Acta Oeconomica Kaposváriensis (2008) Vol 2 No 1, 33-47
Kaposvári Egyetem, Gazdaságtudományi Kar, Kaposvár
Kaposvár University, Faculty of Economic Science, Kaposvár

Business value creation in IT

Ferenc Szatmári, Anita Kovácsné Antal
Budapest Business School, Faculty of Finance and Accountancy, Zalaegerszeg Institute, H-8900 Zalaegerszeg, Gasparich Márk str. 18/a.

ABSTRACT

In business, value creation by IT has been examined on two levels; through an analysis of its macro- and microeconomic effects. When macroeconomic effects were examined, we analysed the 'technological innovation wave' like character of IT, registering obviously positive effects. In the field of microeconomics, we addressed the issue of 'productivity paradox' appearing when the efficiency of businesses' IT investments are analysed then mapped the various alternatives of financial analyses, which can help the management in making value-adding decisions.
(Keywords: the value creation of IT, value creation, financial analysis)

Üzleti értékteremtés az információtechnológiában

Szatmári Ferenc, Kovácsné Antal Anita
Budapesti Gazdasági Főiskola, Pénzügyi és Számviteli Főiskolai Kar, Zalaegerszegi Intézete, 8900 Zalaegerszeg, Gasparich Márk utca 18/a.

ÖSSZEFOGLALÁS

Az informatika értékteremtését az üzleti életben két síkon vizsgáltuk, elemezve a makroökonómiai és a mikroökonómiai hatásokat. A makroökonómiai hatások vizsgálatánál az informatika „technológiai innovációs hullám" jellegét elemeztük, egyértelmű pozitív hatásokat rögzítve. A mikroökonómia területén a vállalatok által az informatikai beruházások hatékonyság-értékelésénél jelentkező „termelési paradoxonnal" foglalkoztunk, majd feltérképeztük azokat a pénzügyi elemzési lehetőségeket, amelyek a vállalatvezetés számára segítséget adnak az értéknövelő döntések meghozatalához.
(Kulcsszavak: információtechnológia értékteremtése, értékteremtés, pénzügyi elemzés)

INTRODUCTION

The business value generated by IT is a highly debated issue in today's macro- and microeconomics. Research projects conducted so far into macroeconomics, have highlighted the 'innovation wave' like nature of info-communication, the effect of which, starting with the upswing of the'90s and surviving the 'dotcom' crash of the end of 2000 is perceivable even today. In microeconomics, we are confronted with the issue of the 'production paradox", which may question its effect on increasing corporate growth. When both areas are studied, an intriguing picture is achieved of the economic mode of effect of IT.

MATERIALS AND METHODS

In our research we relied on the domestic and foreign technical literature available to us and other accessible data. From the analysis, aggregation and selection of these, we have drawn various conclusions regarding national economies and the business sphere. We have mapped and systemised the financial and other valuation methods that are available to companies, with the help of which, although with a measure of risk, they may estimate the expected business profits generated by their planned IT investments and decide which project they should implement.

RESULTS AND DISCUSSION

Effects on macroeconomics

Also in Hungary, the science of *macroeconomics* has long dealt with the issue of business cycles, citing examples taken from economic life and relying on mathematical-statistical analyses various authors (*Erdős*, 1974; *Bródy*, 1983; *Dietmar*, 1997) state that deviation from equilibrium is an ordinary state of the economy and that fluctuations may be started by most varied phenomena. The IT wave is one of these macroeconomic phenomena.

It is not easy to study the influence of IT on cycles, this impact, however, undoubtedly bears a ‘technical innovation wave’ like character (*Christensen*, 1997, 1999). Broader scale studies describe innovation waves triggering revolutionary changes, as described by *Freeman and Louca* (2001) and illustrated in *Table 1*.

Table 1

Innovation waves

Technical innovations (1)	Period of upswing (2)	Period of decline (3)
Utilising water energy in industry (4)	1780 – 1815	1815 – 1848
Steam engine in industry and transport (5)	1848 – 1873	1873 – 1895
Electricity in industry, transport and households (6)	1895 – 1918	1918 – 1940
Combustion engine in industry, transport and war (7)	1941 – 1973	1973 –
Computerisation in economics and society (8)	?	?

