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Innovative investments, growth, risk and capability for survival from the perspective of value building for business owners

1. Innovation as a response to changes in the business environment and as a way to maximize value for the owners

The issue of innovation in economic practice has been perceived differently throughout history. In the early 1950s after a period of great interest in technology and inventions, due to the threat of overproduction, in many markets 'innovations in products and processes took a back seat' (Shaw, 2001). However by the year 1980, innovation-oriented marketing concepts were already adopted by many Western corporations. Nonetheless, the number of 'innovative' products did not translate directly into market success. Numerous studies show that 50–90% of new products do not survive to celebrate their first anniversaries (Shaw, 2001; Andrew, Sirkin, 2004). Among others, two reasons are particularly emphasized: the inability to perceive the difference between an innovative approach and an innovative enterprise (Andrew, Sirkin, 2004), and between creativity and innovation. The creative search for ideas takes place within an abstract context, while innovation is related to the situation of a particular enterprise. If the author of an idea wants to transform it into an innovation, they must account for the general environmental conditions, the time required for implementation, the risk and costs of the project, and the enterprise's potential in terms of implementation.

Innovation, as a 'specific tool of entrepreneurship', is multidimensional, "it does not have to be technical, it does not even have to be anything material" (Drucker, 1992), and it is more of an economic term than a technical one.

In the literature there are many different ways of approaching the issue of innovation – from narrow ones where innovation is "...the first application of an invention" (Mansfield, 1968), to the very broad ones which claim that "innovation refers to any kind of goods, services or ideas which are perceived by someone as new" (Kotler, 1994). As we can see in other definitions, the emphasis on the material or functional aspect of the term 'innovation' is distributed in a varying way – the term 'change' and words such as 'new, special' are present in each definition, denoting the parameters of a product or operation that differ from the pre-existing ones. This study uses the approach in which innovation means "any deliberate change in the status of objects and/or relationships between them" (Bielski, 2007).

A vital objective of an enterprise is its long-term survival in the market, and this requires permanent actions to ensure growth. However the main purpose of operations, and at the same time the goal for company managers, is to "maximize the internal value of the owners' capital" (Brigham, Ehrhardt, 2014), or at least to maintain its value understood as providing the owners with the required rate of return. Competitive enterprises must gain the ability to create competitive advantages which enable them to reach a level of efficiency enabling survival on the market and building value for the owners. This ability is related to the sensitivity to the signals generated by the business environment, the correct perception of conditions within this environment, and flexibility – a short time frame of innovative response, that is the time from the inspirational event to the time of implementing the innovation in response to that event – and the accumulation of the appropriate resources enabling the innovative response.

In today's world, innovative activity is treated as a pre-planned process intended to generate specific and expected results, and not as a spontaneous action with unexpected results in areas that are difficult to foresee. Building value through innovative actions is viewed through the function of growth and risk. Growth is achieved both through capital expenditures (including R&D investments) and new management strategies and techniques. The risk applies both to the ability to manage the variability of cash flows generated by the enterprise, and the management of risks of one-off and specific events such as the risk of bankruptcy. Companies that cannot transition to a new way of thinking about the role of innovation in management and adapt to the new requirements of the environment either go bankrupt or become absorbed by other corporations.

'Innovative entrepreneurs' constantly strive to tip the balance and look for changes, responding to them and using them as an opportunity. They reach this goal by putting "new combinations of means of production and credit" into production and on the market – innovations where the entrepreneur (Schumpeter, 1960), thanks to new production methods, new products or services, creates new markets, acquires new sources of raw materials, or introduces new arrangements in an industry. According to the definitions adopted for the purposes of OECD statistics, "Innovation is the implementation of a new or significantly improved one product (product or service) or process, new marketing method or new organizational method in business practice, workplace organization or relations with the environment" (OECD, 2008).

