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The Capital Budgeting Process - How Italian Medium Size Firms deal with Investment Decisions

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LIST OF FIGURES AND TABLES

FIGURES

TABLES

ABSTRACT

Capital Budgeting process is a combination of very complex decisions and their assessments. A single project can easily harm or enable the company to a large extent and thus it is linked to its future success.

Who is in charge of capital budgeting decisions needs to understand all the steps involved as well as the basic principles of the Capital Budgeting Process.
Capital Budgeting decisions are (or should be) made through several distinct phases, from the identification of the investment opportunity at the very beginning, to the evaluation and measurement of its implementation at the end.

Companies are not all equal, in terms of needs, size, financial resources, knowledge and so on. This means that the capital appraisal process to follow is far from a standard path. There are differences in the application for each stage of the process i.e., identification, selection, authorization, implementation & control and post audit stages.

This study aims to investigate behaviors of Italian companies, in particular medium size firms located in the north-east area of Italy, in their Capital Budgeting Process. Objectives are to understand if the observations of the financial literature on this topic are true even for the surveyed companies and to understand whether there is uniformity in their investment behavior or if significant differences exist linked to particular characteristics/attributes of firms and financial managers. To obtain data a questionnaire has been sent to 2214 medium size companies. The survey collected 271 responses, that is a response rate of 12,2%. From the analysis of the results emerged that the Payback Period method is the most popular technique among medium size firms and that the "Identification & Filtering of Investment Opportunities" step, namely the first one of the Capital Budgeting Process, is deemed as the most important by managers. These findings are aligned with the literature. The second aim has been tackled through statistical χ_2 tests. These reject the idea that firms behave differently accordingly to different features of the

business, specifically the Legal Form (Spa/Srl), the relative size among them (Large medium size firms/Small medium size firms); the sector of activity (Manufacturing & Building/Retail/Services). Even the possible correlation between personal traits of managers (Education and Experience) with the adoption of the NPV method has been rejected by χ^2 tests.

CHAPTER 1
INTRODUCTION

1.1 Corporate Finance Function

According to the financial literature the Finance function can be defined as the management of money in such a way that it is available at the time it is required to carry out the objectives as satisfactorily as possible.[1]

Every organization, being it large or small, public or private, profit oriented or non-profit oriented, needs finance to carry out its day to-day operations and to reach its goals.

"Finance is said to be the circulatory system of the economy body, making possible the required cooperation between the innumerable units of activity."[2]

Thus, being indispensable, finance is rightly known as the "lifeblood and nerve center" of any organization.

It is this importance of finance that has led to the emergence of the concept of Corporate Finance or Business Finance. Corporate Finance, also known as Financial Management deals with financial planning, acquisition of funds, use and allocation of funds, and financial control of the scarce financial resources by any organization.[3]

"Corporate finance is all about maximizing value"[4]

It is the essential for a business, and particularly for a financial manager or an entrepreneur, to procure and use properly and efficiently financial resources. Hence, whoever is involved with financial management must determine its basic objectives. The properly defined and understood objectives are the key, to successfully moving from the firm's present position to a future desired position.

[1] Cf. Howard B.B., Upton M., (1970)
[2] Cf. Siraj M., Fasi M., (2017)
[3] Cf. Guthmann G., Dougall H.E., (1955)
[4] Cf. Brealey R.A., Myers S.C., Allen F., (2017)

Given that companies are profit oriented organizations, their objectives are frequently expressed in terms of money. Two primary objectives are:[5]

1. Profit maximization
2. Wealth maximization.

The first, Profit maximization, comes from the traditional approach of Financial Management. Profit is essential for the success, survival, and growth of the company.
Its measurement is a way to assess the economic efficiency of the firm, it provides the tool by which economic performance can be judged.
Moreover, it leads to efficient allocation of resources, as resources tend to be directed to uses, which in terms of profitability are most desirable. It is therefore said that profitability should serve as the criterion for the financial management decisions.
However, the profit maximization criterion suffers from three basic weaknesses.

1) *Vague*

   Profit is not always defined precisely or correctly. Different mindsets could have different perceptions of profit. For e.g. profits can be the net profit, gross profit, before tax profit, profit per share etc.

2) *Ignores the time value of money*

   A Profit maximization strategy ignores the differences in the time pattern of the benefits received from investment proposals. This criterion fails to consider the distinction between the returns received in different time periods and thus, treats all benefits equally valuable.

3) *Ignores risk*

   Projects alternatives often come with different cash flows patterns and implied risk. A decision that is based just on profit maximization would ignore the risk in favor of higher returns. This could be harmful for a company, because higher risks directly question the survival of a business.

[5] Cf. Paramasivan C, Subramanian T., (2012)

Given the abovementioned weaknesses, the modern approach of Financial Management encompasses a larger objective that is Wealth maximization.

The term wealth refers to shareholder wealth or the wealth of the individuals involved in the business concern.

Wealth maximization, according to this approach is superior because it obviates all the drawbacks of profit maximization approach:

- wealth maximization is based on cashflows. Differently from profits, cashflows are exact and definite and thus avoid ambiguities associated with accounting profits. Profits also can be manipulated because given a change in accounting policies, there could be a change in profit (e.g. a change in the method of depreciation leads to a change in profit). This cannot happen with cash flows.
- wealth maximization adopts a long-term view. It is the value of the company in the long run that is valuable for the owners. Short-term profit maximization can be achieved by the managers at the cost of long-term sustainability of the business.
- wealth maximization considers the time value of money. In wealth maximization, the future cash flows are discounted at an appropriate discounted rate to represent their present value. Suppose there are two projects A and B, project A is more profitable however it is going to generate profit over a long period of time, while project B is less profitable however it is able to generate return in a shorter period. In a situation of an uncertainty, project B may be preferable. So, timing of returns is ignored by profit maximization, it is considered in wealth maximization.
- the wealth-maximization criterion considers the risk and uncertainty factor while considering the discounting rate. The discounting rate reflects both time and risk. Higher the uncertainty, the higher will be discounting rate.

1.2 Three Areas of Financial Management and Meaning of Investment

According to Deolankar[6] and Van Horne & Wachowiz[7], financial management is related to three major decisions:

- *Investment decision*: This relates to the decision made by the financial manager/entrepreneur with respect to the amount of funds to be deployed in the investment opportunities.

  It includes short term investment decisions known as working capital management decisions and long-term investment decisions known as capital budgeting decisions.

- *Financing decision* (Capital Structure Decision): This refers to the decision of the procurement of funds in order to meet the firm's investment needs. This leads to the determination of the appropriate proportion of debt/equity mix.

- *Dividend policy decision* (Profit Allocation Decision): This last deals with deciding the proportion of profits to be distributed to the owners (dividend-payout) and the proportion to be retained (retention ratio) in the business.

Combining these three without exceeding the financial capabilities of the company is fundamental to maximize the value of the firm to its shareholders.

Out of these core areas, the *investment decision* – and specifically the *capital budgeting decision*, which refers to the efficient utilization and management of funds with the specific aim of maximizing shareholders' wealth, will be treated as the central issue this thesis. In particular the process of the investment decision and its techniques of evaluation in Italian medium size companies will constitute the perimeter of analysis.

[6] Cf. Deolankar V., (1996)
[7] Cf. Van Horne J.C., Wachowicz J.M., (2008)

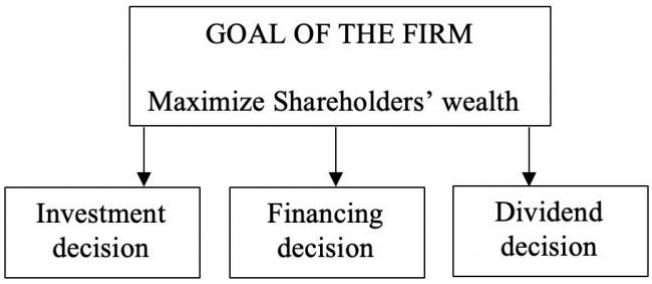


FIGURE 1: Areas of Corporate Finance – Author's elaboration

Having defined the topic of this work – the Capital Budgeting Process – and cleared its scope – the investment decision, it is crucial to know what the financial literature means by "Investment".

"Investment is defined as the commitment of current financial resources in order to achieve higher gains in the future."[8]

The essence of an investment is to forgo present consumption of resources in order to increase the total amount of resources that can be consumed in future.
Alternatively, an investment can be seen in terms of "making an outlay of cash now in the expectation of extra cash coming in the future".[9]
People and companies make investment decisions to acquire assets (tangible or intangible) in order to increase their personal or corporate wealth over a period of time. From the point of view of the financial manager, the objective should be to invest in projects which create value in the company and thus ultimately increase the worth for shareholders. For a wealth-maximizingfimr, the most common form of investment is in real assets (tangible assets as land, buildings, plant & machinery). Such assets are very important for most firms as they represent the largest financial investment and are the key earning assets of the firm.

[8] Cf. Capital Market Authority of the Kingdom of Saudi Arabia, (2016)
[9] Cf. Dixon R., (1994)

1.3 Objectives and Organization of the Study

The objective of this work is to examine the Capital Budgeting Process pursued by Italian medium size companies in a turbulent and risky environment.

Specifically, the objectives of the study are:

1. To investigate corporate practices regarding the capital budgeting techniques and methods used for evaluating an investment proposal.
2. To investigate the criticality in terms of level of difficulty, importance and riskiness of different stages of the Capital Budgeting Process, and the factors affecting capital budgeting techniques which are being applied by the companies.
3. To analyze through statistical tests whether the Capital Budgeting Process is overall homogeneous for these companies or if there are some variables and traits that are correlated to different investment behaviors.

This thesis is divided into five chapters.

Chapter 1 (Introduction) presents the Corporate Finance Functions and its areas of intervention. The second chapter (Capital Budgeting) presents the core topic of this work. Capital Budgeting is defined and it is explained its importance for firms. The chapter then provides some features of investment appraisal decisions and their classification. The third chapter (Capital Budgeting Process) reports what are the main steps of Capital Budgeting Process, even if there is not a single and standardized path this work presents a structure onto which part of the empirical research is based.

Chapter 4 (Financial Techniques, Risk and Overconfidence) is devoted to a brief explanation of financial techniques adopted by managers to analyze investment opportunities. Every technique (e.g. Payback Period, Net present Value, Internal Rate of Return) is presented and accompanied by its principal merits and criticalities which managers should be aware of. The chapter goes on with some precisions on the Cost of Capital as discounting factor and ends with some consideration about risk and overconfidence as behavioral bias. The last chapter, Chapter 5 (Capital Budgeting Process of Italian Medium Size Firms), is dedicated

to the Study. It reports a brief literature review on some previous similar researches, the research question, the methodology adopted and the findings. Results of the survey are reported through descriptive statistics (graphs and tables) and, to analyze the topic of the research, Chi Squared tests are deployed.

CHAPTER 2
CAPITAL BUDGETING

2.1 Capital Expenditure – The Investment Problem

Whenever a firm buys long term assets, or whenever it spends money to increase the value of its existing assets, this expenditure is defined *capital expenditure* (CAPEX).

Long term assets constitute an important part of the total value of the total assets of a company. They can be distinguished in:

- tangible (fixed) assets (i.e. lands, buildings, plants & machineries)
- intangible assets (i.e. brands, goodwill, patents, copy rights)
- financial assets (i.e. stocks)

All these capital items are bought and held in a long-term perspective and thus have an enduring influence on the profit-making and wealth creating capacity of a business.

Capital budgeting is a managerial tool that is vital for investment decision-making. Among the duties of a financial manager, one of the most crucial is to choose an investment from various alternatives considering factors such as cash flows and rates of return. Therefore, a financial manager must be able to decide whether an investment is worth to be undertaken and be able to choose intelligently between two or more alternatives. In order to do this, the capital budgeting decision has to be supported by a sound procedure for evaluating, comparing, and selecting the projects.

As previously stated, the Capital Budgeting decision is not active in a closed ecosystem but has to share the space and be balanced with the Financing decision and the Disbursement decision.

In the form of either debt or equity, capital is a very limited resource. If we consider debt capital, there are two reasons that explain its scarcity:[10]

[10] Cf. Kuppapally J.J., (2008)

- *competition among projects*: Commercial banks and other lending institutions have limited deposits from which they can lend money to individuals, corporations, and governments; and there is a limit to the volume of credit that the banking system can create in the economy. Having limited resources to lend, lending institutions are selective in extending loans to their customers. Investment projects, at the demand side, are thus in competition to be held worthful of a lending.
- *Cost of debt*: even if a bank were to extend unlimited loans to a company, the management of that company would need to consider the impact that increasing loans would have on the overall cost of financing. Adding new debt to finance investments could lead to an increase of the interest rates and other charges making the financing decision (and the linked investment) no more convenient, or even worse, mining the solvency capabilities of the firm.

Any business has limited borrowing resources that should be allocated among the best investment alternatives. Even the best-known firm in any industry can increase its borrowing up to a certain limit. Once this point has been reached, the firm will either be denied more credit or be charged a higher interest rate, making borrowing a less desirable way to raise capital.

On the side of equity capital, a company can issue common stocks to raise capital. However, as the number of shares of a company increases, the company ownership of the individual stockholder may proportionally decrease. New equity increases the total shares outstanding which has a dilutive effect on the ownership percentage of existing shareholders. In addition, also the equity bears a cost. The cost of equity affects the overall cost of capital computed to assess the relative attractiveness of investments.

An outlay of cash made in the expectation of receiving future benefits is defined a *capital* expenditure. To make the distinction between *"capital"* and *"current"* expenditures, the financial literature agrees in defining "capital" expenditures those expenditures whose benefits extend beyond one year.[11]

[11] Cf. Jacobs D.F. (2008)

There is no phase of business management where decision-making has a more profound effect on the long-term welfare of a company than in the area of capital expenditures.

As Brealey, Myers and Allen state *"Smart investment decisions create more value than smart financing decisions"*[12].

Devoting adequate attention to the question of how a company should spend capital funds is the major task of the financial manager.

2.2 Relevance of Capital Budgeting

In order to understand the scale of importance of the Capital Budgeting concern, it is essential to know what this term refers to.

Capital Budgeting involves the making of investment decisions related to assets. The term "capital" in Capital Budgeting refers to the investment of resources in long term assets, while the term "budgeting" refers to the analysis and assessment of revenue inflows and outflows deriving from the proposed capital investment over a specified period of time.

"Capital budgeting is a long-term planning for making and financing proposed capital outlay" C. T. Horngreen et al.[13]

"Capital Budgeting refers to the total process of generating, evaluating, selecting and following up on capital expenditure alternatives" - L. J. Gitman[14]

"Capital Budgeting consists in planning for development of available capital for the purpose of maximizing the long-term profitability (return on investment) of the firm" - R. M. Lynch.[15]

[12] Cf. Op. cit.
[13] Cf. Horngren, C.T., Bhimani, A., Datar, S.M, Foster, G., (2002)
[14] Cf. Gitman L.J., (2003)
[15] Cf. Lynch R.B., (2002)

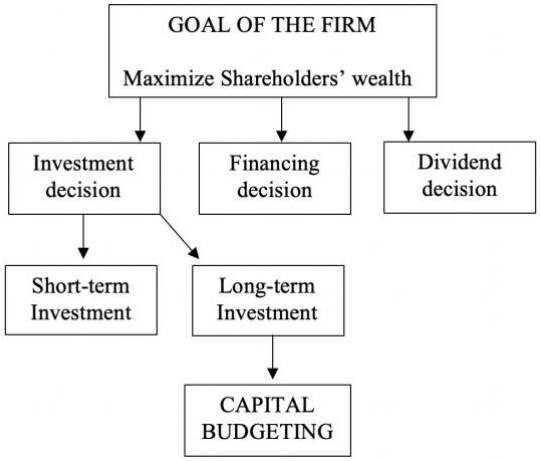


FIGURE 2: Capital Budgeting Function – Author's elaboration

Capital Budgeting, accordingly with what authors say, is not only about allocating financial resources of a business in fixed assets (long term investments) but it is a process that involves the total planning of the investment phase in order to acquire worthwhile projects which will contribute to maximize the value of the firm.

Such projects require large sum of funds and have long-term implications for the company, thus the financial manager together with other business department must be extremely careful.

Capital budgeting is a very complex activity that requires time. As it will be explained further the process involves the searching of new and more profitable investment proposals, investigating engineering and marketing considerations to make initial screenings of proposals, making economic analysis to determine the profit potential of each projects, laying down a clear implementation pattern and monitoring.

Decisions in the area of capital budgeting are considered to be the most important and crucial among the three mentioned above (financing, investing, dividend) because they can influence, to a great extent, the survival, growth and value of a company. Investment appraisal is an essential activity to accomplish the goals, as Porwal[16] states, "Capital Budgeting is one of the important vehicles to achieve

[16] Cf. Porwal L.S., (1976)

objectives of a business concern". And thus, it is directly linked to the overall and final objective of a business entity, that is value creation.

According to Van Horne[17] capital budgeting decision is the most important of the three decisions when it comes to the creation of value. Capital budgeting is imperative to keep the business healthy and to ensure that each euro *(dollar)* spent is actually turning around and making money for the company and its owners.

2.2.1 Accountability and Measurability

Capital Budgeting, as repeatedly been said, is a process that improves the performance of the firm. Not only because it allows managers to balance the profitability and risks of the projects, but also because it creates accountability and permits measurability.[18]

Financial managers must carefully recognize risks and be able to assess them in comparison with the returns of the projects. If this activity is poorly done, they will be held accountable of the failure by the firm's owners or shareholders. However, top managers usually take decisions supported by data and analysis made by their collaboratives. Hierarchy, applied in a process with defined steps and methods contributes to share the responsibility across the financial team and beyond, touching whoever is involved in the process, from the "operative guys" that signal the necessity of a new investment or give their considerations about the feasibility of a projects (whenever the investment opportunity is presented from the upper levels), to the CFO and other top manager that sign and respond directly to the shareholders.

Furthermore, a business must be capable of measuring the effectiveness of its investment decisions both taken and in progress. Measurability allows comparisons and this is essential in order to implement the best investment opportunity and scrap the others. On the contrary, if the investment appraisal activity would give space to

[17] Op. cit.
[18] Cf. Gowtham C.S., Peter M., (2017)

different interpretations even after the analysis of the data about risks and returns, the firm will have little chances of surviving in the competitive arena. This because mistakes in the Capital Budgeting Process are costly and being able to measure the effectiveness of decisions, before and after implementation, is a pre-condition to the survival of the business.

