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BUSINESS INTELLIGENCE IN CONSOLIDATION OF FINANCIAL STATEMENTS

BUSINESS INTELLIGENCE W KONSOLIDACJI SPRAWOZDAŃ FINANSOWYCH

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Summary: The aim of the paper is to analyze the use of Business Intelligence systems in the process of the financial consolidation and reporting in enterprises. This study describes the approaches adopted by companies while preparing consolidated financial statements. The paper is based on critical analysis of academic papers and vendor-specific consultants. The findings reveal that a spreadsheet can be sufficient for a simple consolidation usage. However, a dedicated consolidation software should be implemented when the structure of the group is complex. The consolidation software can add value to the organization by improving efficiency and maximizing information use.

Keywords: consolidation, consolidated financial statements, reporting, Business Intelligence.

Streszczenie: Celem artykułu jest analiza wykorzystania systemów *Business Intelligence* w konsolidacji finansowej i raportowaniu w przedsiębiorstwach. Artykuł opisuje podejścia stosowane przez spółki przy sporządzaniu skonsolidowanych sprawozdań finansowych. Opiera się na krytycznej analizie artykułów akademickich, opracowań, dokumentacji, a także instrukcji dostawców oprogramowania. Do prostej konsolidacji może być wystarczające użycie arkusza kalkulacyjnego. Gdy struktura grupy jest złożona, należy wdrożyć właściwe oprogramowanie konsolidacyjne. Oprogramowanie do konsolidacji może wnieść wartość dodaną przez poprawę wydajności i maksymalizację informacji.

Słowa kluczowe: konsolidacja, skonsolidowane sprawozdania finansowe, raportowanie, *business intelligence*.

1. Introduction

Modern enterprises have to operate on the global market with strong competition and high client expectations. Information is the most important asset for the knowledge-based economy and its leveraging is a key success factor for companies and whole societies [Olszak 2013]. International companies face challenges in their financial reporting, especially consolidated. There are numerous factors that make the consolidation process time consuming and error-prone, for example the complex multi-level organizational structure of the group, entering new international markets, and related to this – mergers, acquisitions and finally pressure to report quickly and accurately. The usage of business intelligence can improve the efficiency and effectiveness of consolidated financial reporting.

The aim of the paper is to analyze the use of Business Intelligence (BI) systems in the process of the financial consolidation and reporting in enterprises. Pursuant to the literature review, there is still a gap in the academic publications on this topic. The literature search which was performed with the terms “business intelligence”, “Consolidated financial statements” and “consolidated accounts” in Google Scholar clearly confirms a research gap.

The study is based on a critical analysis of academic papers and vendor-specific consultants (such as Oracle, Microsoft Dynamics, BI360) to examine the use of BI in the process of the consolidation of financial statements.

The paper consists of five sections. The introduction states the aim of the research, the second section presents the literature review on Business Intelligence and consolidated financial statements. The next section describes the consolidation process which uses Business Intelligence. Finally, the paper presents a conclusion as well as suggestions for directions for further analysis.

2. Consolidated financial statements

2.1. Business Intelligence

The term “Business Intelligence” (BI) appeared before the technology development. It was introduced by Richard Millar Devens in 1865. Devens described the way banker Sir Henry Furnese obtained and used relevant information to win business. In terms of computer science, the term was used for the first time by Hans Peter Luhn in 1958 (IBM) who defined BI as “the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards desired goals”. In 1989, Howard Dresner (Gartner Group) described BI as an umbrella term that covers “the concepts and methods to improve business decision-making by using fact-based support systems.” In the 1990s the notion of BI became widespread, and in contemporary literature researchers propose various definitions. For instance, BI is described as “the process of taking large amount of data, analyzing them and

presenting a high-level set of reports that condense the essence of that data into the basis of business actions, enabling management to make fundamental daily business decisions” [Stackowiak, Rayman, Greenwald 2007].

BI encompasses software and a wide array of processes which are used to collect, analyze and disseminate data for better decision-making [Davenport 2006]. These processes turn data into information and information into knowledge in order to optimize decision-making and manage business performance with the goal to improve the profitability and competitiveness of the business. The term business analytics (BA) was introduced in the late 2000s and represents the key analytical component in BI [Davenport 2006].

The architecture of BI is heterogeneous and consists of several layers [Olszak 2013; Quda 2016]:

1. The data source layer – Operational database – data from Transactional Processing System (TPS) supporting day-to-day business operations as well as other internal sources and external data from business partners, the Internet, governments, market research.

2. The data integration and transformation layers – the process of transforming data using Extraction, Transformation and Load (ETL) tools.

3. The data warehouse layer – integration of distinct data from multiple sources, encompassment used for storage, aggregation and analysis of data.