Innovations require investments, that is expenditures must be incurred to build competitive advantage as a result of innovation. Therefore the economic effects of innovative projects can be considered through the lens of investment expenditures related to project implementation and the current expenditures connected with providing a specifically defined marketing offer. In view of the inability to predict the occurrence and intensity of events with absolute certainty, both during the implementation of investment processes and at the time when competitive advantages stemming from innovation are utilised, it is assumed that risk is defined as a combination of the frequency or probability of a specific adverse event and its consequences (IEC 60300-3-9), or the possibility of deviations from the anticipated effects of operations (Czekaj, Dresler, 1995). An analysis of the risks and benefits of specific aspects of R&D expenditures from the perspective of the company and the owners are provided further on in the paper.

Innovation is the key to economic growth, both on a macroeconomic scale and a microeconomic scale, i.e. the development of the single business. The term has a number of positive economic and social connotations. With innovation, enterprises can develop competitive advantages and open new areas of operations and profitability. Sometimes companies need simply to demonstrate a strategy of innovation to win customers or investors, to promote a new product, or raise capital on attractive terms. First and foremost, innovation can be indispensable for maintaining the ability to survive in the market in the long term (viability) and for the preservation of goodwill by the owners (in terms of monetary value).

Innovation extends far beyond its financial aspect, which is understandable for every forward-thinking *homo economicus*, or its sociological aspect, as it affects the feeling of satisfaction of the inventors and advocates; it also has a civilization aspect since it deeply alters the reality we live in. Regardless of the inherent risks related to innovation it opens an opportunity to build company value and increase value for the owners and customers (the society), which combined on a macro scale leads to the growth of national economies and the entire global economy. Even if many economic initiatives are doomed to fail, activity in the sphere of innovation is strongly rewarded, just as in biology it is recognized that gene expression leads to the evolution and continuity of species.

Innovation, understood as not only unconventional activities but also above-average R&D investments (expenditures), is important for every entity that faces a struggle against market competition.

The high variability of the environment, increasing market saturation in many sectors and stronger competitors, all demand an innovative response in companies, as well as the related necessity to invest in the expansion of departments where significant and permanent competitive advantages can be created. Decision-making processes concerning innovative projects take various routes depending on multiple factors, in particular the form of ownership, the size and economic standing of the enterprise, and the method of financing the required investments, both in the material sphere and in terms of the competence of the managerial staff. The effective management of innovation and the related risks are very important for the financing process. The decision-makers who provide financing in the form of subsidies or debt expect a business plan that should include a long-term financial plan. Without an analysis of cash flow projections from the new venture and the company responsible for implementing the project, financing institutions (banks, investment funds, institutions distributing funds subsidised from state budgets) are unable to assess the attractiveness, the scale of the necessary capital and investment risk, and convince the decision-makers as to the feasibility of the project, and therefore cannot set funding conditions and grant permission to mobilise funds.

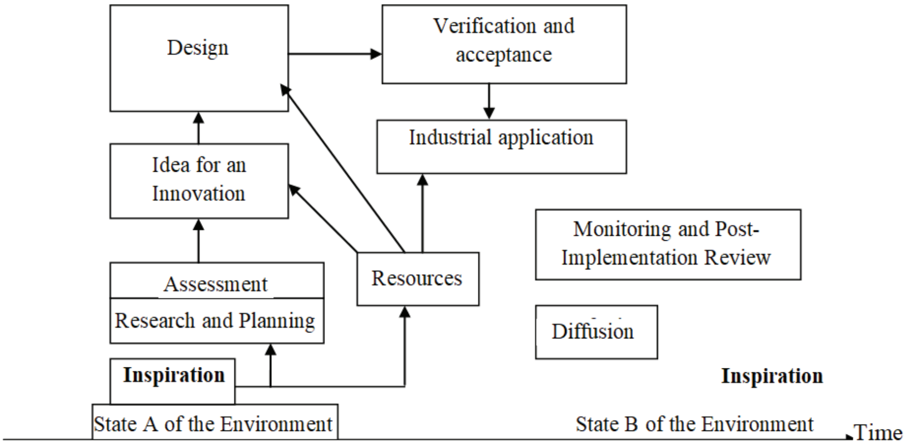
Although reality on many occasions has little to do with plans and expectations, especially in the case of such risky projects as innovations, the very process of planning and monitoring the results of a business plan is an important component of the management of investment processes and risks.

