

Łukasz Wiechetek  
Maria Curie-Skłodowska University  
Faculty of Economics  
Department of Management Information Systems

## **KONCEPCJA CZASOWEGO PROGU RENTOWNOŚCI WDROŻENIA SYSTEMU INFORMATYCZNEGO W MAŁYCH I ŚREDNICH PRZEDSIĘBIORSTWACH**

**Streszczenie.** Artykuł charakteryzuje wdrożenia systemów informatycznych, czyli nieustanną próbę balansowania pomiędzy: wielkością budżetu, zakresem realizowanych funkcjonalności oraz czasem poświęconym na realizację. Autor podkreśla szczególne znaczenie zasobu czasu, jako kluczowego czynnika mającego wpływ na rentowność inwestycji w IT w małych i średnich przedsiębiorstwach.

Celem niniejszego opracowania jest próba scharakteryzowania koncepcji „**czasowego**” **progu rentowności (TBEP)** wdrożeń systemów informatycznych w małych i średnich przedsiębiorstwach, a więc sposobu określenia, po jakim czasie eksploatacji systemu nastąpi zwrot poniesionych nakładów inwestycyjnych, a zatem kiedy przedsięwzięcie informatyczne zacznie generować zyski.

Autor podejmuje także próbę odpowiedzi na pytanie czy i w jaki sposób długość czasu wdrożenia systemu informatycznego w przedsiębiorstwie wpływa na moment osiągnięcia progu rentowności oraz jaki wpływ wywiera proces wdrożeniowy na poziom tzw. **czasowego wskaźnika bezpieczeństwa eksploatacji systemu (TMSES)**.

**Słowa kluczowe:** czasowy próg rentowności, wdrożenie, system informatyczny, MSP

**CONCEPTION OF INFORMATION SYSTEMS IMPLEMENTATION  
TIME BREAK EVEN POINT IN SMALL AND MEDIUM-SIZED  
ENTERPRISES**

**Summary.** Article concerns information systems implementation, the constant attempt to balance between: the budget, the scope and implementation time. The author stresses the importance of the time resource, as a key factor affecting the profitability of IT investments in small and medium enterprises.

The purpose of this paper is an attempt to characterize the concept of **time break-even point (TBEP)** related to information systems implementation in small and medium enterprises, and how to determine when the operation of the system will return the invested capital; after what time will the IT project generate profits.

The author also makes an attempt to answer the question whether and how the duration of the system implementation affects the moment of reaching break-even point and what impact has the implementation process time on the level of so-called **time margin of information system exploitation safety (TMSES)**.

**Key words:** time BEP, IT implementation, SME

## 1. Break-even analysis

Break-even analysis allows to evaluate the projects by determination of value or quantity from which the project starts to be profitable. It allows to determine the level of revenue, which covers the total costs (variable and fixed) related to the functioning of the company<sup>1</sup>. The literature describes in details the quantity and value break-even<sup>23</sup>. In accounting the break-even point is the point (in terms of unit sales) at which the total revenue from the sale is equal to the total cost. In other words, the value of fixed costs divided by the difference between the unit sale price and unit variable cost (unit contribution margin) (**formula 1**).

$$BEP = F_C / (u_P - v_C) \quad (1)$$

where:

*BEP* - break-even point (units of sale)

*F<sub>C</sub>* = fixed costs

*v<sub>C</sub>* = variable costs per unit

*u<sub>P</sub>* = sale price per unit

Wzór 1. Wzór na próg rentowności

Formuła 1. Break-even point formula

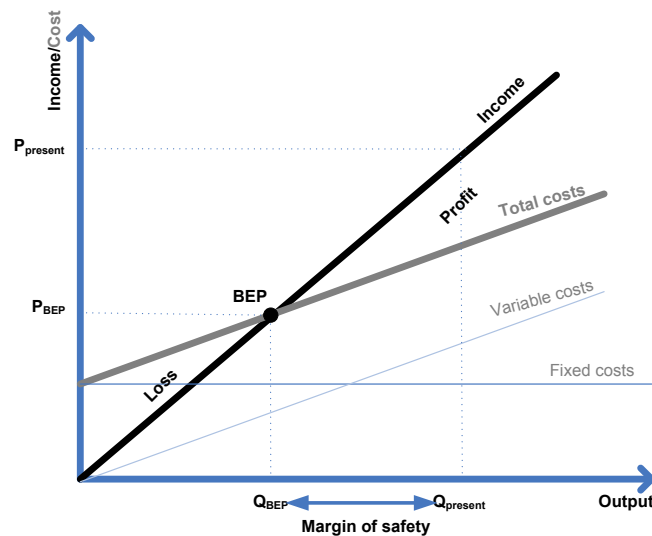
<sup>1</sup> Pomykalska B., Pomykalski P.: Analiza finansowa przedsiębiorstwa. Wydawnictwo Naukowe PWN, Warszawa 2008, s.114.