Source (*Forrás*): *Freeman and Louca* (2001)

1. táblázat: Innovációs hullámok

Technikai innovációk(1), A fellendülés időszaka(2), A hanyatlás időszaka(3), Vízenergia hasznosítása az iparban(4), Gőzgép az iparban és a közlekedésben(5), Elektromosság az iparban, a közlekedésben és a lakásban(6), Robbanómotor az iparban, a közlekedésben és a háborúban(7), A gazdaság és a társadalom számítógépesítése(8)

The typical process, similar to the ’change of regimes’ caused by technological innovations, is vividly described by *Carlota Perez* (2002), a Venezuelan researcher, declaring that if new technology is coupled with cheap inputs, a new horizon of business planning is opened up for companies due to the initial extra profit opportunities, and this *positive growth spiral* (*Gates,* 1995), leads to the ’implosion’ of new technology, which, at the same time, will bring about the ’creative demolition’ of old technologies (*Schumpeter,* 1980).

Consequently, with reference to the above-cited authors, the *life cycle* of revolutionary technology bundles can be defined as follows (*Bőgel and Forgács,* 2003):

Incubation: The new technology is in the *laboratory phase*.
Verification: *Technological feasibility* is verified.
Implosion: *Positive growth spiral* is started.
Growth: New technologies create a *dominant system*.
Slow-down: The development of dominant technologies is no longer revolutionary, but *evolutionary*.
Maturity: The *era of cohabitation* commences, not necessary identical with an era of decline.

The phases of the infocommunication wave can be described as follows:

The phase of incubation (1940-1960)**:** This period was dominated by János Neumann, ENIAC, EDVAC and UNIVAC machines were built at the University of Pennsylvania with support from the war industry. The seeds of the Internet have already been sown with the aid of the Pentagon (ARPANET).

The phase of verification (1960-1970)**:** The most advanced companies, Digital Equipment and IBM had foreseen the future in mainframe computer technology, and these machines have realised their prophecies in certain fields, though in a limited way, e.g. in production automation.

The phase of implosion (1970-1980)**:** Cheap microchips and application integration in the fields of microcomputers and communication appear. Typically, labour productivity increases, while, as a result of the decline of out-dated technologies, productivity deteriorates; this latter change is illustrated by *Table 2*:

Table 2

The annual average growth rate of the productivity of labour force (GDP/man hour)

Years (1)	1870-1913	1913-1950	1950-1960	1960-1970	1970-1980	1973-1980
Germany (2)	1.9	1.2	6.6	5.2	3.6	3.2
Japan (3)	1.8	1.4	5.7	9.6	4.3	2.6
UK (4)	1.1	1.5	2.3	3.2	2.4	1.6
USA (5)	2.1	2.5	2.4	2.4	1.5	0.8

Source (*Forrás*): *Freeman and Louca* (2002)

2. táblázat: A munkaerő termelékenységének átlagos éves növekedési rátája (GDP/Emberi munkaóra)

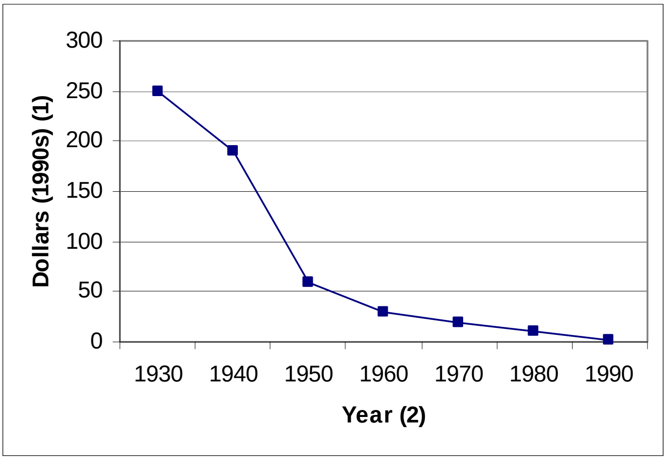
Évek(1), Németorszá(2), Japán(3), Egyesült Királyság(4), Amerikai Egyesült Államok(5)

The *growth industrial branches*, PC production, IT (Information Technology) and communication (telephone, Internet) appeared together with microchips, so the infocommunication wave accelerated. The decrease in the prices of inputs is illustrated by *Figure 1.*

The phase of growth (1980-2000): It is characterised by the total penetration of infocommunication and soaring IT investments. The ’dotcom’ mania develops, the share prices of IT companies skyrocket at the stock exchanges. The wave also improves macroeconomic productivity, which is best illustrated by US economic indicators (*Table 3*).

