ASSESSMENT OF THE INTEGRATION OF THE ACCOUNTING INFORMATION SYSTEM IN SMALL AND MEDIUM LITHUANIAN ENTERPRISES

Arūnas Butkevičius

Doctoral Student
Department of Economic Information
Vilnius University
Sauletekio al. 9, room 411 (II building)
Vilnius, Lithuania
Tel. (8 5) 249 70 44
E-mail: arunas.butkevicius@eh.vu.lt

Abstract. *An accounting information system (AIS) plays a key role in providing the financial information for decision making within an organization. The degree of usability and value of the information provided by an AIS largely depends on its timeliness and quality. Both can be improved by the participation of the non-financial stakeholders in its preparation, and by its reuse across multiple business processes.*

The goal of the research was to investigate AIS integration models in Lithuanian small and medium enterprises, and to determine the prerequisites and obstacles for their integration with the business processes and external information systems. A number of Lithuanian business companies were visited to investigate their information systems. Interviews with the accounting personnel were conducted and the related documentation was inspected. The object of the research was a set of problems concerned with the use of the information provided by the entity's accounting information system in other functional areas for decision making purposes. Issues involving the preparation and communication of the accounting information for the use of external stakeholders were considered as well.

The results of the research showed that the degree of integration of the accounting information systems of small and medium Lithuanian enterprises with their business partners and state institutions remains low, although prerequisites for the integration in some cases are in place.. Obstacles that preclude closer integration with external the systems are the relative inflexibility of the accounting software, the lack of use of the contemporary information and communication technologies, and high investments. To encourage closer integration within the systems, the Service Oriented Architecture should be provided, and be open for Data Integration, easy customization, and extensibility.

Keywords: *accounting information system, business process integration, e-Government.*

Introduction

The dynamic and competitive environment of the business world makes high demands on the timeliness and reliability of the information used for decision making. The success of a business largely depends on the quality of decisions made, and the quality of further decisions depends on the relevance and timeliness of the information.

Decisions are made throughout various departments of an organization and are usually based on the information prepared and stored by those departments themselves. It may be presumed that the lack of integration between departments tends to result in the duplicate and inconsistent information, which is the cause of inefficiency and inaccuracy in making decisions. Furthermore, departments may tend to optimize their decisions for achieving goals set for them and thus neglect the overall goals of an organization. These reasons clearly demonstrate the need for a closer internal integration of business processes between departments.

The primary goals of a business entity are maintaining its short term liquidity and earning profits in the long run. The success of a business in achieving these goals is measured by financial terms. The lower level goals of individual departments that contribute to the achievement of these overall goals are usually measured in financial figures. This financial information is produced by an accounting information system.

The accounting information system records events and transactions, and produces information for the evaluation of the overall success of a business entity, i.e. information on its financial position, financial performance and cash flows. It also serves as a basis for facilitating future decisions. Conversely, financial information is historical. It is a representation of past events and transactions that may be irrelevant for the future decision making. Still, it serves as a good basis for realistic future plans.

The role, which the accounting information system plays in measuring the success of an entity and providing information for the decision making, makes it the backbone of the information system of an organization. This is illustrated by the fact that implementing their Enterprise Resource Planning (ERP) system nearly all companies adopt financial and accounting modules (Juozapavičius et al, 2009). Integrated management of organizational processes is a prerequisite for the improvement of competitiveness. An accounting information system plays athe role of an integrator of the information processes.

World class ERP systems such as SAP, Oracle or MS Dynamics AX are costly and hardly affordable for the majority of small and medium Lithuanian enterprises (SME). Smaller companies choose locally developed accounting systems with a limited functionality that fail to integrate easily with the other information systems in use. This situation leads to the duplication of information and to subsequent inefficiency. The problems of the integration of the information systems were analyzed by Lithuanian researchers and practitioners (Juozapavičius et al, 2009, Kiauleikis et al, 2006, Bagušytė et al, 2007). Juozapavičius et al. (2009) analyzed the demand for the automation of process management systems in Lithuanian SME, the current situation of automation, described the weaknesses of the systems in use, and provided recommendations for overcoming those weaknesses. The research by Juozapavičius et al. was supported by the EU co-financed project "Integrated, Flexible and Open System of Automated Organizational Process Management for Small and Medium Enterprises: Applied Research and the Development of a Software Demo Version".

Their findings can be used in further scientific research and in the development of software packages for the business process management systems. The problems concerning the creation of an integrated accounting information system within the Lithuanian context and its subcomponents were also analyzed by Domeika (2008).

Object of the research. The object of the research is a set of problems utilizing information provided by an entity's accounting information system in other functional areas for decision making purposes. Issues regarding the preparation and communication of the accounting information for the use of external users are considered as well.

Goals of the research. Typically, all companies have an accounting information system for processing transactions that have an impact on their financial position, financial performance, and cash flows. The aim of the research was to examine the integration of an accounting system with other business processes, i.e. to find out to what extent other business processes rely on the accounting information in making decisions (internal integration), how external users base their decisions on the accounting information (external integration) and, on the basis of the research results, to provide recommendations for the development of integrated accounting information systems. The intent was to analyze the role of an accounting information system as an information system integrator for a business entity.