<sup>2</sup> Ćwiąkała-Małys A., Nowak W.: The generalized sensibility analysis of the profit in a company which produces n-assortments. „Operations Research & Decisions”, Issue 2, 2007. p.9-10.

<sup>3</sup> Szczypa P.: Rachunkowość zarządcza. Klucz do sukcesu. CeDeWu, Warszawa 2011, s. 115-118.

Source: own work based on Szczypa P.: Rachunkowość zarządcza. Klucz do sukcesu. CeDeWu, Warszawa 2011, s. 115-118.

Graphic shows the definition of a break-even was presented on **figure 1**.



Rys. 1. Graficzna definicja prognozy rentowności i marginesu bezpieczeństwa

Fig. 1. Graphical definition of break-even point and margin of safety

Source: own work.

In value terms, the break-even means value of sales that can cover the amount of fixed and variable costs. Margin of safety represents the strength of the company. It enables managers to know whether the company is over or below the break even point. So answers the question how large can be reduction in sales to remain profitable. The smaller positive value of the safety margin, the greater the risk of profitability loss, and the greater need for monitoring of sales and cost volume.

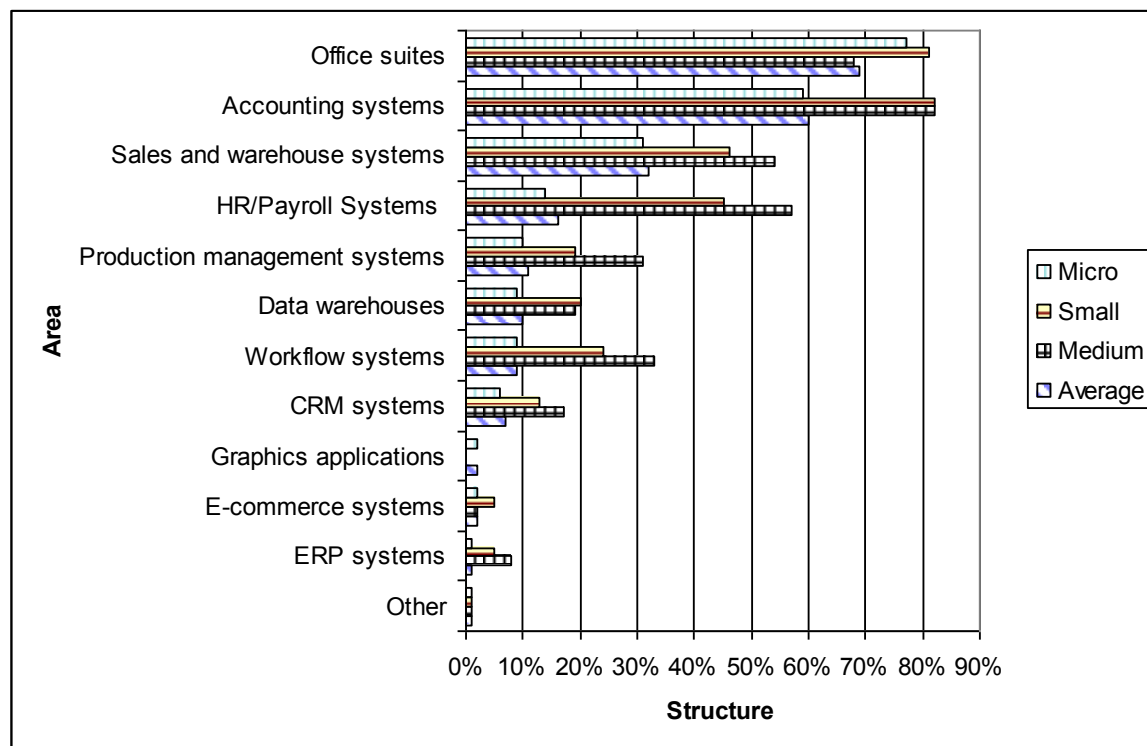
## 2. The use of information systems in SME companies

The statistics<sup>4</sup> shows that the majority of Polish entrepreneurs declare to use the computers and the Internet, but the effectiveness of usage is rather at a low level. Internet usage is usually reduced to sending e-mail, searching information. The SME companies rarely use the IT technology in ordering processes, or implement specialized business management systems.

