ECONOMIC FEASIBILITY OF THE REENGINEERING PROJECTS

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Abstract. Fundamentally, a reengineering project should have, as its common objective, the delivery of a fully functional business/customer service. The reengineering project should be complementary to and supportive of business processes within the enterprise. The paper presents an overview of economic feasibility of reengineering projects. Therefore various financial and accounting justification techniques such as payback period (PP), return on investment (ROI), net present value (NPV), and internal rate of return (IRR) are frequently used by managers in order to assess the economic aspects of the project. Furthermore, these methods could be misleading when employing too short payback periods or too high discount rates, neglecting various benefits of the reengineering projects or being unable to quantify them properly in financial terms.

Key words: reengineering, project, economic feasibility, financial terms

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1. INTRODUCTION

Contemporary business concepts of reengineering are emphasis the importance of a process orientation. Increasingly, organisations are structuring themselves around their business processes in order to improve responsiveness to business opportunities and threats, and adopting integrated software solutions that mirror and support the needs of their core business processes [10].

The necessity of reengineering projects is conditioned by the advanced dynamism of the contemporary world, by the continuous and essential changes that take place inside and outside of companies. The prosper companies that want to maintain forward their competitiveness, are being forced to change all the time the corporative strategy and tactics. Reengineering has been prescribed as an important tool for attaining and maintaining competitiveness. This exploratory empirical investigation into reengineering provides tentative avenues for increasing the probability of success of reengineering projects and raises many issues for further study of the reengineering phenomenon.

To elaborate the reengineering achievement program, the entrepreneurs must have at order of the day some fundamental questions regarding their own companies and the character of their activities: "*Why are we doing what we are doing*? *Why we are proceeding like that?*" Asking such fundamental questions, people are often forced to see from another perspective the rules already settled, according to which, they administrate their business. And, very often, these rules prove to be overcame, irrational or even unacceptable [2]

Reengineering has nothing in common with the little partial improvements or the excising ones, because is destined to assure a general growth of efficiency, and, as a result, is taking place essential improvements. These last improvements are achieved by removing all the old and superannuated belongings and replacing them with new ones, of a greater vitality.

2. THE LANDSCAPE OF REENGINEERING PROJECTS

Advances in information technology (IT) and rising competition have led to new modes of organizing work. Many of these new organizational forms depart from past practice instead of incrementally improving it. The resulting gains for companies can be substantial. *Hallmark*, for instance, discarded

sequential product development in favor of cross-functional teams and reportedly reduced new product introduction time on one card by 75%. After reorganizing, *Bell Atlantic* cut service order rework and saved $1 million annually, while simultaneously improving product quality [3].

Frequently, however, business process reengineering efforts run into serious difficulties. By some estimates, 70% of such projects fail to reach their intended goals [7], and a program that seeks to become a "House of Quality" more often becomes a "House of Cards." Because success often depends on coordinating the right technology, the right product mix, and dozens of the right strategic and structural issues all at the same time, near misses can leave a firm worse off than if the change had never been attempted. While several studies have documented the importance of coordination [9], managers continue to have difficulty achieving it. Often, the problem is not that the proposed system is unworkable but that the transition proves more difficult than people had anticipated. Too often, managers proceed in a hit-or-miss fashion, implementing the most visible bits and pieces of a complex new system, unaware of hidden but critical interconnections.