To achieve this aim, the following objectives have been dealt with:
- To investigate the current state of the internal (within an organization) inte-

gration of the accounting information system in small and medium sized Lithuanian enterprises (SME). This includes determining the extent to which the accounting information system processes and stores information that originates in other functional areas of business entities, such as manufacturing, supply chain management, customer relationship management, human resources, investments, etc. How this information contributes to the decision making was a point of interest as well.
- To investigate the accounting information flows to the external users and evaluate the level of integration with the external information systems.
- To outline the best practices and prerequisites for determining the possibilities for the further internal and external integration.

Research methods. The method used for the research was the analysis of the information gathered during visits to small and medium enterprises, observation of their operations, and researching of their information systems. The main business processes in Lithuanian business entities were identified and the level of their automation and integration with their accounting information was analyzed. Special attention was paid to the processes susceptible to integration that can yield the largest savings in costs, increase in efficiency and competitiveness.

52 business entities from various industries were selected for the research purposes. The research was conducted together with the financial statement audit of those business entities. Among other pro-

cedures, an audit involves the assessment of the information system, including the related business processes relevant to the financial reporting, and communication, as laid down by the International Standard on Auditing 315.

In most cases, the information systems were reviewed in companies that are subject to a statutory audit. Such companies are usually larger, with a more complex organizational structure and business processes, and possess more sophisticated information systems than average business entities. On average, the balance sheet total (total assets) of the companies reviewed was LTL 14.6 mln., with an average income of LTL 18.3 mln. The average number of employees was 69.5, with the largest company having as many as 602. The companies were large enough to justify the analysis of their accounting system integration with their other business processes.

Interviews and inspection of a business entity's documentation were targeted at the determination of the communication and data flow patterns between the accounting personnel and other areas of the organization. Interviews were held with employees, and primarily with those in charge of the preparation and presentation of the accounting information. The analysis of information systems also involved a review of the accounting software used, and the procedures established for the initiating, processing and recording of business transactions as well as the procedures concerned with the accounting of the entity's assets, liabilities and equity. The analysis of software was based on the evaluation of its functionality (operation) and design (database structure), with the emphasis on its suitability for the integration with other business processes.

Accounting information system

One method to improve the productivity of management and other employees is the automation of information systems. Contemporary information systems have more or less automated processes. The major reasons for implementing automated information systems are the savings in employee time in executing business processes, cost savings, and increases in competitiveness (Juozapavičius et al, 2009). Higher operating effectiveness and efficiency help to reduce employee time, which obviously leads to the payroll cost savings. On the other hand, automated information systems improve income growth prospects by extending markets and enabling a better satisfaction of customer needs. Consequently, it can be generalized that automated information systems contribute to the achievement of the main business goal of long-term profitability by lowering costs and increasing income.

Another improvement method is the integration of information systems, i.e. linking them together. Just as in the case of automation, system integration assists in achieving organizational goals by the increase in the transaction processing efficiency and in the quality of decisions made. The success of information systems in achieving these goals largely depends on the initial analysis of the situation and the identification of the opportunities for improvement. One important area of such analysis that contributes to the efficiency is the possible integration of the new systems with the other systems in use (Simanauskas, 2008, pp. 39–46).
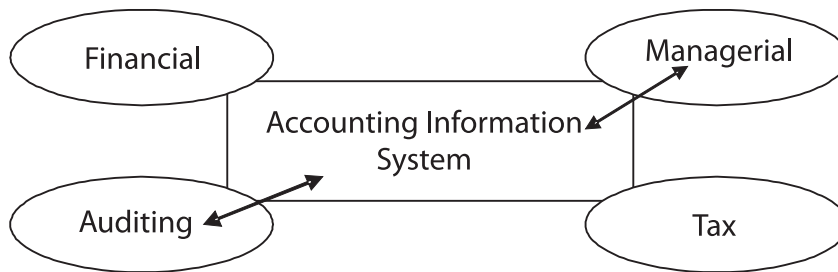
Figure 1. **The sub-disciplines of accountingSource: Baker, 2007, p. 396**

The diversity of elements, subsystems, and their relationships determines a huge range of information system variety. A common way to classify information systems is by their functionality, e.g. [23]:
- Transaction processing systems
- Management information systems
- Decision support systems
- Expert systems
- Office Automation
- Business intelligence.

Probably the most widely used are the data processing systems for the processing of accounting data. Algorithms for the processing of accounting information are usually simple and made of basic arithmetic and aggregation processes (Simanauskas, 2008, pp. 41).

The accounting information system (AIS) is the focus of accounting discipline. It can be subdivided into several sub-disciplines, including financial, managerial, auditing, tax, and the accounting information system as shown in

As depicted in Figure 1, the AIS has closer links with auditing and managerial accounting. The AIS tends to be based on the needs of its internal users. Hence, the AIS has closer links with those, (i.e. managers) who use the information for decision making and auditors who review the design

and evaluate the operating effectiveness of the AIS. The information requirements of tax and financial accounting are usually set by the outside authorities and are designed just to meet the legal requirements in the first place (Baker, 2007, p. 396-397).