2.2.2 A Dual Decision

In the previous chapter it has been said that Capital Budgeting is referred to the investment decision, in particular to the acquisition of long-term assets, and this is right. However, it has also been said that the three areas of financial management, where financial managers are called to take decisions, are interconnected. Every choice in one direction will generate decisions in the other two.
Specifically, the investment decision is highly linked to the financial decision. To invest a company has to find funds, and conversely money is collected since the firm needs it to invest.

Thus, Capital Budgeting entails two important decisions at once: the investment decision and the financial decision. By spending money in a project, the company agrees to make a financial commitment and hence, to find the amount of resources needed at the minimum cost since keeping the cost of capital at a lower level is fundamental. This commitment involves its own set of risks, some of them deriving directly by the investment decision. Indeed, in addition to considering pure financial risks given by rises in the overall interest rates in case of investments funded with debt, a financial manager must consider possible project delays, cost overruns and regulatory restrictions that will increase the cost of the project.
And obviously a company that is investing today, is making also an investment in its future direction and growth because it will likely have an influence on future projects that the company considers and evaluates.

The importance of this dual decision is profound for companies. Understanding that both a financial and investment decision are to be made is paramount to making

successful capital investment decisions. Managing a business is a constant exercise in balancing capital budgeting decisions with its financing decisions.

2.3 Features of Capital Budgeting

The significance of Capital budgeting can be understood more punctually listing its characteristics.

The basic features of this multi sided and intricate activity have yet been presented:

- Involves high degree of risk.
- Have effects over long-time horizon

They are the overall reasons for which an unsound investment decision may prove to be fatal to the very existence of the business concern.

Going more deeply and disentangling these two general considerations, the significance of capital budgeting arises from its peculiarities.

Capital Budgeting:

- *Affects firm's growth in the long run*: A firm's decision to invest in long-term assets has a decisive influence on the rate and direction of growth. Wrong, unprofitable investments may prove disastrous for the future survival, growth and value of a firm.

- *Entails large investments*: Capital budgeting decisions involve large investment of scarce funds. Given the scale of the investments, it becomes necessary to make proper planning regarding capital expenditures and their related financing.

- *Requires long-term commitment of funds*: Capital budgeting not only involves large investments but also entails long-term and permanent commitment of funds. This long-term commitment of funds may also change the level of risk of the firm.

- *Has effects on long term profitability*: Capital budgeting has long-term effect on profitability. Not only present earnings of the company are affected but also its future earnings. The effects of capital budgeting will extend into the future and will have to be endured for a longer period than the consequences of current operating expenditures. Thus, long term profitability of the company depends on the investment decisions.

- *Encompasses complexity in the decisional process*: Investment decisions are among the firm's most difficult decisions, which are complex in nature. This is due to difficulty in estimating the future cash flows from an investment especially in uncertain business conditions. Changes in customers taste, technological advancements, regulatory frameworks and economic downturns are difficult to spot in advance.

- *Is of irreversible nature*: Capital budgeting decisions are irreversible in their nature. This is due to the difficulty in finding a market for second-hand capital assets. Often, the only available alternative for companies that want to dismiss their assets in the event of an investment decision being proved wrong is to scrap them or to sell them at a substantial lower value, thus incurring in a loss.

- *Has "national" importance*: Investment decisions are also concerned with the national importance because, all together, they contribute to determine employment rate, economic activities and growth of an economy. Creating an ecosystem in which firms are encouraged and supported in their investing activities should be a prerogative for governments of every country in order to increase their GDP and be competitive.

2.4 Objectives and Rationale of Capital Budgeting

As every activity performed by a company has its aims even the Capital Budgeting Process is finalized to reach certain objectives.

The objectives of capital investments can be synthetized as follows:

- Obtaining an appropriate return: the company aims to get a minimum return that is expressed by the cost of capital employed
- Maintaining the current value of assets: through investment made to guarantee that the invested capital remains intact and contributes to generate profits.
- Obtaining an increasing continuous income: by exploring alternative investments to find the one that increase the overall return on invested capital.
- Sufficient liquidity: having the minimum limit of liquidity needed to satisfy the requirements of the work, any emergent liabilities that arise during the production process and to manage effectively the working capital
- Creating a competitive advantage: allocating money in those investments that will be recognized as the strengths of a company in the competitive arena.

Behind every investment decision that pursues the objective above specified there is a ratio that has generated it.

All Capital Expenditures see their reason of existence in one of the following justifications:

1. *Expenditure made to reduce costs:*

   This kind of expenditures are intended to reduce or minimize the cost of production and/or handling of products. Often, they are related to the acquisition of brand-new machineries or the adoption of cutting-edge technologies.

2. *Expenditure made to increase revenues:*

These expenditures are made to increase production capacity, through the expansion of facilities and production lines or to stimulate the demand, either through advertising or through product improvement.

3. *Expenditures justified on non-economic grounds:*

Sometimes the underlying economic rationale for other capital expenditures may be less clear-cut. It could happen (and in the real world it happens a lot) that a company face investment decision without the logic "increase revenues/decrease costs" either because they are mandated to by the law, or because they are willing to. Usually projects arising from this rationale do not generate revenues, hence the benefit is hard to find at a first glance and has to be explained in non-economic terms.

2.5 Classification of Capital Budgeting Decisions

2.5.1 Classification according to their nature and risk

CAPEX decisions are faced regularly by business organizations. It is a circular activity, there is no end for it. Firms are constantly seeking new investment opportunities, evaluating some and monitoring the ones yet implemented.

The investment decisions of a company can have several directions. Thus, projects can be categorized following their nature and associated risk.

- *Replacement:* Replacement of fixed assets (especially for tangible assets) may become necessary either because they wear out due to their adoption or because they get obsolete due to new technologies.

  Decisions falling into this category imply generally a lower level of risk. The company is simply replacing equipment or buildings already operative and typically has experience in managing similar new equipment, so cash flows from basic replacement projects are easily predictable. However, it has to be noted that, in case of replacement projects which would radically change the operating process, risk may be considerably higher.

Expansion: Expansion projects are intended to enlarge a firm's established product or market on account of high demand. Obviously, this wish will need additional capital investment.

The risk associated is even in this case quite low since companies are yet experienced with costs, cash inflows and demand trends.

- *Diversification:* Sometimes a company decides to reduce its overall risk by operating in several markets rather than in a single one. To do this capital investments become necessary. The purchase of new machinery and facilities associated to the costs of handling the new products (i.e. the acquisition/empowerment of ERP systems) are considerable capital expenditures.

  Investment decisions that involve introducing new products or entering into new markets are riskier than the replacement and expansion projects. That's because the firm has little or no management experience in the new product or market. Hence, there is more uncertainty about potential pitfalls and future cash flows.

- *Research and Development:* Especially in case of those industries where technology is rapidly changing large sums of money are spent in R&D. These expenses are included in CAPEX valuations.

  As in the previous case, also these ones entail a higher level of risk. This is due to the fact that firms may have: poor goal-setting at the beginning of a research project (misalignment with the strategy); intellectual property-related costs (patents filing and avoidance of/incurrence in legal disputes); different regulatory framework to understand; uncertainty in consumer tastes and timing constraints (another company may bring a competing product to market, or the R&D process can take long enough for the product to be nearly obsolete at the time of its market launch). All these causes of risk could mine the efficiency of a R&D project.

- *Miscellaneous*: As explained before, firm may have to invest money in projects which do not directly help in achieving profit-oriented goals, since usually the do not generate revenues. These expenses may be motivated by legal requirements (i.e. investments in safety) or come on a voluntary basis (i.e. investments at benefit of the local community).

  The risk associated to this kind of projects clearly depends on their significance and scale. For example, a government agency's requirement to simply install fire-doors and general fire-extinguishers in all the buildings, and the requirement to adopt a certified fire-fighting system (specific fire-extinguishers, sprinklers, alarms, automated doors, ventilation systems etc.) are different requests in term of risk considering the financial exposure needed.

2.5.2 Classification according to their interdependence

After having categorized Capital Budgeting decisions according to their nature and risk, the next step is to identify the different types according to their interdependence.

A business may have several investment proposals to consider. It may adopt one of them, some of them or all of them. This is depending upon whether they are independent, contingent (dependent) or mutually exclusive.

- *Independent Proposals:*

  These are proposals which do not compete with each other in a way that acceptance of one precludes the possibility of acceptance of another. Cash flows of an independent project are not related to the cash flows of any other project. For this reason, it can be evaluated strictly on the effect it will have on the value of a firm without having to consider how it affects other investment opportunities. In case of such projects the firm may straight away "accept or reject" a proposal on the basis of minimum return on investment required.

- *Contingent or Dependent Proposals:*

These are proposals whose acceptance depends on the acceptance of one or more other proposals. For e.g. a new machinery may have to be purchased on account of a diversification strategy. In this case investment in the machinery is dependent upon the decision of entering a new market. When an investment decision has to be made, it should be clear whether it is dependent upon other decisions since the "accept/reject" criteria could substantially differ.

In addition, a firm may have to consider a particular type of contingent projects, complementary projects. These are not dependent in the sense that the existence of one is directly connected to the existence of the other, but in the sense that riskiness or cash flows of a project could benefit from the acceptance of the other.

- *Mutually Exclusive Proposals:*

  These are proposals which compete with each other in a way that the acceptance of one precludes the acceptance of others. Usually, reasons for this impossible co-existence are logical (i.e. the renewal of a facility is in contrast with the building of a new one) or given to the scarcity of capital funds or operative concerns (space, employees etc.)

Hence, two or more mutually exclusive proposals cannot be accepted simultaneously. Some techniques have to be used for selecting the better or the best one. Once it is done, other alternatives automatically get eliminated.

2.6 Conclusions

The acquisition and the replacement of assets is a prerogative for every business. All these long-term investment decision fall under the area of Capital Budgeting. Capital Budgeting is not only focused on allocating financial resources to acquire fixed assets, but it encompasses the total planning of the investment phase. The objective is to find worthwhile projects which will contribute to maximize the value of the firm.

It is a relevant activity because it provides accountability and measurability to the firm. In fact, managers undertake a process that lead them to evaluate every project

in detail. This allows the company to be held accountable at the eyes of the external community and investment opportunities to be compared.

The principal features of the Capital Budgeting activity are the high degree of risk involved and its long-time horizon and the rationale behind them is the necessity of firms to increase revenues, decrease costs or to be in compliance with the law or other non-economic reasons.

Capital Budgeting decisions can be classified in accordance with their nature (e.g. replacement of assets, diversification…) or with their interdependence (e.g. contingent projects, mutually exclusive projects…). This second classification is of huge importance and have implications on the right financial techniques to be used, as it will be explained in Chapter 4.

CHAPTER 3
CAPITAL BUDGETING PROCESS

3.1 The Process of Capital Budgeting

"Capital budgeting is the process of analyzing investment opportunities in long-term assets which are expected to produce benefits for more than one year." Peterson and Fabozzi[19]

"Capital budgeting is the process that companies use for decision making on capital projects with a life of a year or more." CFA Institute[20]

"Capital budgeting shall be defined as the process in which a business determines whether projects... are worth pursuing." R. Brealey, S. Myers, F. Allen[21]

"Capital Budgeting refers to the total process of generating, evaluating, selecting and following up on capital expenditure alternatives" L. J. Gitman[22]

What emerges from the above statements is that Capital Budgeting is a *process* through which a company *analyses* investment opportunity that will have an impact in the *long run.*

[19] Cf. Peterson P.P., Fabozzi F.J., (2002),
[20] Cf. CFA Institute
[21] Cf. Op. cit.
[22] Cf. Op. cit.

The Capital Budgeting process leads businesses to the determination of economic and financial profitability of any investment project.

However, the effectiveness of the investment decisions depends upon the soundness of the various activities involved which can be divided into the following steps:[23]

1. Identification & Filtering of Investment Opportunities
2. Evaluation and Selection
3. Implementation
4. Monitoring & Control

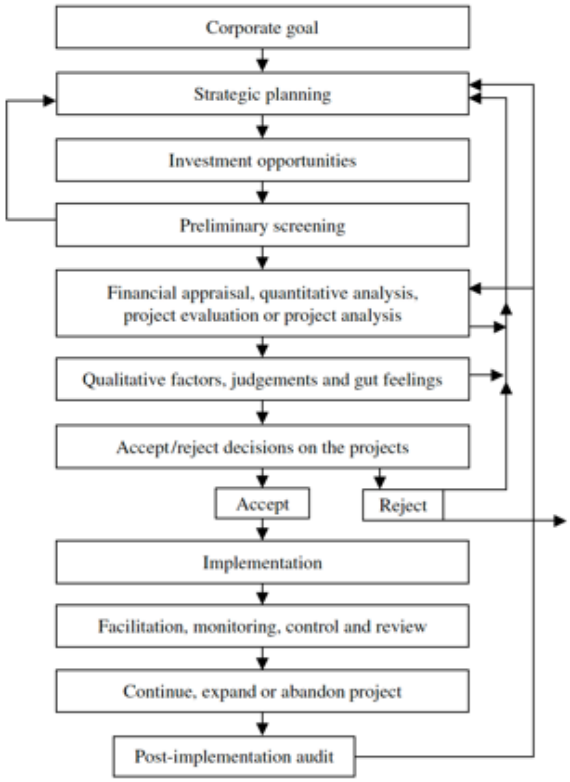


FIGURE 3: Capital Budgeting Process - Irons, R. et al. (2019) "Capital budgeting: Financial appraisal of investment projects"

3.1.1 Identification and Filtering of Investment Opportunities

The Capital Budgeting process starts with the identification of investment opportunities and the consequent generation of investment project proposals. These project proposals obviously have to fit in with a firm's corporate goals, its vision,

[23] Cf. Alkaraan F., Hopper T., (2005)

mission and long-term strategic plan. Of course, if it is an excellent investment opportunity that is not aligned with the current strategic plan, but it is worthful, the corporate vision and strategy may be changed to accommodate it. Thus, the causal relationship works in both directions: strategic planning generates the projects to focus on (indeed normally they represent the strategic plan of the business) but in turn, some investment opportunities are good enough to make a company re-discuss its strategy and set new directions.

In this initial phase investments could be generated since they have to fulfill mandatory requirements, i.e. those investments required to satisfy particular regulatory, health and safety requirements. These are essential for the company to avoid potential heavy administrative penalties or costly legal disputes. Other investments decisions are made on a discretionary base and are generated by growth opportunities, cost reduction opportunities, competitive reasons etc.

A profitable investment proposal does not fall from the sky, someone has to suggest it. Excluding those projects arising from mandatory requirements, which usually are not profitable, investment proposals could come from:

- *top management and directors* mainly in case of investment opportunities linked to expansion projects (in case of M&A for instance it's the desire of the top executives that leads to search for firms to merge with or to acquire)
- *middle management and employees* especially in case of investment proposals regarding cost reduction possibilities (re-layout of production sites, acquisition of new technologies, use of different materials...)
- *external consultant* both for huge opportunities like mergers (that have a massive impact on the firm) or smaller ones like the adoption of new technologies and the implementation of different operating processes.

The company should ensure that it has searched and identified potentially profitable investment opportunities, because the successive steps of the Capital Budgeting Process are set up only to assure that the proposed investments are evaluated, selected, implemented and controlled. There is no more chance to return at the

initial phase and look for other proposals once the process is ongoing without incurring in losses of time and money that are higher according to the scale of the project, its urgency and the step at which it gets stopped.

Thus, for the identification of investment ideas it is necessary to:

- *monitor external environment regularly*

  Directors and top executives should constantly look at competitors to predict moves and act consequently.

  Some firms have R&D departments searching for and researching into new products, services and processes and identifying attractive investment opportunities.

  Competent consultants are to be hired to have a true external vision and suggestions.
- *share corporate strategy and perspectives*

  whoever is involved in the process of capital budgeting should be aware of the long-term strategic plan of the company in order to avoid misalignments or wastes of time.
- *motivate employees to make suggestions*

  It is really unlikely that the financial manager who makes the decision and whoever sets up the methodology knows as much about the technical details and assumptions of a project as the engineers and supervisors involved with the project. The process of Capital Budgeting has to align the incentives and interests of these employees with those of shareholders.

It is important for those investment suggestions coming from inside the firm, such as from its employees, or from outside the firm, such as from advisors, that these are listened to by the management in order to pass to the second step: the preliminary screening.

Generally, in any organization, there are many potential investment proposals generated. It is clear that not all of the are truly worthful and some of them can be

stopped and eliminated before they go through the rigorous financial analysis process.

The identified investment opportunities have to be subjected to a preliminary screening process by the management to isolate those proposals that are unsound with the strategy or those that are not operatively feasible.

Hence, in this step the primarily factors to be considered are:

- Consistency with the strategy
- Compatibility with the law
- Availability of inputs (materials, technologies, people)

Additionally, the preliminary screening may involve some preliminary financial analysis and judgements based on intuitive feelings and experience. Managers have to weight roughly:

- The amount of funds to invest in the project
- Cash flows and profitability
- The level of risk connected to the expected return

This is to measure the soundness of the proposals and to determine if projects under evaluation are unreasonable in operative terms or in financial terms yet at a first glance.

3.1.2 Evaluation and Selection

Projects which pass through the preliminary screening phase become candidates for rigorous financial assessment to ascertain if they are capable of adding value to the firm. This stage is also called quantitative analysis, economic and financial appraisal, project evaluation, or simply project analysis.

The financial evaluation of a proposal aims to

- forecast the expected future cash flows of the project
- analyze the risk associated with these cash flows
- estimate the profitability of the project
- examine the sensitivity of the results to possible changes in the predicted cash flows (timing and scale)

- subject cash flows to simulation
- prepare alternative estimates of the project's net present value.

Project analysis determines the financial profitability of an investment opportunity and tests it under different scenarios. Thus, this activity is really crucial and difficult. Complexity is given by the indispensable application of forecasting techniques, evaluation techniques, risk analysis and even mathematical programming techniques. Whilst basic concepts, principles and techniques of project evaluation are always the same, their application to particular types of projects requires special knowledge and expertise. For example, M&A opportunities, asset expansion projects, asset replacement projects, property investments and international investments have their own special features. Hardly a single manager, CFO or entrepreneur has the knowledge and complete familiarity with all the techniques so, many times firms hire external consultants which provide their expertise to a particular investment situation.