Figure 1

The rate of a three-minute phone call between New York and London



Source (*Forrás*): *Global Economic Prospect* (1995)

1. ábra: Egy háromperces New York – London telefonhívás tarifája

Dollár (1990-es)(1), Év(2)

Table 3

US economic indicators

	1991-1995	**1995-2000**
Annual average GDP growth (%) (1)	3.0	4.3
Annual average productivity growth (%) (2)	1.7	2.8
Average rate of unemployment (%) (3)	6.6	4.8
Average annual inflation (%) (4)	3.3	2.3

Source (*Forrás*): *US Department of Commerce* (2001)

3. táblázat: Az Egyesült Államok gazdasági mutatói

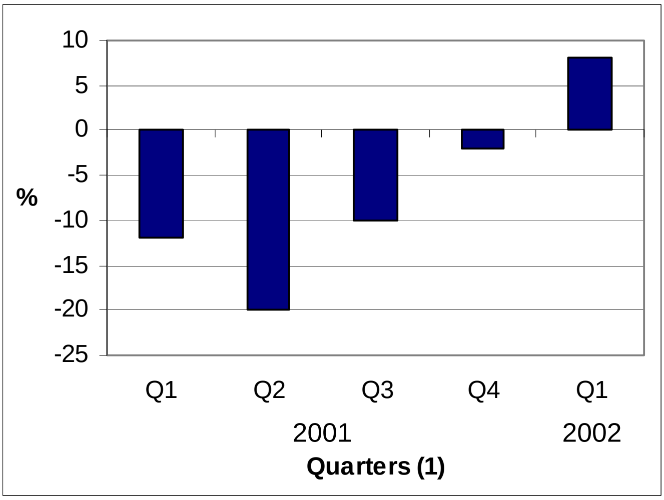
A GDP éves átlagos növekedése (%)(1), A termelékenység évi átlagos növekedése (%)(2), Átlagos munkanélküliségi ráta (%)(3), Éves átlagos infláció (%)(4)

The phases of slowdown and maturity

In this respect, no validly justified statement can be made for the time being, economic analyses of this period are highly variegated. Nevertheless, it seems to be generally accepted that the Dotcom Crash of the turn of 2000 and 2001 at the New York Stock Exchange (when the NASDAQ quotation system crashed) can be considered as a milestone of slowdown; still infocommunication is bound to remain a defining element of economics for a long time. *Figure 2* below verifies this statement.

Figure 2

Change in investments as compared with previous year to purchase IT equipment



Source (*Forrás*): *DRI-WEFA* (2002)

2. ábra: Informatikai berendezések vásárlására fordított beruházások változása a megelőző évhez képest

Negyedévek(1)

The *macroeconomic efficiency* of IT can be measured by various performance indicators, e.g.:

- how big a volume or share it has in GDP,
- how many jobs have been created in this branch of industry for the past decades,
- how many computers households purchased,
- how the internet penetration of a given region or country changes,
- what relationship there is between the size of IT investments and *labour productivity*.

These indices undoubtedly show marked improvement in the developing regions of the world.

Effects on microeconomics

Uncertain returns

Companies and institutions alike spend millions of dollars on IT investments year after year. IDC[1] data show that IT investments reached as high as USD 981 m in 2002. IT investments of businesses in the US exceeded 4% of GDP in 2000 and even in the 'bad year' of 2002 this figure was still higher than 3%. During the 90s, the share of IT in investment budgets increased continuously and 'in the US, this rate was nearly 40% in 2000, right before the stock exchange crash, compared with the amount ten years before, which had ranged around 30%" (*Bőgel and Forgács,* 2003).

[1] See www.idc.com/FI/getdoc.jsp?containerId=IDC_P6582

Considering their volume, we might easily suppose that investments were prioritised after careful analyses and in the hope of *profit expectations*, reality, however, is different in IT. According to *George E. Pinches* (1996)), the reason can be that the costs and benefits of IT investments – similarly to Total Quality Management (TQM) – are practically inseparable from other business figures.

Much to our shock, we must face the fact that the IT investment heat of the 90s was based merely on investors' *anticipations*. Following the Dotcom Crash of the turn of 2000 and 2001 on the New York Stock Exchange, everybody was immediately forced to realise that IT was a highly risky investment target, which statement is further underlined by the CHAOS reports of the *Standish Group*[2]. These reports paint an extremely gloomy picture, in 1994 only 16% of IT projects were successful, 26% in 1998 and only 28% even in 2000.

