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Dashboards Usage for Business Intelligence: Selected Case Studies

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Dashboards Usage for Business Intelligence: Selected Case Studies

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Abstract

Dashboards usage has been a quite popular topic in recent years. In modern economy every second is important in decision making process and dashboards are surely one of the main tools to help achieve that goal. For decision makers they are a very convenient way of getting aggregated information in time. Most dashboards summarize data on predefined criteria but they often provide a drill-down or comparative analysis. Almost all dashboards provide graphical representation of their data for even faster response to situation on the market. Primary goal of this paper is to show the positive effects of using dashboards in business environment. Secondary objective is to show various cases of creating and using dashboards in practice. Every dashboard is unique and usable only to people who need it. This paper will describe the basic dashboard theory and provide two case studies of dashboards implemented in two very competitive industries, telecommunications and banking. Basic dashboard creation explains how to create a dashboard in MS Excel, which can be used at a small company or the company that can't invest in expensive technologies, and case studies analyse implementation of two dashboards implemented for day-to-day reporting and highlighting critical information to management.

Keywords: dashboards, business intelligence, analysis, churn, information management, customers
JEL classification: D83
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Introduction

There is big number of small and medium companies that are generating monthly reports with all data they need for successful decision making process but there is problem with this approach – this reports are monthly. With monthly reports there is gap when managers are leading companies only by intuition. In this cases dashboard with selected key performance indicators (KPI-s) would be right solution and would make managing of company easier and would short reaction time (Eckerson, 2010).

First part of the paper will show basic dashboard solution which can be created in Microsoft Excel. This is a very fast and convenient way of creating ad-hoc dashboards which can be used in smaller enterprises. For medium and large enterprises there are two examples of dashboard creation using more specialized tools like databases and Extract-Transform-Load (ETL) tools which collect data from various sources, often in different formats.

Basic dashboard creation

In case of small and medium companies in many cases purchase of professional dashboard solution would be too expensive so DIY solution can be adequate tool. Here we are thinking on solutions based on Microsoft Excel. As all the ERP-s are adjusted to make export to Excel refreshing of Excel based dashboard tool can be done with one download from system and with filling in data in dashboard tool. With usage of Visual basic for applications (VBA) this process can be done automatically and very user friendly (Alexander, Valkenbach, 2013)

Determining key data and highlighting it

First step in creating own dashboard tool, regardless in witch tool (created from our side or with help of professional program) is to determine what will be our KPI-s, what will be scale for them and in which form we want to show them. Most basic form can be done using tables which can be filled statically (by direct linking to certain cell in source download) or dynamically (using vlookup, hlookup, index or match functions). As this approach is very basic, we will not go display in explaining this approach.

As humans are very visual sensitive our suggestion would be to go with dashboard that would include traffic lights, graphs, Sparkline and gauges. First, we will show you in short steps how to use traffic lights. For start, we need to have KPI for which we would like to set it up – this can be for example deviation percentage of sales to the budgeted value and we need to decide what will be values for green (more than 10%), yellow (from -10 to +10) and red (less than -10%) (Pejić Bach, 2014). After defining criteria we can move on to creating new rule in conditional formatting:

