

Economics as a Key Support Process in ERP Systems

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Abstract

This article is oriented to the problems relating to the management of the economics issues in enterprises as one of the key support processes. It defines and delimits the basic terminology – which is not always understood in the same way in this field, whether this be by managers, economic specialists, or IT professionals. The article goes on to define and delimit the individual sub-processes as well as the relationships between them. The management of economic issues is then confronted with the opportunities and possibilities offered by the functionality of ERP systems – i.e. the software applications without which it would be difficult to imagine the integrated management of an enterprise as a whole, including its coverage of economic, production, logistics and Human Resources issues. This article also summarises observations and knowledge to-date gathered by the Center for inVestigations into Information Systems (CVIS) and presents the main results and outcomes of research conducted in the Czech ERP market with an orientation on the management of economic processes and its follow-up support of managerial decision-making.

Keywords: Enterprise Resource Planning (ERP), Business Processes, Economic Processes, Financial Accounting, Tax Accounting, Managerial Accounting, Controlling, Calculations, Budgeting, Cost Accounting, In-house Accounting, Decision-making Roles, Reporting Statements, Activity Based Costing, Balanced Scorecard

1. Introduction

From the very beginnings of its existence, the Center for inVestigations into Information Systems (CVIS – further only CVIS) has devoted itself to defining the terminology in the field of ERP systems as precisely as possible – both for itself as well as for interested parties among its members and partners (1, 26). The general foundations for research investigations in ERP systems, their classification and effective exploitation in enterprises served to create the cardinal monographic oeuvres of Professors Jiří Voříšek (2) and Zdeněk Molnár (3) at the end of the Nineteen-Nineties and distinguished oeuvres from abroad by world-renowned research organisations like Accenture (4) and Deloitte (5). The last mentioned pair of works serve, together with the professional publications of T. H. Davenport (6), T. Stevens (7), and D. L. Olson (8, 9), as the basis for our own classification of ERP systems.

We define an information system in the ERP category as being an efficient and effective tool or

instrument which is able to cover the planning and management of the main internal processes within an enterprise (i.e. resources and their transformation into outputs) - and this, at all levels – from the operative to the strategic. By the term “Internal Processes”, we mean those processes over which the management have full control – and are thus, the owners of the same. Among these key internal processes are: **production, (purchasing, sales, and internal) logistics, human resources management and economic (financial) issues.**

Some of the most important characteristics of ERP systems are:

- The automatisation and integration of the main/core business processes;
- The sharing of data, procedures and their standardisation across the whole enterprise;
- The creation and making accessible of information in real time;
- The ability to process historical data;

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- A holistic approach to the implementation and use of an ERP concept (1, 26).

Among the main requirements made upon an ERP system are:

- The realisation of measurable benefits and contributions in the field of reducing the overall structure of costs arising from the ineffective management of an enterprise;
- The realisation of non-measurable benefits and contributions in the field of the management of business processes and the accessibility of information in real time.

CVIS also devotes a substantial part of its time and research capabilities to the analysis of ERP systems from the process point-of-view and their practical applicability in the course of the management of standard as well as specific business processes. To-date, we have oriented ourselves above all on the support of value-creation chains – especially in the fields of planning and managing production (10). Since 2008, we have equally conducted more detailed research into the support processes, and especially into the management of economic (read: financial) processes. The following text provides a summary of the basic perspectives and starting points for research into the support of economic management in ERP systems and selected outcomes and results of research conducted in Czech manufacturing and commercial enterprises, and this within the framework of foreign as well as Czech ERP systems.

2. The process-based management of an enterprise

The basis for the success of any enterprise is constant improvement at all of its levels as a response to the constantly changing entrepreneurial environment. It is thus not enough just to reduce costs and to improve the level of managerial decision-making. The foundation-stone for long-term stable growth of an enterprise lies in the **systematic and long-term management of innovation**. Enterprises manage innovation especially in the fields of products and services, cooperating with suppliers and customers, and especially on the level of the enterprise's processes. All of these innovations are interlinked and mutually influence one another, and each type of innovation has an impact upon the enterprise's processes.