The effects of each activity are determined in connection with the future management conditions andare therefore associated with uncertainty and risk. Uncertainty is an intangible phenomenon and occurs mostly in the long run, while risk is a measurable phenomenon and associated with shorter periods (Borowiecki, 1995). The risk is defined as "the probability of an event viewed as negative" (Pszczołowski, 1978) or "the possibility of not achieving the intended effects of business operations or incurring unintentional losses or outlays higher than anticipated" (Ehrlich, 1981).

The volatility of many market parameters (commodity prices, exchange rates, interest rates, etc.) is a natural market characteristic. Some of these events have an impact on the systematic market risk, and some affect the specific risks of companies. Although it seems that intensity in the field of innovation primarily generates specific risks within an enterprise, an insufficient or excessive level of innovative investments has an impact on systematic risk from a macroeconomic perspective and may ultimately influence the overall level of market risk of a given country and the global economy in general.

Preparations for innovation and its implementation must be contained in strictly defined procedures since this is a complex process involving multiple phases (Figure 1).

Figure 1.
The course of innovative processes



Source: own study based on (Nortcott, 1992; Bielski, 2007).

There are different types of specific risks associated with different phases of execution of an innovative project, and involving different scales, partly related to the sources of financing:

1. At the stage of constructing a concept of innovation:
   - risk of losing small financial resources, very rarely leading to the bankruptcy of an enterprise;
   - low risk of losing liquidity in the case of large enterprises, a higher risk occurs only in the case of the small scale of operations, low profitability, and the absence of a financial partner. In such a situation, even insignificant R&D expenditures and just a temporary commitment to the creation of a concept from the key people in a company may have an impact on the liquidity of that company. In general, smaller entities are not highly flexible in terms of obtaining external financing for their current operations, not to mention R&D expenses. Consequently, small companies are often forced to use relatively expensive forms of financing (personal loans, leasing and factoring), often from institutions that do not have access to inexpensive capital themselves;
   - risk of errors in the preparation of grant applications. For example, applications must comply with the generally accepted assumptions of industrial research and conform to the definition provided in detailed legal regulations. Cost-benefit analyses must be enclosed in the application. The project assessment committee also checks compliance with the planned eligible expenditures with the legal provisions, including their justification, indispensability, and appropriate level.

2. At the research and planning stage:
   - risk of losing (wasting) larger amounts of own financial resources; the risk is high when the research activities require the high consumption of expensive research materials or the acquisition of external services (laboratories, expert opinions, etc.). The accumulation of costs reduces own capital, weakening company rating;
   - risk of losing R&D subsidies, if the research project is inappropriately executed (project parameters are not met) or billed;
   - risk of losing financial liquidity, in the event of prolonged research/project design or in the case of the need to return the subsidy. Loss of liquidity at the research stage may lead to the bankruptcy of both the project and the company, as this stage is usually far from the time of reaching BEP, therefore in case of a crisis it is very difficult to find institutions that are able to assess how attractive the project is and provide an injection of financing.
3. During the stage of industrial implementation:
   - risk of failure to accumulate own contribution, by increasing capital through existing shareholders or a new issue of shares (raising capital in *private placement* or *public placement*), most often it means the end of the project;
   - risk of failure to obtain external financing (loans or credits), which in the case of most financed projects means the end or postponement of the project, but not bankruptcy;
   - risk of failure to meet the assumed financial parameters of the innovative investment, loss of trust in the Management Board by shareholders/institutions financing the project, which may lead to the suspension or withdrawal of foreign financing, suspension of the project and even bankruptcy in some extreme cases;
   - risk of no working capital financing stemming from the fact that it was not provided for by the investor or by the bank, which may result in the inability to implement the project or lead to a loss of liquidity and even bankruptcy in the case of a major financial commitment of the investor at earlier stages of the project;
   - risk of a prolonged VAT refund procedure in relation to investment purchases necessary for the implementation of the innovative project; tax offices, by questioning refunds of output VAT or conducting detailed and lengthy screening proceedings, may adversely affect working capital, which at that time may lead to a loss of liquidity;
   - risk of failure to obtain subsidies in the assumed time frame. – There are often no precisely defined deadlines for transferring funds by institutions awarding subsidies, if the subsidy amount is important for the project it may result in a loss of liquidity.