<sup>4</sup> PARP: Kierunki inwestowania w nowoczesne technologie w przedsiębiorstwach MSP. PARP, Warszawa 2007, s. 8.

The performed research<sup>5</sup> shows that awareness of the benefits arising from the use of IT tools in the Polish SME sector is much lower than in large corporations, but also much lower than in Western or American representatives of the SME sector.

The use of information systems offers many measurable benefits, but is also associated with a number of costs generated during the implementation and operation stage. The most commonly used (by Polish small and medium businesses) IT tools are<sup>6</sup>: office suites, accounting systems, sales and storage systems. A full list of the systems used by the Polish SME sector members presents **figure 2**.



Rys. 2. Rodzaje oprogramowania informatycznego wykorzystywane przez polskie przedsiębiorstwa sektora MSP

Fig. 2. Types of computer software used by the Polish SMEs

Source: own work based on PARP: Kierunki inwestowania w nowoczesne technologie w przedsiębiorstwach MSP, PARP, Warszawa 2007, s. 44.

Small and medium enterprises increasingly invest in integrated tools that support the management process and facilitate contacts with clients and subcontractors. The system implementation is time-consuming process, on average, depending on the company size and the scale of the project lasts from several months to several years<sup>7</sup>. So it is a risky process. The risk may result from variable company needs, changes in legal requirements or technical conditions. The risk may be also caused by the possibility of winding up the client company

<sup>5</sup> Chelpiński K.: Mali muszą iść drogą dużych. „Computerworld”, Vol. 18-19/893, 2010, s. 29.

<sup>6</sup> PARP: op.cit. PARP, Warszawa 2007, s. 44.

<sup>7</sup> Yourdon E.: Marsz ku klęsce. Poradnik dla projektanta systemów. WNT, Warszawa 2000, p. 19.

or the company providing implementation services. The danger of modifications is directly related to the implementation project duration. The main goal, therefore, seems to be the earliest possible completion of the implementation. That will reduce costs associated with the duration of the project such as salaries of project managers, but mostly, decrease the risk of changes in implementation aims or the key system requirements. Rapid deployment of the system also allows for earlier generation of additional revenue resulting from the system operation, and thus leads to an earlier return on investment.

However, it is worth to remember that the faster realization of the implementation process may reflect negatively on the functionality of the IT tool or the quality of the introduced system.

### 3. IT system implementation

Implementation of the IT system is one of the most difficult tasks in the area of upgrading the information system of the organization<sup>8</sup>. Implementation process can be defined as introduction of system to the field of the enterprise, transferring system from the people who have designed, implemented it, to the people who will operate it<sup>9</sup>.

The IT system implementation procedure in small and medium-sized enterprises consists of the following phases<sup>10</sup>:

- analysis,
- organizational arrangements for implementation,
- implementation design,
- the proper system implementation,
- start and system operation.

A significant is the fact that the duration of the IT implementation project is clearly correlated with the size of the company and the size of the implementation team. The average duration of the implementation project carried out in companies of different size is presented in **table 1**.

Table 1

Charakterystyka czasowa projektów wdrożeń systemów informatycznych

The time characteristics of IT implementation projects

---

<sup>8</sup> Kisielnicki J., Sroka H.: Systemy informacyjne biznesu. Informatyka dla zarządzania. Placet, Warszawa 2001, s. 131.

<sup>9</sup> Ibidem.

<sup>10</sup> Flasiński M.: Zarządzanie projektami informatycznymi. PWN, Warszawa 2009, s. 35.

<b>N o.</b>	<b>Company size</b>	<b>Type of project</b>	<b>Duration</b>	<b>Team size</b>
1.	small	small size	3-6 months	up to 10 people
2.	medium	medium size	1-2 years	20-30 people
3.	large	large size	3-5 years	100-300 people
4.	corporation	Giant	7-10 years	1000-2000 people

Source: own work based on Yourdon E.: Marsz ku kłęsce. Poradnik dla projektanta systemów, WNT, Warszawa 2000, p. 19.

Thus, the costs associated with implementation of the IT system are generated long before the actual start of implementation, but also after completion of the implementation during the system operation stage. The same situation applies to the revenues (benefits) related to the implementation procedure. Several advantages can be observed already during the pre-analysis stage including: organization of documentation, business processes mapping, eliminating of redundant data. However, the greatest benefits are visible during the system operation phase, after completion of stability phase, for example:

- acceleration of information flow,
- automation of information processing,
- greater control over the company.

