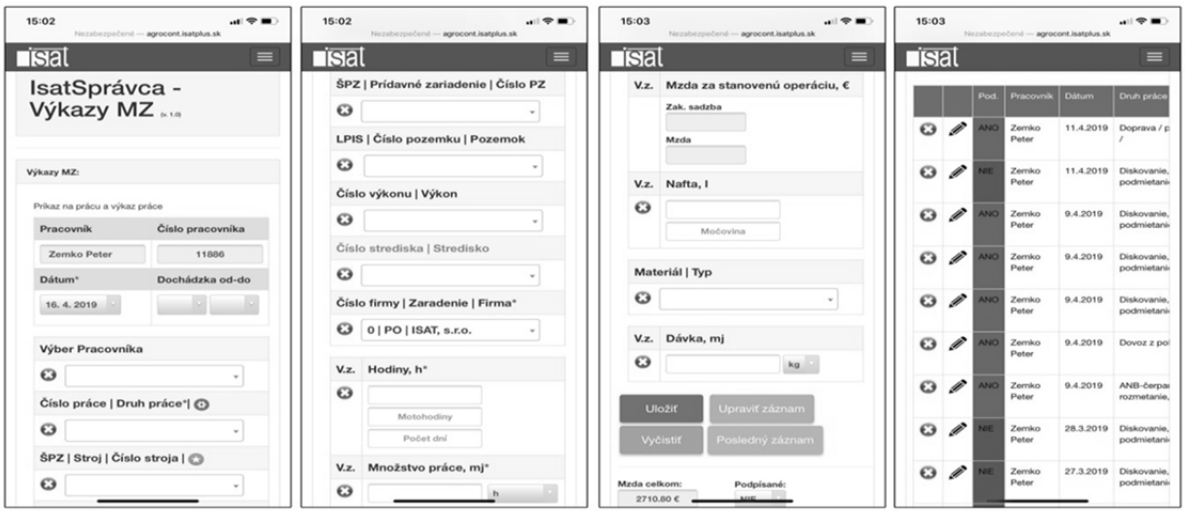

Fig.6. Modul Technological Record

The records created by the employees of the company are linked with the AgroCon IS, thanks to which the managers have the data as needed and can work with them further.

After the successful implementation of the web application design linked to the AgroCont information system, the basic objectives of this application were fulfilled, including:

- Same user interface anywhere without the need to install special software,
- It will work on all platforms (Windows, iOS, Android), on all mobile phones with a web browser with an Internet connection,
- We will always be able to manage and control current information from the IS,
- Create documentation with subsequent connection to the IS and the possibility of final processing of final outputs,
- We can use information from several IS,
- Can manage in-house analyzes,
- We can manage and manage multiple businesses at the same time,
- Based on the information obtained, we can make better and more effective decisions.

Conclusion

The aim was to design and create a web application to facilitate the creation of documentation and record management on a selected farm. With this app, we can easily do all the important operations to run your business with ease, comfortably with your mobile phone, tablet or even your computer anywhere in the world. We do not need any software installation to run the application, you just need a web browser (such as Google chrome, Mozilla firefox, Internet Explorer), Internet connection and login. The stored data is anywhere and immediately available for processing and can be further utilized e.g. for wage creation or as a basis for in-house analyzes. Contribution has been prepared within the solving of scientific grant project VEGA project no. 1/0642/18 "Analysis of the impact of structural parts of forestry mechanisms in the forest environment in terms of energy and ecology".

Autorzy:
Ing. Miroslav MRÁZ, PhD. Department of Machines and Production Biosystems Nitra; prof.h.c. prof. Ing. Pavol Findura, PhD. Department of Machines and Production Biosystems Nitra, Slovakia, E-mail: pavol.findura@uniag.sk; Ing. Oľga Urbanovičová, PhD. Department of Machines and Production Biosystems Nitra, Slovakia, E-mail: olga.urbanovicova@uniag.sk; Ing. Ivan Rigó, PhD. Department of Machines and Production Biosystems Nitra, Slovakia; Ing. Peter Bajus, PhD. Department of Machines and Production Biosystems Nitra, Slovakia; dr inż. Tomasz Dróżdż, Uniwersytet Rolniczy w Krakowie, Wydział Inżynierii Produkcji i Energetyki, ul. Balicka 116B, 30-149 Kraków, e-mail:tomasz.drozdz@office.urk.edu.pl; dr hab. inż. Paweł Kiełbasa, prof. UR, Uniwersytet Rolniczy w Krakowie, Wydział Inżynierii Produkcji i Energetyki, ul. Balicka 116B, 30-149 Kraków, e-mail: pawel.kielbasa@urk.edu.pl,

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