The objective of meeting the information needs of the internal users in the most efficient way by providing high quality and timely information at low cost provides the incentive to integrate the AIS with the other information systems within the organization. Furthermore, integration with the internal systems that are under the control of the same organization is much easier to accomplish, rather than with systems that have been developed externally. Nonetheless, there are attempts to integrate the AIS with the external parties as well. The other reason that prioritizes internal integration over external is that the information flow between the internal users is much more extensive than with the external users. The internal users consume information to make their day-to-day decisions. External communication is done in a less intense pattern, and usually in time periods set by the legal requirements. It tends to be a one-way communication of either gathering external data or submitting information to the external users.

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*Table 1. **Accounting software installations in researched companies***

Manufacturer	Software package	No of instal- lations	DMBS	Average assets	Average income	No. of emp- loyees
UAB "Rivilė"	Rivilė	12	MS SQL Server	13.386.892	16.051.719	77
Firma "PROTAS IR LOGIKA"	Agnum	6	Firebird	13.852.307	14.646.348	64
UAB "Proringas"	Pragma	4	MS Access	9.642.411	12.526.712	117
"EDRANA"	Profit-W SQL	4	SQL Anywhere	20.153.223	6.822.488	66
UAB „STEKAS"	Stekas	3	Paradox	13.233.500	50.315.454	27
Microsoft	Dynamics AX	3	MS SQL Server	67.137.235	76.645.204	242
Epicor	Scala	2	MS SQL Server	3.119.163	7.822.905	8
Natural person	Paulita	2	Pervasive	7.752.329	4.633.496	56
UAB "Finansų valdymo sistemos"	Finvalda	2	SQL Anywhere	7.939.896	12.463.078	84
UAB "DB topas"	Apskaita	2	Advantage	17.353.086	4.105.941	18
UAB "Būtenta"	Būtent	2	Visual FoxPro	222.377	11.625	5
SAP	SAP	1	SAP MaxDB	4.659.600	17.723.545	70
UAB "Prototechnika"	Euro Skaita	1	MS SQL	3.218.749	9.031.387	18
Total:		**52**				

A key element of a computerized accounting information system is software. The use of accounting information for the recording of transactions and decision making in other business processes depends to a large extent on the functionality of the accounting software.

Software programs used in the companies researched ranged from primitive accounting packages with basic functionality to the sophisticated ERP systems. As Table 1 indicates, Lithuanian companies prefer locally developed accounting software. Only 12 per cent of the companies reviewed had extensive ERP systems (SAP, MS Dynamics AX, Scala) installed. Predominantly, larger companies opt for an imported system, whereas smaller companies choose systems of local origin. On average, the assets, income and number of employees are smaller in the companies that use local software (see Table 1). The main reasons for choosing local software are that it is cost effective and tailored to local settings. Conversely, ERP systems offer more flexibility for processing and using information that originates in other business processes. Therefore, they are more readily accepted by non-accounting personnel. This increases the chances of successful integration of business processes with the accounting function.

The information in Table 1 is not intended to reflect the popularity of accounting software in Lithuanian companies because of the small number of companies researched, but instead serves as a broad indicator.

Accounting information system integration with external information systems

Models of the External business process integration

External integration can be analyzed in the context of business models. There is no formal classification of business models, but the following are used widely (Jovarauskienė et al, 2009, p. 85):

- Business-to-business (B2B) model: business processes between business entities.
- Business-to-government (B2G) model; business processes between businesses and state institutions.
- Business-to-consumer (B2C) model: business processes between business entities and final consumers.

Business-to-business. Probably, the most obvious way for the integration of an accounting information system with external business partners is through the replacement of paper documentation with electronic documents. The transfer of documents electronically enables the integration of distant business applications by utilizing the means of information exchange in a predefined format between separate entities. This enables communication between independent information systems without manual intervention. The goal is to replace paper documentation with electronic files. The exchange of paperless documents allows faster, more reliable, and cheaper execution of business processes. Encryption and digital signatures also means better protection of information than traditionally signed paper documents.

The research showed that this is an unexplored area in Lithuanian companies. None of the companies reviewed employed methods to exchange documentation electronically in a predefined format with their partners. The primary obstacle preventing it is the lack of standards. The requirement of the electronic data interchange is that messages should have a well-structured standard format (Vlčková, 2006, p. 130). This is an opportunity for an immense improvement in efficiency and cost savings by the integration of the accounting information systems with customers and suppliers. Therefore, the creation of data exchange standards, e.g. based on XML, should be a priority. Moreover, Lithuanian entities exchange documentation with their business partners in a form that is readily receptive to standardization, such as invoices and goods order forms. E.g. the Law on the Value Added Tax prescribes information that must be contained on a sales invoice. Obviously, there is a need to develop a standard for the exchange of invoice data or goods order forms between business partners electronically. The idea of the standard can be similar to that of LITAS-ESIS – a standard developed by the Lithuanian Bank Association for exchanging payment details between banks.

Another area for the external integration is e-banking. The majority of business transactions end up in a cash receipt or disbursement. Banks and entities basically hold the same information on the payments. The synchronization of such information and the elimination of duplication should lead to considerable cost savings. Furthermore, banks themselves exchange information on the payments in a predefined standard format. The Association of Lithuanian Banks has an approved stan-

dard format (LITAS-ESIS) for the bank statements and the import-export data of payment documents. The same format can be used for the import and export of the data between an entity and a bank as well.