The overall objective of the Financial evaluation stage is to estimate the additional value to the firm which is measured in terms of the project's net present value.
This step serves managers to understand whether the strategy undertaken is wrong. If the proposals identified within the strategic framework of the firm produce consistently negative Net Present Values, it could be a signal for directors and executives that the company is in the wrong path. Hence, project analysis plays an important role in the capital budgeting process since it returns a precious feedback to the strategic planning activity.

In order to make a right analysis of projects financial managers must consider only those cashflows deemed as "relevant". The main principle which guides managers to the correct determination of cashflows that have to be included or excluded in the computation is the one of the "incremental cashflows".
It states that the value of a project is given by all those incremental cashflows which are directly or indirectly linked to its acceptance.
Basically, the logic to individuate them is:

Incremental cashflows = Cashflows with the project – Cashflows without the project.

Those cashflows that are independent from the acceptance or the reject of the investment have to be considered as linked to the normal activity of the business and hence have to be excluded in the computation.

The concept is quite straightforward to comprehend but in reality, incremental cashflows are not always easy to spot.

Managers have to comply with other three rules in order to consider all (and only) the right incremental cashflows:

- Opportunity costs

  Opportunity costs represent the benefits that a company misses out on when choosing one alternative over another. It is "the loss of potential gain from other alternatives when one alternative is chosen."[24] In fact, when a firm can decide among options it has to confront the return of the abandoned option with the return of the chosen one. The extra return of the investment undertaken represents the real incremental cashflow.
- Erosion effect (Side effects)

  The reduction in the sales of a firm's other products, as a result of a new one launched in the market (the investment opportunity under scrutiny), should be treated as an incremental cash flow. These lost sales have to be included because they represent costs (specifically revenue reductions) that the firm must bear if it chooses to produce the new product. If the project would be rejected these costs would not exist, for this reason they must be considered.
- Sunk costs

  These are those costs yet incurred and that cannot be recovered. Sunk costs have to be excluded by financial managers in their computations because the cost will remain the same regardless of the outcome of the decision. Hence, being them not linked to the acceptance of the project they are not considered as incremental cashflows.

[24] Cf. Stevenson A., Lindberg C.A., (2010)

The results of the quantitative analysis heavily influence the investment decisions. Having said investment decisions clearly affect the success or failure of the firm and its future direction, it comes obvious that the correct application of financial techniques is a prerequisite in the Capital Budgeting process. Otherwise, this precious tool in the hand of managers could lead the company to abandon profitable projects in favor of others potentially suicidal. The most widely used and important methods will be presented in chapter 4.

After the quantitative analysis test, a project has to be further evaluated taking into consideration qualitative factors. By qualitative factors it is meant those which are virtually impossible to evaluate accurately in monetary terms but unquestioningly have an impact on the project.
These factors could be linked to:

- society (i.e. the decision to move a plant and fire employees)
- environment (i.e. the decision to exploit an oil field)
- governmental or political attitudes (the chance that the legal framework gets altered or remains unchanged)
- strategical consequences (i.e. decisions that could worsen the perceived reputation of the company)

Even qualitative factors have to be evaluated rigorously in order to avoid that a really good project in financial terms leads the company to a distressful situation because of an underestimated item not directly measurable. However, conversely, qualitative factors are to be taken into consideration also because they may enhance the profitability of a project.

The final estimated Net Present Value of an investment opportunity resulting from the quantitative analysis combined with qualitative factors constitutes the basis of the decision support information. The financial analyst passes this information to directors and executives with appropriate recommendations. Then the management carefully analyses this project evaluation in order to take a decision. Often the

choice whether to assess a proposal as acceptable does not come only from a meticulous judgment of the supportive data but comes even in the lights of relevant prior knowledge, experience, expertise, and "gut feeling". This is not to underestimate the importance of the technical analysis but intends to raise awareness about the fundamental role that executives' experience plays in driving companies to the success.

Since firms have capital constraints, they cannot authorize and successively implement all the proposals claimed "acceptable". Those that pass the evaluation phase must be ranked by strategic importance, return, and risk.
With reference to the risk ranking the company has to assess several risks, some of them general (i.e. market risk, foreign exchange rate risk etc.) and some specifically inherent to a particular project. This activity can be done through sensitivity analysis or building risk maps which rank risk by their impact and probability.

Then investment prioritization has to be done and eventually comes the question of financing.
The demand of funds is compared with the company's internal and external sources of capital supply. Companies may finance Capital expenditures through:

- Equity capital
  - *Shares issuance*
  - *Reserves*
  - *Retained Earnings*
- Debt Capital
  - *Corporate bonds issuance*
  - *Loans*

The crucial factor at this point is the cost of capital.
"Cost of capital is the minimum required rate of earnings or cut-off rate of capital expenditure". E. Solomon[25]

[25] Cf. Solomon E., (1963)

Cost of Capital plays a vital role in the decision-making process of Capital Budgeting. In order to fulfill investors' expectations (maximize the firm's value), the company should invest in those projects which provide a return rate that is higher that their overall cost of capital. Otherwise the company is wasting money since it is investing in projects which returns are not enough to cover the costs incurred to finance them.

Thus, financial managers have to carefully analyze even the way they want to pursue to find funds and do their best to balance rightly debt and equity financing with the aim of minimizing the company's cost of capital.

After solving the question of financing, those projects perceived as the best (those that better suit with financial constraints) are authorized for implementation. Projects could have different scales both in terms of financial relevance and strategic significance, hence, accordingly, they are submitted to the authorization of middle level managers or top executives.

Formal authorization procedures are typically used in large companies, or in case of larger expenditures.

3.1.3 Implementation

Translating an investment opportunity into a material activity is a complex, time-consuming and risky task. Delays in the implementation step can lead to considerable cost overruns.

Once investment proposals have passed through the selection stage and are successfully authorized, then they must be implemented. During this implementation phase several business divisions of the company may be involved. A detailed plan is set up which breaks up the project into individual activities and tasks to be performed. After that, for each of the tasks, one person as well as time frames and a budget are assigned. This is a crucial moment because many individuals have to work aligned, respecting times and budgets. Finally, milestones and deadlines until which certain deliverables have to be performed are set and

communicated. In case of major investments, a project management committee (under the command of a project manager) is created. This is in charge of planning, implementation, and reporting of the entire project.

After that a project is implemented, companies should constantly monitor their progress in order to identify potential operative bottlenecks and deviations from the estimated cash flows, thus allowing for an early intervention.
Managers report periodically to their superiors on project-linked expenditures, as well as on any revenues associated. This communication link between the decision makers and the operating management of the firm allows the company to take corrective actions when these are needed. The activity of monitoring an investment is a prerogative for a successful and efficient management of the capital employed. As an example, tracking expenses and revenues could identify that more marketing campaign should be made to better focus on the target market or that more training to the employees is needed when the handling of complex machineries is required.

3.1.4 Monitoring and Control

Post-implementation audits allow companies to see how precisely the cashflows actually produced correspond with the cashflows forecasted several years earlier.

Post-implementation audit is not always linked to the current decisional process of the project; it could refer to the “post-mortem” of the performance of already implemented projects. In this case, this step, even if it cannot contribute to improve the results of the underlying investment, it can be very fruitful for the decision-making process of other proposals.

The post-implementation audit should provide useful feedback and suggestions relating to project appraisal and even strategy formulation. An ex-post assessment of accuracies and or inaccuracies of cash flow forecasting of past projects can indicate the level of confidence that can be attributed to cash flow forecasting of current similar investment proposals.

And also, whenever projects undertaken in the past within the framework of the firm's current strategic plan do not result in being as lucrative as predicted, this information can promptly lead managers to re-consider the current strategic plan.

Instead, if the post-implementation audit phase is done when the project is still on duty, this step is useful to understand which corrective actions are needed.

However, this activity is really time consuming, hence thorough post-completion audits are not usually performed on each investment. Rather, they are performed on some selected projects, usually the largest projects in a given year's budget of the firm or the business division.

3.2 Conclusions

Through the Capital Budgeting Process, a firm is able to pursue its long-term strategy, communicate internally in an effective and efficient way, create a set of decision rules that can categorize which projects are acceptable and which projects are to be rejected and then make sure things go as planned. These points represent the four main steps of the investment appraisal path:

1. Identification & Filtering of Investment Opportunities
2. Evaluation and Selection
3. Implementation
4. Monitoring & Control

Each phase has its objective and often different people are called to take part on them due to the different areas of the business interested (Directors, Financial Managers and Operations Managers above all).

The result of a well-done Capital Budgeting activity is a more efficiently run business.

CHAPTER 4
FINANCIAL TECHNIQUES, RISK AND OVERCONFIDENCE

4.1 Financial Techniques of Evaluation

Capital Budgeting techniques are employed to evaluate the feasibility of long-term investments. One of the crucial duties of a financial manager inside any company, being it big or small, is to evaluate projects under an economic point of view. To do so he or she can deploy many different financial techniques of evaluation, some of them similar and some completely different. The important thing is to know their features, strengths and weaknesses since not all of them are interchangeable and valid in all situations.

This chapter will start by focusing on various techniques available when evaluating capital budgeting projects by distinguishing in non-discounting and discounting methods. Some of the most widely known and used investment evaluation criteria are presented and discussed considering also their merits and their criticalities. Then some considerations about risk and behavioral implication are reported, in order not to forget their relevance in any capital budgeting decision.

4.1.1 Non-Discounting (or Traditional) Methods

Among the most widely known Non-Discounting Cash Flow Criteria we have:

- *Pay Back Period (PBP)*

  The Pay Back Period represents the number of years required to recover the original cash outlay invested in a project.
- *Accounting Rate of Return (ARR)*

Accounting Rate of Return (ARR) is the average net income an asset is expected to generate divided by its average capital cost, expressed as an annual percentage.

Pay Back Period (PBP)

The Pay Back Period (PBP) is the most traditional method of capital budgeting. It is the simplest and perhaps, the most widely used quantitative method in capital expenditures decisions.

PBP shows the time that is required to earn back the amount invested in an asset from its net cash flows.

The formula for the payback method is very simple:

PBP = Initial investment / Annual net cashflow

The simplicity of this formula has its side effects, it is valid only if annual cashflows are equal (or reasonably consistent) each year. With uneven cashflows it should be adjusted (e.g. considering cumulative cashflows).

Anyway, as a basic example, if a company invests 400.000 € in a new machinery which will produce a positive cashflow of 50.000 € per year, then the payback period is 8.0 years (400.000 € initial investment / 50.000 € annual net cashflow).

The PBP is expressed in years and fractions of years (e.g. with an initial outlay of 380.000 € in the previous example the PBP would have been 7,6 that is 7 years and 7 months approximately).

Decision Rule:

Generally, when the PBP method is adopted to select investments the decisional rule applied is:

- If the PBP is less than the maximum acceptable pay-back period, accept the project.

- If the PBP is greater than the maximum acceptable pay-back period, reject the project.

Thus, the actual PBP is compared with a standard PBP set up by the management that expresses the maximum period during which the initial investment must be recovered. This standard PBP is determined subjectively by the managers on the basis of a number of factors that include for example the type of project and the perceived risk of the project.

PBP can be useful even when ranking mutually exclusive projects. The proposals may be ranked according to the length of PBP and the project with the shortest PBP will be selected.

Merits and Criticalities

The PBP has the following merits:

- PBP method is simple both in its concept and in its calculation;
- It offers a quick solution. Given its few computation inputs it allows managers to calculate rapidly the payback period of the projects.
- The PBP gives indirectly shortcuts on liquidity. It emphasizes the selection of a project with an early recovery of the investment. This is extremely important for small businesses with limited resources (and in general whenever firms have capital rationing constraints) since these businesses need to quickly recover their capitals in order to reinvest them in other opportunities.
- The PBP is very useful in those industries which face an uncertain environment or witness rapid technological changes. This makes it difficult to predict the cash inflows in the long-term. Thus, focusing on proposals with short PBP helps in reducing the chances of a loss through obsolescence.

The PBP has the following criticalities:

- It ignores the time value of money, a fundamental concept of financial mathematics. The concept of the time value of money states that the money received sooner is worth more than the one received later because of its potential to earn an additional return if reinvested. The PBP completely forget this assumption, thus distorting the true value of the cashflows. However, this criticality can be overtaken by discounting cashflows and thus using a different method called "Discounted Pay Back Period".
- The PBP method considers the cashflows produced only until the time the initial investment is recovered. It forgets to consider those cashflows that come in subsequent years.

  This limited view of the cashflows could force managers to eliminate a project that generate lucrative cashflows in its later years.
- PBP method does not measure profitability. It is just a measure of capital recovery and thus it should not be used as the only method of accepting or rejecting a project.
- The set-up of a standard PBP is highly subjective and errors in its computation could lead to wrong decisions.

Accounting Rate of Return (ARR)

The ARR is another non-discounting method used by managers. It is the ratio of the average after tax profit divided by the average investment.
The formula for the ARR is

ARR (%) = average annual profit after tax / average investment

The average profits after tax is the sum of the Profit After Tax for each year and divided by the number of years.
The average investment is calculated by dividing the net investment by two. Thus, the above formula can be expressed more punctually as follows:

$$ARR = \frac{\left[\sum_{t=1}^{n} EBIT_t (1-T)\right] \div n}{(I_0 + I_n) \div 2}$$

Where:

EBIT	is earnings before interest and taxes
T	is the tax rate applied
I_0	is the book value of investment in the beginning
I_n	is the book value of investment at the end of n years.

One basic example of the ARR method:

A company can invest in a machinery which costs 500.000 € and will produce net annual profits (after tax and depreciation) of 40.000 € for the first 2 years and 30.000 € for the next 3 years. The book value at the end of its useful life is expected to be 50.000 €.

The ARR % is:

$$\frac{((40.000 \text{ x } 2) + (30.000 \text{ x } 3))/5}{(500.000 + 50.000)/2}$$

34.000 / 550.000 → 12,36 %

Decision Rule:

Generally, when the ARR method is adopted to select investments the decisional rule applied is:

- If the ARR is higher than the minimum rate established by the management, accept the project.
- If the ARR is less than the minimum rate established by the management, reject the project.

Usually the minimum rate established by the management is the current return on assets of the company.

The method can also be used to rank proposals from the one with highest ARR to the one with lowest ARR.

Merits and Criticalities

The ARR has the following merits:

- As the PBP method it is simple to use
- It is based on accounting information which is readily available
- It takes into consideration all the economic benefits (net profits) generated by the project over its entire life.

The ARR has the following criticalities:

- As the PBP method it does not take into consideration time value of money. And though it takes into account all net income generated, profits are averaged thus making impossible to discount the values.
- It is based on accounting profit and not on cashflows, thus it does not give any insight about liquidity
- It is compared with the one rate arbitrarily decided by management that is generally based on the firm's current return on assets.

  Due to this criterion of evaluation sometimes firms facing period of abnormal growth could reject profitable projects if the ARR is less than the firm's current earnings.
- It can be calculated in different ways. For example, some managers use the formula:

  ARR % = average annual profit after tax / initial investment

  Thus, there could be problems of consistency.

Conclusions on PBP and ARR

Despite its disadvantages the payback method is used widely by the businesses. It is a quicker technique for its simplicity and its powerful message, namely the time required to recover the investment. One of the main limitations is that the method works well when the project has reasonably consistent (equal) cashflows over all the years, that is a hardly frequent case.

PBP method is also a useful tool for small businesses which have high consideration for liquidity concerns even before profitability.
However, due to its limitation in giving a complete analysis, businesses should use the payback method as a preliminary screening tool to scrap the projects that do not meet their payback criteria and then complete the analysis with other more "financially sound" techniques.

The ARR should be used as performance evaluation measure and control devise. It is not recommended as a decision-making criterion for capital expenditures of the firm as it is not using cashflow information.

4.1.2 Discounting (or Modern) Methods

Among the most widely known Discounting Cash Flow Criteria there are:

- *Net Present Value (NPV)*
  The NPV is the difference between the present value of future cash inflows and the present value of the initial outlay, discounted at the firm's cost of capital.
- *Internal Rate of Return (IRR)*
  The internal rate of return (IRR) is the discount rate that equates the NPV of an investment opportunity with 0.
- *Profitability Index*
  The Profitability Index (PI) is the ratio between the total present value of cashflows and the initial capital outlay.

Net Present Value (NPV)

The NPV of a project represents the change in a company's net worth that would result from the acceptance of a project. It is equal to the present value of the project's net cash inflows minus the initial investment outlay.
Due to its peculiarities it is one of the most reliable and complete techniques used in capital budgeting.

NPV method requires the following three inputs:

- The estimation of net after-tax cash flows for each period of the project;
- The initial outlay;
- An appropriate discount rate (i.e. the hurdle rate)

The net after-tax cash flows are equal to the total cash inflow during the period, (including the final salvage value - if any - in the last period), less the cash outflows (including taxes) arising from the project.
The initial investment outlay is the total cash outflow needed to initiate the investment/acquire the asset.
Finally, the discount rate or hurdle rate is the minimum required rate of return which businesses use as a benchmark to decide whether to invest in a project or not. In NPV calculations it is the rate used to discount the net cashflows.
This hurdle rate is estimated considering a number of factors, the most important is the cost of capital. The rate is often adjusted up and down based on the perceived riskiness of the project. If the risk linked to the project is higher than the average risk, the hurdle rate will be higher than the cost of capital of the company (being it the Weighted Average Cost of Capital, the Cost of Debt or the Cost of Equity) and if the risk is lower, the hurdle rate will be lower too. Sometimes for simplicity the hurdle rate applied is directly the cost of capital, without any adjustment.

The first step to do in the calculation of NPV is the estimation of net cashflows arising from the investment over its life. Then, the second step is to discount those cashflows at the hurdle rate.

Obviously, the net cashflows may be even (i.e. equal cash flows in different periods) or uneven (i.e. different cash flows in different periods).
In the rare situation of equal cashflows, the NPV can be easily calculated by using the formula for present value of annuities:

$$\text{NPV} = R\ x\ \frac{1-(1+i)^{-n}}{i} - initial\ investment$$

Where:

R	is the net cash inflow expected to be received in each period;
i	is the required rate of return (i.e. the hurdle rate)
n	is the number of periods during which the project is expected to operate and generate cash inflows.