The main difference is the fact that the level of marginal costs (increase of total costs) associated with the system implementation decreases with the progress of the implementation work. The largest cost is usually preparing and designing implementing process (including the purchase of licenses, purchase of equipment, costs of external experts). Revenues (benefits), however, minimal in the early stages, in most cases become visible in the operation phase.

At the end of the implementation stage the designers, members of the implementation team are replaced by end-users. The system is transferred from the people who have designed, implemented it, to the people who will operate it<sup>11</sup>. This process is important for the organization, on the one hand the system can be underdeveloped and does not meet the requirements of the organization, on the other hand the organization itself may not be ready to adopt the system, which in turn can lead to multiple charges, or increase in the reluctance of enterprise informatization. Implementation of the IT system also causes significant changes in the structure and functioning of the company<sup>12</sup>.

Regarding the complexity of the IT implementation projects, that consume large amounts of resources, not only labor and capital, but also time, bearing in mind not only the current requirements of the company, but their time variability and relatively short lifetime of IT systems it becomes important to ask the following questions:

<sup>11</sup> Kisielnicki J., Sroka H.: op.cit., s. 133-134.

<sup>12</sup> Lech P.: Zintegrowane systemy zarządzania ERP/ERP II. Wykorzystanie w biznesie, wdrażanie. Difin, Warszawa 2003, s. 42-43.

- How long can be the period of effective use of the implemented IT system in the enterprise?
- At what time (during the operation phase) the system will reach the break-even time?
- Can extension of the system implementation time affect the return on investment time?
- How much will the company earn (loss) using implemented tool until the withdrawal of the system?

In the above questions, resource of time plays an important role. On the one hand, longer system implementation period can be derived from the more detailed analysis of business requirements, more complete tests or more comprehensive training. On the other hand, longer implementation time causes additional costs such as: project managers salary, extra trainings, and opportunity costs associated with delayed start of system.

## **4. An economic analysis of information systems**

Economic benefits are one of the most important groups of criteria posed in front of computer systems implemented in small and medium enterprises<sup>13</sup>. An economic analysis of IT implementation projects allows for precise calculation of expenditure necessary to carry out the IT implementation, the expected financial benefits, but also appropriate costs distribution in time. Economic analysis of the IT system implementation process should focus on assessing the benefits (costs) but also, due to stretching of the project in time, also on analysis of risk related to the IT implementation projects.

### **2.1. The cost of system implementation and operation**

Estimating the cost of an IT system implementation seems to be less complicated than the calculation of the revenue generated during the implementation and operation phase. Providers of IT implementation services often calculate typical cost by comparing current project with the already completed IT implementation projects of similar functionality, size and specificity of operation<sup>14</sup>. Costs associated with implementation and operation of the IT system are generated by both: the provider of implementation services, and the company that wants to implement the IT tool<sup>15</sup>. Due to the time period (system life cycle) the costs can be classified as follows<sup>16</sup>:

- the pre-implementation costs,

---

<sup>13</sup> Flasiński M.: op.cit., s. 143.

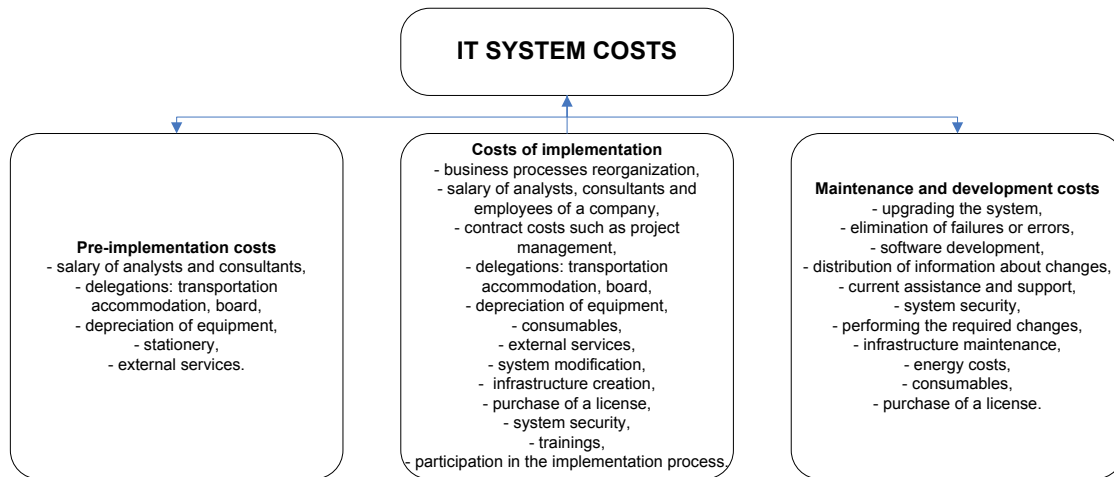
<sup>14</sup> Ibidem.