The management of these innovations do not directly require the realisation of new processes in the whole enterprise; on the contrary, it presupposes the flexible integration of the requisite changes, including so-called **Best Practices** – i.e. a standardised approach reflecting worldwide experience with the management of a company's processes.

In today world, the key role in the course of the implementation of these Best Practices is played by modern information systems in the ERP category. A crucial and fundamental condition for its maximal effectiveness is the process-based management of an enterprise. This considers the organisation as a **set of business processes**, which interweaves through the individual departments and provides its outputs either to the internal or the external customers of the enterprise. A process-based organisation tries to organise and manage work as a unified process, which is sub-divided into its individual, mutually logically interlinked sub-processes (17, 26, 27).

The potential for improvement only of individual activities in these processes is limited – the greatest savings often are to be found in “hidden” places in these processes. In the course of looking for potential improvements, it is essential to look at the process as a whole and to search for improvements in the team of workers who share in the performance of that process. The outputs of these processes are taken right up to the customers – the individual processes are dependent upon each other and have to work together. In order to be able to manage these processes, we have to have pre-allocated aims and a chosen method for their measurement. The final consequence of the improvement of individual processes influences the whole of the **value-creation chain** within an enterprise, which then produces value-added for the customer (13, 17, 27) or, even better – supported by a modern ERP/SCM (Supply chain management) solution, which fulfils an integrative role within the framework of the supplier-customer chain, and **generates value throughout the whole network structure** (26).

The implementation of process-based management leads especially to reductions in costs, increased speed and quality, increased use of the invested assets, increased value-added for the customer, the possibility of quantifying some of the phenomena and increased precision in forecasting future events, the ability to achieve mutually incompatible goals, supports teamwork

and engagement-levels of the members of the team, averts the endless implementation of the widest variety of managerial approaches and procedures, etc.

The process-based management of an enterprise brings with it a whole range of benefits, but nevertheless cannot take place and avoid certain negatives. Many managers confuse these negatives with problems which the introduction of a process-based management approach evokes – like for instance, the short-term chaos entailed or increased demands upon time spent at work. It is not possible to convert to a new way of working from one day to another, and for this reason the old and the new systems will have to co-exist side by side until such time as the new approaches take hold and embed themselves into the company culture. An often-discussed negative effect in working praxis is almost always connected with the dismissal of employees. An enterprise can influence this situation however by reallocating employees other jobs, cancelling some of the outsourced activities, stopping the practice of project-related employment, reducing overtime or halting the induction of new staff prior to the realisation of the transformation process (25, 27).

3. Economics as a support process

We can characterise support processes as a process which provides value-added, which does not take place across the full spectrum of the enterprise, which does not have external customers and which does not generate sales. According to Brady, Monk and Wagner, we can include the following among the economic processes of an enterprise: Financial Accounting, Cost Management, Planning and Budgeting, and Cash-flow Management (14).

At the same time, we can sub-divide Accounting into the following three basic branches:

1. **Financial Accounting** – The main purpose is to provide trustworthy information about the financial situation and operations of the enterprise in the form of financial statements for a variety of different users.
2. **Tax Accounting** – The main purpose of which is to depict the activities of the enterprise such that these will serve for taxation and state requirements (and especially for the correct declaration of the income tax basis).
3. **Managerial Accounting** – Whose main purpose is to provide the requisite information especially to managers at all

levels for the management and evaluation of the enterprise (16, 20, 24).

A system for the management of economic processes based only upon financial accounting information is unable to fulfil the requirements of the contemporary turbulent environment. It is necessary to complement the view of the past (i.e. feed-back) by predictions of future events (i.e. feed-forward). This perspective was often applied by Tomáš Baťa in his time (26) in his system of internal company accounting practices, which included calculations, budgeting and operational accounting (i.e. accounting within the individual workshops). Today, this whole system is called Managerial Accounting. The authors Brady, Monk and Wagner not only include Financial Accounting among the economic processes, but also the individual elements of Managerial Accounting (14, 26).

3.1 Financial Accounting

The basic function of accounting is to provide all of its users with reliable information about just how a given company is economically capable and efficient. Accounting is required to provide information especially about the financial situation (statements in the form of balance sheets) and financial efficiency and performance (in the form of profit and loss accounts) for a given period. Accounting information is intended not only for managers, but also for a variety of external users who are interested in the enterprise for a wide number of reasons (19).