Although nearly all accounting software reviewed was implemented to support the export of payments, hardly any of it was implemented to support the import data function. This is due to the fact that disbursements are prepared on the basis of the structured information existing in an accounting system. On the contrary, import data is less structured because it originates from the external sources.

Business-to-government. Although the research showed that integration between Lithuanian business partners is virtually non-existent, business-to-government models showed better practices. Legislation prescribes obligations for business entities to provide state institutions with the information on various aspects of t business. This makes them primary external users of accounting information. The preparation and provision of the information for governmental users is considered to be one of the most important tasks of the accounting information system. This is especially noticeable in smaller entities, where the owner-manager has a good grasp on the business himself. In such companies, the accounting is done primarily to comply with the legal regulations.

Despite the importance of the provision of information to external users, the analysis of practices in business entities showed that there is no automated integration between their information systems and the information systems of external users. Reports are prepared manually and sent to the

institutions via internet. All major state institutions have a predefined format of data files for the submission of information. The XML standard is used in most cases. Even though the information to the state institutions can be submitted in electronic files, the process of submission involved the manual intervention of employees: forms for submitting accounting information are filled out manually and submitted either by e-mail or through a web portal. This was the case in all the companies researched. The vast majority of them communicated information to the state institutions via internet, but the preparation of the electronic files was manual.

The analysis of patterns and methods for the submission of information to the state institutions revealed that companies most often have to deal with the following state institutions:

State Social Insurance Fund Board of the Republic of Lithuania. Since the beginning of 2008, the Social Security Insurance Fund has implemented the Electronic Insurer Service System – EDAS (Elektroninė draudėjų aptarnavimo sistema). The system enables insurers to submit reports and application forms electronically and to query the social security database. Nowadays, entities have computerized accounting and payroll systems. Data processed by the systems is used for the preparation of reports to the Social Security Insurance Fund.

The EDAS system is open for the integration with the information systems of insurers. The system of the State Social Insurance Fund Board accepts electronic files through the web portal and utilizes the more advanced technology of Web Services. The exchange of information

can be executed by means of two public web services. One is intended to automate the submission of an electronically signed report to EDAS. The other is used in the verification of the template version and in downloading a template for the visual presentation of data. These web services enable the manufacturers of payroll data processing systems to implement the functionality of automated preparation and submission of electronic reports directly from the accounting software to the Fund. E.g. when a new employee is recruited and his data is entered into the payroll system, one mouse click is enough to generate and submit a notification of employment to the social security authorities.

State Tax inspectorate. The State Tax inspectorate has implemented an Electronic Declaration System – EDS (Elektroninė deklaravimo sistema). The system accepts and processes the majority of tax returns. Tax returns can be submitted either by e-mail, by an upload though a web portal, or by filling out forms interactively in a web portal. An exchange of messages through web services is also possible. The EDS system provides two web services: one for submitting files, the other for checking a file's status. Unfortunately, submitted files

have to be confirmed by logging into a web portal. This makes the submission of files through web services less convenient.

Register of Legal Entities. The Register of Legal Entities has implemented the System of Electronic Services of the Centre of Registers – CEPS (Registrų centro elektroninių paslaugų sistema). Business entities are legally obliged to present financial statements and other notifications to the register. The process is usually carried out once a year after the approval of the financial statements. Due to its rarity, its automation would bring few benefits to the business entities.

Department of Statistics under the Government of the Republic of Lithuania. The information system of the Department of Statistics is called the System for Collecting Statistical Reports – SAESS (Statistinių ataskaitų elektroninio surinkimo sistema). The purpose of the system is to collect statistical reports from companies. It only offers the basic functionality of uploading pre-filled statistical reports via a web-portal.

Department of Customs under the Ministry of Finance of the Republic of Lithuania. IDAIS is an internet based information system of the Department of Customs for

*Table 2. **Options for submitting electronic files to the information systems of state institutions***

State institution	IS name acronym	Ways for submission of electronic files			
		E-mail	Upload of pre-filled forms in a Web portal	Interactive filling of forms in a Web portal	Web services
Register of Legal Entities	CEPS	No	Yes	Yes	No
State Tax inspectorate	EDS	Yes	Yes	Yes	Yes
Social Insurance Fund	EDAS	No	Yes	Yes	Yes
Department of Statistics	SAESS	No	Yes	No	No
Department of Customs	IDAS	No	Yes	Yes	No

collecting and processing data on foreign trade within the European Union member states. The system accepts Intrastat reports on the dispatches and arrivals of goods.

A summary of the various options for submitting information to the state institutions is presented in Table 2.

The Bank of Lithuania. The Bank of Lithuania provides several Web services for transferring statistical information to the Web service clients. The IS of the Bank can be queried for official exchange rates, interest rates of the Bank's lending facilities, the liquidity situation in the banking sector, VILIBID and VILIBOR rates, functions for the verification of payments, and a security settlement system. The most important services for the accounting software are found in retrieving official exchange rates and verifying the validity of the IBAN accounts.