Figure 1
Basic data table and options in menu

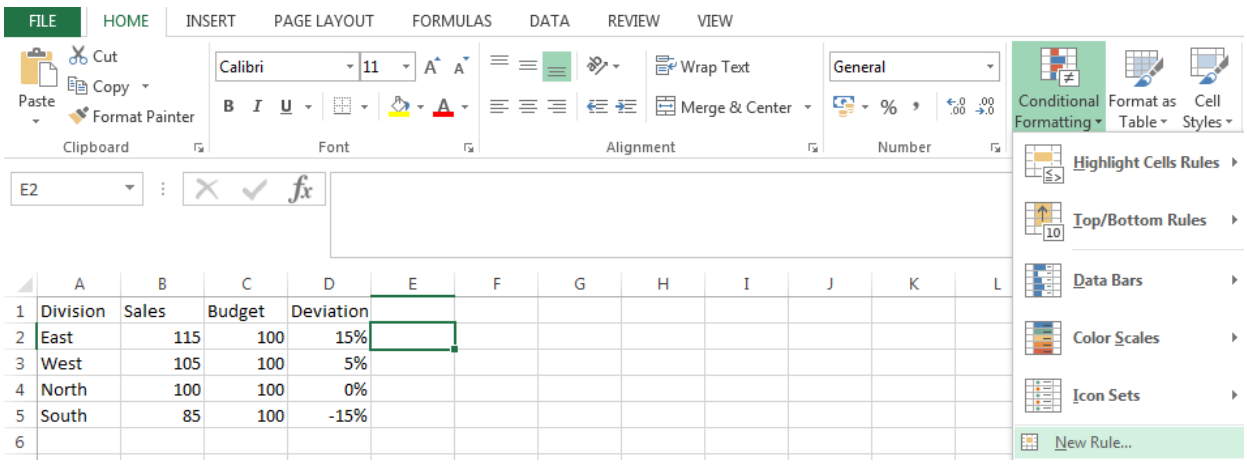

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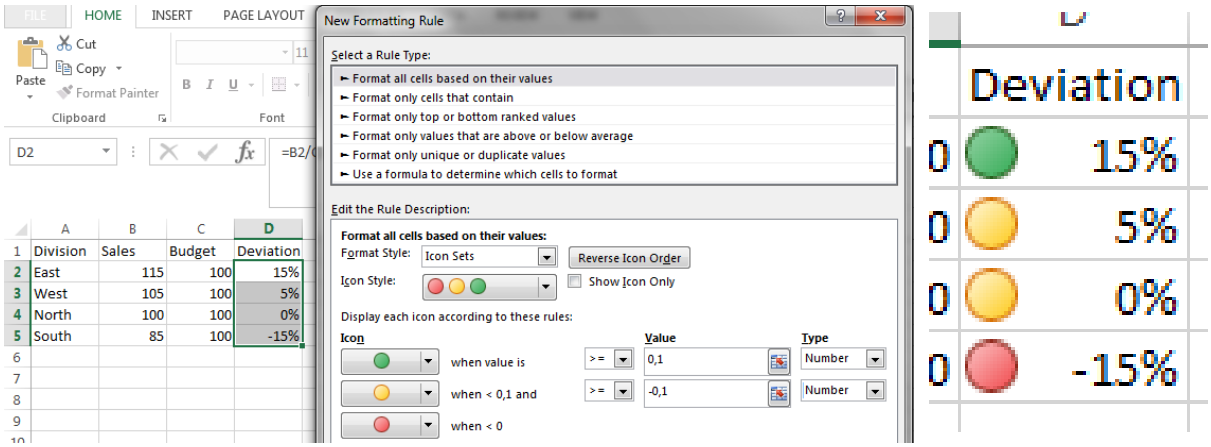
Figure 2
Setting up semaphore KPI and result



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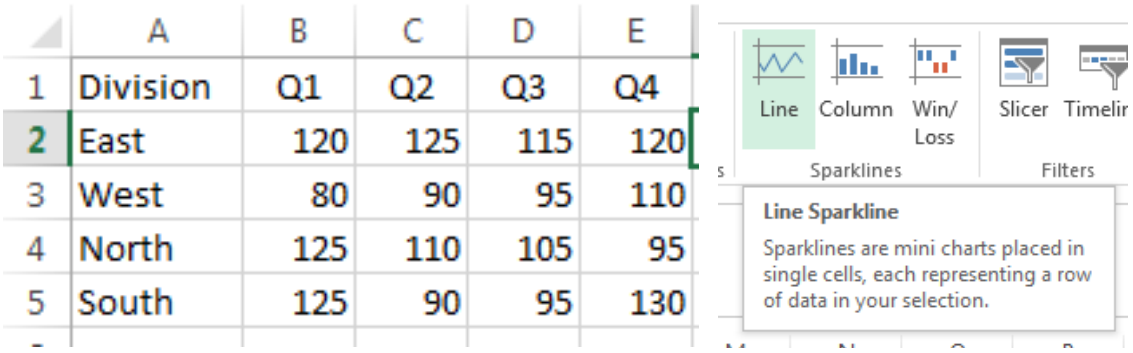
Creating visualised views of data

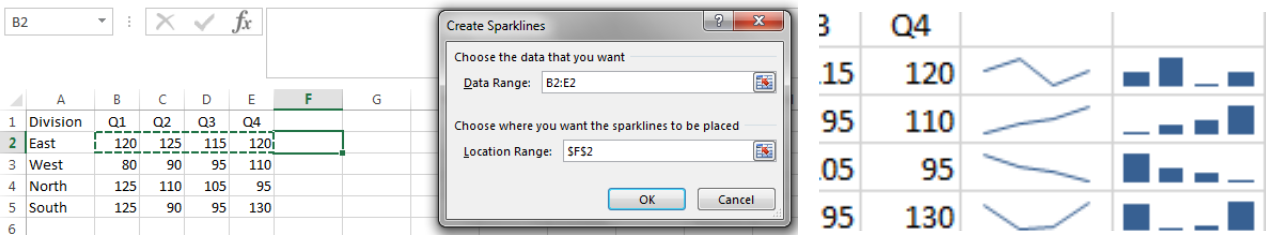
Another useful tool in creating dashboard can be Sparkline graphs. Under this name we can find graphs that are incorporated in one cell and can be great tool for showing trends. First step is also to define data which will be base for Sparkline (in our case this will be quarterly sales per division) (Few, 2006).