Instead, if they are not equal in the periods, we need to calculate the present value of each individual net cash inflow separately and thus the equation is expressed as follows:

$$\text{NPV} = \frac{R_1}{(1+i)^1} + \frac{R_2}{(1+i)^2} + \ldots\ldots - initial\ investment$$

Where:

i	is the required rate of return (i.e. the hurdle rate)
R_1	is the net cash inflow during the first period
R_2	is the net cash inflow during the second period …… and so on.

A basic example with uneven cashflows is:

An initial investment of 50.000 € expected to generate net cashflows of 16.000; 14.000 and 12.000 € at the end of first, second and third year respectively.

At the end of the third year, the machinery will be sold for 25.000 €. The discount rate applied is 9%.

PV factors are:

Year 1 = $1 \div (1 + 9\%)_1 \approx 0{,}9174$

Year 2 = $1 \div (1 + 9\%)_2 \approx 0{,}8417$

Year 3 = $1 \div (1 + 9\%)_3 \approx 0.7722$

Year	1	2	3
Net Cash flows	16.000	14.000	12.000
Salvage Value			25.000
Total Cash flows	16.000	14.000	37.000
x PV Factor @9%	*0,9174*	*0,8417*	*0,7722*
PV of Cash flows	14.678	11.784	28.571
Total PV of Cash flows	**55.034**		
- Initial investment	50.000		
Net Present Value	**5.034**		

TABLE 1: NPV calculation – Author's elaboration

Decision Rule

The NPV method can be used as an accept-reject criterion. Generally, the decision rule is:

- If the NPV is greater than 0, accept the project.
- If the NPV is less than 0, reject the project.

This method can be useful also to select between mutually exclusive projects equal in size. The project with the highest positive NPV would be ranked first and that project would be selected.

Merits and Criticalities

The NPV has the following merits:

- It takes into consideration the time value of money.
- It considers all the net cash flows generated by the investment through its useful life.
- It is possible to alter the discount rate. This is important especially when analyzing long term investment because the longer the time span the higher (usually) is the hurdle rate, given the more uncertainty of cashflows.
- The NPV method benefits of the value additive property. If one project has an NPV of €20.000 and another project has an NPV of €80.000 (and projects are independent), the projects have a combined NPV of €100.000. It is the only techniques to have such a property.

- Since it benefits from the additivity property, the NPV is consistent with the objective of maximizing the net wealth of the company that is the ultimate goal of shareholders/owners.

The NPV has the following criticalities:

- This method is highly dependent on the calculation of the required rate of return to discount the cash flows. Different discount rates will give different present values and thus, the relative desirability of the proposals will change with a change in the discount rate.
  In addition, the greater the volatility of the NPV in relation to the volatility of the discount rate, the larger will be the risk associated. For this reason, Sensitivity Analysis should be run to estimate the impact of this variable on the final value of the investment.
- NPV provides an absolute measure, it leads the accept/reject decision only on the basis of its higher value irrespective of the initial amount paid.
- It is focused on time 0, the time at which there is the initial outlay of cash. When managers compare different projects with different starting times, if they compute both the NPVs at the same T_0 there could be problem of consistency.
- In presence of limited capitals, it cannot be used to rank projects. In fact, it could happen that by investing in the one with the highest NPV the firm has not sufficient funds to invest in others, that taken alone have lower NPVs but together are financially feasible (the company has the money to invest in these) and have a superior NPV. For this reason, with limited funds, the ranking should better be done by the ratio between the PV of the project and its initial cash outflow (limitations exist even in this case, see further about PI criticalities).

Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is a rate that makes the net present value of a project equal to zero. Differently from the Net Present Value method where the

discount rate is known, in the case of Internal Rate of Return method, the value of NPV is zero and the discount rate that satisfies this condition has to be found. Mathematically, IRR is determined by solving the following equation for *r*:

$$IRR: \quad \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - C_0 = 0$$

Where:

r	is the internal rate of return to calculate
C_t	is the Cashflow at period t
C_0	is the Initial outlay

This equation involves that if the cashflows are not equals (uneven cashflows) the correct IRR has to be found by a trial and error process.
In case of equal cashflows the calculation process is easier, for example:
An investment requires an initial outlay of 70.000 € and it is expected to generate 25.000 € per year over 4 years of useful life.

The exact IRR - 15,967% - can be found more easily through the Excel function *TIR.COST*. Anyway, the adoption of the "Present Value of Interest Factor for an ordinary annuity – PVIF" Table provides a good approximation (16%).

Decision Rule

When the IRR method is used to make accept/reject decisions, the decision criteria are:

- If the IRR is greater than the cost of capital, accept the project (r > k)
- If the IRR is less than the cost of capital, reject the project (r < k)

Merits and Criticalities

The IRR has the following merits:

- As the NPV it considers the time value of money and it takes into account the total cashflows generated by the project over its useful life.
- The definition of the hurdle rate is not required to compute the IRR.
- The hurdle rate required to make the comparison and to decide whether to accept or not the proposal can be estimated roughly.
- The IRR once computed is easy to interpret and to visualize by managers

The IRR has the following criticalities:

- It does not consider the scale of the cashflows. By ranking project by their IRR, an investment with NPV of 20.000 € and IRR of 15% is preferred over an investment with NPV of 100.000 € and IRR 10%.
- Ranking projects by their IRR in case of mutually exclusive proposal could be misleading for manager. This is connected to the previous point regarding the non-consideration of the scale of cashflows.
- When a project has some negative cash flow between other positive cash flows, the equation of the IRR method is satisfied with more than one rate of return, i.e., it reaches the trap of Multiple IRR. This creates confusion.
- Considering the wealth maximization objective, IRR is only able to decide whether a project is worth accepting or not, but what increase in wealth will occur cannot be measured by IRR.

Profitability Index (PI)

The Profitability Index is an investment appraisal technique that divides the present value of future cashflows of a project by the initial investment required.

It is actually a modification of the NPV method and differently from this last which gives an absolute measure (the total value created by the project expressed in a currency) it gives a relative measure (the ratio indicates how much cash is generated by the project for each unit of currency invested).

The PI's formula is the following:

$$PI = \frac{PV\ of\ future\ cashflows}{Initial\ investment}$$

or mathematically

$$PI = \frac{PV\ (C_t)}{C_0}$$

One basic example is:

The investment required to implement a new production line is 60.000 €. The investment is expected to generate 25.000, 23.000, 18.000 and 15.000 € in the first, second, third and fourth year respectively. Assuming a useful life of 4 years and no salvage value the PI is computed as follows:

Year	**1**	**2**	**3**	**4**
Cashflows	25.000	23.000	18.000	15.000
x PV Factor @7%	*0,9346*	*0,8734*	*0,8163*	*0,7629*
PV of Cashflows	23.365	20.088	14.693	11.444
Total PV of Cash flows	**69.590**			
Initial Investment	60.000			
Profitability Index	**1,1598**			

TABLE 2: PI calculation – Author's elaboration

A PI of 1,16 means that every 1€ invested in this project has created 1,16€ of cash.

Decision Rule

When the PI method is used to make accept/reject decisions, the decision criteria are:

- Accept the project when PI > 1
- Reject the project when PI < 1
- In case of PI = 1 the firm, financially speaking, is indifferent to the project

When PI is greater than, equal to or less than 1, NPV is in turn greater than, equal to or less than 0 respectively.

The selection of the investment proposals with the PI method can also be done on the basis of their ranking. The highest rank is given to the project with the highest PI.

Merits and Criticalities

The PI has the following merits:

- It considers the time value of money as well as all the cash flows generated by the project being similar to the NPV method
- It is useful especially when capital rationing constraints exist. In particular, in case of equal NPV among proposals it helps to determine which one generates more cash per unit of currency invested, this thanks to its peculiarity of being a relative measure rather than an absolute measure.
- It is consistent with the shareholders' view of maximizing the wealth of the company.

The PI has the following criticalities:

- As the NPV method its efficacy relies on the correct estimation of the hurdle rate. A wrong discounting rate would mine the final decision to undertake or to avoid the investment.
- Being a relative measure is an advantage for the PI method in case of equal NPV, but whenever projects are mutually exclusive and different in the scale of their cashflows, it could lead to the wrong decision (as it could happen applying the IRR method).
- As the NPV it is focused on time 0. Being a ratio do not solve the problem of consistency when projects with different starting times are evaluated at a common point.
- The PI method in case of limited capital is useful to understand how much cash is generated from each unit of currency invested, and thus to rank project. However, it is not able to guarantee the maximization of the NPV. By relying on it, managers cannot determine the right mix of investments capable of saturating all the budget at disposal.

Conclusions on NPV, IRR and PI

The NPV, the IRR and the PI are three evaluation techniques which take into account the important principle of corporate finance: the time value of money. The

first is an absolute measure, the others are relative measures. All of them are consistent with the final goal of shareholders and owners that is the maximization of the firm's value. However only the NPV and PI methods identify the amount of cash generated by the investment, the IRR is only able to communicate whether a project is worthwhile or not.

The IRR is the most complicated to calculate and in case of unconventional cash flows (i.e. there are net cash outflows other than the initial investment outlay) we may get multiple results thus leading to confusion. However, the IRR does not involve the exact computation of the hurdle rate (which is required by the other two methods) but it is sufficient a rough estimation for the comparison with the internal rate of return found. Once computed the IRR is much more immediate to interpret and this is an explanation of its wide use among managers.

The PI is the direct alternative to the NPV method and it is useful when proposals have the same NPV but the initial outlay is different, however as the IRR it peculiarity of being a relative measure is meaningless when it comes to compare projects with Present Values of cashflows different in size.

All this said, the financial literature is concordant in defining the NPV method as the most valid and complete technique. This does not mean that the others are to be avoided but, on the contrary, through the comprehension of their merits and criticalities, managers could combine these methods and take more accurate decisions.

4.1.3 Cost of Capital

In the previous paragraphs the Cost of Capital has been mentioned quite often. In fact, it represents the discounting rate (or hurdle rate) that has to be applied when computing the NPV and the PI method and the one to compare the IRR with.

The purpose here is not to explain in detail how it should be computed but to describe briefly its different interpretations.

The Cost of Capital is a financial concept that can be measured considering two possible sources of capital: debt and equity. Depending on this the financial literature distinguishes Cost of Capital in Cost of Debt and Cost of Equity.

- *Cost of Debt*

  When projects are funded through the collection of money from external parties (banks and in general all lending institutions) the Cost of Capital to take into account should be the Cost of Debt. This is expressed as the amount of interest paid (interests linked to the indebtment for the investment operation) divided by the total subscribed debt. Interests in fact represent the cost that companies have to bear when collecting money from external parties.

  When a firm has the intention of funding a project through debt, it should use the Cost of Debt as hurdle rate in the application of NPV, IRR and PI methods.

- *Cost of Equity*

  In case of investments funded by capital coming from the shareholders/owners of the firm the Cost of Capital to consider is the Cost of Equity.

  The Cost of Equity is defined as the rate of return required by shareholders and it is based on the level of risk associated with the investment. The idea behind the concept is straightforward: owners want to be paid for the risk they bear by investing directly their money.

  The calculation anyway is not immediate and requires managers to understand its features. The formula derived from the Capital Asset Pricing Model theory indeed is the following:

$$\mathbf{E(R_i) = R_f + \beta_i * [E(R_m) - R_f]}$$

  Where:

  $E(R_i)$ = Expected return on asset i

  It is the rate of return required by owners to bear the risk of investing capital in a project.

  B_f = Beta of asset i

  The beta (β) of an investment is a measure of the volatility of its returns relative to the entire market, thus it is used as a measure of risk. The greater

its value the riskier the project is (and hence the higher will be the expected return of the investment). It can be computed through statistical regressions or it can be estimated by looking at similar companies when available.
The β coefficient is interpreted as follows:

- β =1 exactly as volatile as the market
- β >1 more volatile than the market
- β <1>0 less volatile than the market
- β =0 uncorrelated to the market
- β <0 negatively correlated to the market

Rf = Risk-free rate of return
It is the return expected from a risk-free investment (usually return rates of Treasury Bonds are taken as approximation of risk-free investments).

$E(R_m)$ = Expected market return
The Expected Market Return, in general expressed as an average rate of return of the industry/sector of a firm, is fundamental to calculate the Market Risk Premium $[E(R_m) - R_f]$. Since owners expect to be properly compensated for the amount of risk they undertake the risk premium represents the additional returns required above the rate of return on a risk-free investment. Its effect on the Cost of Equity calculation depends on the value of β, the volatility of returns.

For the peculiarities of this formula, the Cost of Equity is a reliable representation of the Cost of Capital when investments are funded directly and solely by the shareholders/owners. However, it is not immediate to understand and to compute as the Cost of Debt. Managers must be aware that incorrect estimation of β or Risk Premium could lead to misleading discounting rates.
Particularly, with regards to β, the correct value to consider when projects are financed entirely through equity is represented by the Unlevered Beta.

Also known as Asset Beta, it removes the impact of debt and allows to measure riskiness of projects without considering effects of the financial leverage. The formula is:

$$Unlevered\ Beta = \frac{Equity\ Beta}{1 + (1 - t)\ (\frac{D}{E})}$$

- *Weighted Average Cost of Capital*

  Finally, when projects are funded through both sources of capital it should be better to consider the Weighted Average Cost of Capital (WACC). The use of WACC is anyway suggested when evaluating investment opportunities because it takes into consideration the overall financial structure of the company.

  The WACC is computed with after-tax Cost of Debt, the Cost of Equity and the relative weights of Debt and Equity as inputs.

  The formula is the following:

$$WACC = K_d * (1 - t) * \frac{D}{E + D} + K_e * \frac{E}{E + D}$$

Conclusion on Financial Techniques

The effectiveness of NPV and other financial techniques of evaluation is heavily linked to the correct computation of the discounting rate applied. This hurdle rate is the expression of the Cost of Capital, which in turn can be interpreted as Cost of Equity or Cost of Debt. When both are considered the rate is given by the WACC formula. All these different interpretations of the Cost of Capital are recommended in different situations (with the WACC being the most suggested given its capacity to consider the overall financial structure of the company), it is up to financial managers which one to consider being aware of possible drawbacks in case of errors.

4.2 Considering Risk in Investment Appraisal

Risk in financial terms is referred to the degree of uncertainty and/or potential financial loss that is linked to an investment decision.

Uncertainties exist when the outcome of an event is not known. Dealing with assets whose cash flows are expected to extend in the long-term is not an easy job for financial managers. The evaluation of risk therefore depends, on the decision maker's ability to identify and understand the nature of uncertainty surrounding the key variables.

In this paragraph, three kinds of risk are presented and then two possible methods that are adopted by managers to cope with it are briefly described - the Scenario Analysis and the Sensitivity Analysis.

In addition to the uncertainty arising around projects' expectations, the difficulty to forecast exactly cashflows may be the result of behavioral biases. Managers are humans and thus inclined to errors.

Obviously, these topics have a very high relevance for companies, especially for big companies, and they would deserve many pages to be analyzed in detail. However, the objective here is just to remind that even for medium size firms uncertainty regarding cashflows is a concern and that managers have to pay attention in the investment process.

4.2.1 Kinds of Risk

Uncertainty as it happens for big companies plays a role even for mid-size firms.

It should be noted that risk, depending on its kind, can be identified as follows

- Business Risk – it is linked to the uncertainty given by the simple fact of being active in a given industry. For example, for a company that produces video cameras, the expansion on the market of smartphones with HD cameras is something to consider when evaluating opportunities.
- Operational Risk – it is connected to the risk arising from failures or misbehaviors in the operating process – clearly a company purchasing a new machinery has to take into consideration possible fallacies in the production process that may have an impact on cash inflows' size/timing.
- Financial Risk – in this category fall all those uncertainties related to the money management. Classic examples are inflation risk or exchange rate risk. Managers must be aware that this kind of risk exists not only for bigger

firms, but even for smaller ones. Medium size companies, which make considerable investments as well, should consider that changes in the inflation rates or in the exchange rates impact their cash flows and their cost of capital.

4.2.2 Scenario Analysis and Sensitivity Analysis

Scenario Analysis and Sensitivity Analysis are techniques used to consider risk.
With the first, to calculate the estimated value of cashflows deriving from a specific investment, managers make projections of these cashflows by considering the investment performance under different scenarios. Usually the project is measured in three scenarios: the best case, the expected case and the worst case; and a probability is also assigned. This enable the company to get a range of possible outcomes and hence to have an idea of the riskiness of a project.
Even if it seems quite basic and easy as technique, depending on the complexity of the investment, scenario analysis may be a demanding exercise. It is difficult to foresee what the scenarios are and to assign them probabilities. The results can be estimated mathematically or statistically.
In general, one should be careful when assigning probabilities to different scenarios since there could be a tendency to consider only the scenario with the highest probability.
Sensitivity Analysis is a financial technique used to determine how changes in a variable (known as input or independent variable) affects the changes in another one (the target variable). Firms can in this way calculate cashflows generated by their investment proposals by identifying “critical” variables and observing how they impact the final result. It is called “Sensitivity analysis” because this method attempts to provide a measure of the sensitivity of some target parameters to the variables of greatest interest in the model.
Since it allows to predict the outcome of an investment given the behaviour of a variable it is a very powerful technique, however as the scenario analysis it is not easy to compute.

4.3 Overconfidence Bias

Financial techniques as the NPV method or Scenario analysis are important tools for managers. By using them accordingly to the type of investment and with the awareness of their merits and criticalities, financial managers are able to take better decisions, namely those which increase the wealth of the firm's shareholders.

However, NPV, IRR, PB and all the other techniques are just instruments in the hands of a human. They heavily rely on inputs that sometimes must be estimated by financial managers. The main examples regard the discounting factor (sometimes they have to be adjusted: what is the degree of subjectivity and its impact on the results?) and the assignment of probabilities to possible scenarios (how can managers say that a scenario is more probable than another one?).

In general, in every decisional process there is a part of subjectivity and thus the forecast of cashflows is also the result of sentiments and feelings.

Obviously when everything works there is apparently no need to ask if credits for the success of the investment has to be given more to this "right feelings" rather than to well done analysis or even to the fate or coincidences. Instead if the project turns out to be a failure, good management practices tell us that a deeper analysis post investment has to be implemented in order to understand the causes.