2. Risk and added value from innovative projects in the context of capital market equilibrium and budgeting of investments

In the long run, incurring investment expenditures on innovations is necessary for companies to achieve cash flows at a scale which covers the required rate of return on assets. The level of this rate is naturally related to the business (operational) risk which results from multiple business risk factors, but the very intensity of R&D investment is a factor that increases business risk which is discussed in more detail later in the article.

Companies that use development strategies based on the increased intensity of R&D investments rely on effects such as a higher growth rate of expected cash flows. In practical analyses of investment effectiveness and value of companies, this means a higher nominal cash flow from operating activities, which should be adopted in the period of a detailed forecast. In some situations this may also be a reason to use the upwardly adjusted growth rate applied to calculate the terminal value.

A temporary increase of business risk and, consequently, an increase of the total risk of the enterprise (including also the effects of financing) can be a kind of side effect of innovative projects of significant scale. If we assume that the risk of business operations is expressed as a beta coefficient related to the required rate of return on assets in accordance with the general CAPM (*capital assets pricing model*) formula (Sharp, 1963; Lintner, 1964), then, in the case of analysing the value of companies going through a period of incurring high R&D outlays, we could consider the need to adjust the beta parameter in relation to the level characterising a given company in its typical (average) moment, or the level characteristic for the industry.

In the simplified model including the concept of the value of money over time and the CAPM model, such issues as the rate of return, risk, growth and value can be combined by the following formulas:

$$V = CF/(k - g) \quad [1]$$

where:
CF – residual cash flow for investors on account of investments in risky assets
g – the long-term growth rate of cash flows
k – required rate of return on assets (cost of the capital financing the assets)
V – current value of assets generating cash flows in the longterm

The $V = CF/(k - g)$ formula, or perpetual annuity with a fixed rate of increase, is a simplified model of discounted cash flows (DCF) resulting from the foundations of the concept of the value of money over time in the theory of investment value by Graham and Dodd (Graham, Dodd, 1934). Generally speaking, the current value of assets results from expectations as to future cash flows generated by assets, discounted using a rate reflecting the risk of flows (of assets). The higher the expected increase in assets and the lower the risk level, the higher the value of assets.

$$k = RFR + MRP \times \beta \qquad [2]$$

where:
RFR – a rate free from business risk
MRP – market risk bonus associated with a broad portfolio of investments in the capital market
β – beta coefficient reflecting systematic (non-diversifying) risk of individual instruments or their portfolios

The $k = RFR + MRP \times \beta$ formula, developed in 1962–1966, proposes a relatively simple relationship between investment risk and the required rate of return on risk, which can describe the relationship between risk and return for a single company or the entire capital market (CAPM equilibrium model).

Both formulas were used here to derive an equation describing the change in the value of a project or enterprise depending on the change in fundamental parameters.

For a specific investment project, a company or, more generally, assets with a projected cash flow (CF_1, g_1) and the required rate of return on risk (k_1), the value of capital (V_1) can be determined using the formula resulting from using the equation [1]

$$V_1 = \frac{CF_1}{k_1 - g_1} \qquad [3]$$

If the financial profile of the investment project is changed (the case marked with index '2') by adding R&D investments affecting *CF*, *g* and *k*, then the delta of capital can be determined ($\Delta V = V_2 - V_1$) as follows:

$$\Delta V = V_2 - V_1 = \frac{CF_2}{k_2 - g_2} - \frac{CF_1}{k_1 - g_1} \qquad [4]$$

Finally, after transforming the equation [4], the financial effect of innovation is the difference in the value of capital (ΔV) between two investment projects that differ in the level of innovation, which can be described by the model of increasing perpetual annuity:

$$\Delta V = \frac{\Delta CF + V_1 \times \Delta g - V_1 \times \Delta k}{k_2 - g_2} \qquad [5]$$

The numerator of the equation [5] reflects the financial effect of innovation in three dimensions: changes in residual flow, changes in its growth rate, and changes in its risk (required rate of return). The denominator builds a stream of financial effects (time series) with a target risk and growth rate from today to infinity.