Financial Accounting processes all of the accounting matters that express changes which occur in the enterprise's property and assets and related accounting units as well as tracks costs and benefits/contributions from the point-of-view of the accounting units as a whole. **Financial Accounting is not concerned with questions relating to the management** of accounting units as a whole nor of their subsidiary organisational elements; neither does it resolve the problem of how to arrive at data about the quantity and prices of produced goods and services that have been created, but rather, of the as yet unrealised inventory (e.g. unfinished products, sub-assemblies and products), which the enterprise has created as a result of its own activities (19, 22).

When recording financial accounting, one must not forget to uphold the general accounting principles (e.g. the assumption of accounting units, the duration of the enterprise, the accrual principle) as well as valid legislation. Among the basic legal framework of Czech Accounting

practices is the Law on Accounting, the accompanying proclamations to that law and Czech Accounting Standards. In Europe as well as here, the **financial and taxation accounting systems are mutually interlinked and intermingled**; in addition, the tax rules and laws have a significant impact upon the accounting procedures of financial accounting – which under certain circumstances are significantly impacted (23, 24).

3.2 Managerial Accounting and Controlling

The depiction of economic phenomena is, in **Managerial Accounting, subordinated a priori to the requirements of the top management of the enterprise**. Especially problematical evaluations are, within the overall framework of this type of accounting, resolved rather on the basis of a view to the future rather than on the basis of historical prices, - which are given preference by Financial Accounting. Managerial Accounting makes use of valuations on the basis of pre-set quantities, at the level of Opportunity Costs and Benefits (expressing “lost” benefits or saved costs) or else on the basis of a wider understanding of reproduction prices. This enables one to track the results from the sale of individual products or services for instance (20, 21).

The most frequently cited components of Managerial Accounting are:

- Calculations;
- In-house accounting;
- Budgeting;
- Decision-making roles.

In the USA and Great Britain, the concept of Calculations is unknown; however, they make use of so-called **Cost Accounting** (30).

Operations within accounting units are the domain of **In-house Accounting**, which usually tracks operations according to the individual internal departments and within their framework, also according to the individual performance and operations of the enterprise. The forms, organisation and orientation of this in-house accounting process is determined by the Accounts department itself in line with internal rules and regulations. Czech legislature only states that in-house accounting must ensure verifiable supporting materials for the financial accounting process on the following:

- About the state and changes to the state of inventory created by one’s own activities;

- In order to express the activation of one’s own performance;
- For the valuation of inventory and other performances created by one’s own activities.

In-house accounting may be organised within the framework of analytical accounts for financial accounting purposes or in independent accounting spheres, or as the case may be, a combination of both approaches (21, 22, 32).

According to Professor Jiří Vysušil, choice between one’s own production and purchasing, the optimisation of costs, the analysis of critical points, valuations of investments, pricing decisions and other such are all **decision-making roles**. In addition, investment calculations and budgeting are an independent component of decision-making roles. These should show whether or not the planned investment makes sense. Here, well-known methods like Rate of Return, NPV – Net Present Value, or IRR – Internal Rate of Return are all used. If the Managerial Accounting is to be of good quality, it must confront differing variants of the decision-making problems and must know how to select the best possible variant (20, 28, 30).

While financial accounting is usually managed by the Chief Accountant, **the function of Controller has specially been created for the management of Managerial Accounting**. All this was developed and applied in Anglo-Saxon countries. European countries reacted to the origin of Managerial Accounting in two ways. Some adopted it, adapted it and further developed it in line with their own needs, while others changed the designation of Controller into **Controlling** (which is totally unused in the USA) to describe the duties and functions of this work, and in the end, even a whole new discipline of the theory of management. This conception has been furthest developed in Germany (P. Horváth, H. Vollmuth) and Austria (E. Eschenbach). The duties and functions of Controlling are richer than those of Managerial Accounting, and this is mainly because a strong emphasis is placed not only on Operative, but above all on Strategic Controlling (18, 28, 30).

Professor Vysušil also mentions that Managerial Accounting and Controlling stand - theoretically and practically, opposite each other despite the fact that they both have the same goals and almost the same methods (30).