Figure 3
Basic data table and options in menu



Source: Created by author

Figure 4
Setting up Sparkline and result



Source: Created by author

Dashboards in telecommunications

Telecommunications are a dynamic and competitive industry and require fast decision making. Telecoms are trying to improve competitiveness by constantly gathering information about their customers and the competition. This information is collected through reports that are obtained from various departments such as: customer care, customer retention, sales, distributors, finances, etc. These reports can be used to create summary dashboards.

Many software companies (Dundas Data Visualization Inc., InetSoft, Qlik Technologies Inc., etc.) are offering real-time software applications that showKPIs for different telecom departments. Such applications are often interactive and data can be filtered by numerous indicators (such as date, type of users etc.) and then used to crate various graphs (such as revenue, data usage, minutes of use etc). These solutions are often very expensive and require months to adjust to a particular company. They require maintenance and some of the data cannot be matched in real time. Other real time dashboards can be created on a TV screen and track the data that is changing every second as this is not high volume data. One such dashboard is often used in customer care. It shows in real time the number of calls users have made to the call centre, the average call time, the average waiting time, the purpose of calls, the number of call backs and calls on hold.

High-volume and high-frequency data, however, are less suitable for a real-time display (especially if the telecom has dated and dispersed software solutions. Such data include data on short message service (SMS), calls (voice), multimedia messaging service (MMS) and data. They are measured by revenue, minutes of use, number of sent and received SMS and MMS, and number of bytes uploaded and downloaded. Very often such data is stored in multiple software solutions (prepaid and post-paid transactions for example, can have different software solutions) and it takes a great amount of time to generate summary reports. These reports based on customers' transactions, can be used to create a dashboard in MS Excel that will show the daily statistics. In that way they can also be matched with other information such as customer care data or billing department data.

It is necessary that the telecom workers are well acquainted with figures from the previous day (such as number of new customers, cancelled users or activated vouchers) and able to keep track of all the major changes on a daily basis. For example, a competitor might launch a more competitive tariff. If on the following day they see a spike in service cancellations, they might be tempted to attribute it to the competitor's move. But there may be another reason for cancellation of service such as user dissatisfaction, migration between prepaid and post-paid serviceor fraud, and this information needs to be available. They can order different reports to see if those users ported out or cancelled the service for some other reason, and this information usually comes from different departments. It is important to track both new customers (on different tariffs) as well as sales (vouchers for prepaid users). The data of interest is a number of active and churned users (users that have left the network either because of the SIM card expiration or cancellation of service), the information on changes from one status to the other for both prepaid and post-paid (business and residential), voice and mobile broadband (MBB), and on voucher refills (by voucher denomination). As telecoms have different definitions of active and churned users (based on customer status), it is hard and very often impossible to generate status dashboards in real time (as millions of transactions require hours for performing queries).

One important piece of information in many telecom reports is customer status. This is often stored as a categorical variable that can have one of the following

values: being installed, active in the last 7 days, active in the last 30 days, active in the last 60 or 90 days, expired and cancelled. Telecoms have different definitions of the last activity. It can be based on last generated call, SMS, MMS and data usage or it can be based on service that was charged. So when generating a report, we deal with millions of transactions that are made each second to determine the customer status and track the changes in statuses. It also happens that different information systems have delays as the data need to be uploaded from other systems.

Reports are often generated in a text file at the end of each day so that they can be used in the dashboard the following day. The MS Excel dashboard can be constructed as data sheets (prepaid and post-paid sheets where we can import the ordered summaries from the previous day) and pivot sheets (different sheets for: prepaid voice, prepaid MBB, post-paid residential, post-paid business, post-paid residential MBB, post-paid business MBB, voucher refills). With the help of Visual Basic, we can import the text reports into data sheets by changing a set of parameters (e.g. date), which should be stated in the name of the text report, or we can add the data manually. The data from pivot tables (that are daily refreshed with the ordered text reports) can be called into a sheet that generates the summary.

