Sales Management by Providing Mobile Access to a Desktop Enterprise Resource Planning System

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Abstract – **The purpose of this article is to argument the need of extending the functionality of a desktop Enterprise Resource Planning (ERP) system by providing web-based access to it and describing the design and its implementation. The thematic content of the article is interdisciplinary. It concerns directly salespersons and sales managers because salespersons need web-based access to their desktop ERP systems. It concerns IT companies because they have a specific software solution – web-based software which provides web access to the database of a desktop ERP system. To illustrate the process of extending the functionality of a desktop ERP system, we have chosen MS Dynamics Navision as a popular and well-known ERP system. The practical implications of this paper concern other ERP systems, not only MS Dynamics Navision. The findings of this paper are useful for sales managers and salespersons that use desktop ERP systems and IT companies that upgrade ERP systems.**

Keywords – **selling process, sales management, salesforce automation, MS Dynamics Navision, web applications, Delphi XE.**

1. Introduction

Extending the functionality of an ERP system is usually in the direction of adding new modules or new reports within the ERP system.

This is an expensive process for end users because these add-ons or new reports within the ERP system are specific for a certain customer and usually cannot be used by other companies even in the same business sector.

In other cases, salespersons or sales managers need simple web access to their desktop ERP system. The web access allows them to use the ERP system from their mobile device. The cases when such situations happen are the following. The need for using such functionality for sales managers is manifested in cases of planning, coordinating and controlling sales. This is the case when a sales manager is for a long time out of the office of the company and there is a need for a decision related to the commercial policy. For salespersons – the need for mobile access to a desktop ERP system occurs in planning and preparation phases, establishing needs, drawing up a sales plan, completing and administering the sale and assessing the visit to a customer. A significant part of the salespersons' working time is out of the office. They often travel for several days to serve customers in regions they are responsible for. They do not have permanent access to their desktop applications including the used ERP systems. A significant part of salespersons' working time is out of the office.

2. The Need of Extending the Functionality of a Desktop ERP System by Providing Web-based Access to it from a Salesperson's Point of View

Sales and after-sales services to customers are related to the movement of sales teams. In many sectors, the implementation of the sales process is not possible to happen entirely remotely. This requires sales teams (from managers to salespersons) to work most of their time outside office. The specifics of the business process in organizations raise the question of the possibility of remote access to desktop applications including ERP systems. This need is important both for the purposes of managing the sales process (strategic level) and for sales (tactical level).

Sales managers travel a lot. Depending on the specifics of the business and of a specific organizational and management structure, they conduct negotiations with clients at high levels, on the spot at the client's; negotiate with suppliers; participate in trade fairs. All of this often requires a long time outside the office. The management of the sales process is closely related to the use of a variety of information for decision-making purposes. The use of desktop ERP applications sometimes makes it difficult to maintain rhythmic work (Figure 1.).
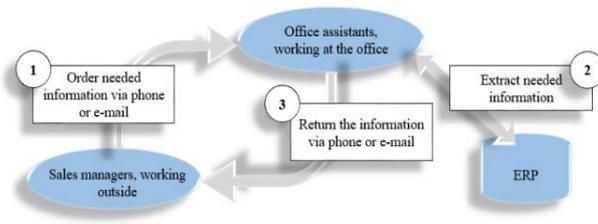

Figure 1. Process of meeting information needs related to the use of a desktop ERP system when the sales manager (or the salesperson) is out of the office

The key stages of the sales management process that are most closely related to the need to use data or reports from ERP systems outside of the office are: planning sales, coordinating the sales process and controlling. The main features of these steps, the activities of the sales managers and the necessary information for the realization of the activities are presented below in the following stages.

Stage 1. Planning the sales process at the organization

The basic characteristics of this stage are analysis and assessments of environmental factors influencing the sales process. Objectives are formulated at different levels (strategic and tactical). Targets are decomposed at different levels (by territories, by groups of customers, by product groups and/or business units in the organization, by sales teams). Strategies and sales programs are being developed.

The carried-out activities during stage 1 are the following:

- Market opportunities analysis and evaluation;
- Competitors analysis and evaluation;
- Sales analysis and evaluation;
- Identifying products that are sold together for specific customers;
- Sales forecasting;
- Measuring probability of sales;
- Macro environment analysis and evaluation;
- Suppliers analysis and evaluation;
- Defining sales goals;
- Sales strategies development;

- Sales plans development;
- Territory planning.