Controlling has continued to develop in business praxis and has become an indivisible part of every modern enterprise. In spite of this, there

are significant differences of opinion between theory and practice about the term Controlling. It is not possible to find an unambiguous one word equivalent for this term in the Czech language, which is why it is never translated.

However, the following main functions are often allocated to Controlling:

- Planning (the creation of a wide variety of differing plans);
- Provision and documentary needs (ensuring requisite high-quality information);
- Controlling and analytical (controlling the enterprise's processes, their analysis and detecting probable deviations); and...
- Reporting (a complex system of indices and information, often in the form of concrete statements and reports) (16, 33).

The professional literature oriented to Managerial Accounting, or respectively, on Controlling mentions an enormous quantity of widely differing methods, approaches and indices. It is clear that such an extent of analyses and plans is impossible to master, not so much for technical reasons, but rather due to time

constraints. Among the most frequently mentioned tools are:

1. **Type, calculation and capacity classification of costs;**
2. **Cover contribution** (their contribution to covering fixed costs and profits)
3. **BEP – Break Even Point**
4. **Short-term commercial results**
5. **Breakdown of deviations from plans or budgets**
6. **Cost, or respectively, profit centres** (18, 20, 21, 28, 29, 31, 32)

Controlling is thus, truly often a much more demanding set of tools, than the simple controlling and meeting of plans or budgets. It is therefore possible to consider them as a component of a MIS – Management Information System.

From the above, we can assume the point-of-view that the management of economic processes within the enterprise must have well-mastered financial and managerial accounting sub-processes. The information from these areas is then used by the Controller, and should be at least at the level of the above-mentioned MIS.

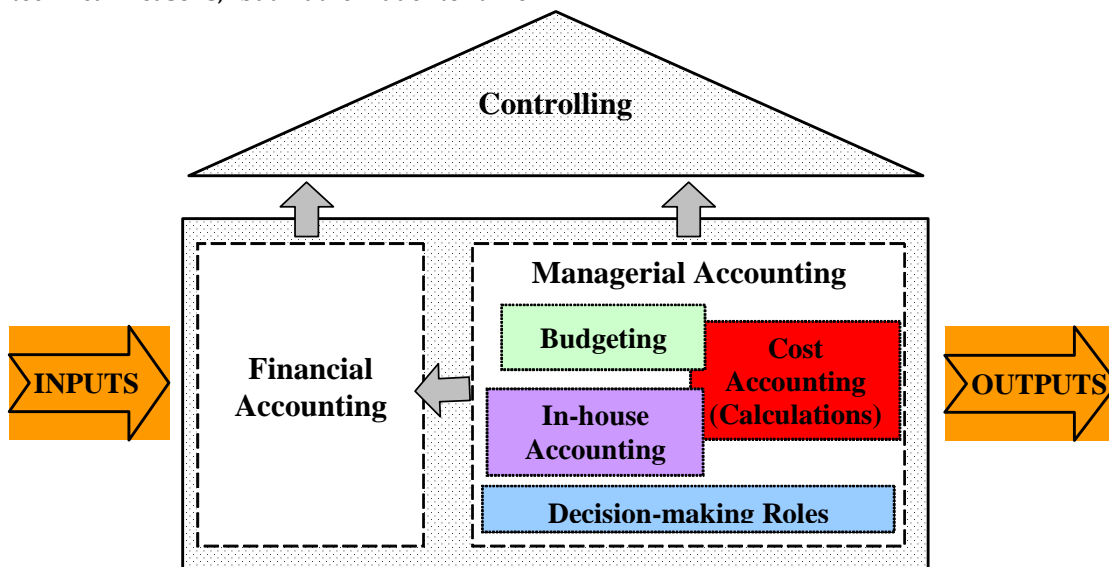


Fig 1. Economic processes within an enterprise

4. Research Methodology

The key for establishing an appropriate research methodology in the fields to be investigated is an understanding of the meaning and significance of so-called **methodological triangulation** – i.e. the combination of the qualitative as well as quantitative methodological approaches as a full-valued research alternative (12). One decidedly cannot do without qualitative methods, which is

confirmed on the one hand by investigations by world renowned researchers, and on the other by CVIS' own research activities.