<sup>15</sup> Plumb I., Zamfir A.: Use of ict in SMEs management within the sector of services. „Annals of the University of Oradea, Economic Science Series”, Vol. 17 Issue 4, 2008, p. 485-487.

<sup>16</sup> Flasiński M.: op.cit., s. 144.

- costs of implementation,
- maintenance and development costs.

Selected categories of costs associated with enterprise information systems are shown on **figure 3**.



Rys. 3. Kategorie kosztów związanych z funkcjonowaniem systemu informatycznego w przedsiębiorstwie

Fig. 3. Categories of costs associated with enterprise information system

Source: own work based on Flasiński M.: Zarządzanie projektami informatycznymi, PWN, Warszawa 2009, s. 144; Gunia G.: Wdrażanie zintegrowanych systemów informatycznych, Wydawnictwo Fundacji Centrum Nowych Technologii, Bielsko-Biała 2009, s. 58-60.

The costs of system implementation, assuming a fixed range of functionality, can also be divided into fixed, independent of the duration of implementation and operation process, and variable costs closely related to the implementation time and system life cycle.

To determine the break-even time it is important to separate the costs related to the system implementation and operation phase, its appropriate grouping into fixed and variable costs, and the precise determination of their value.

Summary of fixed and variable costs related to the IT system implementation and operation is presented in **table 2**.

Table 2

Koszty stałe i zmienne związane z wdrożeniem i eksploatacją systemu informatycznego  
Fixed and variable costs related to the IT system implementation and operation

		Fixed costs		Variable costs	
No.	Specification	Phase		Specification	Phase
1.	salary of analysts and consultants	- preparation of implementation		salary of project managers	- preparation of implementation - realization of



No.	Fixed costs		Variable costs	
	Specification	Phase	Specification	Phase
				implementation
2.	business processes reorganization	- preparation of implementation - realization of implementation	upgrading the system	- realization of implementation - operation
3.	system modification	- realization of implementation	current assistance and support	- operation
4.	external services	- preparation of implementation - realization of implementation	system security	- preparation of implementation - realization of implementation - operation
5.	infrastructure creation	- realization of implementation	infrastructure maintenance	- operation
6.	hardware	- realization of implementation	energy consumption	- realization of implementation - operation
7.	licenses	- realization of implementation	consumables	- realization of implementation - operation
8.	trainings	- realization of implementation	elimination of failures or errors	- realization of implementation - operation

Flasiński M.: Zarządzanie projektami informatycznymi, PWN, Warszawa 2009, s. 144; Gunia G.: Wdrażanie zintegrowanych systemów informatycznych, Wydawnictwo Fundacji Centrum Nowych Technologii, Bielsko-Biała 2009, s. 58-60.

Much of the above fixed costs can become variable (temporary fixed) due to extending the duration of IT implementation process. As an example we can describe training costs. The duration of training, and thus the associated costs are generally defined in the pre-implementation phase. The costs depends among others from the functional scope of the system, the number of users to be trained, the number of training groups, but their value should not be related to the duration of implementation stage. However, in the case of significant delays in implementation, postponement of starting operation phase, it may be necessary to repeat the part or the entire training cycle.

## 2.2. The benefits of operating IT system

From the economic point of view, the proposed difference between the total benefits generated by the implemented IT system, and the cost of the implementation and operation

should be positive, otherwise the efforts to implement the enterprise IT system would be irrational.

Estimating the overall benefits of using a computer system is an extremely difficult undertaking<sup>17</sup>. The overall set of benefits includes both indirect and direct benefits. The benefits are generated in the implementation phase, as well as in the system operation stage. Examples of benefits generated by the management support systems are:

- reducing the cost of maintenance and administration,
- better quality of data,
- faster reporting,
- the ability to control the availability of resources and products,
- better utilization of production capacity,
- coherent and homogeneous information,
- reduction of information system maintenance costs of,
- greater focus on customers,
- better identification of customer needs,
- matching of products and services to customer needs,
- increase in quality of service,
- integration of the various departments of the company,
- sales processes improvement,
- reorganization and improvement of business processes,
- reduction of employment costs,
- reduction in reserves.