The summary table should have 31 rows (maximum number of days per month) it would generate summary for each day of the current month. The data from all pivot tables would be imported in each column with the help of GETPIVOTDATA function. We can include forecasts and be able to see deviations from targets, averages etc. Number of port-ins, port-outs, migrations and fraud should be included as well. The graphs would be automatically updated from the summary table. Graphs can show the figures on each day of the month (count of intake, count of customers per tariff, number of vouchers by denomination etc.). It is easy to copy the summary sheet into a new workbook and distribute it across the company without having to distribute the data that were used to generate it. Such a dashboard would be fairly easy to use, as new data need to be added and pivot tables need to be refreshed only once a day. The summary table automatically retrieves the data from the pivot sheets and graphs are automatically updated with new data. It is also cost- effective as such a dashboard is easy to set up.

Dashboards in banking

Banks are very important subjects in the financial system of national economy as they provide an intermediary system between the money owners and money lenders. Although core banking model has not changed much in the past few centuries, modern technology and markets are making a big influence on current banking models and services.

Since dashboards are intended to be structured and aggregated reports which are very easy to read and should provide key information to employees who make decisions they are often called progress reports. For bank managers they provide a quick view of new loans and deposits or other required products. One such dashboard was implemented during late 2014 at a bank in Croatia.

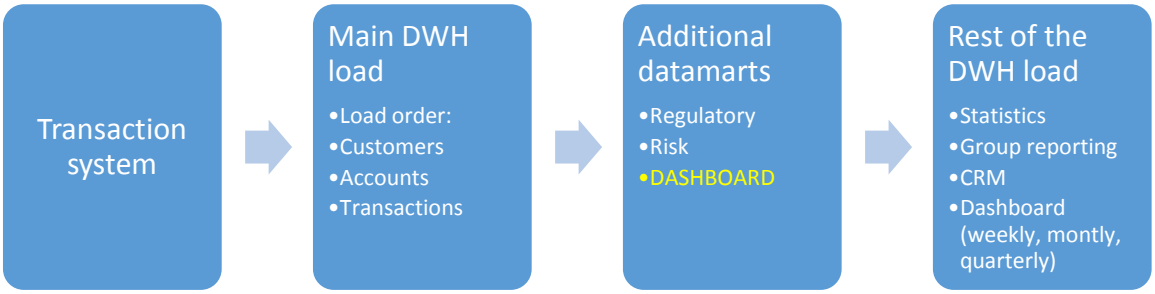
Collecting and preparing data

Data used to create the dashboard's views was taken from a specially created part of the data warehouse(data mart) inside bank's data warehouse (DWH). Every day after the data has been loaded from transaction system into DWH it is transformed into aggregated tables suited for dashboard which group data on various criteria

(some on customer-level and some on account level). These data transformations are created in same ETL tool (Extract-Transform-Load, e.g. DataStage or ODI) used for loading the DWH. It was very necessary to carefully integrate dashboard load into general DWH load because dashboard datahad to be prepared before the workday starts in order to provide key information to management as soon as they arrive to work, but it should not have prolonged the rest of DWH load.

In order to do that, dashboard loading was implemented as a part of the DWH load andstarted right after all needed information was transferred from transaction system to DWH. Dashboard loading is included in the main DWH loading sequence (data transfer from transaction system into DHW) which starts every night at 00:05h. Dashboard is usually loaded between 07:00 and 07:30h after all data about clients, accounts and transactions has been transferred to DWH. Additional processes are triggered to aggregate data into new aggregated tables used for weekly, monthly and quarterly analysis.

Figure 1
Graphical representation of DWH process



Source: Created by author

Presenting the data

Dashboard's interface was created as a Web application and access has been granted to specific users (Board and Management). After implementation they were very satisfied with the presented product as it provided a quick overview of bank's key products over the intended period (day, week, month, quarter). Users have reported that the implemented dashboard features all of the key components: it is well organized, contains relevant information and provides data comparison against previous periods.

Detailed drill-down and drill-through analysis were not implemented in the first step as many other reports were available from DWH/BI department but they are a planned upgrade for the upcoming period. The only form of drill-down was created on the geographical level for the board to see how branches performed and for branch managers to see their summarized data.

To summarize, some pros and cons of this dashboard are listed below.