It can also be concluded that only the EDS and EDAS systems implement the service-oriented architecture (SOA) through the use of web services. Web services support interoperable machine-to-machine interactions over a network and enable the highest level of system integration. Having the metadata of a web service, system developers can implement the full integration of the accounting systems with the external information systems. This means that for the time being, accounting information systems can achieve full integration only with the EDS and EDAS. Unfortunately, other state information systems fail to raise integration possibilities based on the web services or other SOA technologies.

The use of information and communication technologies in the provision of public services is referred to as Electronic Govern-ment, or e-Government. The sophistication of the E-government service depends on the stages of its maturity. The extent of the possible system integration can also be assessed by the maturity stage that has been reached by a state institution. A classification of maturity stages is presented below (Kašubienė et al, 2007, p. 71):

1. Providing information (enabling access to the information on the internet).
2. Two-way communication (services through web forms, email and bulletin boards).
3. Transaction services (the handling of transactions with businesses).
4. Transformation processes (governance, e.g. online voting).

The information systems of the Lithuanian state institutions have already reached their 2nd or 3rd stages. This has also been confirmed by a high-ranking readiness survey in the United Nations e-Government. In 2008, Lithuania ranked 28th among 192 countries of the world [24].

Irrespective of the maturity stage that governmental information systems have reached and their service orientation, the current level of integration in small and medium-sized Lithuanian companies remains low, because the client systems fail to make use of the services offered. The most obvious reason for this must be the fact that the automation of the submission processes to state institutions would only save a limited amount of manual work. Investments in extending software in order to add to the functionality of an SOA client would not pay off in a short time.

Business-to-consumer. End consumers are usually private persons who do not have information systems implemented.

There are neither the means nor the demand for the integration of the accounting information systems with private consumers. However, institutional consumers may have information systems open for the integration, e.g. public procurement information systems.

Prerequisites for external integration

High investments and subsequent maintenance costs preclude many businesses from pursuing integrated external solutions. Therefore, as some authors point out (Vlčková, 2006, p. 131), smaller businesses implement the elements of integration only upon being urged by strong partners. In such cases, the benefits of integration may not outweigh its costs.

It can also be concluded that integration of the accounting systems depends on the features of the external information systems. External information systems should have features that enable integration. The implementation of service-oriented architecture (SOA) increases the chances of successful integration. SOA can also support enterprise-wide Business Process Management (BPM), which assists in optimizing the business processes inside an organization (Bajwa et al, 2008, p. 16). SOA not only helps to develop flexible software applications, but also enables integration with other systems.

Service oriented architecture is a concept used in the systems development and integration. It views the functionality of business processes as services. A service is a self-contained function that performs a specific task. SOA packages this functionality into software modules that can be integrated and used by organizations that use different systems.

SOA enabling technology facilitates Web services. Web services are a standard method to support SOA. Web services are computer programs for the exchange of data between computers using XML-based standards – WSDL (Web Services Description Language) to define services, SOAP (Simple Object Access Protocol) to invoke services, and UDDI (Universal Discovery, Description and Integration) to locate services (Trembly, 2009, p. 20). The implementation of Web services is not a costly undertaking that requires technical expertise; SMEs can also afford Web services to integrate their information systems with those of their partners and customers (Vidgen et al, 2004, p. 372).

Web services may not only be a method to support operations, but can also be a source of the competitive advantage. Vidgen et al. (2004, p. 376) define 5 levels of business transformations brought about by the use of Web services. Where each level provides more benefits for an organization, it also entails higher costs:

1. Web Service Enhancement – Web services are integrated into the existing IS applications. E.g. the accounting software may use Web services to submit information to the social security authorities instead of printing and submitting paper documents.
2. Application Sourcing – Web service based IS applications are sourced. At this level, an organization may acquire complete applications for the business process management, such as ERP or CRM.

3. Application Brokerage – integrated IS applications are sourced. Organizations acquire applications that interact with each other and with legacy information systems. Organizational structures change as business processes are redesigned to accommodate the installation of new systems.
4. Collaborative Commerce – Web services are used to build process networks. Web services are used to collaborate with the business partners, e.g. in Supply Chain Management. Business processes are shared across organizations.
5. Business reconfiguration – accelerating growth. The whole enterprise is transformed and the business mission is reassessed.

Integration of the accounting information system with the internal business processes

The purpose of an accounting information system is to supply information to the external and internal sources for decision making. The extent to which other business processes rely on the accounting information depends on its availability and reliability. Availability and reliability can be increased through a better integration of the accounting systems with the other information systems of a business entity.

An accounting information system serves as a firm infrastructure that supports the primary value-adding activities. In the performance of this role, it often acts as a centralized data storage area, e.g. when an ERP system is installed. Thus, an accounting system integrates information flows among the information systems of an organization.

Models of integration with the internal business processes

The design and operation of business processes vary greatly among business entities. Many factors such as the nature of operations, organizational structure and corporate culture dictate the actual implementation of business activities that make up a business process. Despite their diversity, business processes are aimed at achieving common organizational goals. To achieve goals, tasks constituting a business process are performed. The performance of these tasks entails the use of resources (inputs) and produces outputs. An important input is the information that is used for decision making. An output can also be information that is to be recorded and utilized in subsequent processes.