In summary, we can state that after the former upbeat period, nowadays, it is a widely shared view with regard to *corporate IT investments* that those proposing the investment should analyse the economic requirements and verify the *benefits* of projects.

The productivity paradox

It is undoubted that the development and spread of IT has no direct and substantial influence on *labour productivity*. The conflict between IT investments and productivity is referred to in technical literature as the '*productivity paradox'*.

Paul Strassmann (1990) did not find a correlation, while *Brynjolfsson and Hitt* (2001) (former being the researcher of MIT and the latter of the University of Pennsylvania) could actually show that computers have a positive impact on increasing productivity. They furthermore established that the *impact was delayed*:

- *in a one-year period* computers contribute to *increasing the output*, but do not improve productivity,
- *in a three-to-seven-year period*, however, there is *significant and positive correlation*, since companies, banking on IT opportunities, *restructure themselves*.

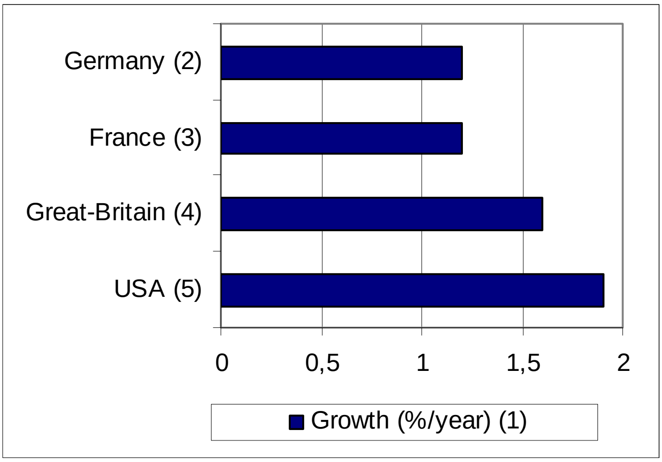
Our argument seems to be further verified by the following statistics (*Figure 3*) showing that the US economy, after a slump of nearly two decades, since the second part of the 90s has witnessed a spectacular productivity improvement, presumably due to former large-scale IT investments. In the meantime, in large European countries *productivity* is lagging behind that of the US, due to the different size of IT investments (*Tyson,*2003).

The researchers of the McKinsey company[3] have revealed further correlations and also posted their findings in 2001 on their homepage. They found that the growth rate of productivity in the US, during the period between 1995 and 2000, averaged at 2.5% annually, which is almost double the rate of 1.4% for the period between 1972 and 1995. It was perhaps one of their most significant results to prove that the productivity increasing effect of IT does not appear in the same way in the various sectors of macroeconomics. The jump in productivity in 1995 was almost entirely caused by the output of the following six sectors: retail trade, wholesale trade, securities trade, telecommunication, semiconductors industry and computer manufacturing.

[2] See www.standishgroup.com
[3] See www.mckinsey.com

Figure 3

Average annual productivity growth in the private sector between 1993 and 2002



Source (*Forrás*): *OECD* (2003)

3. ábra: A termelékenység éves átlagos növekedése a magánszektorban 1993-2002. között

Növekedés (%/év)(1), Németország(2), Franciaország(3), Nagy-Britannia(4), Egyesült Államok(5)

The business value of IT projects

In the *microeconomic analyses* of IT projects, there is no obvious positive relationship between the financial success and competitiveness of a company and the extent of its IT investments. Numerous researchers, *Hamel* (1990), *Mintzberg* (1994) and *Mintzberg* (2003) agree, however, that IT improves the *organisational competences* of companies, and if IT developments are performed in concert with *company strategy*, value creation shall not lag behind for long in the future. An *integrated, real time, electronic company* is born, which is market-centred in each of its segments and can serve customers continuously at the highest standards.

Company managers naturally will select the investment project of the ones competing with each other that carries the most *business value*. IT investment projects also need to compete. Still *Murphy* (2002) gives a word of warning regarding IT investments: 'The analyses performed in order to *support projects from the financial point of view are loaded with bureaucracy, hypocrisy and dogmas*."