The following information is required for stage 1:

- sales growth rate for the sector;
- sales growth rate of the organization;
- structure of sales (by product groups, by regions, by client groups, by sales teams, by time periods);
- market shares by basic competitors;
- competitor' sales;
- sales seasonality by product groups, by territories, by client groups;
- client base structure by product groups and territories;
- clients' market basket;
- structure of suppliers.

Stage 2. Coordination of the sales process in the organization

The basic characteristics of this stage are organization and implementation of sales strategies, programs and plans.

The carried-out activities during stage 2 are the following:

- distribution of territories by sales teams and salespersons;
- defining of group and individual purposes;
- monitoring the supplier's market;
- calculating the cost of supplied products;
- calculating discounts;
- calculating the sale price;
- defining product proposal.

The following information is required for stage 2:

- Client structure by sales, by territories;
- Delivery prices;
- Transport expenditures of delivered products by transport type;
- Margin by product groups;
- Products that are not ordered but may be offered by salespersons.

Stage 3. Control of the sales process

The basic characteristics of this stage are monitoring the implementation of sales strategies, programs and plans.

The carried-out activities during stage 3 are the following:

- monitoring the completion of sales targets;
- monitoring the work of sales teams.

The following information is required for stage 3:

- Target's degree of execution by product groups, sales teams, salespersons;
- New client's share in the client database;
- Lost client's share in the client database;
- Number of finished (delivered and payed) deals;
- Number of not finished (delivered, but not payed or payed, but not delivered) deals;
- Sales turnover by product groups, territories, sales teams;
- Achieved margins by product groups and salespersons;
- Number of customer visits by salespersons;
- Number of customer phone calls by salespersons;
- Clients not payed the delivered products.

Sales managers need either to synthesize a report from the used desktop ERP system or to extract sales data at transactional level. Sales data at transactional level are usually exported from the desktop ERP system to another software application for later processing or new data entry. Sometimes middle tier software is used for ETL procedures. All these operations, when the manager is not in the office and does not have direct access to the desktop ERP system, become difficult to implement and are usually clumsy to fulfil.

Similar difficulties are experienced by salespersons. Their main duties are related to meeting customer. The entire sales process in many sectors requires a visit to the customer. Table 1. shows only the stages of the sales process that are most dependent on the need for direct access to the organization's ERP system.

Table 1. Possible operations of salespersons with the ERP system to carry out activities at key stages of the sales process when working outside the office

Name of the stage	Possible operations with the ERP system when performing the stage
Planning and preparation of the sale	- Data access to customer profiles; - Creating a new customer; - Adding additional data to the profile of existing customer; - Information from previous meetings; - Customer basket; - Access to daily schedule of visits; - Updating the daily schedule of visits;
Defining customer needs and wishes	Adding additional data to the profile of existing customer;
Creating a sales plan	- Checking available quantities by products; - Checking of expected deliveries;
Claims management	Checking types of claims by product groups;
Finalizing sales and administration	- Creating a new order; - Adding additional data to the profile of existing customer; - Creating a new customer profile;
Evaluation of the visit	Filling in the personal salesperson report;

All defined arguments clearly outline the need to provide mobile access to desktop ERP system for sales teams in organizations.

3. Literature Review

Business intelligence methods are widely used in economics. Their use is extremely important for identifying customers and their behavior, which makes the extraction of knowledge from data a key process in the organization [1]. Some authors argue the need of sales management processes automation [2], [3]. Some EU projects (e.g. the DIMBI project – www.dimbi.eu) are focused on BI [4], [5], [6]. Some publications [7] are focused on business analysis using data from ERP systems.

The success of a BI solution consists, in the end, in how much it helps the users, managers and technicians, in an organization to achieve the company's critical goals: achieving or exceeding revenue figures, seeking opportunities to reduce costs throughout the organization and maximize profitability by identifying the most profitable customers, most profitable products, services or programs [8], [9].

Business Process Management includes concepts, methods, and techniques that support the design, administration, configuration, adoption, and process analysis. Business process management is based on explicit representation, with their activities and execution constraints between them [10], [11].