The implementation of innovations is associated with changes in capital involvement (financing of investments) and with the expectation of increasing the level of cash inflows. These aspects are expressed by the parameter ΔCF. Innovation can also be expected to raise the current growth rate of expected cash flows (expression $V_1 \times \Delta g$). The third component that links innovation with the value of the project and the company is the aspect of changing the profile of risk and the required rate of return, which is included in the expression $V_1 \times \Delta k$. The last aspect may occasionally elude inventors and innovators, that is why it is important to emphasise that innovative activity generates risk in itself and requires negative, time-divided flows at the stage of investment and at the stage before reaching BEP (*break-even point*). Therefore, even if we imagine an innovative project whose aim is to reduce the operational risk of an enterprise (e.g. by decreasing fixed costs or reducing seasonality), an increase of the required rate of return should be expected, especially if innovation requires an intensive (costly) R&D investment program. Such conclusions are also drawn from the analysis of the MCC curve, which is discussed later on.

Innovative projects become a source of added value for companies if the financial effects such as changes in the residual cash flow and higher growth rate ($\Delta CF + V_1 \times \Delta g$) outweigh the effect of increased risk ($V_1 \times \Delta\beta \times MRP$).

The conclusions from the description above can be extended to the theory of equilibrium of capital assets. Using the basic CAPM parameters (equation [2]) and the derived equation [5], we are able to formulate the following relationship (the parameter Δk is replaced by the expression $\Delta\beta \times MRP$, whereas k_2 – by the expression $RFR + MRP \times \beta_2$) – equation [6]:

$$\Delta V = \frac{\Delta CF + V_1 \times \Delta g - V_1 \times \Delta\beta \times MRP}{RFR + MRP \times \beta_2 - g_2} \qquad [6]$$

Using this formula, it can be hypothesised that companies that increase their involvement in innovative projects (in a significant way) contribute to the increase of systematic risk of their operations (assumption of $\Delta\beta > 0$). In the case of two companies with a similar sector profile and financing structure, a higher beta coefficient should be assigned to the company with a higher intensity of R&D expenditure. Empirical observations also indicate that sectors associated with new technologies to the highest extent are characterised by a relatively higher beta level than 'traditional businesses'. This is the outlook from the perspective of micro CAPM (regardless of the potential impact of individual investment decisions in R&D on the level of market risk (MRP) and the rate free from business risk).

Naturally, the presented description of relations between innovation and the company value (capital of investors) is simplified, not only because of the use of the increasing perpetual annuity model.

CAPM in a certain way classifies entities (instruments) on the capital market in terms of risk. The literature on the subject presents many attempts to describe whether and how different factors can affect the beta level of companies or, more broadly, the rates of return. The prevailing view is that "the rate of return and risk are strongly linked to financial indicators, but the set of best-forecasting financial indicators is not constant" (Salmi, Virtanen, Yli-Olli, 1996). The problem of the impact of innovation (R&D investments) on the risk-income analysis is not widely considered in the literature. Undeniably, R&D investments have an impact on the operational risk of enterprises through their impact on cash flows. In relation to operational risk, the key significance of various factors is pointed out (Brigham, 1996) as follows:

– sales volatility (including cyclicality and seasonality and volatility of sales prices),
– operational leverage (fixed/variable cost relation),
– pricing volatility of investment outlays and the ability to adjust product prices to changes in the pricing of outlays.

However, as for now, there is no recognized development of CAPM in which the beta coefficient would be mathematically decomposed into prime factors in such a way that the proposed model could successfully pass statistical tests and become entrenched in literature or practice. In the corporate finance handbook, we can find an indication of two key determinants of the value of beta coefficients (Brealey, Myers, 1999):

– economic cycles ("seasonal companies, whose income and profits depend to a large extent on the phase of the economic cycle, generally exhibit high beta values"),
– operational leverage ("obligation to pay predefined production-related expenses increases the beta coefficient of a capital undertaking").