4. The presentation/end user layer – tools that display information in different formats (dashboards, scorecards, multimedia interfaces) to users. Query and reporting tools, online database processing (OLAP), data mining, analytical applications provide functionalities of forecasting, modeling, analyzing sales, and what-if scenario.

BI application areas comprise, among others, retail industry, insurance, banking finance and securities, telecommunication and manufacturing industry. The adoption of BI analysis brings the most significant effects in the following areas: supporting cross and up selling, customer profiling and segmentation, analysis of parameters importance, survival time analysis, customer loyalty analysis, credit scoring, fraud detection, logistics optimization, forecasting of strategic business processes development, web-mining, and web-farming [Olszak, Ziemia 2006] .

BI covers many areas of data analysis in enterprises’ financial services, among others [Quda 2016]:

- Relationship marketing – e.g. market analysis, customer loyalty, customer complaints;
- Performance management – e.g. profitability analysis, customer lifetime value;
- Risk management – e.g. credit risk assessment, liquidity risk, security analysis;
- Assets and liability management – e.g. income analysis, interest rate sensitivity, credit loss provision;
- Compliance – e.g. financial capital adequacy analysis, balance sheet portfolio analysis, transaction activity analysis.

The rationale behind the application business analytics is the following: achieving competitive advantages, support of strategic and tactical goals, better organizational performance and decision outcomes, production of knowledge and obtaining value from data [Holsapple et al. 2014].

2.2. Consolidated financial statements

The consolidation of financial statements, caused by upcoming conglomerates, appeared in the United States at the beginning of 1900s. Great Britain issued rules of consolidation in 1939, but made them compulsory with the “Companies Act” of 1948 [White 2015].

In Poland, consolidated financial statements are regulated in the Accounting Act of 29.09.1994 (consolidated, 2019, item 351) and the Regulation of the Ministry of Finance of 25.09.2009 on detailed rules for the preparation of consolidated financial statements of capital groups by entities other than banks, insurance companies and reinsurance companies (consolidated 2017, item 676).

Since 1 January 2005 – according to Regulation (EC) 1606/2002 of the European Parliament and of the Council of 19.07.2002 on the application of international accounting standards – consolidated financial statements of all listed companies, as a mandatory rule, should be prepared pursuant to International Financial Reporting Standards (IFRS) as adopted by the EU. The consolidated financial statements are defined in IFRS 10 Consolidated Financial Statements, issued in 2011 by the International Accounting Standard Board (IASB), as the financial statements of a group of companies in which the assets, liabilities, equity, income, expenses and cash flows of the parent company and its subsidiaries are presented as those of a single economic entity. The consolidated financial statement is presented by the parent company [IFRS.10.4] from the date on which the investor obtains control until its loss [IFRS.10.20]. In the group of companies, the parent company is the entity that controls the others, which are called subsidiaries. The control will take place when the investor is exposed, or has rights, to variable returns and the ability to affect those returns through its power. The non-controlling interest (NCI) is the part of the equity in the subsidiaries which is not attributable to the parent company directly or indirectly. The structure of the group of companies can have one or many stages, in the multi-level group there are higher and lower level parents and subsets of companies.

For many years consolidated financial statements have been considered to be more important than statutory ones – pursuant to Accounting Research Bulletin (ARB) 51 from August 1959 “there is a presumption that consolidated financial statements are more meaningful than separate statements and they are usually necessary for a fair presentation when one of the companies in the group directly or indirectly has a controlling financial interest in the other companies”.

3. Literature review

BI systems are used by a wide group of enterprises, hence BI has become an important subject for both academic researchers and business practitioners, especially over the past three decades.

Rikhardsson and Yigitbasioglu in 2017 analyzed academic papers in the period 2005-2015 in the Australian Business Deans Council Journal quality list. They found 27 articles on BI relevant to management accounting. The authors divided the methods used in papers into: conceptual – theoretical model building (37 percent), experimental (30 percent), surveys (15 percent), case studies (11 percent), literature review and archival (both 4 percent) [Rikhardsson, Yigitbasioglu 2017].

The research on the effects of using BI systems in an excellence management and decision-making process were conducted in start-up companies [Azeroual, Theel 2018]. Based on the BARC report, the researchers indicated that BI was used in start-ups mainly in controlling (89 percent), management (70 percent), sales (57 percent) as well as accounting and marketing (both 38 percent). BI is mainly used in data analysis (97 percent), reporting (84 percent), 58 percent focuses on planning and budgeting, and 49 percent on forecasting and rolling planning.

The conducted research on business analytics in the finance department based on the literature reviews of leading journals indicates a research gap, particularly in the area of consolidation [Esswein, Chamoni 2018]. The literature classification framework has two dimensions: the accounting activities, which consists of three parts: booking, statutory reporting, consolidation, while management accounting comprises: strategic cost management, performance measurement, planning and decision making, and support in financial statement preparation. Although the consolidation is a complex process, the results of the analysis show that management accounting has attracted more attention than financial accounting and business analytics, which have not been examined and still need to be investigated.