One of the most common biases is Overconfidence. The overconfidence effect is a bias in which a person's subjective confidence in his or her judgements is reliably greater than the objective accuracy their knowledge and information.[26] [27]

Studies [28] [29] [30] [31]show that not only managers are affected by overconfidence in their judgments but in general professionals from many fields (e.g. investment bankers engineers, lawyers).

There are several factors that can explain why managers may be expected to be overconfident, especially in a capital budgeting context. Among them we have:

- *Capital budgeting decisions are generally complex*

[26] Cf. Fischoff B., Slovic P., Lichtenstein S., (1977)

[27] Cf. Alpert M., Raiffa H., (1982)

[28] Cf. D. Kahneman, P. Slovic And A. Tversky (1982)

[29] Cf. Russo, J., Schoemaker, Paul. (1992)

[30] Cf. Kidd, J.B., (1970)

[31] Cf. Wagenaar W.A. And Keren G.B., (1986)

They often require projecting cash flows for a wide range of uncertain outcomes. People tend to be more overconfident when approaching difficult tasks. Barber and Odean[32] affirm that overconfidence is greater when making forecasts where the outcome has a low predictability, and during decisional processes that lack of a prompt and clear feedback.

- *Capital budgeting decisions are not well suited for learning*

  Kahneman and Lovallo[33] (1993) report that the learning process occurs "when closely similar problems are frequently encountered, especially if the outcomes of decisions are quickly known and provide unequivocal feedback."

  In most firms, managers have to take major investment decisions once in a while and thus they experience long delays before learning the outcomes of projects.

  Learning from such investment experiences is not an easy job.[34]

- *Unsuccessful managers are less likely to retain their jobs and be promoted*

  Successful managers may become overconfident because of a self-attribution bias, they tend to overestimate the degree to which they are responsible for their own success[35]

- *Self-image may evoke overconfidence*

  According to Blanton et al[36] every individual has a desire to be seen knowledgeable and trustable. Fiske and Taylor[37] note that confident behavior is often perceived as an indicator of competence. Therefore, individuals might want to cast themselves in a better light, but this could lead to underassessment of risks and overconfidence.

Given the above-mentioned factors it is clear that even managers of medium sized companies are not immune from the overconfidence bias. In any financial analysis

[32] Cf. Barber B.M., Odean T., (2001)
[33] Cf. Kahneman D., Lovallo D., (1993)
[34] Cf. Einhorn H. J., Hogarth R. M., (1978)
[35] Cf. Miller D. T., Ross, M., (1975)
[36] Cf. Blanton H., Pelham B., Dehart T., Carvallo M., (2001)
[37] Cf. Fiske S.T., Taylor S.E., (1991)

concerning investment appraisal they should be aware of this psychological threat which may have a very negative impact on the final result.

4.4 Conclusions

Financial managers in their evaluations can rely on several techniques, each one with its proper advantages and criticalities. The NPV method is the one deemed as the most financially correct due to its peculiarities but it is not fool-proof and thus sometimes other techniques have to be applied as an alternative or as complementary tools to better spot the best investment opportunity.

Anyway, the knowledge of these methods and their right application rules do not exclude managers to commit avoidable mistakes. They have to include in their analysis the Risk variable. This can be done through Scenario Analysis, Sensitivity Analysis or other techniques. What is important is that manager find the best suitable way for them to consider it when evaluating projects because in a world characterized by uncertainty – the investment area – risk is a variable that, if not considered properly, can lead companies (independently by their size) to default.

The last thing financial managers have to take into account is represented by all those behavioral biases that influence their choices. In this chapter overconfidence bias has been given as example. Whenever managers rely heavily on experience and forget financial rules and prescriptions, they are entering into a danger zone. Even if experience and right gut feelings are sometimes the traits that identify the best financial managers it has to be remembered that there are not immune to overconfidence and this can lead firms to bad and potentially disastrous investments.

CHAPTER 5
CAPITAL BUDGETING PROCESS OF ITALIAN MEDIUM SIZE FIRMS

5.1 Literature Review and Research Questions

5.1.1 Literature Review

Several are the researches in finance and accounting that have examined the investment area. Unfortunately, in spite of the importance of medium size firms, most of the literature is related to capital budgeting practices of large firms.

In general, studies[38] [39] have shown that discounted cash flow techniques, such as Net Present Value and Internal Rate of Return, have become the dominant method of evaluating and ranking investment opportunities. Following the theory that managers undergo capital budgeting decisions basing on the assumption that the primary goal of the business is to maximize the shareholders' wealth, companies will invest in projects that yield a positive NPV. Some important researches support this point of view.

As explained previously there are many methods and techniques that managers can apply when facing capital budgeting process.[40] However, in some instances, theory seems to be ignored by managers[41] and in practice there is often divergence from business to business.

Researches on large companies in the past showed that among the discounting techniques the IRR method was the most popular technique. Gitman and Forrester's research[42], based on a survey of 268 US firms, along with a similar survey of Scott

[38] Cf. Kester G., Chang R.P., Echanis, E., Haikal S., Isa M., Skully M., Tsui K., Wang C.J., (1999)
[39] Cf. Bennouna K., Meredith G.G., Marchant T., (2010)
[40] Cf. Ross, S.A., (1995)
[41] Cf. Mcdonald, R.L., (1998)
[42] Cf. Gitman L.J, Forrester J.R., (1977)

and Petty[43], claim that companies prefer the IRR method over the NPV method and rely on the Pay Back Period method as supplementary tool. With regard to the discount rate used, they found out that primarily firms apply a management-determined target rate of return and then comes the rate computed through the weighted average cost of capital approach. This is in some way in contrast with what academics affirm. The science of Corporate Finance claims the NPV technique, over the IRR method, as the most correct method to use[44] and recognizes that management-determined target rates as hurdle rates are hardly precise due to behavioral biases. Finance literature has sought to give an answer to the gap between what is theoretically right and what is actually preferred in practice. Most of the explanations are connected with managers' preferences and limitations. The strong preference for IRR over NPV method is justified by the fact that the information provided "better fits" with managers' cognitive process (Evans and Forbes[45]. In addition, Burns and Walker[46] and Cohen and Yagil[47] affirm that IRR method is preferred since managers are more comfortable with percent values, which facilitate comparison among projects and with hurdle rates or generally with their daily financial references (such as capital costs, interest rates, risk premiums and inflation rates).

Before reporting some highlights concerning researches on medium size firms, it has to be said that there is not a single accepted standard definition of small/medium business in the literature and that researches on capital budgeting techniques and practices of companies targeted as "small" could correspond to the "medium size" etiquette given by the European Union. The EU classifies firms into this category primarily on the basis of number of employees, which has to be between 50 and 249. Additional criteria (note that at least one of the two has to be fulfilled) are the amount of sales and the total assets of the company which have to be between 10

[43] Cf. Scott D.F, Petty W., (1984)
[44] Cf. Brijlal P., Quesada L., (2009)
[45] Cf. Evans D.A, Forbes S.M., (1993)
[46] Cf. Burns R., Walker J., (1997)
[47] Cf. Cohen G., Yagil J., (2007)

and 50 million € and between 10 and 43 million € respectively. In the United States, for example, there is not a clear and defined categorization, the federal government does not formally recognize a mid-size category. For this reason, it is quite difficult to find many scientific papers which can be aligned in their perimeter to our research. Among them, the works of Grablowsky and Burns[48], Block[49], Graham and Harvey[50], Danielson and Scott[51] are worth to be mentioned. They sought to focus their analysis of capital budgeting practices of small enterprises, mainly US firms. Hereafter, in this paragraph, when "small" is used as categorization it has to be read as "medium", since small companies of the cited papers correspond to medium size companies in Europe.

Grablowsky and Burns wrote that among the main reasons which explain the small companies' less adoption of modern capital budgeting techniques we have management's lack of understanding of financial techniques associated with the costs of hiring external consultants. Additional reasons reported by the authors, who analyzed a sample of 65 firms, include the lack of knowledge and staff needed to properly analyze investment opportunities. Block, with his survey on 232 small companies, found out that the Payback Period method was the most adopted. However, he noted an increasing trend on the use of discounted cash flows approaches as the NPV. The overall preference of small firms for the Payback Period criterion was then reaffirmed by Graham and Harvey with a survey on 392 CFOs of small and large American and Canadian businesses. They conducted a statistical analysis and affirmed that large firms rely heavily on present value techniques and on the capital asset pricing model, while smaller ones are more likely to use non discounting methods. At the same conclusion arrived Danielson and Scott with their analysis on 792 firms. They stated that investment decision of small and large firms might differ since many small companies do not adopt sophisticated capital budgeting techniques and do not involve discounted cash flow methods. They have a preference for easier techniques as the Pay Back Period

[48] Cf. Grablowsky B. J., Burns, W. L., (1980)
[49] Cf. Block S., (1997)
[50] Cf. Graham J.R., Harvey C.R., (2001)
[51] Cf. Danielson M.G., Scott J.A., (2006)

method or they rely on experience and gut feels. The authors affirmed that among the reasons behind the different behaviour in the investment appraisal process there are lack of financial education, difficulties in quantifying future cash flows, short operating history, lack of discretion in investment decision and credit constraints.

The above-mentioned studies compared small companies with larger ones and sought to find whether exist differences in the capital budgeting process between them. All of them investigated US or Canadian companies. More interesting and closer to the perimeter of this thesis are those researches focused on European companies. Unfortunately, there is quite a lack of studies in this direction. Useful are the works of Rossi[52] [53].

The author surveyed 43 European firms (from France, Italy and Spain). His results show that the PBP method was the most frequently used to evaluate capital budgeting decisions (37.21% of respondents), followed by the NPV method (25.58%), IRR (16.28%), PI (11.63%), and ARR (9.30%).

Rossi affirms that the large use of PBP and IRR (about 54%) shows the widespread short-term vision of European firms. As he claims "the IRR is more of a short-term measure and is used as an approach to assess the rate that would be used to make the present value of a project equal to the amount invested. For this reason, some argue that it is a form of a payback method that uses a rate."

In addition, the PBP method was the most popular among SMEs, while the larger firms used the NPV technique. This confirms the findings of his American colleagues, namely the use of more complicated techniques is correlated to the size of the business (the Chi-squared tests confirmed the association between firm's size and use of the IRR and NPV methods ($p < 0.05$)). In a similar research (2015) Rossi surveyed 71 firms of Southern Italy and the findings were the same, a general preference for the PBP method and a correlation between size and use of IRR and NPV techniques.

[52] Cf. Rossi M., (2014)
[53] Cf. Rossi M., (2015)

The usefulness of Rossi's works, apart from having analyzed the techniques applied by European companies, derives from the investigation of the Capital Budgeting process of these companies (even if in a limited way).
In the analysis of the behavior of the 71 Italian companies the author observed that 53% of the managers deemed the Project Definition phase as the most important step. The Analysis and Selection step and the Implementation step were chosen by 29% and 7% of the respondents respectively while only the residual 3% considered the Review phase important. Note 8% is missing, it is not clear if the author reported his percentual values with a mistake or if there were a fifth option not mentioned. By the way, it is clear the predominance of the first step over the others.
He also observed that there was no difference between companies of different sectors or of different size, in all cases the Project Definition stage is considered the most important step of the capital budgeting process.
With reference to the Cost of Capital, his research shows that 28,2% of the respondents use the Cost of Debt in their computations, 8.4% use the Weighted Average Cost of Capital and the vast majority, 63,4% estimate the Cost of Capital relying on its experience (26.8%) or do not consider it at all (36,6%).

Rossi's researches have been taken as basis of our analysis and findings, when possible, will be compared.

5.1.2 Research Questions

The next paragraphs will investigate the investment behaviour of Italian medium size firms located in north-east Italy.
The objective of the research is twofold.
The first is to understand whether the same conclusions of the past literature are true also for Italian companies and particularly for those analyzed.
The second and principal aim, instead, has the prerogative to deepen the analysis among medium size companies object of the study. The idea to verify is that these firms could have different investment behaviors, that is to say firms may differ in

the way they face the Capital Budgeting Process accordingly to some characteristics.

This research question, at least for what concerns Italian medium size businesses, has not yet been tackled by the financial literature and thus encompasses originality and could address further studies.

5.2 Methodology

Research material for the present study was collected through an online questionnaire. Targeted respondents were Financial Managers of medium size companies located in four Italian regions forming the north-eastern area of the Italian peninsula (Emilia Romagna, Veneto, Trentino Alto Adige, Friuli Venezia Giulia). In order to find these firms, the AIDA database of the Bureau van Dijk portal, a database which contains economic and financial information of every Italian company legally registered in its respective Chamber of Commerce, has been used.

Filters applied to extract companies were:

1. Company status: must be an active company
2. Location: legally based in one of the four regions forming the north-eastern area of Italy - Emilia Romagna, Veneto, Trentino Alto Adige, Friuli Venezia Giulia
3. Employees number: must be between 50 and 249 in all the past three years
4. Sales amount: must be between 10 and 50 million € in all the past three years
5. Legal form: must be a kind of "società di capitali", hence a firm with limited liability

Filters 3 and 4 have been used in order to be aligned with the European Union's definition of mid-size companies. To make the analysis the more homogeneous possible, the additional "in all the past three years" constriction has been applied. This avoid that firms considered "large" or "small" in the year before (because of the non-compliance with the EU requirements) would have been included in the

analysis contaminating the results. In fact, non-medium sized companies could have different behaviors and prefer different investment techniques. The time span, hence, must be enough to eliminate/attenuate the old habits of these companies.
At July 2019, the number of firms targeted as medium size companies and thus objective of this study was 2230.
After having obtained the e-mail address of almost the entire population of companies (2214 firms) an invitation letter to participate to the survey has been sent to the Financial Directors.

The questionnaire was structured to require the least possible completion time by managers of the firms. The average completion time was 5 minutes, exactly the time estimated and communicated in the invitation letter.
The survey was formed by three section plus one brief introduction where respondents were asked to write the name of their Company in order to facilitate the analysis and avoid contacting them again when reminders to participate were sent.

The questionnaire contained 21 questions, all closed-type for easier interpretation and more efficient completion.
The first section was about general information of the company. For example, it asked the legal form of the company, the business sector, the subjectivity of the company to other entities' control or the ownership of plants in foreign countries.
The second section, the heart of the questionnaire, was addressed to understand the Capital Budgeting Process and techniques applied by these firms.
This part investigated how many investments (of considerable size and relevance) companies made on average in the past years, which steps of the process are deemed as the most important, the level of standardization of their investment procedure, techniques applied and other aspects that will be entirely presented in the next paragraph. With the use of contingency table and Chi Squared tests, responses have been analyzed in order to find possible correlations between variables.

The last section was built to gain data about the respondents (financial managers). They were asked to communicate personal information such as age, degrees, years of experience and even opinions about the investment phase.

Out of 348 managers that initiated the questionnaire (15,7% of the population), valid respondents have been 271, that is a response rate of 12,2%.
Valid respondents are those who completed at least the third section. This considerable gap between managers that initiated the survey and managers that arrived at least until the end of the third sections is (probably) mainly due to technical problems. Some of them in fact communicated their impossibility to skip from one section to another in the online procedure. Unfortunately, this kind of technical issue did not manifest itself at the beginning when a subgroup of companies was targeted to test the functionality of the survey.
Anyway, 77,9 % of respondents did not encounter any kind of problem (at least in the first sections) and thus provided useful answers.
In the next paragraph will be considered 271 individual respondents when investigating the Capital Budgeting Process in correlation with variables of the companies. Instead, when personal data of managers become part of the analysis, only 254 individual respondents will be taken into account. This number represents those managers that completed successfully all the 21 questions (73% of total respondents).

5.3 Findings

The following paragraph discusses the main findings of the survey on the Capital Budgeting Process of 271 Italian medium size firms. Obtained data are initially presented through descriptive statistics and then the chapter ends with Chi Squared statistics used to investigate the possible correlation among specific traits of the firms and investment behaviors.

5.3.1 Descriptive Statistics

The first main classification made on the questionnaire considers the legal form of the company. Out of 271 companies, 156 businesses are classified as "Società per Azioni – (Spa)" and 115 as "Società a Responsabilità Limitata – (Srl)". None of the firms has other type of legal form. (Figure 4)

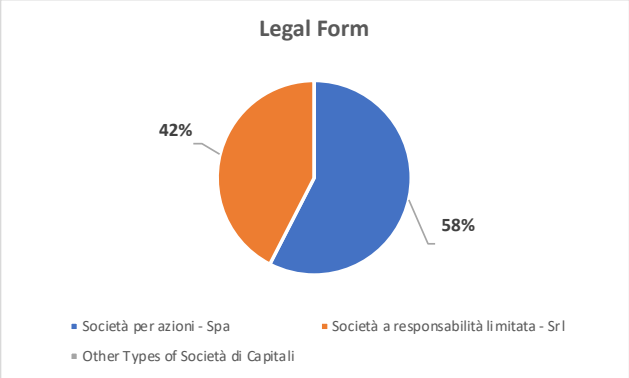


FIGURE 4: Legal Form of Surveyed Firms – Author's elaboration

The second principal classification is based on the business sector of activity.
187 firms represent the manufacturing/building sector; 55 the service sector; and the remaining 29 are involved in the retail sector. (Figure5)

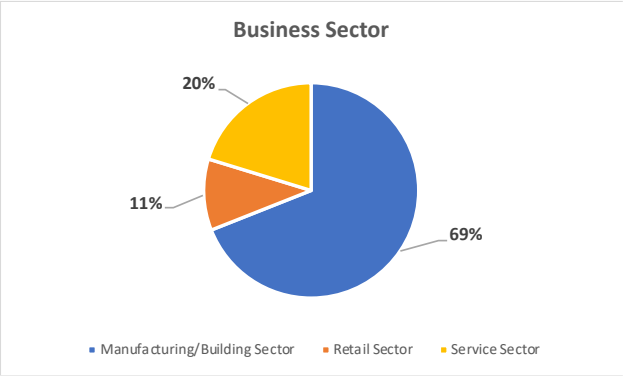


FIGURE 5: Business Sector of Surveyed Firms – Author's elaboration

As specified before, all the targeted companies were medium size businesses. However, to deepen the analysis, it is useful to have a clue about the relative size of these companies among them. For this reason, the third question of the

questionnaire was aimed at classifying responding firms in “large” mid-size companies and “small” mid-size companies”. The question asked to say whether the firm’s average annual sales of the last 3 years was above or below 25 million € (keeping in mind that all targeted companies have an average amount of annual sales that for sure is comprised between 10 and 50 million €, as the AIDA filter confirmed). What results is that 151 companies have had less than 25 million € of average annual sales, and 120 firms have had more than 25 million € of average annual sales. (Figure 6)

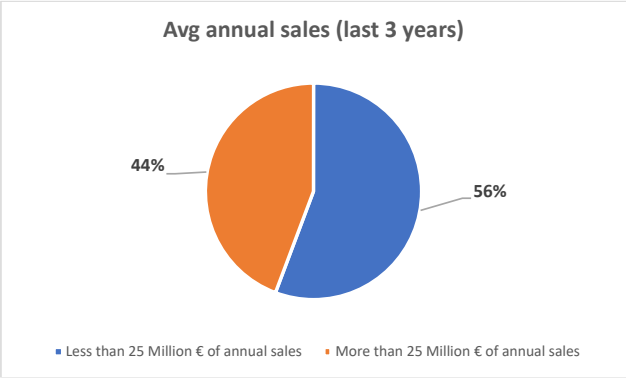


FIGURE 6: Average Annual Sales of Surveyed Firms – Author’s elaboration

These three classifications will be used further to understand if the Capital Budgeting Processes of Italian mid-size companies in the North East differ accordingly to some variables.

