

ERP AND PLM RESOURCES IN ESTONIAN SMEs

Tähemaa, T.; Karjust, K.; & Pohlak, M.

Abstract: *Acronyms ERP, PDM, PLM and other related terms are highly used but often misunderstood - is it a concept or method? Is it a utilized software tool or maybe something rather different? SME-s (Small and Medium Enterprises) are the biggest group of enterprises swinging between two different understandings, also swinging between manual work and automated data managing.*

The prerequisite of winning competition is the high productivity of labour and capital usage [1]. It seems to be tradition in SMEs that the software systems are not classified as "productive capital usage". Maybe this is truth if we look at the development speed of software programs and new solutions as Saas (Software as a Service) [2] and Cloud Computing [3]. At the moment the task is capture the current situation in Estonia for future benchmarking. Key words: PLM, ERP, PDM, web Based Systems, Product Development.

1. INTRODUCTION

The increasing competitiveness in global market highlights the importance of design quality, productivity, multi-company collaboration, optimal price levels and predictability. To improve their ability to innovate, get products to market faster, and reduce errors, the manufacturers have been continuing to improve their product development and management abilities. To look closer the Estonian enterprises then SME is most usual type, if we follow the European definition of this term [4]. Only in case of international concerns operating in Estonian area the definition is doubtful.

Among local SME-s many have grown from micro enterprises, a number of bigger ones have developed from soviet factories reorganized by their new owners. Additionally, there are a few larger international enterprises with their subdivisions situating in Estonia and also some combinations of listed before types of enterprises. One is clear – all those enterprises and their leaderships have only a few decades of experience how to survive in open global market. It is also clear that there is no hope of getting free of charge supervising to success from abroad because of global competition. In this paper the current software tooling capability as one success factor is analysed based on a small number of Estonian mechanical industry SME examples. Method of "visit and discuss SMEs CEO/CTO" with preliminary questioning form has been used to collect data. Perhaps it was only a way to get valid and commented information straight from the source. For emotion free result always more than one person was involved from researcher's side and their comments were combined after questioning. The research is obviously fully anonymous as most details are sensible enough and not always showing enterprises from the strongest side.

Similar researches have been carried out in field of Estonian tooling companies where overall competitiveness and productivity analysis was presented based on the data from the end of year 2007. Also numerically controlled hardware's rational exploitation was under observation and cluster development together with e-manufacturing was proposed as

development tool [5]. Actual work is pretending to follow partly the steps of this successful investigation and partly find new perspectives not only for tooling companies. It is necessary to point out that the economical situation has changed as well and higher productivity is much more important than in “good old times” at year 2007.

2. TERMS, REALITY AND THEORETICAL EXPLANATIONS.

In the current part of the paper the terms ERP, PLM and some other related ones are under observation and description. The intersections and dissimilarities between different types of managing tools are pointed out and the availability of those software solutions with support and localizations are discussed.

In the period of economical expansion the attention was paid mostly for fulfilling orders and fighting against labour shortage. In the contract phases the productivity rises to the top.

As a fact, Estonia is below the EU average in its efficiency of transforming innovation inputs into outputs (both Applications and Intellectual Property) [6]. So far the flexibility and openness have been keywords to success but for continuous development wider variety of attraction factors is needed. Almost everybody has understood that along with flexibility and openness productivity is the new element to work with. The problem is how to increase productivity in machinery SMEs with lack of investments.

It is obvious that on the market we can find huge amounts of software tools proved as productivity risers. Most of the top quality ones are large modular systems developed and designed for certain types of large enterprises. Then a big part of software tools pretend to be universal, often it means that you anyway have to adopt your work process according to the requirements of program. And last there is a portion of successful and less successful small

vendors providing “tailored suits” for one enterprise or a group of enterprises. Problem is how to choose software and later measure the positive effect or ROI of such kind of investment.

So let’s point out risks of investing into soft values:

- Investment is invisible. You can easily forget that you have bought something.
- Not for resell. Once you have bought some supporting software you cannot pass it forward.
- “Try before by” is not an easy task. Might be time-consuming to select one, especially if you want to try it with correct and familiar data in it.
- Unclear ROI. Software does not do anything without a user – so who earns return – specialist or tool?

There are of course much more positive nuances in case of good choice.

- Software lasts forever. Usually at least until it is morally useless.
- Flexibility. In most cases you can add functionality and licences.
- Safe. Easy to back up, transfer and wilfully remove.
- Portable. Offers possibility to use remote office.
- Relatively low overhead cost. Service agreements pay usually 10% of investment. Zero cost if unused for longer time.

The risks mentioned before are main reasons to postpone also simple ERP and PLM purchasing. But there exists another distraction as well – high speed of development and renaming of existing tools. “We will buy the next version” is a quite frequent excuse for not having software tools. In the following part we investigate reasons of such excuses and try to find out what people really mean with the terms like ERP and PLM in Estonian SMEs.

First of all we have to understand there are two levels of those terms. One level is concept level and another is software system type level. It is clear that one can plan enterprise resources also without

software tool, and for instance product document management is possible without computer as well. But if the concept is missing or is unmethodical then the software tool itself does not help much.