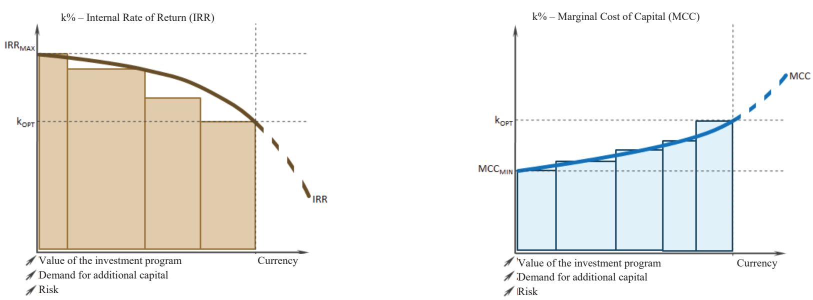
The three-factor FF 1993 model (Fama, French, 1995) attempts to shed more light on the relationship between risk and return rates. In its original version, Fama and French proposed that the basic equation of CAPM, described by Sharp-Lintner, defining the rate of return through *RFR*, *MRP* and the beta coefficient (market variables), could be supplemented with specific parameters: scale (stock market capitalization of shares) and the M/B (market/book value) indicator. Another proposal, the most recent one, is the five-factor FF 2014 model (Fama, French, 2015), which included two new parameters: operating profitability and investments (annual change in assets in relation to assets at the end of the period). According to FF, the extended formula explains the relationship between the rate of return and the variables in the range of 71–94%, which should be considered a valuable result. The authors of FF 2014 tested their five-factor model based on global data (Fama, French, 2017). In the summary, the authors claimed that "the main problem of this model is that it is unable to fully capture low average returns of minor shares whose returns behave like low-profit companies that invest aggressively.”

It is difficult to judge whether the FF 2014 model is going to be very popular and accepted by theoreticians and practitioners as a ‘better alternative’ to the basic Sharp-Leitner CAPM model. It should be noted that the obvious problem for practical application is the issue of dividing the risk of economic activity into the market section (systematic, non-diversifiable) and the non-systematic (specific) section, and the calculation of the capital cost that could serve for the purposes of the valuation of investment projects and enterprises. The FF 2014 model suggests that factors such as scale, the relation of the market and book value, profitability and intensity of investment, generate specific risks that increase the risk exposure resulting from market parameters (*RFR*, *MRP*), which should be included in the required rate of return (capital cost). The very fact that the list of significant determinants of the rate of return includes the intensity of investment is worth noting, however the author of this study believes that business finance researchers can gain a better understanding of the nature of the volatility of beta coefficients and the cost of capital only by appreciating the significance of R&D investment.

Enterprises planning to carry out innovative projects that require external financing must assess whether the project will be a source of added value and whether the company will be able to finance the investment program at an acceptable cost. The feasibility analysis, in fact, compares the expected internal rate of return on the implementation of the entire investment program and the total cost of the enterprise’s capital in order to find the optimal program. The chart on the left [Figure 2A] presents a hypothetical investment program consisting of four investment projects of various scales and different internal rates of return (by descending IRR). The chart on the right [Figure 2B] presents a hypothetical structure of external financing in the form of five tranches of various scales and capital costs (from the least expensive to the most expensive financing).

Figure 2.
The course of internal rate of return and the marginal cost of capital for a hypothetical investment program

Fig. 2A   Fig. 2B



Source: own study based on (Czekaj, Dresler, 1995).

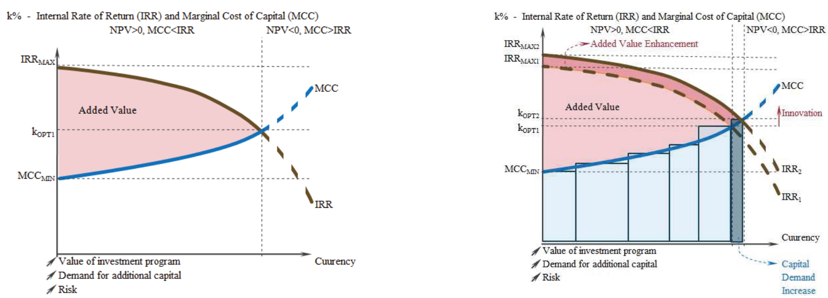
"The optimal investment program will be a program covering all those projects whose internal rate of return is higher than the cost of obtaining the capital necessary to finance these projects" (Czekaj, Dresler, 1995).