The CVIS performs research investigations in the Czech ERP market on an annual basis - since 2000. The research methodology used by CVIS are based upon their own experience (26) as well as observations and expertise defined in the

professional oeuvres of authors like Gill, Johnson (11) and Pavlica (12).

The research investigation itself is realised in the following way:

1. A questionnaire is sent out to provider/supplier organisations, in the form of a quantitative questionnaire complemented by a qualitative control of the data provided (e.g. by telephone calls to their customers to verify selected references and the correctness of the data about the functionality and other aspects of the ERP solution).
2. Qualitative questioning of users as well as supplier/provider organisations in the form of market research and discussions, which are then processed into case-studies.

The aims of the research are:

1. To prepare an overview of the ERP market for prestigious Czech publications like Extra Publishing and CCB.
2. To verify general theories about the ERP market, and to generate situational and contextual interlinked theories.

In order to realise the individual investigations, the authors make use of their own prior experience of research into the Czech ERP market. The selection of the sample is deliberate, and on the basis of the following requirements and principles:

1. To acquire data from the maximum possible number of provider/suppliers of all of the information systems available on the Czech market that have ERP functionality, and to do so through repeated questioning.
2. To exploit personal contacts with concrete individuals responsible for solutions in the management teams of the provider/supplier companies, because of the motivational factor and to evoke their interest in the results of the research.
3. In the course of creating the sample of respondents for the purposes of the research study, emphasis is placed on ensuring that the given sample corresponds to the basic set and thereby, includes everyone who fulfils the set conditions – which are that they are domestic producers of software applications in support of ERP systems

as well as representatives of world-class software corporations in the Czech Republic and who provide ERP systems here.

Thus, the aim is the maximisation of the number of respondents, and at the same time this is done with an awareness of the potential risk of simplifying techniques and a certain level of superficiality of responses.

4. Previous experience has shown that, in the course of researching the local ERP market, it is not valid to say that there is a direct proportionality between the size of the sample under investigation and the simplification of the techniques used and thereby, also reducing the responsive ability of the questionnaire. Respondents are sufficiently motivated to provide exhaustive responses through the possibility of making presentations of their products in professional publications – and which they also understand and take to be a certain form of promotion of these products.

The high levels of responsive ability, validity and reliability of the research investigations are based upon the following principles:

1. If new questions are included in the questionnaire, a pilot research study is undertaken on a small sample of respondents such that it is possible to verify if the questions are properly and clearly formulated, and whether they are clearly understandable or not.
2. The investigated sample of respondents is deliberately selected; in 2008, it represented almost 90 % of the basic sample, from the perspective of the number of implementations of the ERP systems under investigation.
3. The information acquired through the questionnaire is verified over the telephone and in selected cases, confronted by calls to customers as well as being confronted through qualitative questioning (i.e. market research and discussions).
4. The reliability of the research studies are based upon their annual repetition of the verified methods and approaches used, while deviations of results are tracked and controlled over time.

In view of the above-mentioned facts, it is therefore possible to generalise upon the

outcomes, results and conclusions gained through the written responses to the questions posed.

5. Research results with an orientation on the management of economic processes

Let us first look at what priorities does the full coverage of economic processes between ERP systems delivered to the Czech market have. As is clear from the research conducted by CVIS (Graph in Fig. 2), which was conducted in the period covering 2006 – 2008, the management of economic processes are functionally covered by cca 95% of ERP systems, and this includes all of the key areas – **Cost and In-house Accounting, Budgeting, Financial Accounting, Decision-making Roles and Controlling**. Other ERP application coverage of some of the above-mentioned areas is missing or is not completely resolved. A similarly rich range of functionalities is only oriented to the field of purchasing and sales logistics.