Web technologies and web applications are quite common and complex nowadays [12], [13].Other authors [14] examine the application of the gamification concept as a relatively new approach in the area of software systems, which aims to increase participants' engagement in a process, change their behavior and stimulate innovation. The use of game design elements is presented as an additional aspect to software products based on ERP, CRM or SCM concepts, which are currently widely used in the workplace [15].Software for archiving data and report management moves from the traditional desktop environment to the more flexible web and mobile areas [16], [17]. Backing up and restoring this data is crucial for the existence of organizations therefore corresponding characteristics of the most popular database management systems are examined in detail in other publications [18].

There are also researches related to the application of the technologies for knowledge discovery from structured data, contained in databases, and from unstructured text data, accumulated in organizations [19]. The usage of mobile and web technologies creates prerequisites for the use of approaches for processing unstructured data [20].

We did not find articles dedicated on the extending of the functionality of desktop ERP systems by providing mobile access to them in Emerald Insight, DOA and Elsevier in the last five years. Since the topic of this article is interdisciplinary – from sales managers and salespersons viewpoint and from IT specialist'sviewpoint, it is written by two authors with marketing and informatics specialization. We are thankful to salespersons who gave us precious advice and ideas on the thematic content of this article.

4. Design and Implementation of a Web Application Which Extends the Functionality of a Desktop ERP System with Web-based Interface

MS Dynamics Navision is a famous ERP system. A lot of IT companies have built additional modules which extend Navision's functionality. This part of the paper describes the design and the implementation of a web application which connects to the database of a desktop version of MS Dynamics Navision.

The desktop version of MS Dynamics Navision may be started by several links.

The first link "Microsoft Dynamics NAV 2009 R2 Classic" opens the "database.fdb" file, located in "C:\ProgramData\Microsoft\Microsoft Dynamics NAV\60\Database".

The second link "Microsoft Dynamics NAV 2009 R2 Classic with Microsoft SQL server" opens the demo database "Demo Database NAV (6-0).mdf", located in "C:\Program Files (x86)\Microsoft SQL Server\MSSQL.1\MSSQL\Data".

The web application that will be created connects to the second database.

The web application (WA) will have only read-only access to all tables in the database. In this case we do not make changes in the Navison's database.

The example WA will show a list with all tables. We will choose one table, e.g. for marketing campaigns (table "Campaign"). We will modify the table "Campaign" through the desktop Navision and we will see the changes in the WA.

The WA will be created with Delphi XE as a web application.

The connection between the WA and the Navsion's database is created with a **UDL file** (file "Navision.udl"). The OLE DB provider is "Microsoft OLE DB Provider for SQL Server". The server name

is "VASILEV". The database on the server is "Demo Database NAV (6-0)".

The **UserSessionUnit** is used to store components for the access of the WA to the database: ADOConnection, ADOTable and DataSource.

The **ADOConnection** is connected to the Navision's database (The property "ConnectionString" is set to "FILE NAME = Navision.UDL".

The **ADOTable** is connected to the ADOConnection (The property "Connection" is set to "ADOConnection").

The **DataSource** is connected with the ADOTable (The property "DataSet" is set to "ADOTable").

This organization of connecting to the database (using the UserSessionUnit) allows multithread access to the database by each web-based client.
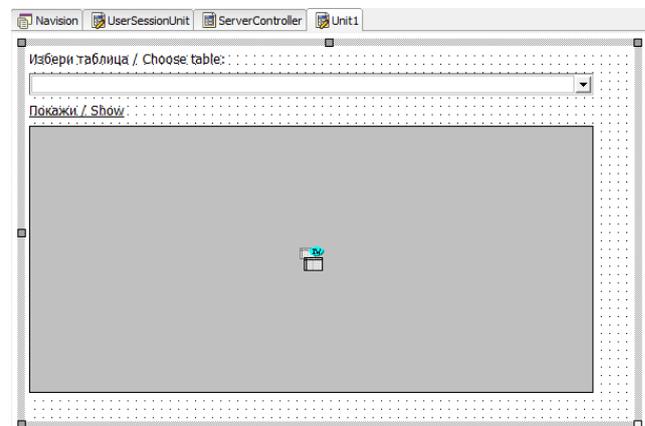
The WA is created as a one-page WA (Figure 2.).