The minimum level of the MCC curve results from the current cost of debt. The course of MCC must result from the analysis of available sources, the capability of debt servicing and payment of dividend, and the characteristics of the investment program. It seems that the maximum level of capital costs does not have a clearly defined boundary, especially if the managers and current owners of the enterprise rely on the possibility of diluting and obtaining additional equity in the private market (stock market, private equity funds, venture capital funds, and business angels). Even in the area of debt financing there are opportunities to obtain financing for implementing innovative ventures of high risk without asset security (high-interest bonds, mezzanine financing, subordinated loans of the owners). In practice, large-scale R&D projects are difficult to finance solely with debt (theoretically cheaper than equity).

The logic of the application of the IRR and MCC curves for analysing an investment program including innovative projects is illustrated by the charts below [Figure 3].

Figure 3.
Choosing the optimum investment program

Fig. 3A Fig. 3B



Source: own study based on (Czekaj, Dresler, 1995).

The graph on the left [Figure 3A] presenting the course of IRR and MCC without an R&D investment project shows the level of optimum capital cost k_{OPT1} at the intersection of the curves, and the added value is the area between the curves. The chart on the right [Figure 3B] presents a hypothetical R&D project that will positively affect individual projects and the overall cost-effectiveness of the investment program (IRR upward shift), its implementation requires a supplementation of funding. A rational financial institution, given the increase in the total capital demand and the increase in risk related to the specificity of R&D projects (uncertainty as to effects, lesser opportunity to secure liabilities), can provide higher financing but it should be expected that it will be more expensive than the most expensive tranche so far, thus raising the optimum level of capital cost to the point k_{OPT2}. The increase in added value can be seen between the curves IRR_1 and IRR_2.

As a result of an innovative project, a company may increase the potential return on the investment program, and the whole endeavour is more profitable (the achieved added value growth) despite the increased demand for capital and the higher cost of capital.

Conclusions

Investment strategies and the related replacement and development expenditures (including R&D investments) have an impact on the viability of a company,on the added value over the invested capital, and, consequently, on its current value. Innovation is not only an element of strategy that opens new opportunities for companies to maintain their ability to compete on the market and retain value from the perspective of long-term investors. The innovation of organisational culture with an appropriate level of capital expenditure in the sphere of R&D opens the potential for increasing company value.

In addition to the aforementioned benefits, a negative side effect of increased innovative activity is the greater business activity risk associated with the temporary cash flow volatility increase or the emergence of specific types of risk, often of the non-recurrent nature. Due to higher R&D expenditures, expectations regarding the increase in cash flow volatility should be reflected in the perception of capital market investors by increasing the required return rates (market capital cost), and more precisely by increasing the beta coefficient. This is because market players adjust their expectations as to the rates of return, guided by the principle of assertiveness towards risk, in a way setting a new acceptable level of the marginal cost of capital. Diversification of the portfolio can reduce new risks, but not in 100% – part of the risk 'settles down' in a systematic (residual) form. In well-performing markets, investors can quickly account for the expectations in the price of securities and have access to information, so any changes in the risk profile of a particular company should be reflected in the capitalisation of the given company and the entire market, and consequently in the CAPM parameters. Therefore, theoretically, the increased activity of a specific company or industry in the field of innovation should result in an increase in its beta coefficient.

The accumulated risk (of a company implementing an innovative project), reflected in the beta coefficient, should not contain non-recurrent specific risks. It is debatable whether non-recurrent specific risks affect goodwill through higher rates of return (in the form of bonuses over the market cost of capital), or investors prefer to value projects step by step, starting with the estimation of goodwill without specific risks (CAPM), and then adjusting this result down to the assumed value of non-recurrent events. The risk reflected in the beta coefficient should have an impact on the cash flow over a long period and not on the one-time flow.