4. Consolidation process using BI

The process of preparing consolidated financial statements may be divided into several phases (Figure 1).

The consolidation starts with the setup of a consolidation model to project the whole process. It consists of the identification of the obligation – both the Act of Accounting and IFRS contain exemptions and exceptions from the consolidation. This phase comprises: recognizing the group of companies (consolidation scope) by determination of the control, methods of consolidation (full, proportional, the equity method), as well as the people involved in the process, planning the sequence of events, and preparing instructions. The key issues at this stage are the standardization of the accounting principles and the closing date. According to the regulations: the accounting policies in the group should be uniform [IFRS.10.19], if they differ,

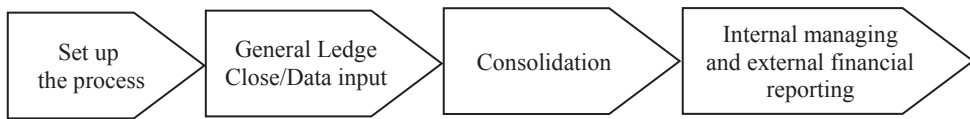


Fig. 1. Phases of the consolidation process

Source: author's own work.

appropriate adjustments must be made [IFRS.10.B87]; the reporting date of the financial statements of the parent and subsidiaries should be the same. If the end of the reporting period of the parent is different from that of a subsidiary, the subsidiary will prepare additional financial information as of the same date as the financial statement of the parent for the consolidation purpose [IFRS.10.B92]. The expected practice is the preparation of the parent's management instruction which comprehensively defines the accounting principles, disclosure requirements, reporting segments, approaches to intra-group transactions and unrealized profits [Zielke 2017].

The effectiveness of consolidation relies on input data, so the phase of gathering data from subsidiaries by the parent company is crucial. Depending on the complexity of the consolidated financial statements which is affected by the size of the group, relations and transactions between companies, the parent chooses an appropriate tool that supports the entire process. The approaches to the preparation of consolidated financial statements are presented in Table 1.

In Poland, the MS Excel is still used by most organizations as a consolidation tool, only the biggest groups of companies implemented dedicated solutions – financial consolidation and reporting applications [Sumiński 2010]. The financial consolidation and reporting applications are part of Enterprise Performance Management (EPM) systems. One of the vendors – Oracle – defines EPM as processes designed to help enterprises plan, budget, forecast, proceed with financial close and consolidation, and finally report on business performance.

If a manual spreadsheet is used, the parent prepares a consolidation packet as a template and sends it to all subsidiaries. The consolidation packet facilitates gathering and grouping specific financial data from subsidiaries to provide comparable and complete information. For medium-sized companies, filling spreadsheets manually can result in difficulties with data accuracy and maintenance of the process. In this situation, the next level is using Enterprise Resource Planning systems (ERP) as a consolidation tool, but due to manual eliminations this solution cannot meet the requirements of a more structured consolidation, besides ERP is a transactional system with limited reporting possibilities. The most advanced approach used to manage financial statements consolidation is an external tool – dedicated software which involves BI.

On foreign markets there are also available applications based on cloud computing, such as Software as a Service (SaaS), for which access is paid monthly or there is an

Table 1. Tools used in the consolidation of financial statements

Approach	Specification	Example	Description	Strengths	Weaknesses
General tools	Elementary, manual processing with spreadsheets	MS Excel worksheet	The spreadsheet template is prepared by the parent and sent via e-mail to subsidiaries. The spreadsheet is updated and sent back.	Low cost, easy to implement	Difficulties with maintaining the spreadsheet, no audit trail
	Generic data warehouses	Tailor-made, dedicated solution	Coded, indexed data are loaded from an accounting system to a data storage system, in which calculations are performed and a report is generated.	Customization capability	IT project requires programming and maintenance, inflexible
ERP System	G/L (general ledger) platform	The intercompany Integration Solution for SAP Business One	Creation of dummy consolidation company which allows journal entries of all branch companies.	ERP systems typically have such functionality and support consolidation.	Not sufficient for complex, sophisticated consolidation, not practical if not all companies use the same ERP.
	Global template	Microsoft Dynamics NAV	Standardizes operations in and financial data transferred from subsidiary.	High quality of financial data	It does not incorporate any extended functionality for intercompany eliminations.
Dedicated consolidation software	EPM systems with BI	BI360, Hyperion Financial Management, IBM Cognos Controller	Ability to maintain and control of all aspects of the reporting and consolidation.	Automates activities, limits manual entries and probability of making mistakes.	Time consuming and demands high financial investments

Source: author's own work based on white papers of Oracle, BI360.

annual subscription fee, examples include LucaNet, BoardPC, and Ten Key ATB. The applications also support financial consolidation and reporting, but due to the lack of a Polish language version adapted to local conditions, such software is not used in Poland.