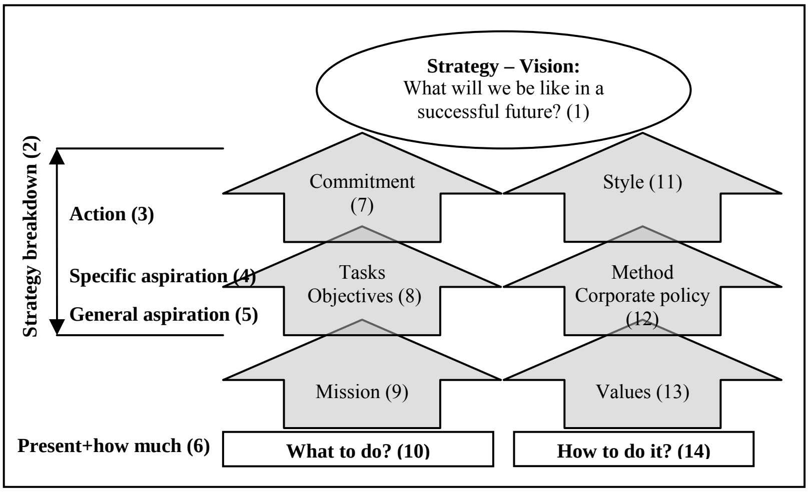
The methodology currently used by project management to select the project to be implemented should not be considered an 'exact science', still it is one of the most important project management tasks. Adopting the suggestions of the authors, *Bőgel and Forgács* (2003), the following four methods may be applied:

- selection based on the strategic requirements of the organisation,
- selection based on project categorisation,
- selection based on financial analysis,
- selection based on a weighted system of criteria.

Selection based on the strategic requirements of the organisation
Tenner (1998), in their book on restructuring companies, state that the path of strategic implementation is paved by *specific aspirations (tasks)*, that is, various *developmental projects* (*Figure 4*). It can be seen that the implementation of corporate strategy sets *operative objectives* and specific *project implementation requirements* are generated. All these strategic projects typically also include requirements for IT development, so IT projects will be realised in parallel. There is no need for financial analysis in this case, though we do need a strict project budget.

Figure 4

The framework of strategic management



Source (*Forrás*): *Tenner* (1998)

4. ábra: A stratégiai vezetés keretei

Stratégia – Jövőkép: Milyenek leszünk a sikeres jövőben?(1), Stratégia lebontása(2), Cselekvés(3), Specifikus törekvés(4), Átfogó törekvés(5), Jelen + Irány(6), Elkötelezettség(7), Feladatok Célok(8), Küldetés(9), Mit kell tennünk?(10), Stílus(11), Módszer, Vállalati politika(12), Értékek(13), Hogyan kell tennünk?(14)

Selection based on project categorisation
Classifying projects into various categories may support management decisions. We can arrange our opportunities according to different categories, e.g. *importance*, *urgency* or perhaps both or in consideration of *time span or deadline*.

We can also classify projects according to the *causes* of their implementation. Consequently, there are *problem solving projects*, those banking on opportunities or those answering to directives (to management or governmental requirements, etc. considered as 'threats'). This latter categorisation conveniently fits in with the company's *SWOT Analysis*.

Selection based on financial analysis

All financial analysis methods are considered as 'classic' ones and with minor differences they can be found in all technical books on investment valuation or corporate finance (see e.g.: *Brealey and Myers*, 2003; *Fekete and Husti*, 2005; *Illés*, 2007).

In the following section, I am shortly introducing one possible financial evaluation model for IT projects based on the methodology suggested by *Ivánné Illés*.

The full range of dynamic and static methods is the following:

- Dynamic calculations (considering the time value of money), Discounted Cash Flow (DCF):
  - Net Present Value (NPV),
  - Internal Rate of Return (IRR),
  - Profitability Index (PI).
- *Static calculations* (do not consider the time value of money):
  - Payback Period (PB),
  - Cost comparison (time value excluded),
  - Profit comparison (time value excluded),
  - Profitability calculation (accounting rate of return/average rate of return on book value, not considering time value).

The estimation of future cash flows is critical to each method, since these are real estimations. There is, however, a way to consider inflation when doing these calculations and there exist methods to estimate investment risk (sensitivity analysis, break-even point analysis, simulation approach, the application of risk-free equivalents). Static methods are not used on their own, only as ancillary methods to supplement the dynamic ones.

Of the above-mentioned, the most frequently used financial valuation methods are the following:

Net Present Value, NPV:

Net Present Value (1) is a differential-type index, showing how much net income (net growth) will be generated if initial capital investment is deducted from the discounted aggregate amount of the cash flow generated during the term of the investment.

$$NPV = -C_0 + \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} = -C_0 + PV \tag{1}$$

A project is adequate, if NPV>0, that is, if it makes a profit. As a drawback of using NPV we can mention that in the case of limited resources, the application does not ensure maximum growth.