At the moment they are useful to better know the traits of the sample.

Considering the respondent firms’ average amount of sales of the last three years it can be noted that Spa are equally split among “large” and “small” medium size companies (51,3% vs 48,7% respectively). Instead, there are more Srl companies with an average annual sales amount lower than 25 million € and thus the percentage of “small” medium size firms is a bit higher with this legal form. (figure 7).

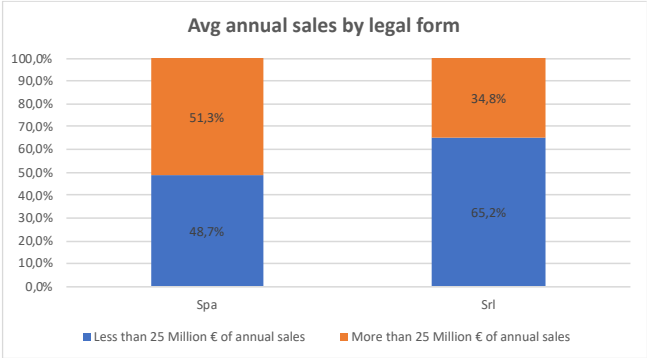


FIGURE 7: Average Annual Sales of Surveyed Firms by Legal Form – Author's elaboration

As shown in figure 8, almost the same proportion of Spa and Srl is active in the three business sectors - Manufacturing/Building, Retail and Services-, with a vast predominance of the first one.

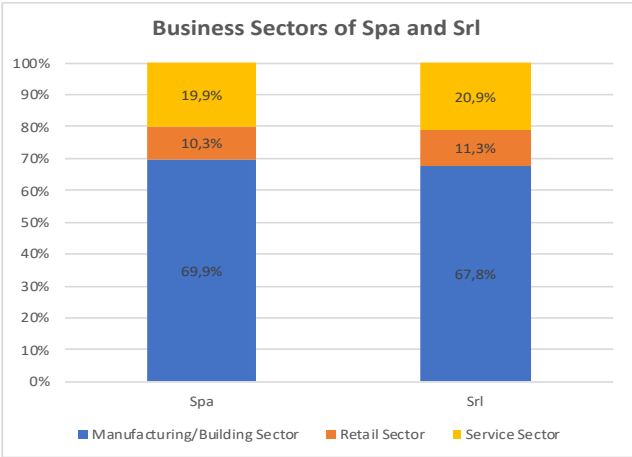


FIGURE 8: Business Sectors of Surveyed Firms by Legal Form – Author's elaboration

Figure 9 shows instead the proportions of large and small medium size firms active in the three businesses sector mentioned. In this case it can be seen that the percentage of medium size companies that made more than 25 million € and active in the Retail Sector is two times bigger than the percentage of firms active in the same sector and with less than this amount of sales (15,7% vs 7,3%).

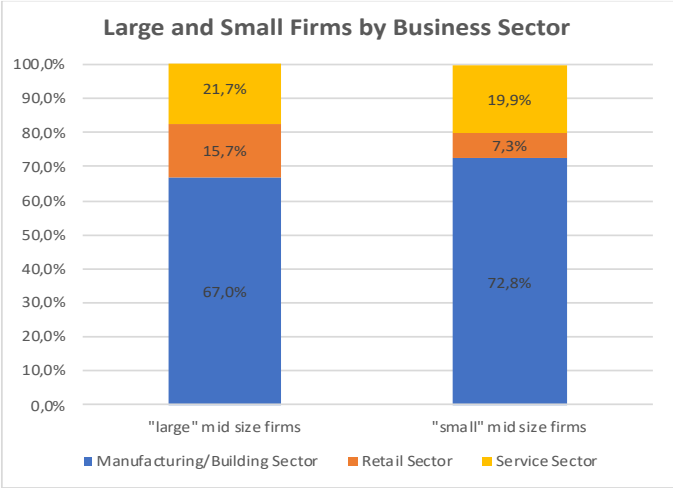


FIGURE 9: Business Sectors of Surveyed Firms by Relative Size – Author's elaboration

The last two questions of this first section regarded the subjectivity of medium-size firms to the control of third parties and the possible ownership of manufacturing/logistics plant in foreign countries.

93 companies (34,3%) declared to be under the management and control of third parties and 178 (65,7%) responded negatively. If this numbers are split basing on the legal form of the company, what emerges is that Spa responding affirmatively were 53 out of 156 (34%) and Srl were 40 out of 115 (35%), almost the same percentage.

About the ownership of manufacturing/logistics plant in foreign countries, the question aimed at understanding if medium size Italian companies are operating actively even out of the Italian borders. The possession of buildings and machineries in foreign countries would imply relevant investments and major criticalities for companies due to possible unknown variables such as different cultures, laws or currencies. Only 41 firms declared to own manufacturing or logistics plant in foreign countries and conversely 230 did not (15,1% vs 84,9%). Given the preponderant number of firms without plants outside Italy we could affirm that for most of Italian medium size companies, relevant investment are mainly faced inside the Italian framework. This includes laws, bureaucracies, financing institutions, people's knowledge and skills and so on.

As said, section 2 was the heart of the survey with 9 questions.

At the beginning companies were asked to say if they made, on average in the last three years, more or less than 3 annual investments. In the questionnaire has been specified to consider only "relevant investments". For relevant investments it was asked to take into account those non-ordinary cash outlays economically and financially impacting for the firm, which require an analysis of expected costs and benefits and need large capitals to be implemented.

This clarification was made firstly because steps of the Capital Budgeting Process and the use of financial techniques commonly take place when companies have to acquire large assets in terms of money and secondly because managers could have had different interpretation of "Investment" thus leading to a bad and not homogeneous data collection.

116 managers (42,8%) declared that their company made on average more than 3 annual investment. Of them, 68 represent Spa and 48 Srl. Even in this case the percentage of who declared to make more than 3 investments annually does not differ greatly among the two groups (43.6% vs 41.7% respectively). (Figure 10)

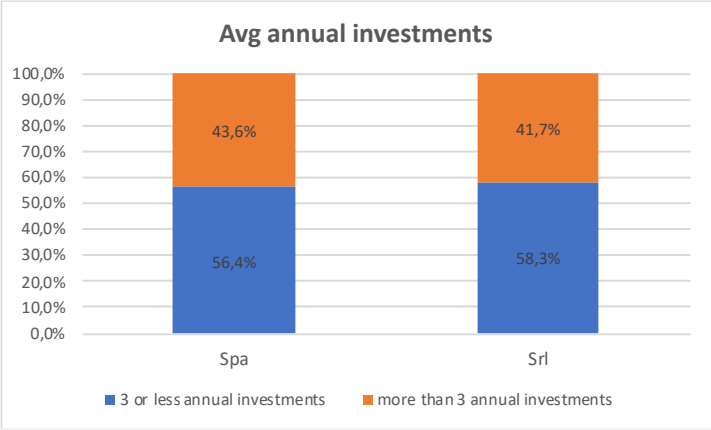


FIGURE 10: Number of Investments of Surveyed Firms by Legal Form– Author's elaboration

This thesis agrees with the financial literature in considering the Capital Budgeting Process as a series of steps to be followed. In Chapter 3, the Process has been presented as an aggregate of action that can be summarized into 4 main steps, namely:

1. Identification & Filtering of Investment Opportunities

2. Evaluation and Selection
3. Implementation
4. Monitoring & Control

In the survey managers were asked to identify among these steps the one deemed as the most important. Since the concept of importance is relative and can be subjected to different interpretations, a clarification also in this case was given. Respondents had to point out the most important step according to them considering the level of attention they put on each stage. The one for which they spend more attention is deemed as the most critical, hence important.

Out of 271 financial managers 172 (63,5%) deemed the first step, Identification & Filtering of Investment Opportunities, as the most important; 68 (25,1%) chose the second step, Evaluation and Selection; 21(7.7%) pointed out the third, Implementation; and 10 (3,7%) opted for the last step of the Capital Budgeting Process, Monitoring & Control. (Figure 11)

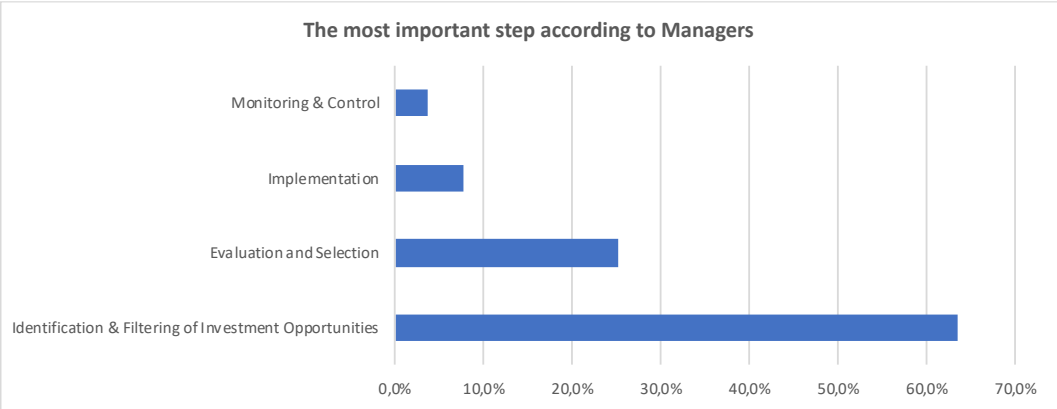


FIGURE 11: The most important Step according to managers of Surveyed Firms – Author's elaboration

The responses are aligned with Rossi's observations, in fact, what emerges from these numbers is that medium size firms of the north-east of Italy are heavily focused on identify the best investment opportunities. The percentage of respondents who declared this step as the most important is almost two times larger than the other three combined (63,5% vs 36,5%). Anyway, even if it could be interpreted as a good sign because companies seem to be interested in finding

opportunities in line with their strategies and thus oriented to the long term, this data communicates at least two things:

- For these companies the investment appraisal is a difficult concern since the beginning. Competition among firms is heavy and constantly identifying new business opportunities is a resource-spending activity. This huge competition makes companies strive to survive investment after investment and hence the real vision in on the short term. In order to confirm or deny this, a related question was asked in the fourth section with regards to the area perceived as the most difficult among Investment and Financing. Results are presented further (see figure 25).
- Medium size firms are underestimating other phases. Only 10 companies (3,7%) claimed to consider the Monitoring & Control step as the most important one. This was largely expected and in accordance with the results of Rossi (2014). As the author affirms: *"The fact that the review process is not considered important highlights that managers-entrepreneurs continue to follow the same capital budgeting scheme. They have difficult to consider any comments from the review process. This approach may have a negative impact on the firm's financial management policy, because they do not change their previous processes."*

An interesting question proposed in the questionnaire is the one that aim to understand if medium sized firms interviewed have a standardized Capital Budgeting Process or not. Managers were asked to opt among three degrees of standardization explicitly described in the question.

Standardized Process: all investment proposals follow a unique and clear path. This allows to control anytime and easily in which stage the proposals are, and to identify the resources employed and the direct referents/owners of the projects.

Limitedly Standardized Process: there is not a single investment process. Projects, according to their characteristics may be subjected to different steps and decisional paths. It is anyway possible to individuate the progress of the projects and their referents/owners and resources.

Non-Standardized Process: there is not a single investment process. Projects, according to their characteristics may be subjected to different steps and decisional paths. It is not possible, or it is difficult, to identify the resources employed and the direct referents/owners of the projects.

According to this classification of standardization 62 managers declared that their firm has a Standardized Process while 78 affirm that their company has a Non-Standardized Process. The majority, almost half of respondents, say that investment proposals follow a Limitedly Standardized Process. (Figure 12).

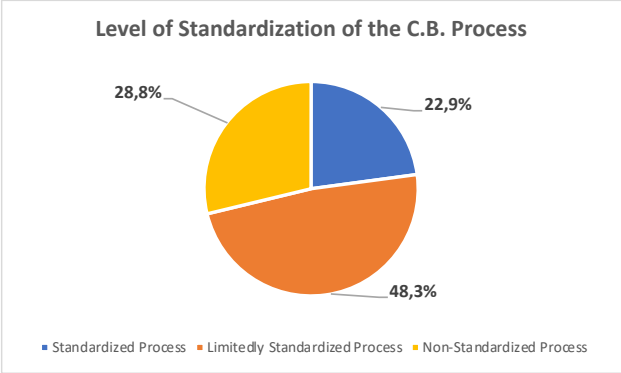


FIGURE 12: Level of Standardization of the C. B. Process of Surveyed Firms – Author's elaboration

Before entering the part related to the financial techniques applied the questionnaire investigate the source of investment proposals inside medium size companies. Results show that for the vast majority of the firms (80%) investment proposals come from the Entrepreneur, the Partners of the firm or the Directors/Top Management. (Figure 13)

This was expected, in medium size firms, particularly in Italy, the presence of the founder of the company in all the relevant decisions is consistent. And even the Board of Directors has its weight. Less common are those proposals coming from middle management and external consultants. Probably, in larger firms, the number of investment proposals coming from these two categories would be higher. In fact, in large companies, the hierarchy ladder is usually longer and thus the number of "middle managers" is greater. More managers linked to operational activities could be translated in more investment suggestions. For example, operational managers

of manufacturing firms, having visibility on machineries and in general the manufacturing process, could require the acquisition of new technologies with better functionalities. This, in small and medium size Italian firms, is limited by the fact that culturally all investment proposals come from the top.

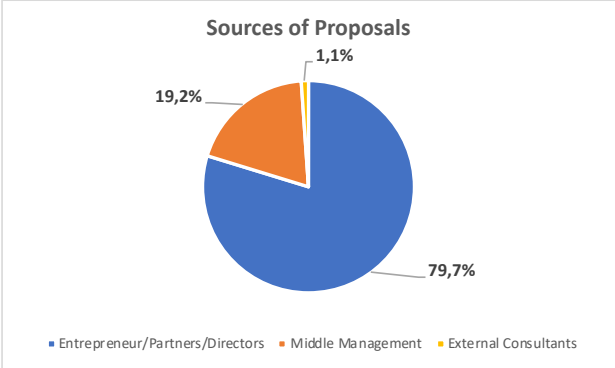
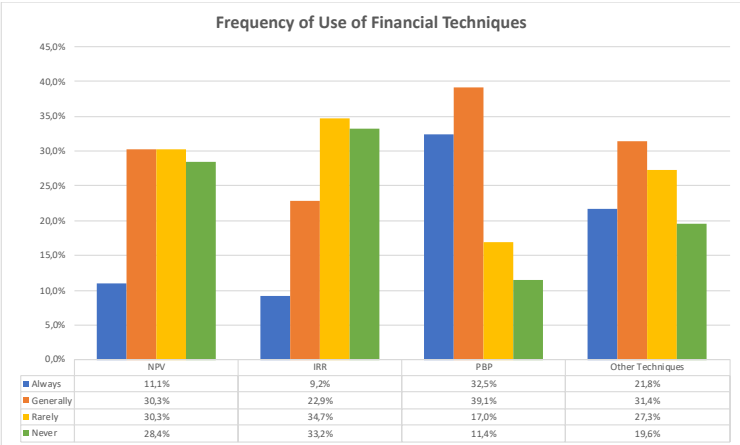


FIGURE 13: Source of Proposals of Surveyed Firms – Author's elaboration

As noted by many authors the Net Present Value, the Internal Rate of Return and the Payback Period are the more widespread methods used by companies all around the world to analyze the financial feasibility of projects. For this reason, these are the techniques proposed as answers in the questionnaire when managers were asked to declare the frequency of use of each one.

The frequency was expressed as a four-degree scale where possible steps were ALWAYS – GENERALLY – RARELY – NEVER.

Results are shown in Figure 14.