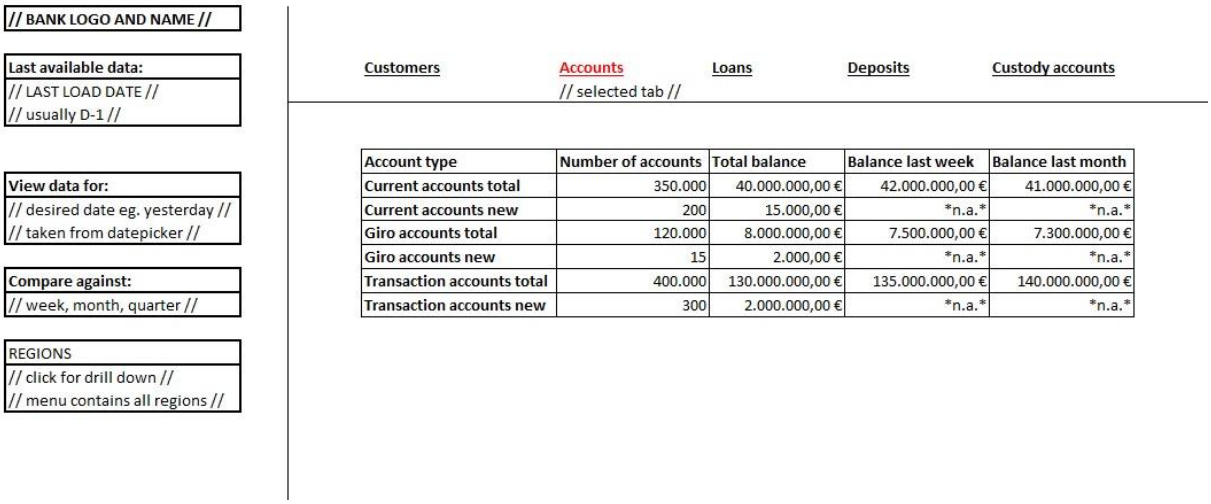
Pros:

- Simple and structured view of the bank's key performance indicators
- Provides key information to management on daily basis
- Enables basic drill-down analysis for quick overview
- Provides data comparison against different periods of time
- Easy to upgrade with new products and services
- For developers: developed in-house with regularly used tools and data
- For users: designed by their colleagues (developers) so it is very user-friendly

Cons:

- Had to be integrated "in the middle" of the DWH load in order to provide data early in the morning
- Does not share any existing analytical tables so some of the resources are wasted
- Monthly and quarterly processes must be run parallel with regular monthly reports which uses up many resources

Figure 2
An approximate view of the implemented dashboard



Account type	Number of accounts	Total balance	Balance last week	Balance last month
Current accounts total	350.000	40.000.000,00 €	42.000.000,00 €	41.000.000,00 €
Current accounts new	200	15.000,00 €	*n.a.*	*n.a.*
Giro accounts total	120.000	8.000.000,00 €	7.500.000,00 €	7.300.000,00 €
Giro accounts new	15	2.000,00 €	*n.a.*	*n.a.*
Transaction accounts total	400.000	130.000.000,00 €	135.000.000,00 €	140.000.000,00 €
Transaction accounts new	300	2.000.000,00 €	*n.a.*	*n.a.*

Note: Design and values are not exact
Source: Created by author

Conclusion

This paper has tried to show three different dashboard case studies which were all implemented at different industries. All of these dashboards had different purposes and different tools available to their creators. Every dashboard has fulfilled its initial expectations for business users and provided key data at the needed moment. They all have some limitations and they will all be revised and expanded in the near future.

These dashboards were all created in full or in part by the authors of this paper by the specification given from their business colleagues or Management. This means that the presented dashboards are highly specialized tools which would not be suitable for other similar companies and therefor these case studies can be understood as examples.

Hopefully these case studies will help professionals and other interested in this thematic to better understand the importance of dashboards in modern business and help them create their own dashboards using one or more tools mentioned in this paper.We suggest that in some future studies there should be focus on out-of-the-box solutions which would be easier to implement and more modular for faster and wider usage.

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Dijana Ćosić graduated at Faculty of Economics and Business Zagreb (University of Zagreb) in 2006. She began her career on RTL Croatia as a database administrator in 2006. In the same year she has published one paper on data mining usage in healthcare, and started working as a data analyst in Valicon d.o.o., then Hendal d.o.o. She accepted a customer intelligence specialist position at Tele2 Croatia where she worked for four years. Valicon d.o.o. and Hendal d.o.o. followed again. Her interests are analytics, data mining, neuromarketing, market research. Author can be contacted at **dijana.cosic@gmail.com**

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Bojan Korizma received master's degree at Faculty of Economics and Business (University of Zagreb) in 2011. His career began as helpdesk administrator where he learned the importance of basic data analytics and providing users with quality data. After that he worked at Raiffeisen Bank Austria d.d. Zagreb as a Business Intelligence Developer for two and a half years. Currently working as Business Intelligence Designer and Developer at Erste&Steiermarkische Bank d.d. Zagreb. He has published two articles on cloud computing in banking and electronic auctions. His interests are data warehousing, data analytics and web application development. Author can be contacted at **bojan.korizma@gmail.com**