So the first task is to define future cash flows and this is exactly what causes real troubles with regard to IT projects due to the complicated embeddedness of IT in the company's life. In the case study of *Norbert Welti*, for instance, the incomes and expenditures of a SAP implementation project performed at a Swiss company were itemised as follows (*Table 4, Table 5*). (*When it was impossible even to estimate expected profits, the relevant rows were left empty!*)

Internal Rate of Return (IRR):

The rate (2) at which we discount cash flows, their aggregate present value will equal initial capital investment, that is, NPV = 0.

$$-C_0+\sum_{t=1}^{n}\frac{C_t}{(1+IRR)^t}=0 \qquad (2)$$

IRR is essentially a unique profitability ratio, expected annual rate of return, which is ensured by the project based on the estimated cash flows. Any investment is acceptable if the Internal Rate of Return is higher than the return expected by investors (cost of capital), that is, IRR>r. The disadvantage of using IRR is that in certain cases it causes problems. For example, for unconventional investments, various IRRs can be calculated.

Table 4

The expenditures of a SAP implementation project in Switzerland

Investments (1)	**Current costs (2)**	**Costs of in-house personnel (3)**
SAP software (4)	Consultation (5)	In-house man days (6)
Hardware (7)	Education (8)	Other personnel costs (9)
	Travel and others (10)	
	Communication (11)	
	Maintenance (12)	
	Depreciation (hardware/software) (13)	

Source (*Forrás*): *Welti* (1999)

4. táblázat: SAP bevezetési projekt kiadási oldala Svájcban

Befektetések(1), Folyó költségek(2), A belső személyzet költsége(3), SAP szoftver(4), Tanácsadás(5), Belső embernapok(6), Hardver(7) Oktatás(8) Egyéb személyzeti költségek(9), Utazás és egyebek(10), Kommunikáció(11), Karbantartás(12) Érték-csökkenés (hardver/szoftver)(13)

Profitability Index (PI)
The ratio of the present value of the cash flows generated by the investment and initial capital investment.

$$PI=\frac{\sum_{t=1}^{n}\frac{C_t}{(1+r)^t}}{C_0} \qquad (3)$$

So profitability index (3) is a cost-benefit ratio, which tells us how much our return will be on the investment of a unit of money. If PI>1, the project is acceptable, because it increases the assets of the enterprise. A possible disadvantage of PI can be that in the case of mutually excluding investments, it may mislead decision-makers, if selection is to be made from several investment alternatives.

Payback Period (PB)
This index (4) is not based on discounting and is used to calculate how many years it will take initial capital investment to be paid back.

$$\text{Payback Period} = \frac{\text{Initial capital investment}}{\text{Expected annual cashflow}}, \qquad PB = \frac{C_0}{\sum_{t=1}^{n} C_t \Big/ n} \qquad (4)$$

In the event the payback period is shorter than the one expected by the enterprise, the project may be approved.

Table 5

The financial objectives of a corporate SAP project (Example)

Objective (1)	Financial profit or loss /year (in Swiss francs) (2)
Making the period of responding to customers' queries less than 2 hours (3)	
Improving the accuracy of responses (4)	
Optimisation of routine sales administration (5)	100000
Improving the balance between customer demand and available materials (6)	
Shortening payment terms by 5 days (7)	40000
Optimisation of routine financial administration (8)	40000
Reducing the lead time by 50% (9)	
Reducing average stock levels by 40% (10)	580000
Doubling inventory turnover (11)	370000
Reducing production costs (12)	
Improved performance as a result of better planning and programming (13)	900000
Improving total output by 2.5% with an unchanged headcount (14)	500000
Estimated total cost saving (profit) (15)	*2 530 000*

Source (*Forrás*): *Welti* (1999)

5. táblázat: Egy vállalati SAP projekt pénzügyi céljai (Példa)