Companies seek to automate their most labor-intensive processes, where automation would bring the largest benefits and investments can be reclaimed in the shortest period. Further benefits can be obtained by the integration of the automated processing. Research carried out by Juozapavičius et al (2009, p. 107) indicated that companies prefer to automate and improve the following business processes:
- Sales
- Human resource management
- Quality control
- Contract management
- Documentation management
- Management of the provision of services
- Procurement
- Project documentation management.

For research purposes, general business processes that are exposed to a large number of transactions and are likely to occur in every business company were identified, namely: sales, procurements, warehousing, operations (manufacturing), payroll, and fixed assets.

Sales. The research showed that a sales cycle is most likely to be integrated with the accounting function. Even if primitive accounting software packages are used, it is quite common to set up access to the accounting system for salespeople. Printed sales invoices are immediately booked in a general ledger and an accounts receivable ledger.

In 78 percent of all the information systems reviewed, invoices were prepared and printed from the accounting software, thus enabling an immediate booking into the general ledger, accounts receivable ledger, inventory records, and other books. In more than half of these cases, invoicing was performed by salespeople entering the billing information directly into an accounting system. The other half of these cases did not show any real integration of the sales process, because the invoicing was done by the accounting personnel and the process was based on the information received informally from salespeople. Furthermore, although billing in many companies was done directly from an accounting system, only in a few cases did the accounting systems serve as a repository for the sales related information, such as customer orders, prices and payment terms.

Companies operating in the retail sector have demonstrated good practices regarding the integration between the accounting and sales processes. Retail companies usu-ally have to record a large number of sales involving small amounts. The duplication of the recording would be very inefficient; therefore, POS (point of sale) terminals were integrated with the accounting systems, i.e. sales information was transferred to the accounting books automatically. In addition, most of the companies with integrated POS terminals also used barcode scanners for the automation of the sales process.

Specifically, the accounting software applications examined with POS integration were Pragma, Agnum, Būtent, Finvalda, Edrana and Rivilė. In general, POS integration was implemented in all major locally developed accounting systems. The high occurrence of integration can be attributed to the straightforward technology of operating POS terminals from the accounting software by means of the functions in the Dynamic Link Libraries (DLL) provided by the terminal manufacturers.

Procurement. Contrary to the sales process, the accounting for purchasing involves posting documents that were produced by the external entities. Purchasing documentation varies greatly in format and content. The lack of standardization prevents automatic processing and involves manual work.

The analysis of business companies showed that the purchasing process is rarely integrated with the accounting system. In most cases, the accounting personnel were only responsible for posting purchase invoices into the books after checking for the necessary approvals and in preparing payments. In larger entities that had ERP systems implemented, more activities of the purchase process, such as the genera-

tion of purchase orders, order approval, sending orders to suppliers, and posting dispatch notes and invoices were automated.

Warehousing. Warehouse attendants have to keep records for their reference. An accounting department also needs information on the quantities of inventories for the accountability purposes and on their cost for the financial reporting purposes. However, keeping records of inventory movement is a labor intensive task. The duplication of the inventory records would be very costly, inefficient and error prone. When processing a transaction companies that deal in a large number of inventory items (such as retail, wholesale and manufacturing companies) have their inventory transactions recorded by the employees. It is very unusual for the accounting personnel to maintain inventory records.

The accounting software of the companies researched implemented modules for the inventory management. Only one company maintained its inventory records in another system that was not integrated with its financial accounting.

Operations/manufacturing. Compared to other business processes, the production process is usually very specific to a business. A large variety of operations in businesses is an obstacle to the standardized automation. To solve these problems, businesses tend to either engage in the in-house development or to purchase specialized software. Specialized systems to process operational processes are likely to be disconnected from the accounting system. 11 out of 52 Lithuanian companies under investigation used some kind of software other than an ERP system in their

operations. In 4 cases, it was an in-house developed software because no suitable commercial off-the-shelf software was available. None of the specialized information systems was really integrated with the accounting information system. At best, data was exchanged by utilizing an import functionality.

Large ERP system manufacturers offer industry solutions for the processing operations specific to an industry. E.g. SAP offers solutions to banking, automotive, public service, education, healthcare, insurance and a wide range of other industries [19]. However, such solutions are affordable only for large and well-established companies. Another drawback of the standard solutions is that companies are forced to adapt their business processes to suit the model of an ERP system. Although an ERP system may reflect the best practices of a particular industry, its adoption may mean losing a competitive advantage, because the business processes are managed in the same manner as those done by the competitors using the same ERP system.

Payroll. Payroll processing is highly influenced by the local laws and regulations. It proves to be more efficient to purchase a locally developed payroll package rather than adapt imported software. Many personnel and payroll accounting systems developed locally offer the functionalities of storing permanent employee data, work time records and calculating payroll, but fail to address other human resource management information needs, such as employment planning, recruitment and selection, evaluation, motivation and career planning.

There is no need for the tight integration between the payroll processing software and the general bookkeeping software. Payroll is prepared on a monthly basis and only its totals are transferred to the general ledger. The posting of a payroll fails to involve a lot of manual work and it is acceptable if there is no automatic posting. Some companies choose to adapt a payroll processing system that is not integrated with the accounting software.