It can be postulated that innovation at the micro scale, temporarily characterised by intensive R&D outlays, is the source of a change in the cash flow profile; the changes in the residual cash flow ΔCF and changes in the growth rate of flows Δg, and at the same time changes of the β parameter by additional systematic risk ($\Delta\beta$) must lead to an increase in the rate of return required by investors (Δk) on the capital employed. Nonetheless, it is necessary to take into account the non-recurrent risks that coincide with increased investment activity. Innovative projects become a source of added value for investors if the financial effects such as changes in the residual cash flow and higher growth rate ($\Delta CF + V_1 \times \Delta g$) outweigh the combined effect on the risk of two factors: increase in systematic risk ($V_1 \times \Delta\beta \times MRP$) and the resulting specific risks.

Appendix — Conversion of formulas [1] and [2] into [5]

$$\begin{cases} [1] \quad V_1 = \dfrac{CF_1}{k_1 - g_1} \\ [2] \quad k_1 = RFR + MRP \times \beta_1 \end{cases} \qquad \begin{cases} V_2 = \dfrac{CF_2}{k_2 - g_2} \\ k_2 = RFR + MRP \times \beta_2 \end{cases}$$

$$\Delta V = V_2 - V_1 \qquad V_2 - V_1 = \frac{CF_2}{k_2 - g_2} - \frac{CF_1}{k_1 - g_1}$$

$$\begin{cases} k_1 - g_1 = \dfrac{CF_1}{V_1} \\ k_2 - g_2 = \dfrac{CF_2}{V_2} \end{cases}$$

Equations are subtracted side by side to the following form:

$$k_2 - g_2 - k_1 + g_1 = \frac{CF_2}{V_2} - \frac{CF_1}{V_1}$$

Substitute: $\Delta k = k_2 - k_{1;}$; $\Delta g = g_2 - g_1$; $\Delta CF = CF_2 - CF_1$

$$\Delta k - \Delta g = -CF_1 \times \frac{\Delta V}{V_1 \times V_2} + \frac{\Delta CF}{V_1}$$

Then take ΔV to the left side

$$\Delta V = \frac{(\Delta g - \Delta k) \times V_1 \times V_2}{CF_1} + \frac{\Delta CF \times V_1}{CF_1}$$

Substitute:

$CF_1 = V_1\, x\, (k_1 - g_1)$

$$\Delta V = V_2 \times \frac{\Delta g - \Delta k}{k_1 - g_1} + \frac{\Delta CF}{k_1 - g_1}$$

Then substitute $V_2 = V_1 + \Delta V$ and take advantage of the fact that:

$$1 - \frac{\Delta g - \Delta k}{k_1 - g_1} = \frac{k_2 - g_2}{k_1 - g_1}$$

$$\Delta V \times \frac{k_2 - g_2}{k_1 - g_1} = V_1 \times \frac{\Delta g - \Delta k}{k_1 - g_1} + \frac{\Delta CF}{k_1 - g_1}$$

Both sides of the equation are multiplied by:

$$\frac{k_1 - g_1}{k_2 - g_2}$$

$$\Delta V = V_1 \times \frac{\Delta g - \Delta k}{k_2 - g_2} + \frac{\Delta CF}{k_2 - g_2}$$

Or denoted in a different way:

$$\Delta V = \frac{\Delta CF + V_1 \times \Delta g - V_1 \times \Delta k}{k_2 - g_2}$$

If we substitute: $\Delta k = \Delta\beta \times MRP$; $k_2 = RFR + MRP \times \beta_2$

$$[5] \quad \Delta V = \frac{\Delta CF + V_1 \times \Delta g - V_1 \times \Delta\beta \times MRP}{RFR + MRP \times \beta_2 - g_2}$$

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Innovative investments, growth, risk and capability for survival from the perspective of value building for business owners

Summary

This paper presents the innovative activity of enterprises as a process that is risky but necessary for the survival of a company in a competitive market, and as a way to maximize the long-term value for the owners. Risks and benefits were analysed, and the possible sources of added value in innovative projects were identified in the context of the capital market equilibrium and the budgeting of investments. Innovative projects become a source of added value for investors if the financial effects such as changes in the residual cash flow and higher growth rate outweigh the combined impact on the risk generated by two factors: increase of systematic risk and emerging specific risks.

Key words: innovation, R&D investments, risk factors, added value