Cél(1), Pénzügyi eredmény/év (svájci frankban)(2), A vevői megkeresések megválaszolásához szükséges idő 2 óra alá csökkentése(3), A válaszok pontosságának javítása(4), A rutinszerű értékesítési adminisztráció optimalizálása(5), A vevői igények és a rendelkezésre álló anyagok közötti egyensúly javítása(6), Fizetési határidők 5 nappal való csökkentése(7), A rutinjellegű pénzügyi adminisztráció optimalizálása(8), A rendelések átfutási idejének 50%-kal való csökkentése(9), A készletek átlagos állományának 40%-kal való csökkentése(10), A készletforgási sebesség megduplázása(11), Termelési költségek csökkentése(12), Teljesítményjavulás a jobb tervezésnek és programozásnak köszönhetően(13), A teljes output 2,5%-kal történő növelése változatlan létszám mellett(14), Becsült teljes megtakarítás (haszon)(15)

The *Discounted Payback Period* (5) is an enhanced PB index, which tries to consider the time value of money. It shows how long the investment will need to operate in order to be repaid with respect to net present value.

$$PB_N = \frac{C_0}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t} \Big/ n} \tag{5}$$

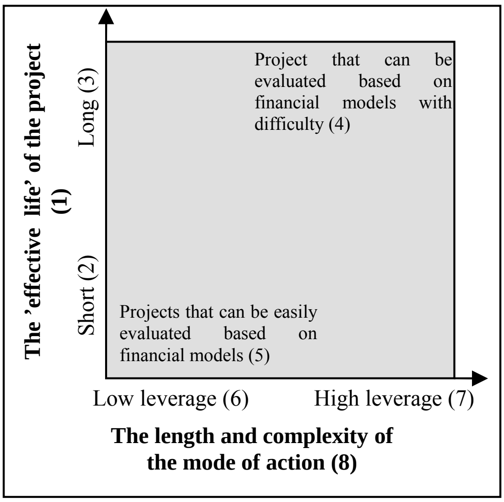
It essentially shows us the discounted income of how many years we will need to pay back the initially invested capital.

In summary, we can state that the *calculation of the four indices* above is the most frequent method, and based on the information gained, we can make decisions in line with our *corporate strategic objectives*.

Cost-effectiveness analysis of IT
Carrying out various *financial analyses* regarding IT projects is not an easy task due to the highly sophisticated corporate embeddedness of IT. *Total Cost of Ownership (TCO)* focuses on defining the total cost of ownership. Its efficiency analysis is targeted at how many resources are used in order to reach the result. In our country, Kürt Zrt.[4] deals with the evaluation of ***IT systems*** in this respect. *Figure 5* below is to illustrate the related difficulties:

Figure 5

Factors making financial project evaluation more difficult



Source (*Forrás*): *Bőgel and Forgác,s* (2003)

5. ábra: A projektek pénzügyi értékelését nehezítő tényezők

A projekt „hatásos élettartama"(1), Rövid(2), Hosszú(3), Pénzügyi modellekkel nehezen értékelhető projektek(4), Pénzügyi modellekkel könnyen értékelhető projektek(5), Kevés áttétel(6), Sok áttétel(7), A hatásmechanizmus hosszúsága és bonyolultsága(8)

[4] www.kurt.hu/itaudit/2?print=1

Selection based on a weighted system of criteria

Since the publication of the book written by *Kaplan and Norton,* entitled 'Balanced Scorecard' in 1998, the multi-aspect and weighted evaluation system worked out by them for company management has been adapted to various fields. Recently, it has spread especially as the methodology to be used for fields that are difficult to evaluate due to their complex effects, and IT investment undoubtedly falls into this category. *Tony Murphy*, an expert at Gartner Inc., for example, uses the following system of criteria for IT investments, calling them the 'five pillars of benefits realisation' (*Murphy*, 2002):

- strategic alignment,
- business process impact,
- architecture,
- direct payback and
- risk.

CONCLUSIONS

Based on *macroeconomic trends we can state that the effect of IT is undoubtedly* positive and has brought about an upswing both for national and the global economies. Presumably, this *'wave' has reached its apex*, but we may also pinpoint that IT shall continue to *have its strong presence felt in our lives in the future* as we have already observed it related to the innovation wave in the automobile industry.

Regarding microeconomic effects, IT opens up opportunities for management, who, however, will need to learn how to exploit these opportunities. The methodology of analysing financial opportunities in advance is more or less *identical with the methods employed for evaluating investments*, with the difference that *estimating cash flows carries an even higher risk.*

The five-pillar system suggested by Tony Murphy seems to be the most practical one for assessing IT investments; research should be continued in this direction by attempting to work out a more universal weighted system of criteria for this area in detail that could be relevant to IT projects

ACKNOWLEDGEMENT

Authors would hereby like to thank all the employees of the Technical Library of Budapest Business School, Faculty of Finance and Accountancy Zalaegerszeg Institute and especially to Istvánné, Horváth library manager; the dedicated help provided by these people was indispensable for carrying out the research above.