	NPV	IRR	PBP	Other Techniques
Always	11,1%	9,2%	32,5%	21,8%
Generally	30,3%	22,9%	39,1%	31,4%
Rarely	30,3%	34,7%	17,0%	27,3%
Never	28,4%	33,2%	11,4%	19,6%

FIGURE 14: Frequency of Use of Financial Techniques – Author's elaboration

In the analysis of these results a value has been assigned to each frequency grade, from 1 associated to NEVER and 4 to ALWAYS. This allows to get an overall value (the weighted average) that expresses the frequency for each method. (Figure 15)

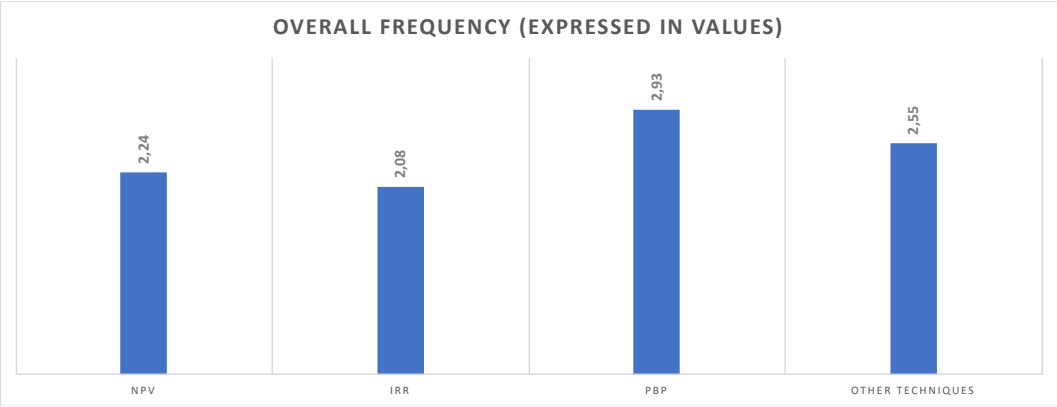


FIGURE 15: Overall Frequency of Financial Techniques– Author's elaboration

The survey confirms the results of the financial literature for what concerns the most used technique. The Payback method appears to be the preferred one with an overall value of frequency of 2.93. What was not expected was almost equal value of NPV and IRR methods, with the second that was deemed to be lower following the literature's observations. Probably this is due to the fact that firms under analysis are all medium size, hence further analysis considering the relative size among them has to be done. The next paragraph explicitly investigates also this issue and provides an explanation.

Interesting also is the second highest value (2.55) that represents all the other techniques not included as options of answer. Given the improbability that medium size firms use advanced techniques such as the real option methods (not presented in the previous chapter because of their complexity in the application, in fact they are used mainly by multinationals or firms of great size), this value could encompass those techniques cited – ARR and PP, and others minor method – but also the possibility that directors do not apply any financial method.

Considering risks and possible different outcomes is fundamental in financial analysis. The questionnaire aimed at investigating how surveyed medium size companies take into account the variability of results with a question on the application of Scenario Analysis and Sensitivity Analysis. Similarly to the financial techniques adopted even in this case respondents were asked to declare the frequency of each of the two analysis (figure 16) and an overall value has been computed (figure 17).

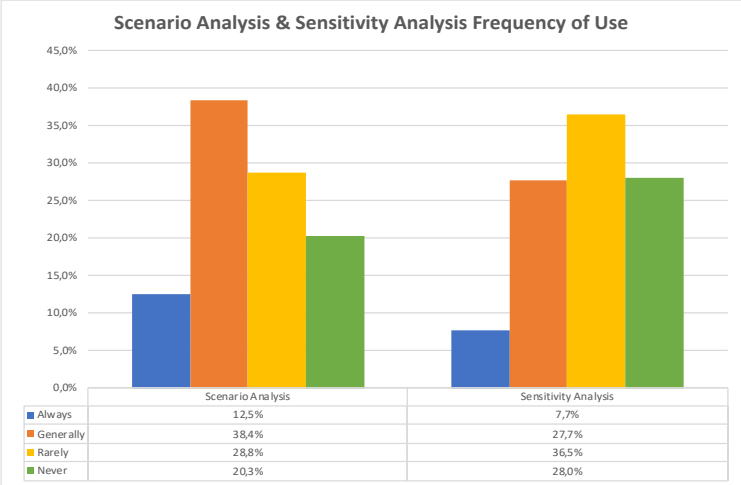


FIGURE 16: Frequency of Use of Scenario & Sensitivity Analysis – Author's elaboration

FIGURE 17: Overall Frequency of Scenario & Sensitivity Analysis – Author's elaboration

Respondents have shown a general preference for the Scenario Analysis (2,43 vs 2,15). This was in some way expected because the first technique, which take into consideration different possible outcomes, is more applicable to medium size companies (even if this is not meaning that it is easier to use). Managers imagine

possible scenarios, better and worse than the expected one, assign probabilities and taste the riskiness of the projects. This is far quicker than looking for the most critical variable and calculating how future cash flows will move according to its changing values. Measuring the sensitivity of cash flows or other target variables is useful when the analysis is well-done and right variables of interest are taken into account.

Probably, for medium size companies' managers it is often enough to estimate a range of results with their probabilities and then decide if the investment is worthful or not. Instead, large companies' managers (with more resources and people available) need to individuate which variables will lead to good or bad outcomes in order to control them if projects are undertaken.

Besides investigating financial techniques and ways to consider risk, the survey aimed also to understand what source of capital is preferred among equity and debt, and the cost of capital used in financial analysis concerning the investment appraisal.

With regards to the favored source of financing, managers were equally distributed in their responses, 49,4 % of them financed their projects through debt while 50,6% collected money from the owners (figure 18).

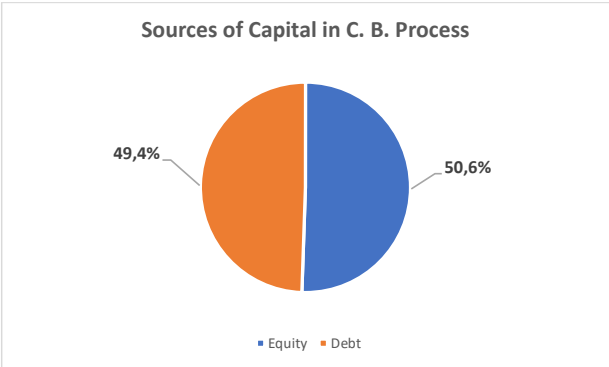


FIGURE 18: Main Sources of Capital of Surveyed Firms – Author's elaboration

Most of the respondents (48%) declared that the Cost of Capital considered when analyzing the financial feasibility of projects is the Cost of Debt - computed or estimated -, followed by the Cost of Equity and the WACC - computed or estimated.

These last two with the almost the same degree of preference. The interesting fact is the quite high percentage of managers (25,5%) that affirmed explicitly not to take into account the Cost of Capital in their Capital Budgeting analysis (figure 19).
With reference to the use of the Wacc, results are quite aligned with Rossi's observations, but they get quite different for what concerns the Cost of Debt. As mentioned, he measured a value of 28%, 20 pp lower than our research. An explanation could be the different formulation of the possible answers, in fact the present survey has included also the cost of equity as an option of response and put together the "non-considered" option with "reliance on experience" option.

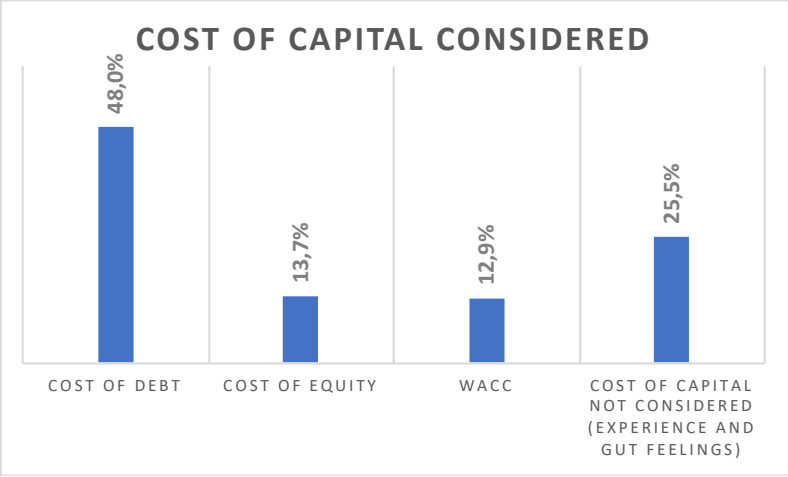


FIGURE 19: Cost of Capital Configurations applied by Surveyed Firms – Author's elaboration

Anyway, going back to the results, this communicates that 1 out of 4 Directors makes his/her considerations relying heavily on gut feelings. This could be an advantage for firms when managers are really experienced and skilled, but it could become a disadvantage if overconfidence and other behavioral biases take place due to the reasons explained in Chapter 4.

The last question of Section 2 investigated the final step of the Capital Budgeting Process, the Monitoring & Control phase. Directors were asked to say which reason among the one presented was deemed as the principal reason that explains differences between the expected cashflows and the actual ones realized,

considering those investments (ended or still in their life-cycle) made in the last few years. Respondents had to choose among:

"mistakes/difficulties in the Identification & Filtering of Investment Opportunities phase";

"mistakes/difficulties in the Evaluation and Selection phase";

"mistakes/difficulties in the Implementation phase"

or, as last option, *"external events happened after the Implementation phase, events out of the control of the company".* This question made managers to indirectly reveal the critical phase of their firm's Capital Budgeting Process.

Results are shown in figure 20.

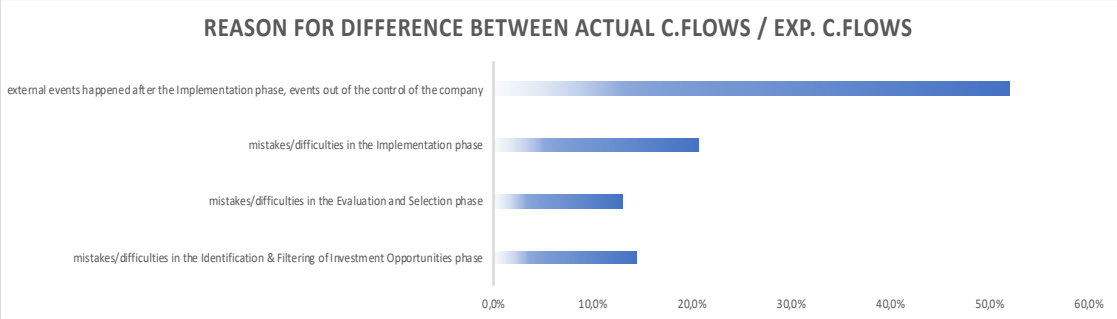


FIGURE 20: Reason for difference between actual cashflows and expected ones by Surveyed Firms – Author's elaboration

Half of respondents (52%) did not see fallacies in their Capital Budgeting Process phases that explain those differences between actual cashflows and the estimated ones. The other half, which explicitly identified one of the steps as responsible for cashflows estimations' failures, distributes more or less equally the liability to the phases, with a prevalence for the Implementation phase. If we link these answers with the one at the beginning, regarding the most important step (read worthful of attention) for managers the results could seem quite incongruent. They stated to deem the Identification & Filtering of Investment Opportunities step as the most important, but they are aware that the one where they commit most of the relevant errors is the Implementation phase. Anyway, an explanation for these answers can be found in the fact that financial managers are responsible more directly for the Identification of worthful projects and their financial analysis, while operational

managers are liable for the implementation phase. Obviously since this questionnaire was fulfilled by the first category of managers there could be some feelings of shame for them in admitting their personal failures and thus they could have oriented their answers to the options that are not under their complete control, namely the Implementation phase and the happening of subsequent external events.

The last section was addressed to gain information about the respondents. As specified above, managers who were able to finish the questionnaire were 254. From now on, in this paragraph, data are presented taking into accounts only these respondents.

It emerged that very few are those managers with less than 35 years, only 3,5%. Considering the relevance of the role this is normal and not surprising. The majority of managers (53,1%) of medium size companies are at least 50 years old but a consistent number of them is in their forties/late thirties (43,3%) (figure 21).

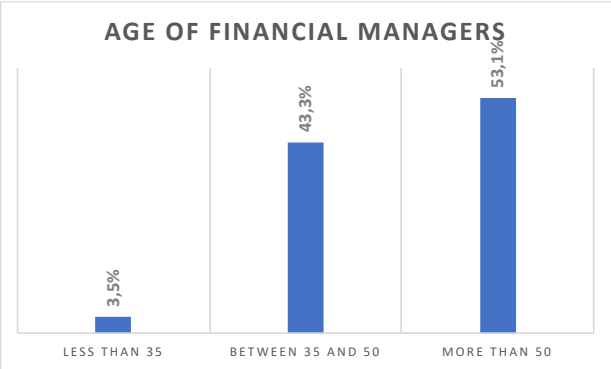


FIGURE 21: Age of Financial Managers of Surveyed Firms – Author's elaboration

This result could be a first hint which suggests that financial managers of Italian mid-size companies are generally experienced. Since it was expected, in order to confirm this idea respondents were asked to say how many years of experience they had in the role of Financial manager, even considering their experience in other firms.

The survey largely confirmed the guess. As shown in figure 22, the vast majority of them are on duty for more than 12 years (70,1%). The remaining 29,9% is quite equally shared among the other ranges given as options.

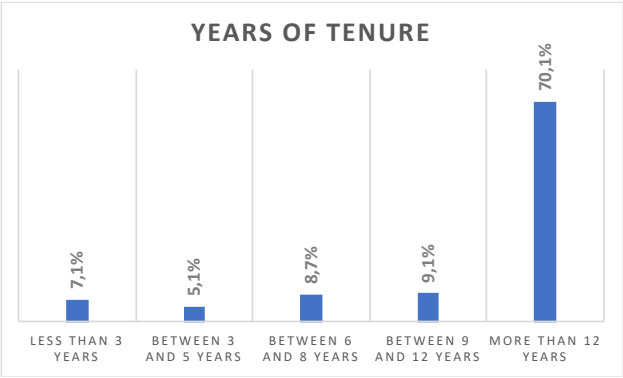


FIGURE 22: Years of Tenure of Financial Managers of Surveyed Firms – Author's elaboration

Another important thing that deserved to be investigated, referring to the personal traits of managers, was their level of education. In order to understand if managers have an economic/financial background two questions were addressed to them. The first asked whether respondents are in possession of a university degree in economics related fields. Surprisingly almost half of them do not have a degree at all or do not have a degree related to the role (figure 23).

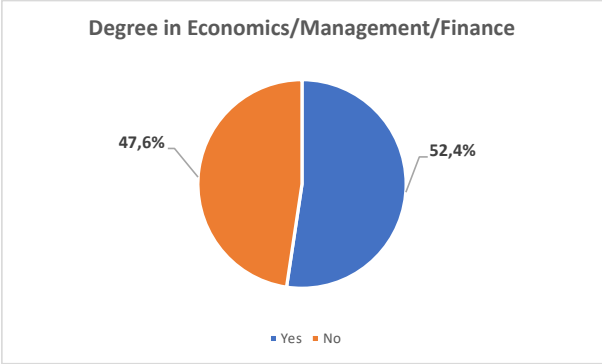


FIGURE 23: Financial Managers of Surveyed Firms with a Degree in Economics related fields – Author's elaboration

The second question was made to understand how many managers have a higher education level through the possession of a Master (MBA, MIM…). The 13,4% of them responded affirmatively (figure 24)

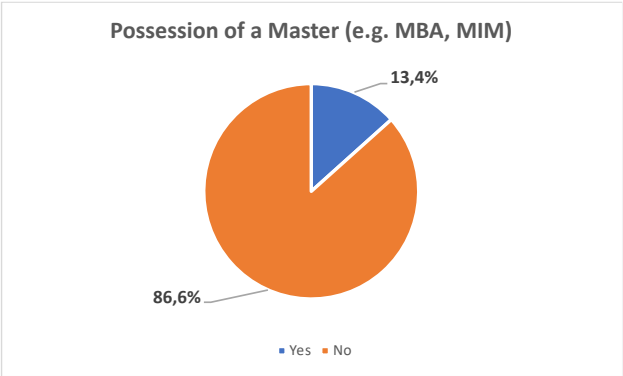


FIGURE 24: Financial Managers of Surveyed Firms with a Master – Author's elaboration

The survey aimed also to understand if these financial managers are in their respective firms' Board of Directors since, given their role, they are heavily responsible for the growth and prosperity of the company. Out of 254 respondents only 75 are also Directors (29,5%) (figure 25).

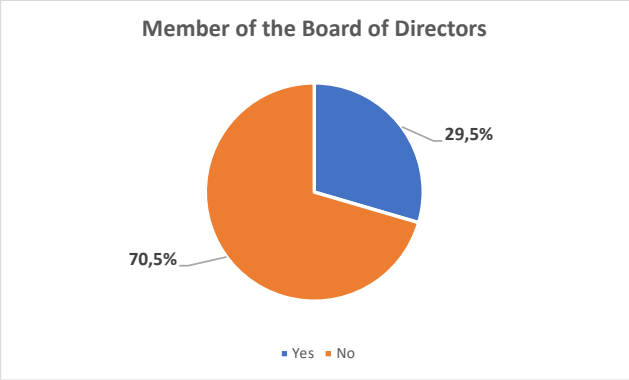


FIGURE 25: Managers Members of the BoD in Surveyed Firms – Author's elaboration

Finally, the questionnaire collected two personal opinions of respondents. One was about the area of corporate finance deemed as the most difficult for their respective firms and the second had the objective to understand what are the factors, according to their view, that make difficult the Capital Budgeting Process for Italian mid-size companies.

The area perceived as the most difficult one for these financial managers is the investment area. This confirms what has been said previously, medium size firms are striving for surviving in a hypercompetitive world, it is far more demanding and troublesome for them finding and implementing the right investment than collecting money (figure 26).