Figure 2. Design of the WA in Delphi XE

A combo box (TIWComboBox) is used to show the tables in Navision's database. A Grid (TIWDBGrid) is used to show the contents of a chosen table. A label (TIWLabel) is used to show the text "Choose table:". A link (TIWLink) is used for the link "Show".

An event procedure is created. The event is the creation of the main form of the WA (Fig. 3.).

```
procedure TIWForm1.IWAppFormCreate(Sender: TObject);
begin
// connect with Navision's database
UserSession.ADOConnection.Connected := True;
// load the list of tables in the combo box
UserSession.ADOConnection.GetTableNames(
IWComboBoxTables.Items );
// connect the visual table (within the WA) with the
physical table (NAV's DB)
IWDBGrid.DataSource := UserSession.DataSource ;
end;
```

Figure 3. Code listing of the event procedure on creating the main form of the WA

This event procedure (Fig.3.) is executed once, when the end user opens the WA in a browser.

Another event procedure is created. It is connected with the event clicking on the link (Fig. 4.).

```
procedure       TIWForm1.linkExecuteSQLClick(Sender:
TObject);
  begin
    // disconnect the connection to a previous table
    UserSession.ADOTable.Active := false;
    // delete the columns of the previous table from the
grid in the WA
    IWDBGrid.Columns.Clear;
    // connect to the new table
    UserSession.ADOTable.TableName :=
IWComboBoxTables.Text;
    // show the contents of the new table
    UserSession.ADOTable.Active := true;
  end;
```

Figure 4. Code listing of the event procedure on clicking the link "Show"

This event procedure (Fig. 4.) is executed when the end user clicks on the link "Show". The user may choose a table and show its content. The link "Show" has also the refresh function. If the content of a table is changed by a user using the desktop Navision, the change will be automatically visible in the WA.

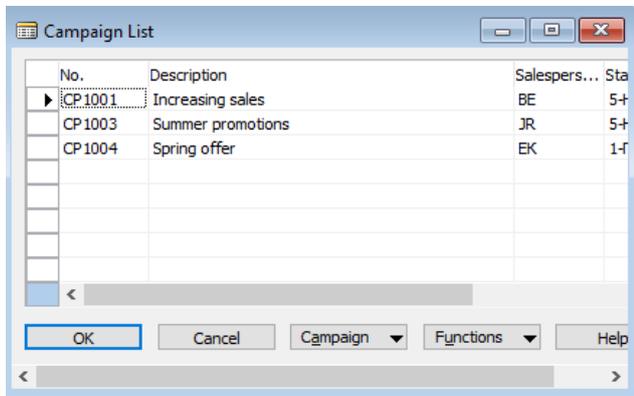The visualization of the campaign list in Navision is the following (Fig. 5.).

Figure 5. Visualization of the campaign list in Navision (as a desktop application)

The visualization of the campaign list in the created WA is the following (Fig. 6.).

Figure 6. Visualization of the campaign list in the created WA

The created WA has live read-only connection to Navsion's database. This WA may be extended with other functions. The mode of the WA may be changed to a read-write WA.

5. Conclusion

Extending the functionality of a desktop ERP system by providing mobile access is a difficult and interdisciplinary topic. This article highlights some marketing aspects of it by discussing the sales managers and salespersons viewpoint. Sales managers need a lot of information from their desktop ERP systems when they travel or when they visit customers. Their information needs to determine the need to extend the functionality of a desktop ERP system by providing web access. This web access is analyzed in detail in the different stages of the sales process. The first viewpoint is the viewpoint of sales managers and salespersons – which information they need when they are outside their office.

The second viewpoint is the IT specialist viewpoint. It describes a technological solution of creating a web application which has a read-only access to a desktop ERP system. To illustrate the web application Microsoft Dynamics Navision is chosen. The web application is created with Embarcadero Delphi. It gives simple read-only access to the tables of the desktop ERP system Microsoft Dynamics Navision.

Future work may focus on the design of different reports which may be visible in the mobile version of an ERP system. Future work may focus on extending other ERP systems.