Managers of the companies separates the benefits derived from the use of a system and benefits generated by reorganizing the company due to the implementation work. Therefore the implementation of IT system generates a two-fold benefit. Initially, business processes and organizational structure are being optimized during the phase of system implementation. Then, after putting the system into use, the various business processes become standardized and automated through the use of IT tools. So, the IT system implementation triggers the synergistic effects that are derived from the interaction between the IT tool and the company for which the implementation work is being performed. The real benefits arising from the IT implementation lies, therefore, not only in technological and functional capabilities of the implemented system, but mainly in the ability of company to introduce a system, implementation combined with the reorganization of the company<sup>18</sup>.

It can be observed that the main benefits of using the IT system are determined by the finalization of the implementation process, the level of objectives achievement. Secondary benefits arise from the level of efficiency of the implementation work, generating short-term

---

<sup>17</sup> Ibidem, s. 143.

<sup>18</sup> Lech P.: op.cit., s. 139.

benefits. A sample list of benefits generated by the enterprise information system contains **table 3**.

Table 3

Wykaz korzyści generowanych przez system informatyczny przedsiębiorstwa  
List of benefits generated by the enterprise information system

No.		Benefit	Direct	Measurable	Financial	Measure
1.	Automation	reduction of employment	Y	Y	Y	saved amount of wages
2.		reduction of the process errors	Y /N	Y	Y /N	value of avoided losses
3.		less consequence of errors	Y /N	Y /N	Y /N	difference in the number of errors, the difference in time of error correction
4.		quicker decision making process	N	Y	Y /N	time difference from the rise of the problem to decision
5.		matching more creative tasks	N	N	N	-
6.		new way of work	N	N	N	-
7.	Information	better use of resources	Y /N	Y	Y /N	indicator of productivity, cost of released capital
8.		better decisions	N	Y /N	Y /N	savings generated by the decisions in financial terms
9.		faster response to deviations	N	Y	N	time from the deviation to the corrective action
10.		better knowledge about the customers	N	N	N	-
11.		better comfort of work	N	N	N	-
12.	Transformation	new products and services	N	Y	Y	profit from new products, services (minus the loss resulted from the resignation of the old)
13.		shorter delivery times for new products	Y/ N	Y	Y	difference in time from idea to realization
14.		new distribution channels	N	Y	Y	profit from sales through new channels
15.		better quality of products and services	N	Y/ N	Y/ N	difference in the number of defects, warranty repairs
16.		better support and service	N	Y/ N	Y/ N	claims costs
17.		optimization of business processes	Y/ N	Y/ N	Y/ N	-
18.		improving relationships with partners	N	Y/ N	N	less rotation of partners, the difference in the number of incorrect deliveries
19.	1	flattening of the organization	Y	Y	Y	savings of the employment costs

No.		Benefit	Direct	Measurable	Financial	Measure
20.		better communication	N	N	N	-
21.		greater level of knowledge of the organization and employees	N	N	N	-
22.		increase of employees comfort and loyalty	N	N	N	-
23.	prestige	publication in the professional journals	N	Y	N	quantity and the volume of publications
24.		modern and competent company image	N	N	N	-

Source: own work, based on Lech P.: *Metodyka ekonomicznej oceny przedsięwzięć informatycznych*, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2007, s. 43-56.

The above table indicates that most of the benefits in terms of automation, transformation, and the information flow from the use of IT systems, can be measured, quantified. Thus it becomes possible to determine what income is generated through the use of IT tools during both stages: implementation and operation of the system.

The benefits generated by the system can be considered as the savings achieved by the enterprise that resulted from the introduction of a computer system. Some of the benefits are noticed in the phase of preparation and realization of the implementation, but the main benefits are observed during the system operation phase. Faster implementation of the system determines the longer time of use and therefore a higher level of benefits, profit for the company.

## 5. The concept of the time break-even analysis in small and medium-sized enterprises

The concept of the time break-even analysis of information systems implementation is based on the traditional break-even analysis, that allows to determine the amount (value) of sales, from which the project become a profitable investment. The time break-even means, the amount of time (duration of the implementation and operation stage), which elapsed from the beginning of an implementation project. That period of time is necessary to completely cover the costs of system implementation.

Studies conducted by the author and the analysis of the literature shows that the time of system implementation in a small or medium enterprise ranges from 3 months up to 2 years<sup>19</sup>.

<sup>19</sup> Yourdon E.: op.cit., p. 19.