Then different accents are highlighted in separate interest groups – both inside and outside of enterprise. Inside of enterprise the accent depends on experience of workers or how different tools were introduced to them in the inculcate process. Outside there are just different interest groups willing to show that their tools are most powerful and suitable for everybody. Finally, workers usually see only their narrow part of functionality of the system and evaluate the whole from their own point of view. It means that for warehouse worker's the whole ERP is just a warehouse module where salesmen are causing errors by selling goods out.

Here we get the first rule that good soft investment is mostly a task for the leadership. Only leaders or board can see the wider view and explain everything.

It was nice to recognize that in most cases the concept of ERP or PLM was cultivated in SMEs. The balance between software system owners and so called “manual workers” in Estonia is illustrated in Fig.1 and Fig. 2.

As we can see the MS Office is still the most popular tool for planning enterprise resources. It means that in 67% cases it should be possible to increase productivity with reducing manual work amount in ordering, warehousing, producing, selling, archiving documents and making online analysis.

Even more – 78% among SMEs are not using possibilities of modern product development tools. Drawings are still archived in papers, versioning is mostly manually driven and differs between users, no FEM users and feedback information like VOC and reclamations are not available for product development team.

For better understanding of those figures let us give different definitions for ERP and PLM as those terms are understood

among SMEs and among ERP & PLM researchers. SME people use to understand that ERP is something that manages in business level and PLM is something managing in product level.

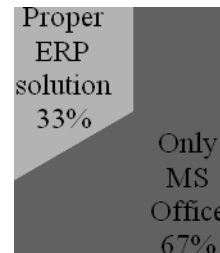


Fig. 1. Enterprise Resource Planning users among Mechanical Engineering SMEs

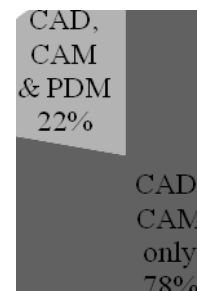


Fig. 2. Product Lifecycle Management elements distribution in Mechanical Engineering SMEs

Generally ERP systems create interactive environments designed to help companies manage and analyze the business process associated with manufacturing goods, such as inventory control, order taking, accounting, and much more. This basic definition still holds true for ERP, today its definition is expanding [7]. A product lifecycle management or PLM system – is ideally an information processing system or set of IT-systems that integrates the

functions of the whole company. This integration is done through connecting, integrating and controlling the company's business processes and produced products by means of product data [8].

3. CATEGORIZATION OF ENTERPRISES.

At the very beginning a group of local enterprises with different ambitions and profile was needed to be found. Target here was to find small but highly opened colourful cluster of producers where with optimal amount of work highest level of results could be expected.

The mission was completed together with IMECC (Innovative Manufacturing Engineering Systems Competence Centre). Suitable cluster was prepared by IMECC team at the beginning of year 2009. Needed variety of profiles was fulfilled and is described below.

- From the point of view of employers' number – the almost full range of SME group was presented.
- From the point of view of location – different regions were covered.
- From the point of view of production profile both sectors – subcontractors and enterprises with their own product development department were involved.

In Fig. 3 and 4 three relations are illustrated – distribution of ERP and PLM functionality level in correlation with

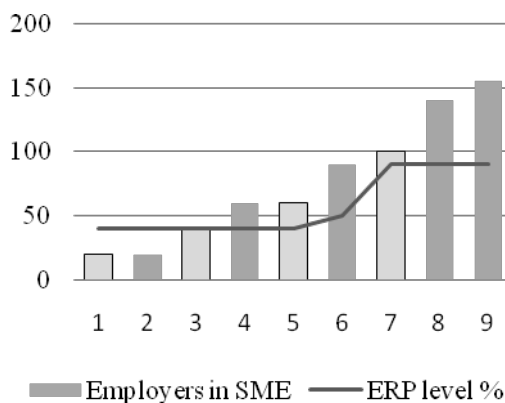


Fig. 3. Correlation between employer's amount and ERP systems functionality

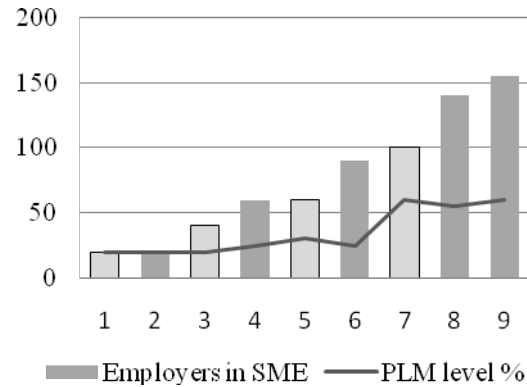


Fig. 4. Correlation between employer's amount and PLM systems functionality

employers number in both production profile sectors, where subcontractors are marked with bordered columns.