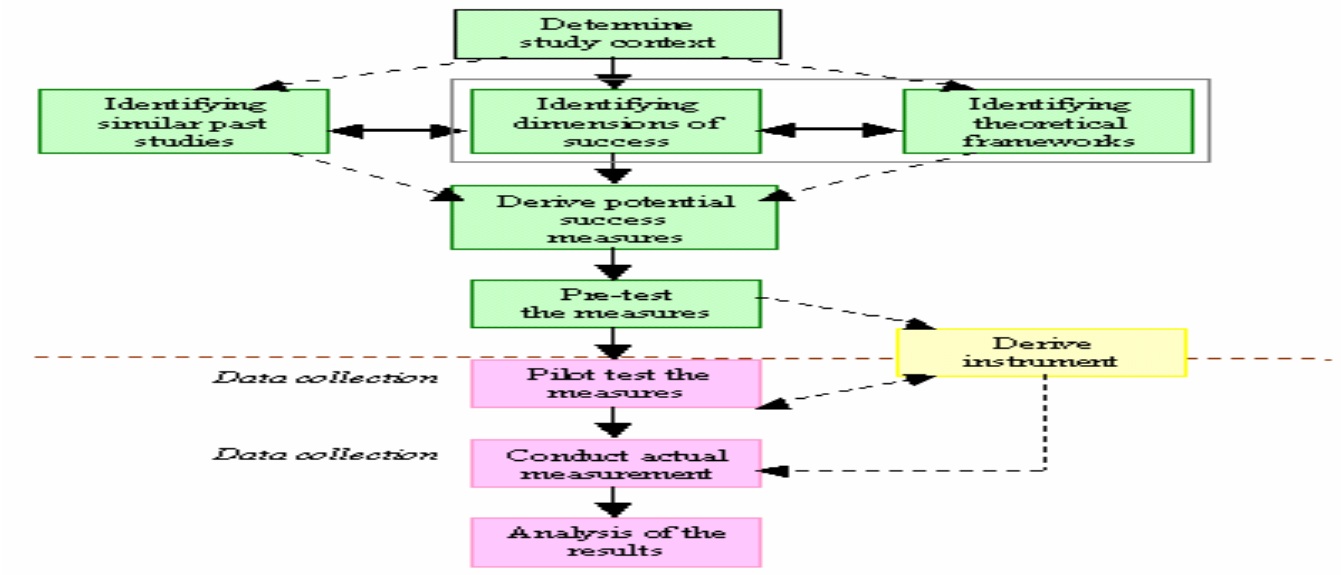
The path to change has several stumbling blocks. Some companies cannot adapt or they miss new opportunities, leaving them vulnerable to startups [11]. Sometimes companies acquire technology without modifying their human resource practices, mistakenly assuming "technological determinism" - that technology's effects are independent of the organizational structure in which it is embedded. In the 1980s, for example, General Motors spent roughly $650 million on technology at one plant without updating its labor management practices. As it turned out, the technology upgrade provided no significant productivity or quality improvements. Recently, in [5], we found that the one-to-one relationship between business strategy and manufacturing flexibility is established to enable managers to set clear priorities in investing and developing necessary manufacturing flexibility.

Econometric research also suggests that are significant relationships among social networks, technology use, completed projects, and revenues for project-based information workers. Results are consistent with simple production models of queuing and multitasking and these methods can be replicated in other settings, suggesting new frontiers for bridging the research on social networks and IT value [1]. In support of these aims, organisations seek means of better understanding their business processes.

Practitioners and researchers have discussed extensively the various applications of process-modelling at different phases of a reengineering project. Important contingent factors have been reported across various process-modelling contexts. However, little empirical evidence exists on how to conduct process-modelling successfully, and how to measure the success of a process-modelling initiative.

Process-modelling is a technique for supporting system life-cycle management (see Figure 1). Regardless of potential benefits, modelling is a resource intensive activity involving considerable costs (e.g. licenses for the modelling tool, third party modelling expertise, staff training in model development and maintenance). Organizations making these investments need to know if this intermediate procedure is worthwhile. A question often asked by both practitioners and researchers is “in what way(s) would the overall outcome have been different in the absence of modelling?” A valid, reliable and feasible process-modelling success measurement-model would aid in addressing this question.

Figure 1 – Process – modelling



Source [9]

3. USEFUL TOOLS IN THE ECONOMIC FEASIBILITY OF PROJECTS

Many traditional financial analysis techniques employed by managers such as payback period and return on investment fail to take the time value of money into consideration. Although useful tools in the financial analysis of investment decisions, their exclusive use can result in faulty decisions such as the acceptance of projects that lose money and the rejection of projects that may represent significant financial advantages. Analytical techniques used in finance to take the time value of money into account are called discounted cash flow methods.

The economic feasibility approach seems to be very natural and straightforward one and perhaps that is why it is so wide-spread in relevant companies worldwide. The investment has to be financially sound and viable because such a project competes for limited resources with many other projects. Therefore various financial and accounting justification techniques such as payback period (PP), return on investment (ROI), net present value (NPV), and internal rate of return (IRR) are frequently used by managers in order to assess the economic aspects of the project. However, many researchers argue that these methods support decisions that are sensible when viewed in isolation and they do not always indicate the best action when we take into account the whole organizational context [7].

Furthermore, these methods could be misleading when employing too short payback periods or too high discount rates, neglecting various benefits of the new reengineering system or being unable to quantify them properly in financial terms. To overcome the problems inherent in using purely economic appraisal approaches, analytic and strategic appraisal approaches have been promoted.