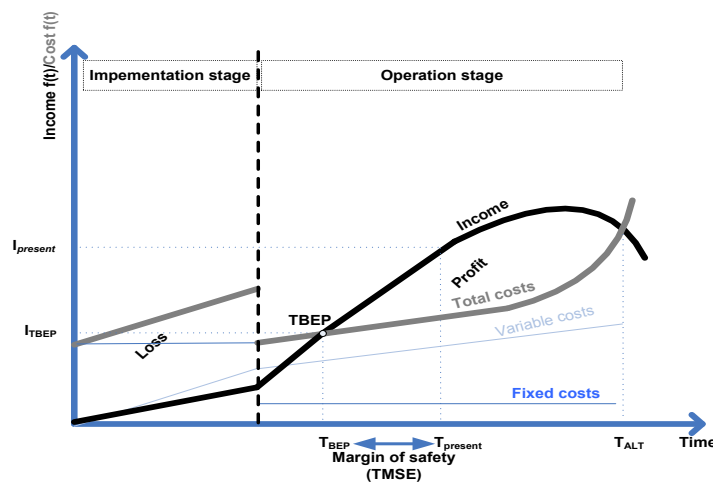
The computer system as a result of: technological constraints, the dynamics of economic development, changes in attitudes and customer requirements can be effectively used in an enterprise only in a strictly limited period of time. This period is determined by factors related to:

- system: flexibility, scalability,
- user/operator: the dynamics of development, staff turnover, the organization of business processes,
- attitude, strategy of system developer and the determinants generated by the environment: changing law, changing market requirements.

Therefore, it becomes necessary to try to design tools that enable to answer the following questions:

- If capital expenditures spent on the implementation and operation of the IT system will be recovered during the operation phase?
- At what time (during the operation phase) the system will reach the break-even time?
- Does the duration of the IT system implementation stage is directly related to break-even time and company risk?

In order to answer these questions it is necessary to combine revenues and expenses arising from the system implementation and operation with the time, when the expenses are incurred, which is developing the concept of time break-even point (TBEP). Graphic illustration of the time break-even concept is shown on **figure 4**.



Rys. 4. Graficzna definicja czasowego prognozy rentowności oraz czasowego wskaźnika bezpieczeństwa eksploatacji systemu

Fig. 4. Graphic concept of time break-even point and time margin of safety

Source: own work.

The main assumptions of the concept of a time break-even:

- the life cycle of the enterprise IT system consists of two main phases: the implementation phase and operation phase,
- revenues and costs associated with the IT system are generated both in the implementation and operation phase,
- revenues and costs associated with the IT system exploitation depends on the duration of the implementation and operation of the system,
- during the implementation phase, the costs associated with the IT system exceeds the benefits,
- during the implementation stage the fixed costs are higher than in the operation phase,
- system life cycle ends up in the operation phase when the income and expenses generated by the system are equal.

Using the above assumptions, the formula for the time break-even (TBEP) is as follows  
**(Formula 2):**

$$TBEP = F(t) / (b(t) - v(t)) \quad (2)$$

where:

*TBEP* – time break-even point

*F(t)* = fixed costs,

$$F(t) = \begin{cases} F(t)_i & - \text{implementation stage} \\ F(t)_e & - \text{exploitation stage} \end{cases}$$

*v(t)* = variable costs of ICT usage per time unit

$$v(t) = \begin{cases} v(t)_i & - \text{implementation stage} \\ v(t)_e & - \text{exploitation stage} \end{cases}$$

*b(t)* = benefit of ICT usage per time unit

$$b(t) = \begin{cases} b(t)_i & - \text{implementation stage} \\ b(t)_e & - \text{exploitation stage} \end{cases}$$

Wzór 2. Wzór na czasowy próg rentowności

Formuła 2. Time break-even point formula

Source: own work.

Determination of a time break-even requires dividing the system life cycle into two stages: the stage of implementation and operation. Subsequently, it is necessary to determine the amount of fixed costs and variable costs associated with the system, and then assign the costs to the stage of IT system life cycle.

Basing on an analysis of the **margin of safety (MS)** resulting from the break-even point analysis it can be stated that in the concept of a time break-even margin of safety, will take the

form the **time margin of information system exploitation safety (TMSES)** determining the sensitivity of the company to shorten the average life cycle of the IT system, e.g. by extended implementation time, technology changes, changing customer requirements. This is the period of IT system operation that runs from the time break-even point until the end of the average system life time. The formula for the time margin of information system exploitation safety is as follows (**Formula 3**):

$$TMSES = (ALT - TBEP) / ALT \quad (3)$$

where:

*TMSES* – time margin of information system exploitation safety,

*TBEP* – time break-even point,

*ALT* – average system life time.

Wzór 3. Wzór na czasowy wskaźnik bezpieczeństwa eksploatacji systemu

Formula 3. Time margin of information system exploitation safety formula

Source: own work.