References

[1]. Krastevich, T. (2013). Using Predictive Modeling to Improve Direct Marketing Performance. *Economic Studies*, *22*(3), 25-55

[2]. Grise, P., & Zuniga Huertas, M. K. (2013). Choosing ICT tools: Proposition of a model to deliver value for clients. *Journal of technology management & innovation*, *8*, 71-71.
Doi: 10.4067/S0718-27242013000300071.

[3]. Moutot, J. M., & Bascoul, G. (2008). Effects of sales force automation use on sales force activities and customer relationship management processes. *Journal of Personal Selling & Sales Management*, *28*(2), 167-184.

[4]. Atanasova, T. (2016). The DIMBI project guidelines for innovative teaching curricula in the field of business intelligence and data. *Economics and Computer Science, 2*(5), 7–16.

[5]. Kuyumdzhiev, I. (2016). The DIMBI project–innovative approaches for teaching business informatics. *Economics and computer science*, *2*(5), 26-36.

[6]. Marinova, O. (2016). Business intelligence and data warehouse programs in higher education institutions: current status and recommendations for improvement. *Economics and Computer Science, 2*(5), 17-25.

[7]. Nycz, M., & Pólkowski, Z. (2014, October). The ERP system as a basic system for business analyses. In *Proceedings of the 2014 6th International Conference on Electronics, Computers and Artificial Intelligence (ECAI)* (pp. 63-66). IEEE.

[8]. Cristescu, M. P. (2017). Business Intelligence Integrated Solutions. *Land Forces Academy Review*, *22*(4), 270-275.

[9]. Marinov, G., & Andreeva, B. (2017). Common mistakes in data representation in student projects. In second conference on innovative teaching methods (ITM 2017) 28-29 June 2017, Varna (vol. 28, p. 86).

[10]. Cristescu, M. (2018). IT solutions for business process management: 25th International Economic Conference of Sibiu (IECS 2018). Doi: 10.1007/978-3-030-01878-8_6. In book: Innovative Business Development—A Global Perspective, 65-75.

[11]. Marinov, G. (2016). Small Sample Properties Of Panel Cointegration Tests In The Presence Of Structural Change. *Journal of Social and Economic Statistics, 5*(1), 35-41.

[12]. Petrov, P., Krumovich, S., Nikolov, N., Dimitrov, G., & Sulov, V. (2018). Web Technologies Used in the Commercial Banks in Finland. In Proceedings of the 19th International Conference on Computer Systems and Technologies (pp. 94-98). ACM.

[13]. Sulov, V. (2016). Iteration vs Recursion in Introduction to Programming Classes: An Empirical Study. *Cybernetics and Information Technologies, 16*(4), 63-72.

[14]. Stoyanova, M. (2018). Application of the gamification concept in project management software systems. *Monographic library" Knowledge and business" Varna.*

[15]. Stoyanova, M. (2015). Gamification process in information systems. Special Issue Proceedings of ETAEc 2015 Conference, Scientific Bulletin – Economic Sciences, 14, 174-180.

[16]. Bankov, B. (2018). The cost of designing user-friendly web applications. *Известия на Съюза на учените-Варна. Серия Икономически науки*, *7*(2), 283-289.

[17]. Bankov, B. (2019). Software Evaluation of PHP MVC Web Applications. 19 International Multidisciplinary Scientific Geoconference SGEM 2019 Informatics, Geoinformatics and Remote Sensing, 19(2.1), 603-610.

[18]. Kuyumdzhiev, I. (2019). Comparing backup and restore eficiency in MySQL, MS SQL Server and MongoDB. 19 International Multidisciplinary Scientific Geoconference SGEM 2019: Conference Proceedings, 28 June-7 July 2018, Albena, Bulgaria: Vol. 19. Informatics, Geoinformatics and Remote Sensing. Iss. 2.1, Sofia: STEF92 Technology Ltd., 19, 2019, 2.1, 167-175.

[19]. Sulova, S. (2018). Integration Of Structured and Unstructured Data In The Analysis Of E-Commerce Customers. *International Multidisciplinary Scientific GeoConference: SGEM: Surveying Geology & mining Ecology Management*, *18*, 499-505.

[20]. Sulova, S., Todoranova, L., Penchev, B., Nacheva, R. (2017) Using text mining to classify research papers. *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM. 17*(21), 647-654.