

DETERMINANTS OF BUSINESS INTELLIGENCE USAGE IN CROATIAN LARGE COMPANIES

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Abstract: *Application of Business Intelligence (BI) tools have increased in the last few years in the firms worldwide with the goal of increased competitive advantage fulfilled. Among BI tools the most important are reporting, data warehousing (DW), on-line analytical processing (OLAP), data mining (DM) and corporate performance management (CPM). Goal of the paper is to research to what extent Croatian large companies use BI tools, and which factors influence BI tools implementation within Absorptive Capacity Theory (ACT) framework. Croatian large companies have significant role in Croatian economy, what is the main reason why this paper is focused to this group of firms.*

Key words: *business intelligence, Absorptive Capacity Theory*

1. INTRODUCTION

Business intelligence (BI) is relatively new field of information technologies which includes usage of different tools as data warehouse, knowledge discovery from databases, on-line analytical processing for improving business decision making. BI process comprehends data collection, conversion of data into information, information analysis, e.g. conversion of information into knowledge, and finally decision making on the basis of the knowledge acquired on this way (Murfitt, 2001). BI is oriented on information which enables understanding of the past and present period, and on which it would be possible to predict the future processes, events, action or motion, for increasing the competition of the companies, as the final goal (Kalakota & Robinson, 2001).

Researches about BI tools adoption perform in the world in the last decade, and point out the trend of increasing usage of BI tools, although the usage of them is still on relatively low level (Pended, 2009). In the same time, in spite of numerous researches which goal is to define the preconditions of successful information technology implementation, there are still frequent situations in which implementations are not successful (Legris et al., 2003).

Organizations from developing countries specify limited resources (money, experience, employees, management support) as obstacles in new technology acceptance (Diez & McIntosh, 2009), which are important factors for technology usage on which Resource Dependence Theory (RDT) and Absorptive Capacity Theory (ACT) are focused. These theories are explaining success of the new technology implementations (Schneberger & Wade, 2007).

The goal of this paper is to research to what extent Croatian largest companies use BI tools in their business, and specifically different fields of business, levels of management, as well as decisions which are based on the business intelligence systems.

Large companies in Croatia have strong influence on Croatian economy, and by multiplier effect, and increasing their competition has positive influence on economy as a whole. The 400 largest Croatian companies accomplish 47.7 % of total income, 45.2 % of total net profit, 57.2 % of total

export and 61.2 % of total import in Croatian economy and realize about half of total investments.

On the base of this founding we define expectations related to the results of this research:

- Hypothesis 1: Croatian largest companies does not use BI methods sufficiently, and level of tools application differs significantly across the departments;
- Hypothesis 2: BI implementation in the largest scale is defined by limited resources within a company in correspondence with ACT.

2. RESEARCH METHODOLOGY

In order to realize the research target, an original empirical survey was conducted on the basis of a random sample of large Croatian companies, selected from the Institute for Business Researches list of the 500 largest companies in Croatia, by the random choice method. Total sample of 200 companies were selected randomly. The questioner research was performed in September 2008, and from 200 selected companies 68 companies participated in the research, which forms response rate of 34% which is acceptable for this type of research (Sapsford, 2007). The questioner is developed on the research conducted on the BI tools usage (Eckerson, 2006), and after 4 in-depth interviews additionally adapted to specific Croatian circumstances connected to the companies' organizational structure. Questions are also defined according to the RDT and ACT, and applicability of these theories as factors of explication BI tools is tested by regression model. As dependent variable percentage of employees which use BI tools is used and independent variables are grades of the examinee on the Likert scale of importance following factors for BI tools implementations: educated employees, budget, experience, management support and competition between departments. First four factors are typical for ACT, while the last factor is typical for RDT. Those factors emerged during the in-depth interviews used in the interview designing process.

The characteristics of the selected companies are as following: privately owned companies dominate (76%), and smaller number of companies have mixed (16%) or state (7%) ownership. The origin of the company capital in majority is domestic (51%), foreign ownership of the capital is present in one third (27%) of the companies, and mixed ownership in one fifth of the companies (22%). In most of the companies (two thirds of cases 66%) number of employees exceeds number of 250, in one quarter (25%) of companies there are from 50 to 250 employees, and in one tenth (9%) companies there are up to 50 employees.