REFERENCES

Bőgel, Gy., Forgács, A. (2003): Informatikai beruházás – üzleti megtérülés. Budapest : Műszaki Könyvkiadó, 229. p.

Brealey, R., Myers, S. (2003): Principles of Corporate Finance. 3. Boston : McGraw-Hill Inc., 985. p.

Bródy, A. (1983): Lassuló idő. Budapest : Közgazdasági és Jogi Könyvkiadó, 274. p.

Brynjolfsson, E., Hitt, L. (2001): Computing Productivity: Firm-Level Evidence. In: Boss, G.: Sloan Workig Paper. 4210-01. Boston : MIT Sloan School of Management, 43-56. p.

Christensen, C. (1997): The Innovator's Dilemma. Boston : Harvard Business School Press, 134. p.
Christensen, C. (1999): Innovation and the General Manager. Boston : Irwin/McGraw-Hill Inc. 389. p.
Dietmar, M. (1997): Bevezetés a makroökonómiába. Budapest : Aula Könyvkiadó, 335. p.
Enswort, P. (2001): The Accidental Project Manager. New York : John Wiley & Sons, 337. p.
Erdős, P. (1974): Adalékok a mai tőkés pénz, a konjunktúraingadozások, és a gazdasági válságok elméletéhez. Budapest : Közgazdasági és Jogi Könyvkiadó, 376. p.
Fekete, I., Husti, I. (2005): Beruházási kézikönyv. Budapest : Műszaki Könyvkiadó, 589. p.
Freeman, C., Louca F. (2002): As Time Goes by. Oxford : Oxford University Press, 317. p.
Gates, B. (1995): The Road Ahead. Los Angeles: Viking, 221. p.
Illés, I. (2007): Vállalkozások pénzügyi alapjai. Budapest : Saldo, 243. p.
Kaplan, R.S., Norton, D.P. (1998): Balanced ScoreCard. Budapest : Közgazdasági és Jogi Könyvkiadó, 301. p.
Mintzberg, H. (1994): The Rise and Fall of Strategic Planning. Albany : Prentice Hall, 234. p.
Mintzberg, H. (2003): The Strategy Process. Albany : Prentice Hall, 189. p.
Murch, R. (2001): Project Management – Best Practices for IT Professionals. Albany : Prentice Hall Inc., 333. p.
Murphy, T. (2002): Achieving Business Value from Technology. New York : John Viley & Sohns, Inc., 384. p.
Perez, C. (2002): Technological Revolutions and Financial Capital. Springfield : Edward Elgar Publishing, 343. p.
Pinches, G. (1996): Essentials of Financial Management. New York : Harper Collins College Publishers, 323. p.
Prahalad, C.–Hamel, G. (1990): The Core Competence of the Corporation. Boston : Harvard Business Review, 142. p.
Schumpeter A. (1980): A gazdasági fejlődés elmélete. Budapest : Közgazdasági és Jogi Könyvkiadó, 254 p.
Strassmann, P. (1990): The Business Value of Computers. New York : New Canaan, 298 p.
Tenner, A.R., DeToro, I.J. (1998): BPR – Vállalati folyamatok újraformálása. Budapest : Műszaki Könyvkiadó, 363 p.
Tyson, L.A. (2003): Why Europe is Even More Sluggish then the U.S. In: Business Week, 123. 3. 84-96. p.
Welti, N. (1999): Succesful SAP R/3 Implementation. New York : Addison-Wesley, 128 p.
Whitehead, R. (2001): Leading a Software Development Team. New York : Addison-Wesley, 189. p.

Corresponding author (*Levelezési cím*):

Ferenc Szatmári
Budapest Business School, Faculty of Finance and Accountancy,
Zalaegerszeg Institute
Department of Information Technologie
H-8901, Zalaegerszeg, POB 67.
Budapesti Gazdasági Főiskola, Pénzügyi és Számviteli Főiskolai Kar,
Zalaegerszegi Intézete
Informatika Tanszék
8901 Zalaegerszeg, Pf. 67.
Tel.: 36-92-509-959, 36-30-928-3067
e-mail: szatmari.ferenc@pszfz.bgf.hu