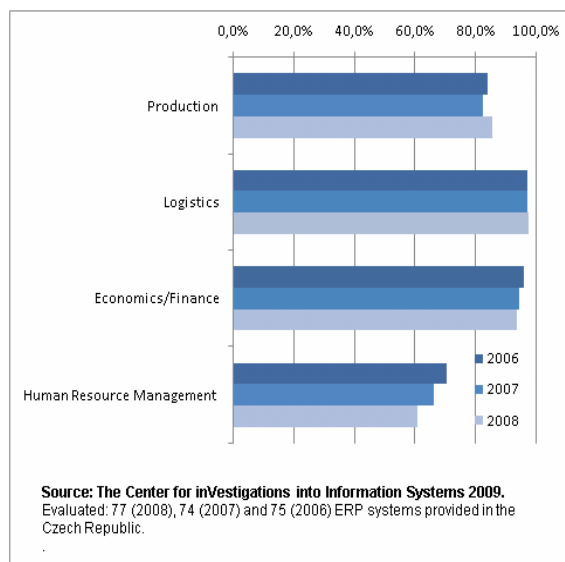


Fig 2. Coverage of key internal processes by ERP systems delivered to the Czech market

The management of two other key processes – i.e. Production and Human Resources Management – are less well represented in ERP systems. Production management is a highly specific issue and even though the data contained in the graph above shows a high frequency for the support of production in ERP systems, it cannot be related to the coverage of all types of production processes – whether from the perspective of the continuity or the take-up of production. The common base-line represents so-called small-scale production (34), or respectively, the tracking and evaluation of made-to-order products.

As regards Human Resource Management, which is without question an essential process within the framework of an ERP concept (1), the relatively low frequency of its representation is influenced by the fact that the results do not reflect or count applications which are used to cover this area and which are sub-deliveries to the main core system (these are predominantly from world-class providers), which our local domestic systems (e.g. PERM, PERMIS, Nugget, and Kompas2) do not have – i.e. Human Resources Management applications.

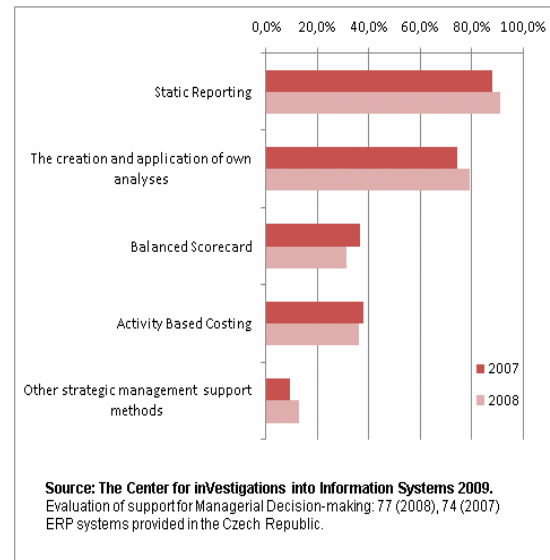


Fig 3. Support of Managerial decision-making in ERP systems delivered to the Czech market

Another factor which is closely linked to economic processes and which has a direct influence upon their management is support for managerial decision-making – and especially support for methods like Activity Based Costing, and Value Based Management, for instance. Between 2003 and 2006, managerial information systems became an indivisible component of the majority of ERP systems offered on the Czech market. Research into this market in 2007 confirmed that only 2.6 % of ERP systems did not contain even the possibility of static reporting.

Based upon our latest evaluations, we can confirm this trend. Nevertheless, coverage by means of methods directly linked (not only) to the management of economic processes, including unified management concepts like the Balanced Scorecard method, are not strongly represented in ERP systems. This is partially given by the fact that, should an enterprise consider the use of such methods within the framework of an information system, then this will only be at the time when it has secured the internal processes of routine operations in a

corresponding manner. They subsequently innovate their existing ERP system to include managerial superstructures in the form of products like Cognos, Infor Performance Management, Business Objects, etc.

The subject of analytical processing offered by the majority of ERP systems is only operational data, especially from the fields of Accounting and Sales, and this is usually in the form of pre-prepared reports. In the course of analysing the data in the transaction system, users have the possibility of accessing these reports. They can ask questions regarding above all the effectiveness of purchasing and sales, the state and management of inventory, and can determine marketing and sales strategies, or discover opportunities on the market, and so on. Analysis of the operational data in transaction systems has however many limitations, and for this reason some ERP providers offer expansion sets for their system to upgrade them into full-value data storage and warehousing. Basic analysis takes place in the same way as for the analytical processing of data in transactional systems. Advanced analysis is then based upon statistical forecasting, "what if?" modelling, or on data-mining algorithms. Only then can users define concrete scenarios and sets and work them up to various levels of detail.