Due to the consolidation software, data collection is fully automated – data are uploaded from accounting systems to the data warehouse – the central database. There are several ways to load data: using an ETL tool (for example: Microsoft SQL Server Integration Services) or a built-in tool to extract data from accounting software, inputting data from files [Solver Inc. 2017]. The software delivers the following functionality: validation of the data accuracy, automatic generation of opening period, diagnostic check and quality controls with alerts. It is also possible to implement a standardized global group of accounts which includes a country-specific account range (for example for VAT local regulations). The data are collected on a monthly, quarterly or annual basis after the financial close. The financial close is a set of sequential steps requiring alignment and a clear direction across the entity – it consists of closing subledgers (Accounts Receivables, Accounts Payables, Inventory, Fixed Assets etc.) into the General Ledger, preparing accruals and prepaids, making judgments and estimates, and preparing closing entries [Chhabra 2010].

The next phase is the consolidation to reconcile, translate, eliminate and consolidate financial information. Reconciliation involves confirming the reliability of accounting records by comparing to corresponding balances in other entities. Translation takes place when the group consists of foreign subsidiaries whose financial statements must be translated to the parent's presentation currency. The translation proceeds, as described in International Accounting Standard 21 – The Effect of Changes in Foreign Exchange Rates, which translates into: assets and liabilities at closing rate, income and expenses at exchange rate at the date of transaction, resulting exchange differences are recognized in other comprehensive income. The software automates the translation process. The consolidation runs according to the procedures [IFRS10.B86] as follows:

- Combination items of assets, equity and liabilities, as well as income, expenses and cash inflows and outflows of the parent company and subsidiaries.
- Elimination of the carrying amount of the parent company's investment in each subsidiary.
- Offset in full amount of assets, liabilities, income and expenses which raised in intra-group transactions.

The consolidation adjustments, elimination entries, and calculation NCI can be done automatically, but the software also allows companies to make manual corrections. It is possible to view the sequence of entries and the software provides detail audit trails.

The last phase is reporting. The consolidation software enables companies to prepare a variety of external and internal reports. The statutory requirements come from many sources [Oracle 2014], e.g. in the USA, from the Financial Accounting Standards Board (FASB) which publishes financial and reporting standards; in

Europe and other countries from the IASB, regulated industry (for instance banking, insurance companies must comply with special accounting requirements), government – rules also derive from local authority or stock exchanges, the Sarbanes Oxley (SOX) Act, and the tax authorities.

The software produces a complete set of consolidated financial statement consisting of a balance sheet, a profit and loss statement, cash flow, changes in equity as well as notes to the financial statements. In addition, the consolidation software supports sustainability reporting following Global Reporting Initiative (GRI), financial reports may be also fulfilled in XBRL format.

Additionally, the software supports generating internal reports for management purposes. Except for trial balances, the system may also collect the unstructured data. Apart from the consolidation, the software includes budgeting, forecasting, financial modeling, ad-hoc reporting to help the model roll-up and evaluate the alternatives, for instance, to check the tax impact after changes in the legal structure [Solver Inc. 2017]. In the presentation layer, the consolidated data may be viewed from many perspectives (by currency, geographical region). Dynamic reports are generated period over period or multi-period, using pre-built web-based visual analytics and dashboards. Due to calculating KPIs and peer benchmarking (comparing companies in the industry or region), the software enables a more accurate and faster decision-making process.

5. Results and conclusions

The purpose of this paper is to give an insight into the process of financial consolidation using BI systems. When consolidation involves a group of a simple structure (a few entities, single level and currency, constant scope) manual processing with spreadsheets is suitable. On the other hand, the consolidation of complex groups with elementary tools like Ms Excel is not sufficient, so enterprises implement financial consolidation and reporting applications. Implementing EPM systems speeds the financial close and reporting cycle. High quality reporting is viewed favourably by investors and management. In addition, EPM systems can add significant value to the organization through the integration of reporting with forecasting, budgeting, financial modeling, improving efficiency, and the maximization of information.

The magnitude of the benefits after the implementation may be found in the white-papers of the vendors, for instance Oracle Hyperion Financial Management [Oracle 2014]:

- 32% less time spent creating monthly internal financial reporting and 26% for external reporting respectively,
- 36% fewer monthly manual adjustments.

The growing requirements of stakeholders, who demand increasingly more detailed disclosures of financial and nonfinancial information, make reporting more

complex and hence the usage of the EPM technology in enterprises will increase. For the above reason, and due to a gap in academic studies, there is a need for further research covering surveys in the Polish companies.

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