3.1. Use of Net Present Value Analysis in the Economic Feasibility of Projects

The net present value (NPV) is the most useful of these discounted cash flow methods. NPV analysis yields a result, expressed in after-tax (important for profit-based operations), that takes into consideration the difference in the value of future cash flows and the cost of raising the capital required for the investment. NPV helps make sound decisions about whether to accept or reject potential investment projects based on an objective financial criterion. Projects associated with positive NPVs represent net savings for the organization. Projects associated with an NPV of zero will recuperate only the cost of the capital required to make the investment. Projects associated with negative NPVs represent a financial loss for the organization.

The baseline year is when the initial investment is made. All cash flows occurring in future years are reduced in purchasing power compared to this baseline year. The amount that the cash flows associated with a given year are reduced, or discounted, in value is a function of time and the "hurdle rate". The hurdle rate can be the cost of the invested capital if the project is to be funded with borrowed capital or the required minimum return the project must generate in order to justify the investment of internally available funds. This allows for direct comparison of cash flows. A positive NPV of 1.00€ for a project initiated in 2008 with a hurdle rate of 10% means that the project will return the full cost of the invested capital (10%) plus 1.00 € in 2009-equivalent € value.

The following table illustrates a NPV analysis for a core lab reengineering project at a non-profit organization utilizing internally available funds to finance the project. To simplify matters, the entire investment is made at the beginning of the project. If the client had been a taxable, for-profit operation, the calculation would be more complex because IRS credits for capital cost allowances must be taken into consideration. The economic life of the project is set at five years. This is equivalent to the estimated amount of time that the potential labour savings can be maintained without investing additional capital to replace assets required to initiate the project as they age. It is important to base the estimate of the economic life of a project on this criterion rather than on a set criterion like the payback period. Use of the payback period for the economic life does not account for positive cash flows that may accrue to the hospital after the payback period and may result in the rejection of a financially sound investment.

Table1 - An Example of NPV Analysis

Year	Est. Labor Cost Savings Realized in Year =N	DiscountingFactor (using a 10% "hurdle"rate	Present value of savings at 10% hurdle rate	Opportunity cost assessed against savings in Year=N
	A	B	C = (A x B)	D = (A – C)
1	404.357 €	0,909 €	367.561 €	36.796 €
2	808.714 €	0,826 €	667.998 €	140.716 €
3	808.714 €	0,751 €	607.344 €	201.370 €

4	808.714 €	0,683 €	552.352 €	256.362 €
5	808.714 €	0,621 €	502.211 €	306.503 €
Total	3.639.213 €		2.697.466 €	941.747 €
Less: Initial Capital Investments made at time=0			1.400.000 €	
Equals: Net present value			+1.297.466 €	

Source: Data processing after financial reports.

Because the organization will use internally available funds to finance this project, we have assumed that the organization can pick from two mutually-exclusive investment projects: (1) Invest €1.400 of its capital resources in the core lab project, or (2) invest the same amount in a 10% security for 5 years.

The return the organization would make from the security represents the "opportunity cost" of the core lab project because the organization is foregoing the opportunity to earn the accrued interest on the security in order to mobilize the capital to implement the core lab project. The core lab project must replace this opportunity cost before it can return a positive NPV.

The use of a security as a "challenger" to the core lab project is prudent since it requires objective financial proof that the project has the potential to provide a higher return than simply saving the money. The "null hypothesis" (H_0) states that the core lab project will not outperform the return on the security. This null hypothesis must be disproved in order to accept the management's hypothesis (H_1) that investing the money in the core lab project will outperform the return on the security. Since the projects are mutually exclusive, if the core lab project cannot outperform the return made on the security, the analysis will return a negative NPV, H_0 would not be rejected and the core lab project would not be accepted. Conversely, if the analysis returns a positive NPV, H0 would be rejected and the core lab project would be accepted.

The 10% security would pay €700.000 in accrued interest at its maturity date [(€1.400.000 X 10%) X 5 years]. This explains €700.000 of the €941.747 opportunity cost of the core lab project. What about the €241.747 difference? This is caused by the negative impact of inflation on the earnings of the security which, if "left" in the investment for 5 years, would endure a €241.747 decrease in their purchasing power. Therefore, to match a return equivalent to €700.000 in "today euros", the core lab project must return €941.747 at the end of five years.

The interpretation of the NPV analysis is as follows:

H_0: The core lab project will not outperform the security

H_1: The core lab project will outperform the security

Criteria for rejection of H0: Core project returns a positive NPV

Result: Core lab project shows an NPV of +€1.297.466

Decision: Reject H_0, Accept H_1

A positive NPV of €1.297.466 indicates that the project would outperform the security by €1.297.466 after compensating for the negative impact of inflation and recovery of the €1.400.000 initial investment.