3. EMPIRICAL RESULTS

The interviewees are asked to express if they are using BI tools such as data warehousing (DW), reporting, on-line analytical processing (OLAP), data mining (DM), and corporate performance management (CPM).

Department	DW	Reporting	OLAP	DM	CPM
Sales	49	65	41	21	7
Ordering	34	43	28	16	6
Finance	40	56	37	15	9
Accounting	35	49	32	10	9
Comptrolling	47	56	38	18	9
Marketing	25	32	25	10	4
Human Resources	16	21	18	7	6
Production	18	19	18	9	6
Research and development	10	13	12	6	3

Tab.1. Usage of BI tools across different departments

According to the results of the research, reporting tools are used in the most of the cases (81%), and in more of the half of the companies' data warehousing (63%) and on-line analytical processing (51%) are used. Data mining (22%) and corporate performance management (9 %) are the least used. This tools use, in average, 15.8% of employees in the companies, with standard deviation of 22.6%.

Table1. presents the percentage of BI tools usage across different departments and one can see that there is a much lower level of implementation at the department level, and there are great differences between departments. For example, DW is used in 49% of sales departments and 18% of production departments.

Respondents estimated the importance for the educated staff, budget, experience, management support and competition among departments, on the Likert scale from 1 to 5, with 1 as the not important factor and 5 as very important factor, and mean values are calculated. Respondents rated in average educated staff as the most important (4.538), second group consist on the budget (3.346), experience (3.442) and management support (2.942) while competition among departments have the lowest grade in average (2.288).

In order to explain BI tools usage within the RDT and ACT framework, the model of multiple regression was estimated, where the percentage of employees that use BI tools in the company is dependent variable, and RDT and ACT factors are independent variables. The results are presented in the Table 2, where estimated values of regression parameters are presented with *p*-values in the parenthesis and two parameter estimates for the ACT factors (budget and management support) are highly significant. RDT factor (competition among departments) is not statistically significant.

The value of Adjusted R-Square is quite low (0.293), what means that some other variables exist, which are not included in this model of multiple regression, but they have a significant influence on dependent variable, what is the limitation of this research.

		Regression coefficients
Constant		-22,073
Independent variables	Educated staff	-3,126
	Budget	8,852**
	Experience	2,354
	Management support	4,914*
	Competition among departments	-0,040
	Adjusted R-Square	0,293

Tab. 2. Results of multiple regression model: Share of employees who use BI tools – dependent variable

** statistically significant at 1% level

* statistically significant at 5% level

4. CONCLUSION

The results of research suggest various usages of different tools among large firms. Reporting is the most used tool, because this tool is completely automated and static; it does not require high level of knowledge and active usage. In addition, reporting tools are used for delivering reports to the users at all management levels. DW is the second most used tool, but it is often a prerequisite for the other tools surveyed. Indeed, OLAP, DM and CPM are used only in those firms that also have implemented DW with only few exceptions. Only 15% of employees in average use BI tools, but the adoption of BI tools differs among departments. The largest percentage of usage BI tools is in the departments which are under the most pressure for delivering immediate results (Sales) or communicates with the management (Comptrolling). BI tools are also implemented often in accounting departments, and those departments that are under pressure to save the money (Ordering) or to keep an eye on liquidity (Finance), which further indicate that the acceptance of BI tools could be connected with the management support. Such findings support our first research hypothesis that Croatian largest companies do not use BI tools in greater extent, and the usage of BI tools differs significantly among the departments.

The acceptance of BI tools could be interpreted successfully within the framework of ACT that indicates a limit to the acquisition, assimilation and exploitation of information in organizations as a result of insufficient resources (budget and management support), which supports our second hypothesis. Other typical factors were tested for ACT (educated staff and experience), and for RDT (competition among departments), but they are not identified as important for level of acceptance of BI tools, measured by the percentage of employees that uses BI tools. This conclusion confirms that without money and management support firms will not utilize the best possible tools to gain competitive advantage (Díez & McIntosh, 2009).

The future studies should be aimed at adoption of other BI tools specific usage within medium-sized and small firms and to test step-by-step BI tools implementation approach for such firms that are usually budget constrained. Also, the best possible ways for getting management support also should be a subject of further research hence, as an important determinant of the level of BI tools usage within organizational settings.

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