The review of the information systems of Lithuanian companies indicated that the major accounting software packages included modules for payroll processing. However, 32.7 percent of the companies reviewed did not process payroll with their accounting software. Almost half of such companies had manual systems (based on MS Excel spreadsheets). The other half chose specialized payroll processing software. The most popular specialized software was Vikarina (2/3 of all cases). The findings lead one to presume that Lithuanian managers believe that payroll integration with an accounting information system brings minimal savings in employee time, because its totals have to be transferred to the general accounting only intermittently.

Interestingly, a high rate of disconnected information systems in regard to their HRM and general accounting functions was noticeable in the companies that had the sophisticated ERP systems of foreign manufacturers installed. The reason for choosing local payroll software was that the standard HRM solutions of foreign manufacturers often fail to comply with local legislation concerning payroll. Specific payroll calculation rules and social security systems require additional effort for the localization. Probably because of the small market, foreign manufacturers do not bother to adapt their payroll module to the local settings. Moreover, such systems are relatively costly to install and can only justify themselves in very large companies with many employees (Juozapavičius et al, 2009, p. 109).

Some authors (Juozapavičius et al, 2009, p. 109) argue that the payroll and work time processing systems currently used in Lithuanian companies are not adequate for the true human resource management (HRM). They lack applications to process selection, recruitment, personnel planning, career planning, employee assessment, and similar HRM tasks.

Investments/fixed assets. The acquisition and disposal of the fixed assets occur irregularly. Compared to other areas of accounting, the processing of fixed asset transactions is not a labor intensive activity (Simanauskas, 2008, p. 226). A low rate of transactions does not call for its integration with other processes for decision making. In most of the cases reviewed, the accounting software had a module to account fixed assets. Fixed asset transactions in all cases were processed by the accounting personnel after the appropriate approval o fthe management. Ad hoc reporting fulfilled the need of the internal information users.

It can be summarized that the interaction of business processes with the accounting function takes place in two perspectives:
-   Reusability of master reference data among business processes in processing and recording transactions.
-    Decision making based on the information collected and recorded in other business processes.

Special attention has to be given to the analysis of the integration of business processes with the function of outsourcing. The accounting function requires specific technical knowledge and skills. Smaller companies tend to outsource the accounting function to the external service providers, because they fail to posses the required knowledge. The main reasons for choosing an external service provider are cost, service quality, and the ability to focus on their main activities (Daňko, 2006, 25 p.). Although smaller entities are usually owner managed with few employees, which means that their functions are not segregated and by their nature are integrated, outsourcing creates an additional demand for the integration of external accounting with the information system of the company. Documentation to the service providers is usually submitted after the end of the month. Consequently, accounting information is prepared with a time lag which makes it less usable for operational decision making. Some service providers try to close the time and logistical gap by using technologies such as Remote Desktop Connection. Still, it can be concluded that the integration of business processes in smaller entities is very weak and virtually non-existent.

Prerequisites for internal integration

Data integration. One of the most important prerequisites for the seamless business process integration is data integration. It involves combining data from different information systems into a single database and providing a unified view of this data. From the management perspective, a synonym for the data integration is Enterprise Information Integration. It is a process of integrating information to provide a single interface for users accessing the data.

In establishing the design of a database structure, it is important to follow the principles of good database design, e.g. data should not be duplicated; it should be recorded once and reused whenever possible (Simanauskas, 2008, p. 169). Thus, all users within an organization should be provided with a unified view of the data that is achieved by integrating data from different sources into a single view. This is achieved by storing permanent reference data in a single location. Permanent reference data, which is also called master data, includes data that is persistent and non-transactional in nature. In a business context it describes business objects, i.e. it is data of permanent reference about customers, vendors, inventory items, employees, departments, locations, general ledger accounts, etc. It is used to support the business processes that are executed by several functional groups within an organization. The multiple usage of the same data in several functional groups may be the reason for storing the data in different systems within an organization. Such disconnected systems provide data with the risk of duplication and subsequent inaccuracies. Fortunately, the risk can be avoided by referencing data centrally.

The need for the data integration of business processes can be illustrated by the analysis of the master reference data of ERP systems. The extent of the reusability of the permanent master data across business processes can be estimated by the number of ERP database tables that contain foreign keys referencing primary keys

of the master data tables. For the purposes of the analysis, the Rivilė ERP system was selected because it was the most popular system among the Lithuanian companies under investigation . The database contains 78 tables for storing master reference data and 95 tables for storing transactional data (excluding the payroll module). Some master data tables were selected and the number of tables referencing them was established. Major business processes that make use of the master data were also noted. The results of the analyses are presented in Table 3They show that the master data is used in different business processes a lot. The rate of the referencing of master data is as high as 1/3 of all the tables in the database referencing the most often used master data tables.

Yet another rather theoretical concept of data integration is a federated database system. A federated database management system integrates autonomous databases into a single view without merging them. Users view a collection of databases as a single federated database, which is also called a virtual database. The advantage of a virtual database over the merging of databases is that the constituent databases remain autonomous and retain flexibility and high performance.