ERP and PLM functionality level is counted on the base of the number of the modules in the system. Even if the enterprise uses only stand-alone modules like 'ordering module' or 'warehouse keeping module' in case of ERP, or 'CAD' and 'CAM' modules in case of PLM (ERP/PLM system as whole software product is not in use), the certain percentage of ERP/PLM functionality is indicated and shown in the Fig. 3 and 4. Correction coefficient is also used in case of insufficient use of module.

The functionality level was found as following:

$$lv = \left(\frac{1}{n} \times \sum_{i=1}^n B_i \right) \times 100\% \quad (1)$$

and

$$0 \leq B_i \leq 1$$

where

lv – current functionality level;

n – number of modules in average system;

B – module utilization coefficient;

i - module type, $i = 1, 2, \dots, n$.

ERP and PLM level is in correlation with the employers' amount but not correlated with the production profile. We can also see that the PLM curve's highest point in Fig. 4 is only slightly over 50%, which means a little more than a half of PLM offered modularity is currently used by

larger SMEs and only a few modules (mostly CAD and CAM, as it was pointed out in Fig. 2) are currently used in smaller SMEs.

4. SUCCESS FACTORS IN FUTURE DEVELOPEMENTS.

Human brain is often very selective and it is impossible to retransmit memory and experience from one person to another. Human nature has also an ability to twist facts and forget them. So every bit of information that should last longer than employers' work cycle at the company should be saved and kept in systematised form. Basic rules for systematization should develop as early as possible and most suitable tooling for it is not less important. And of course, an early start is better. Otherwise the amount of collected experience is smaller than the competitors'. Old way for such archiving tasks was based on "pen and paper", so it was an additional load for an employer to do, especially to repeat it many times. A good solution for the present age is a computer system, which is actually a helpful tool for everyday jobs with a concurrent ability to systematically collect valuable information and power to present the information in most useful and understandable ways.

Both, ERP and PLM pretend to be such instruments. And they are not the only ones. A huge number of less and more specialized systems and modules exist inside and outside of each other covering partly one another's functionality. It is obvious that it is not an easy task to find the most proper system at once. Moreover, by choosing an improper one, the position of the company may drop among others.

If we analyse the situation from the point of view of low level ERP and PLM users then it is clear enough that in global market they are going to lose their profit because of slower order response time, less exact pricing policy, slower time to market and clumsier resource handling. Many options as manufacturing flaw tracking, online

ordering, mass customization, shared warehouse, B2B selling engines etc are almost impossible to reach. All this gives clear signal, that in the nearest future it is impossible to grow or even survive without improving the level of supporting software tools [9]. One important success factor is going to be the optimization in software selection, inculcating and effective using.

In the way to optimize software selection there is an abundant choice of both, ERP and PLM solutions available in the worldwide market. Mostly designed for medium and large enterprises the systems include a wide variety of modules. The list of vendors is periodically analysed and rated by different researchers and those reports are available also for everybody. Focus and Aberdeen [9, 10, 11] have pointed out that in 2006...2008 the biggest turnover was made in the midmarket, but 35% of midsize business own mature systems, older than 10 years, and they need to be replaced. This gives us clear sign that software production for small business sector is going to develop all over the world in the nearest future.

Inculcating one or more software systems at an enterprise is not an easy and cheap task. Key for success is professional inculcating project management and educating the employers in time. It is clear that a lot more effort is needed for the inculcation and running of two or more parallel systems than concentration to one uniform system. Reality is that non system fits perfectly with every business special needs and tailoring work is always expensive.

Effective use is highly connected with integration of modules or different systems. Double data inserting, archiving and searching obligation reduces productivity and scanty integration causes walls between departments.

5. CONCLUSION

Development direction shows that in very close future the most vendors have to offer

their tools in mode of SaaS (Software as a Service) over the WEB which means wider variety of possible tooling available for small enterprises without tremendous expenses in the launching process. It means also, that customer is not bounded anymore to one vendor for minimum 10 years but it is possible to run even several WEB services concurrently for testing purposes. Another trend is that the ERP and PLM are getting more and more integrated in design level. First examples are already in market where PLM is as sub module in ERP system and vice versa.

Finally, cluster approach for micro- and small enterprises with similar profiles allows them to cooperate in usage of certain fragments of supporting software. Furthermore, the need to work in cluster opens possibility for winning and better handling of bigger collective procurements, allows easy share of warehouse leftovers, generates better visibility of unloaded technological resources for subcontract works etc. SME as a term is not very suitable to use here in Estonia because the gap between small and medium enterprises is not only expressed in employers' number but depends on competition, customer needs, turnover and profit level. It could sound idealistic but from wider perspective the deeper experience exchange and wisely organised cooperation in small enterprises level improves overall productivity and Estonia's worldwide competition level. High price level and good quality/functionality relationship of larger software systems could be indirect engine for further cluster formation and cooperation.

6. ACKNOWLEDGEMENTS

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8. CORRESPONDING AUTHOR

Assoc. Professor Toivo Tähemaa, Department of Machinery, Tallinn University of Technology, Ehitajate tee 5, Tallinn, 19086, Estonia, toivo.tahemaa@ttu.ee