The above formula indicates that calculation of the TMSES level requires determination of the time break-even and assumption of the ALT index value. The ALT index value, according to studies, literature and the results of research conducted by the author, depends both on the IT system and company specific, but also on the conditions related to the provider of implementation services and level of current assistance and support.

## 6. Conclusion

The article attempts to characterize the concept of time break-even of information systems implementation in small and medium enterprises, as a tool that supports an economic assessment of company IT system. The beginning of the paper author presented a break-even point and the characteristics of IT implementation projects in small and medium-sized enterprises. By emphasizing the complexity of the IT implementing process, author indicates that the process requires a multifaceted analysis not only in financial scope and functionality terms, but also from the time of return on investment point of view.

Conversion the concept of break-even point on the ground of IT systems implementation becomes foundation for developing time break-even point. The TBEP concept can be used not only for selection of IT system and implementation services provider, but also to control the course of the implementation process, which improves the safety of information system exploitation.

The area of time break-even of information systems implementation has not yet been sufficiently explored, although it seems very important. The literature research, interviews conducted by the author with managers of IT implementation projects indicate that:

- Quick return on IT investments, achieving time break-even, plays a crucial role. Technical progress is particularly fast in the field of information technology, more often than in other areas of the enterprise it is possible that before reaching time break-even point it will be necessary to conduct further implementation or change the system.
- The rate of return on IT investment is also caused by the fast development of small and medium-sized enterprises. This leads to substantial expansion or replacement of operated IT system.
- The benefits of the IT implementation project, especially in the organizational area, are generated also before the system operation stage. However, at this stage implementation costs significantly outweigh generated revenue.
- Small and medium enterprises should pay special attention to the duration of the IT system implementation. The low value of time margin of information system exploitation safety can lead to failure in time break-even point achievement (due to a reduction of system lifetime as a result of: longer implementation time, technological, legal, or functional changes). This can lead to problems with the company functioning.
- The results of the time break-even analysis of IT systems implementation performed by different companies, due to the differences in the range and budget, are hardly comparable. However, the time break-even analysis can be applied as one of the tools to choose the right IT system and implementation services provider.



## Bibliography

1. Ali A., Krapfel R., LaBahn D.: Product innovativeness and entry strategy: impact on cycle time and break-even time. „Journal of Product Innovation Management”, Vol. 12, 1995, <http://dx.doi.org/10.1111/1540-5885.t01-1-1210030>.
2. Chęłpiński K.: Mali muszą iść drogą dużych. „Computerworld”, nr 18-19/893, 2010.
3. Cwiąkała-Małys A., Nowak W.: The generalized sensibility analysis of the profit in a company which produces n-assortments. „Operations Research & Decisions”, Issue 2, 2007.
4. Flasiński M.: Zarządzanie projektami informatycznymi. PWN, Warszawa 2009.
5. Gunia G.: Wdrażanie zintegrowanych systemów informatycznych. Wydawnictwo Fundacji Centrum Nowych Technologii, Bielsko-Biała 2009.
6. Kisielnicki J., Sroka H.: Systemy informacyjne biznesu. Informatyka dla zarządzania. Placet, Warszawa 2001.
7. Lech P.: Metodyka ekonomicznej oceny przedsięwzięć informatycznych wspomagających zarządzanie organizacją. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2007.
8. Lech P.: Zintegrowane systemy zarządzania ERP/ERP II. Wykorzystanie w biznesie, wdrażanie. Difin, Warszawa 2003.
9. Malanowska I., Koliński A.: Wykorzystanie narzędzi gospodarki elektronicznej w działalności przedsiębiorstw z sektora MSP. „E-Mentor”, nr 2, 2009.
10. PARP: Kierunki inwestowania w nowoczesne technologie w przedsiębiorstwach MSP. PARP, Warszawa 2007.
11. Pomykalska B., Pomykalski P.: Analiza finansowa przedsiębiorstwa. Wydawnictwo Naukowe PWN, Warszawa 2008.
12. Plumb I., Zamfir A.: Use of ict in SMEs management within the sector of services. „Annals of the University of Oradea, Economic Science Series”, Vol. 17 Issue 4, 2008.
13. Śliwczyński B.: Controlling w zarządzaniu logistyką. Wyższa Szkoła Logistyki, Poznań 2007.
14. Szczypta P.: Rachunkowość zarządcza. Klucz do sukcesu. CeDeWu, Warszawa 2011.
15. Yourdon E.: Marsz ku klęsce. Poradnik dla projektanta systemów. WNT, Warszawa 2000.