It's important to note that the project is expected to return €3.639.213 in total labor cost savings to the hospital over five years. According to our analysis this amount can now be broken down as follows:

€1.400.000 in labor cost savings to replace the capital resources used-up to make the initial investment. This represents the only "real" cost of the project

€941.747 in labor cost savings to compensate for the opportunity cost of the project. This is an artificial cost.

€1.297.466 in savings over and above (A) and (B).

Finally, at the beginning of an NPV analysis it is important to identify the strategic intent of the project. If part of the strategic intent is to reduce operating costs and decrease prices. In order to increase organization revenues, the projected increase in revenues needs to be evaluated and included as a positive cash flow in the calculation. If the intent of the project is survival then a negative NPV might be acceptable if

the negative financial impact of the investment is outweighed by the potential financial losses that may be associated with rejection of the project. In this case, the analysis led to the conclusion that mobilizing the capital required implementing the core lab project is in keeping with a strategy to maximize potential returns.

3.2.Use of Cost Benefit Analysis (CBA) in the Economic Fesibility of Projects

A popular economic calculation for the "attractiveness" of an investment is Return on Investment (ROI). ROI is a calculation of the most tangible financial gains or benefits that can be expected from a project versus the costs for implementing the suggested program or solution. Cost Benefit Analysis (CBA) is more comprehensive than ROI, and attempts to quantify both tangible and intangible costs and benefits.

Table 2 lists some of the potential costs and benefits that may be accrued by a reengineering project. Although the list is not comprehensive, it does provide an indication of the range of factors that you should take into consideration when assessing the economic feasibility. The table includes both qualitative factors, costs or benefits that are subjective in nature, and quantitative factors, costs or benefits for which monetary values can easily be identified. I will discuss the need to take both kinds of factors into account when performing a Cost Benefit Analysis.

Table 2 - Potential costs and benefits of a reengineering project

Type	Potential Costs	Potential Benefits
Quantitative	Hardware/software upgrades Fully-burdened cost of labour (salary and benefit) Expected operational costs Training costs to train developers in new/updated technologies	Reduced operating costs Reduced personnel costs from a reduction in staff Increased revenue from additional sales of your organization products/services
Qualitative	Increased employee dissatisfaction from fear of change Negative public perception from layoffs as the result of reengineering	Improved decisions as the result of access to accurate and timely information Raising of existing or introduction of a new barrier to entry within competition out of market Positive public perception that organization is an innovator

There are two lines of thought regarding qualitative Cost-Benefit analysis. The first strategy is to keep things simple and go with your instincts: if the project seems like a good idea, then it most likely is. The second line of though is that you can quantify the qualitative aspects of a project and thereby compare them fairly. If this is the case, stop wasting everybody's time and simply admit that you're making a judgment-based decision.

So, how would you quantify qualitative factors? To do so, we follow these steps:

Identify the qualitative factors. Brainstorming with several people is usually a good option.

Quantify the importance of each factor to your organization. For example, give each factor a rating of one to five, where five is the most important.

Numerically rate each alternative against each qualitative factor. *For example*, rate each alternative on a scale of zero to ten where ten is the highest possible rating.

Multiply the importance weighting by the rating for each alternative.

Calculate the overall score for each alternative by summing the individual scores.

In most cases, executives expect to see an economic justification based on phased benefits and costs over a three to five year window [6]. Being able to show a positive ROI in a one or two year timeframe will probably make the project an instant hit, but this is an unusual circumstance. Given the time value of money, a euro is worth more today than it will be tomorrow. To account for this economic fact, future costs and benefits need to be "discounted" in order to calculate today's value. The discount factor, also known as the cost of capital, might be specified by various authorities. Generally, the selected discount rate should be less than the Prime Rate.

CONCLUSION

Organizations often utilize standard formulas such as a cost benefit analysis (CBA), return on investment (ROI), or net present value (NPV) to determine if a project should be undertaken. These investment criteria are significant factors used to decide whether or not to initiate a program or project, but if you are unable to measure the results, then "so what." A sound benefit realization strategy will provide a process along with guidelines to measure actual benefits and a means to hold people accountable for results.

By measuring the results of a project, an organization will be able to make informed decisions about how much benefit is available to be reinvested.

ROI and CBA calculations are useful, because they allow you to examine your options and make wise choices. They are also an essential component of your business plan, because they become the "proof" that implementing a project is a sound business decision. ROI is useful when costs and benefits are tangible and tightly focused on a specific program with boundaries. CBA is more comprehensive, and is useful when both tangible and intangible costs and benefits need to be considered.

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