Table 3. **Extent of referencing the selected master data tables of an ERP system**

Master data table	Table name	Primary key	No of referencing tables	General ledger	Sales	Purchasing	Payments	Warehousing	Payroll
Accounting journals	I01_DKZR	I01_KODAS_ZS	4	x					
Chart of GL accounts	N01_ACCT	N01_KODAS_SS	38	x	x	x	x	x	x
Cost centers	N06_OBJ	N06_KODAS_OS	48	x	x	x	x	x	x
Departments	N07_IMON	N07_KODAS_IS	61	x	x	x	x	x	x
Vendors	N08_KLIJ	N08_KODAS_KS	36			x	x	x	
Customers	N08_KLIJ	N08_KODAS_KS	36		x		x	x	
Location	N09_VIET	N09_KODAS_VS	17		x	x	x	x	x
Taxes	N12_TAX	N12_KODAS_XS	4		x	x			
Payment terms	N14_TERH	N14_KODAS_TS	6		x	x			
Employees in charge	N15_MEN	N15_KODAS_MS	34		x	x	x	x	x
Inventory items	N17_PROD	N17_KODAS_PS	49		x	x	x	x	
Unit of measurement	N18_MAT	N18_KODAS_US	50		x	x	x	x	
Services/expenses	N25_KOD	N25_KODAS_BS	4						x
Banks	N34_BANK	N34_KODAS_WS	5				x		x
Currencies	N45_VAL	N45_KODAS_VL	22		x	x	x		
Employees	N60_ASM	N60_KODAS_SM	25	x	x	x	x	x	x
Storage bins	N65_LOKA	N65_KODAS_LC	5					x	

Data integration also can be implemented by data import and export functionality. Nowadays, most of the accounting software packages use SQL based database management systems (DBMS) that provide tables for direct access (see Table 1 for the DBMS used for the managing database of accounting information in the companies researched). DBMS enables direct access to database tables by bypassing the graphical user interface. This makes it easy to import data directly into a database. However, software vendors rarely represent documentation in their database structure. It may take a great deal of time to find out the right table to dump data into. For example, when a sales transaction is posted in the popular accounting package Finvalda, information is posted into 13 tables: invoice header and detail files, warehouse records, accounts receivable and the general ledger, just to mention a few.

The majority of the accounting software packages reviewed provide the functionality of data export into the popular formats such as MS Excel for further processing. However, this import functionality was implemented only in a few cases. The import of data is a much more complex process because the data has to be well structured and data validation has to be carried out upon its import. Accounting software vendors usually only offer their services for importing opening balances when their system is purchased.

Another option for the system integration may be the use of middleware. Middleware is a piece of software for connecting applications. It allows the interaction of applications across a network. During the research, no usage of any kind of middleware was identified in Lithuanian companies.

Extensibility and customization. Information systems are usually individually tailored to the needs of a business entity. The implementation and maintenance of disparate information systems and their integration is a lengthy and costly process. Furthermore, such integration is inflexible and unstable. Upon the change in the system, it has to be reintegrated. Such a situation is the result of the lack of the standardized product that would be affordable to smaller entities.

Currently, there are products on the market that aim to automate all the business processes of a company. However, they are still considerably inflexible and costly. To overcome this drawback, the system should be open. Openness means the possibility to implement tailored extensions, i.e. the users should have a chance to make modifications and add additional functionality to the purchased software. A very good example is ABAP (Advanced Business Application Programming), which is a high level programming language created by the German software company SAP. However, software vendors are reluctant to disclose their code for business and security reasons.

Except for imported ERP systems, none of the reviewed accounting software allowed for its extensibility. Only a limited customization of reports was possible. However, software vendors seem to be ready to develop additional features themselves, which is not a very attractive option in terms of cost, time, and flexibility.

Conclusions

The research indicated that at the present time, many business entities have automated their business processes to various extents. Despite a high level of automation in the basic business areas such as accounting, sales, and payroll, there are still unexplored areas of the external system integration. Integration of the existing systems with external business partners would lead to increases in the operational efficiency, because business processes can be made faster, more reliable, and cheaper.

Contemporary information technology, based on the Service Oriented Architecture and exploiting the advantages of Web services, enables the integration of information systems between business partners. Major state institutions in Lithuania have implemented these technologies. However, its use between business partners is less common because few smaller entities can afford investments into the technical expertise. Moreover, integration with the information systems of business partners is hampered by the lack of standards for exchanging documentation.

Lithuanian proprietary accounting software systems do not have features allowing their integration with the information systems of more specific business processes. Fortunately, the manufacturers of accounting software packages are ready to extend the functionalities of their solutions. Tailoring software to the needs of a business means high development and maintenance costs; this is not always affordable for smaller companies. The ultimate integration of business processes is possible only in flexible systems that can be customized to suit specific needs.

On the basis of the findings of the research, some recommendations can be made for system development and integration:

- Information systems should implement Service oriented architecture to enable seamless integration with business partners.
- XML based standards to define accounting documentation should be developed. This is a precondition for the replacement of paper documents with the electronic ones.
- Accounting information systems should make use of the functionalities offered by the information systems of state institutions through Web services.
- Information systems should be open to easy customization and extension.

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