MS Excel, Cognos and other company-own applications or individual solutions rank among the most frequently used client tools of managerial superstructures in ERP systems (e.g. the Manager module in the Karat information system). CPM (Corporate Performance Management) tools integrated within the framework of an ERP system are rarely applied in Czech enterprises, and this includes companies which have implemented solutions like Dialog 3000S (Activity Based Costing/Management) or Infor ERP LN (Value Based Management).

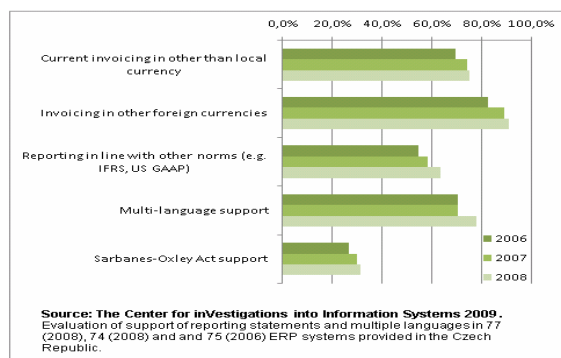


Fig 4. Support of reporting statements and multiple languages in ERP systems delivered to the Czech market

The last and no less important area is the reporting statement system. Here, we investigated whether the ERP systems used enabled invoicing in currencies other than the national currency. As became clear from the results of the research, (viz graph in Fig. 4), the gradual growth trend is clear in this area. This is also true for cases where the enterprise in other foreign currencies. This may be the consequence of the interlinkage of large parts of companies which the investigated ERP systems serve, to foreign trade. In the course of realising international commercial relationships, organisations desperately need these functions since, according to current Czech accounting rules and regulations, they can invoice in currencies other than the national currency, but have to report (i.e. make out and submit statements) only in Czech crowns.

The environment of the global economy requires above all the comparability and reliability of submitted information in the field of managing economic issues. Among the two main directions or trends of international harmonisation of accounting practices belong, without a doubt, the International Financial Reporting Standards (IFRS) and the Generally Accepted Accounting Principles (US GAAP). It is precisely because of this gradual harmonisation of accounting standards that will have an ever greater impact upon Czech enterprises and the timely resolution of these problems and issues already today offer competitive advantages to forward thinking enterprises. In addition, those enterprises which emit publicly tradable paper and certificates (bonds, shares, etc.) within the framework of the EU must compulsorily put together a consolidated accounting statement which complies with the IFRS standards. Individual member states within the EU however can also transfer this duty to individual accounting closing statements by means of their own legislation and regulations. This situation now holds true for the Czech Republic.

6. Conclusion

The characteristics of processes, the delimitation of the appropriate terminology and the results set out above will serve in the future as starting points for even deeper and more detailed research into the whole system of managing the economic issues within enterprises as well as reporting statements, the automatization of this process within the context and framework of ERP systems, and their interlinkage with the value creation chain and management processes (i.e. managerial decision-making).

One of the researched fields of economic processes is the in-house accounting system, which the great majority of enterprises do not have sufficiently worked through at the moment and which often is not in accord with financial accounting principles. This situation then leads to imprecise and insufficient information for the management of all of the company. Enterprises are introducing profit-centre operations or management on the basis of SBUs (Strategic Business Units), in order to more precisely determine and report costs and benefits, nevertheless, the organisational structure itself has but a minimal influence upon the effective management of economic processes.

Another neglected area is that of the system for calculations. An example might be the state of in-house inventory stocks (and thus even of the whole company's operational results), which are reported erroneously if the resultant calculation is not elaborated systematically for all of the enterprise's products and services. In addition, these enterprises do not even make money based upon these erroneous calculations of real production costs to cover their future investment needs.

Another important view on the problems and issues mentioned in this article is the technological point-of-view and this from the perspective of the volume and quality of the processed information and its exploitation. It often happens that an enterprise has not mapped its processes precisely enough and thus often performs activities which repeat themselves and contribute to the overall ineffectiveness of the enterprise's operations – which, according to research conducted by CVIS to-date, represents one of the key lacks and insufficiencies of the management of economic processes in manufacturing and commercial organisations.

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