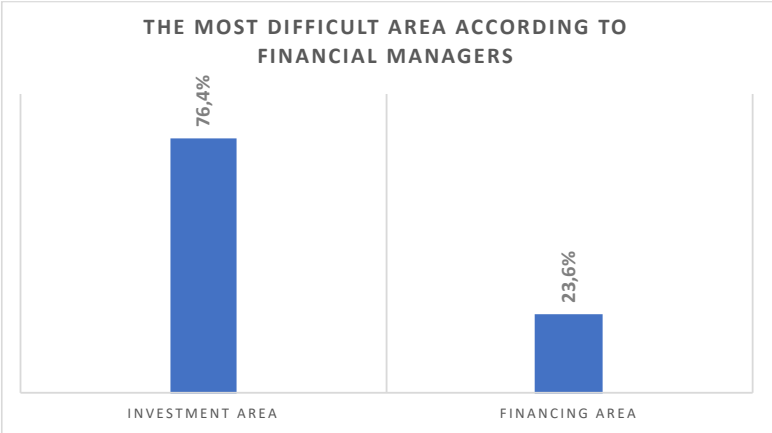


FIGURE 26: The most difficult area according to Financial Managers of Surveyed Firms – Author's elaboration

The reasons that according to financial managers explain the problematic path for medium size companies in facing the Capital Budgeting Process are mainly related to bureaucracies (35,4%) and national/regional laws unfavorable for investments (26%). Interesting is that 32 firms (12,6%) indicated the scarcity of technically qualified people as the main reason (figure 27)

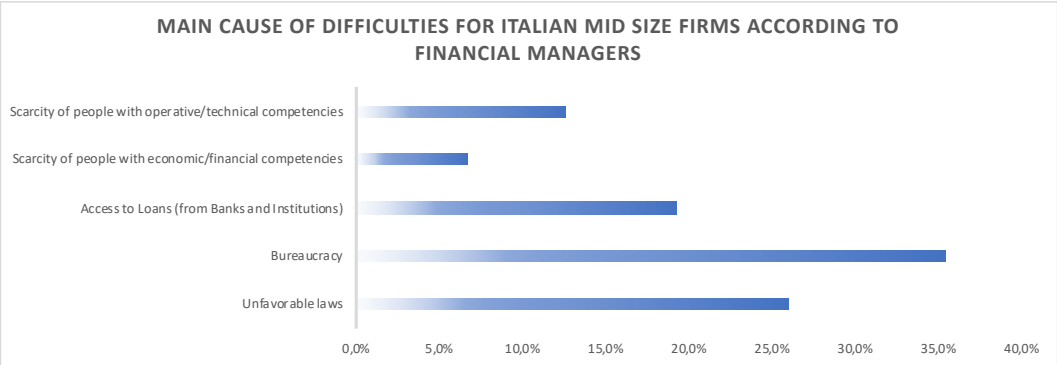


FIGURE 27: Main cause of difficulties for Italian mid-size companies according to Financial Managers of Surveyed Firms – Author's elaboration

5.3.2 Analysis of Responses

In the previous paragraph results of the questionnaires have been presented through descriptive statistics.

Anyway, the main objective of this work is to understand whether Medium Size Business located in the north eastern area of Italy follow a homogeneous Capital Budgeting Process or if significative differences exist.

The principal hypothesis to be validated is that Companies' different responses communicate an heterogenous path of investment appraisal.

Thus, respondents have been categorized as mentioned in the beginning of this chapter, according to their legal form, relative size and business sector and through Chi Squared Tests the responses have been analyzed.

For each categorization, 7 statistic tests have been conducted. These aimed to investigate:

- Differences in the frequency of use of the NPV method
- Differences in the frequency of use of the IRR method
- Differences in the frequency of use of the PBP method
- Differences in the frequency of use of Scenario Analysis
- Differences in the frequency of use of Sensitivity Analysis
- Differences in the main source of financing
- Differences in the Cost of Capital applied

At the end, two additional Chi Squared tests have investigated the possible relationship among Experience of financial managers and use of the NPV method and Possession of a degree in Economics related fields and the use of the NPV method.

Results are presented as follows:

- 7 Chi Squared tests to analyze possible differences in the Capital Budgeting Process among Spa and Srl

- 7 Chi Squared tests to analyze possible differences in the Capital Budgeting Process among Large and Small mid-size firms
- 7 Chi Squared tests to analyze possible differences in the Capital Budgeting Process among firms active in different Business Sectors
- 2 Chi Squared tests to understand if personal traits of the financial managers are correlated to the use of the NPV method

Every statistic test is presented through a table which shows the observed/expected frequencies, the χ_2 critical value with *n* degrees of freedom at $p= .05$ and the resulting χ_2 statistics with an indication of the accepted (or not rejected) hypothesis. In general, as stated, the hypothesis to be validated is that companies behave differently accordingly to their traits.
This guess is represented by the wording *"H_1: $\pi 1 \neq \pi 2$"* which suggests that there is a significative difference among groups.

Notes to the analysis:

- *Computations have been done through statistics tools and Excel.*
- *Wording H1: $\pi 1 \neq \pi 2$ represents the translation of the research question for each case and it is accepted when groups under analysis show a statistical difference in their response rate*
- *Wording H0: $\pi 1 = \pi 2$ represents for each case the Null Hypothesis*
- *Graphs besides the tables show the same frequencies in percentual values.*
- *Graphs and Tables are all author's elaboration.*

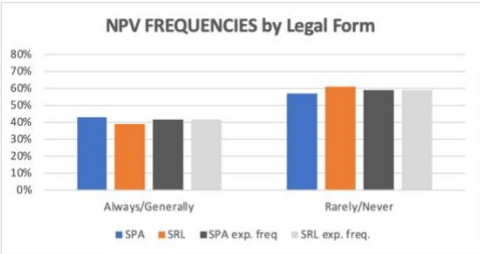
A) ANALYSIS OF RESPONSES BY LEGAL FORM

A1 H_0: $\pi 1 = \pi 2$

"the percentage of Spa and Srl applying the NPV method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Spa and Srl applying the NPV method differs according to the legal form"



NPV used	SPA	SRL	SPA exp. freq	SRL exp. freq.
Always/Generally	*67*	*45*	*64*	*48*
Rarely/Never	*89*	*70*	*92*	*67*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,398*
p value	*0,528*

the result is not significant at p < .05	H0	π1 = π2

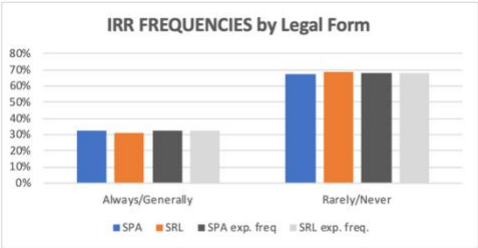
FIGURE 28: TEST A1 - Author's Elaboration

A2 H_0: $\pi 1 = \pi 2$

"the percentage of Spa and Srl applying the IRR method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Spa and Srl applying the IRR method differs according to the legal form"



IRR used	SPA	SRL	SPA exp. freq	SRL exp. freq.
Always/Generally	*51*	*36*	*50*	*37*
Rarely/Never	*105*	*79*	*106*	*78*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,059*
p value	*0,809*

the result is not significant at p < .05	H0	π1 = π2

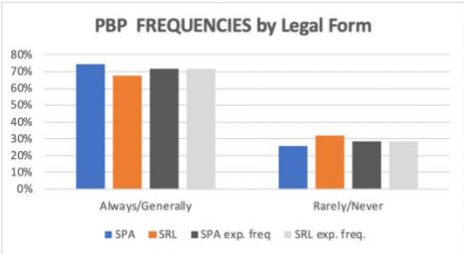
FIGURE 29: TEST A2 - Author's Elaboration

A3 H_0: $\pi 1 = \pi 2$

"the percentage of Spa and Srl applying the PBP method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Spa and Srl applying the PBP method differs according to the legal form"



PBP used	SPA	SRL	SPA exp. freq	SRL exp. freq.
Always/Generally	*116*	*78*	*112*	*82*
Rarely/Never	*40*	*37*	*44*	*33*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*1,389*
p value	*0,239*

the result is not significant at p < .05	H0	π1 = π2

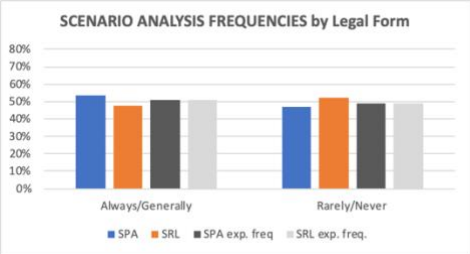
FIGURE 30: TEST A3 - Author's Elaboration

A4 H_0: $\pi 1 = \pi 2$

"the percentage of Spa and Srl applying the Scenario Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Spa and Srl applying the Scenario Analysis differs according to the legal form"



SCE.AN used	SPA	SRL	SPA exp. freq	SRL exp. freq.
Always/Generally	*83*	*55*	*79*	*59*
Rarely/Never	*73*	*60*	*77*	*56*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,766*
p value	*0,381*

the result is not significant at p < .05	H0	π1 = π2

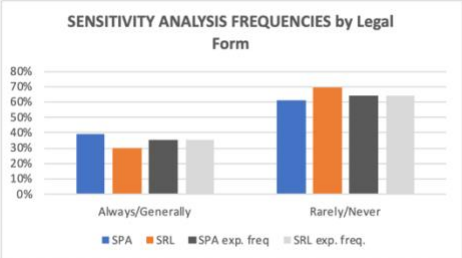
FIGURE 31: TEST A4 - Author's Elaboration

A5 H_0: $\pi 1 = \pi 2$

"the percentage of Spa and Srl applying the Sensitivity Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Spa and Srl applying the Sensitivity Analysis differs according to the legal form"



SEN.AN used	SPA	SRL	SPA exp. freq	SRL exp. freq.
Always/Generally	*61*	*35*	*55*	*41*
Rarely/Never	*95*	*80*	*101*	*74*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*2,174*
p value	*0,140*

the result is not significant at p < .05	H0	π1 = π2

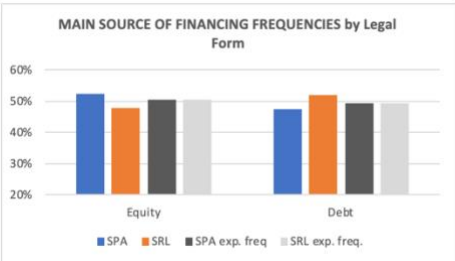
FIGURE 32: TEST A5 - Author's Elaboration

A6 H_0: $\pi 1 = \pi 2$

"the main source of financing of Spa and Srl is the same"

H_1: $\pi 1 \neq \pi 2$

"the main source of financing of Spa and Srl differs according to the legal form"



SOURCE OF FIN.	SPA	SRL	SPA exp. freq	SRL exp. freq.
Equity	*82*	*55*	*79*	*58*
Debt	*74*	*60*	*77*	*57*
	156	*115*	*156*	*115*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,595*
p value	*0,441*

the result is not significant at p < .05	H0	π1 = π2

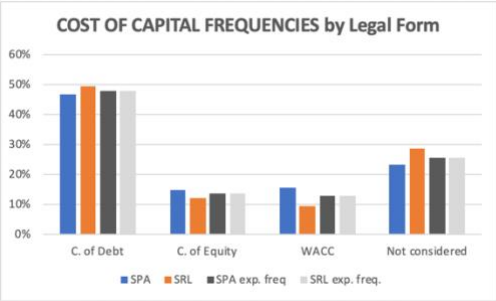
FIGURE 33: TEST A6 - Author's Elaboration

A7 H_0: $\pi 1 = \pi 2$

"Spa and Srl consider the different types of Cost of Capital in their analysis with the same proportions"

H_1: $\pi 1 \neq \pi 2$

"Spa and Srl do not have the same preferences for the different types of Cost of Capital"



COST OF CAPITAL	SPA	SRL	SPA exp. freq	SRL exp. freq.
C. of Debt	*73*	*57*	*75*	*55*
C. of Equity	*23*	*14*	*21*	*16*
WACC	*24*	*11*	*20*	*15*
Not considered	*36*	*33*	*40*	*29*
	156	*115*	*156*	*115*

Degrees of Freedom	*3*
Critical value of $\chi 2$ at $p = .05$	*7,815*
$\chi 2$ statistic	*2,983*
p value	*0,394*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

FIGURE 34: TEST A7 - Author's Elaboration

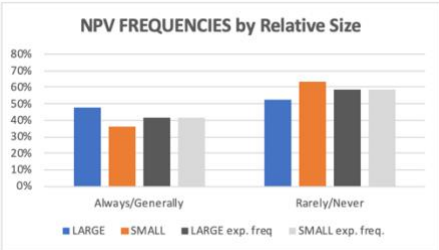
B) ANALYSIS OF RESPONSES BY RELATIVE SIZE

B1 H_0: $\pi 1 = \pi 2$

"the percentage of Large and Small firms applying the NPV method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Large and Small firms applying the NPV method differs according to the relative size"



NPV used	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Always/Generally	*57*	*55*	*50*	*62*
Rarely/Never	*63*	*96*	*70*	*89*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of $\chi 2$ at $p = .05$	*3,841*
$\chi 2$ statistic	*3,383*
p value	*0,066*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

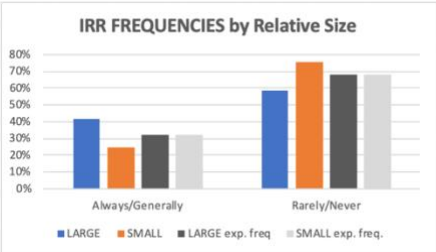
FIGURE 35: TEST B1 - Author's Elaboration

B2 H_0: $\pi 1 = \pi 2$

"the percentage of Large and Small firms applying the IRR method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Large and Small firms applying the IRR method differs according to the relative size"



IRR used	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Always/Generally	*50*	*37*	*39*	*48*
Rarely/Never	*70*	*114*	*81*	*103*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of $\chi 2$ at $p = .05$	*3,841*
$\chi 2$ statistic	*9,036*
p value	*0,003*

the result is significant at $p < .05$	H1	$\pi 1 \neq \pi 2$

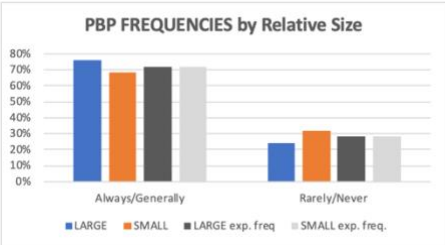
FIGURE 36: TEST B2 - Author's Elaboration

B3 H_0: $\pi 1 = \pi 2$

"the percentage of Large and Small firms applying the PBP method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Large and Small firms applying the PBP method differs according to the relative size"



PBP used	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Always/Generally	*91*	*103*	*86*	*108*
Rarely/Never	*29*	*48*	*34*	*43*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*1,909*
p value	*0,167*

the result is not significant at p < .05	H0	π1 = π2

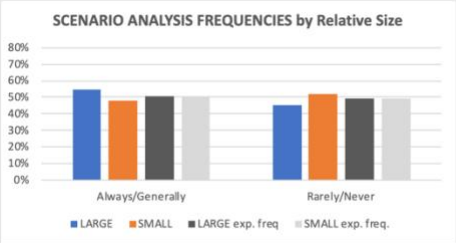
FIGURE 37: TEST B3 - Author's Elaboration

B4 H_0: $\pi 1 = \pi 2$

"the percentage of Large and Small firms applying the Scenario Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Large and Small firms applying the Scenario Analysis differs according to the relative size"



SCE.AN used	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Always/Generally	*66*	*72*	*61*	*77*
Rarely/Never	*54*	*79*	*59*	*74*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*1,433*
p value	*0,231*

the result is not significant at p < .05	H0	π1 = π2

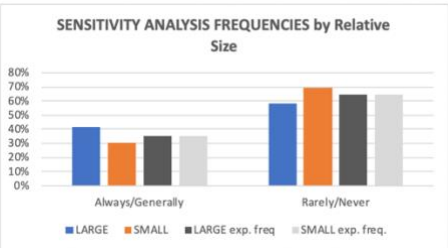
FIGURE 38: TEST B4 - Author's Elaboration

B5 H_0: $\pi 1 = \pi 2$

"the percentage of Large and Small firms applying the Sensitivity Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of Large and Small firms applying the Sensitivity Analysis differs according to the relative size"



SEN.AN used	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Always/Generally	*50*	*46*	*43*	*53*
Rarely/Never	*70*	*105*	*77*	*98*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*3,669*
p value	*0,055*

the result is not significant at p < .05	H0	π1 = π2

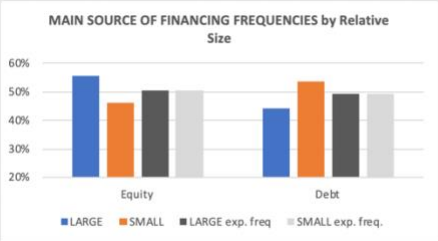
FIGURE 39: TEST B5 - Author's Elaboration

B6 H_0: $\pi 1 = \pi 2$

"the main source of financing of Large and Small firms is the same"

H_1: $\pi 1 \neq \pi 2$

"the main source of financing of Large and Small firms differs according to the relative size"



SOURCE OF FIN.	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
Equity	*67*	*70*	*61*	*76*
Debt	*53*	*81*	*59*	*75*
	120	*151*	*120*	*151*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*2,402*
p value	*0,121*

the result is not significant at p < .05	H0	π1 = π2

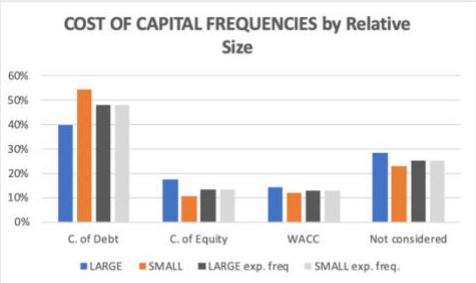
FIGURE 40: TEST B6 - Author's Elaboration

B7 H_0: $\pi 1 = \pi 2$

"Large and Small firms consider the different types of Cost of Capital in their analysis with the same proportions"

H_1: $\pi 1 \neq \pi 2$

"Large and Small firms do not have the same preferences for the different types of Cost of Capital"



COST OF CAPITAL	LARGE	SMALL	LARGE exp. freq	SMALL exp. freq.
C. of Debt	*48*	*82*	*58*	*72*
C. of Equity	*21*	*16*	*16*	*21*
WACC	*17*	*18*	*15*	*20*
Not considered	*34*	*35*	*31*	*38*
	120	*151*	*120*	*151*

Degrees of Freedom	*3*
Critical value of χ2 at *p = .05*	*7,815*
χ2 statistic	*6,145*
p value	*0,105*

the result is not significant at p < .05	H0	π1 = π2

FIGURE 41: TEST B7 - Author's Elaboration

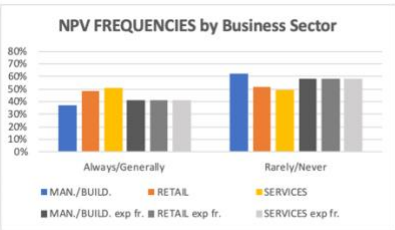
C) ANALYSIS OF RESPONSES BY BUSINESS SECTOR

C1 H_0: $\pi 1 = \pi 2$

"the percentage of firms active in different Business Sectors that apply the NPV method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of firms active in different Business Sectors that apply the NPV method differs"



NPV used	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Always/Generally	70	14	28	*77*	*12*	*23*
Rarely/Never	117	15	27	*110*	*17*	*32*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of χ2 at *p = .05*	*5,991*
χ2 statistic	*3,829*
p value	*0,147*

the result is not significant at p < .05	H0	π1 = π2

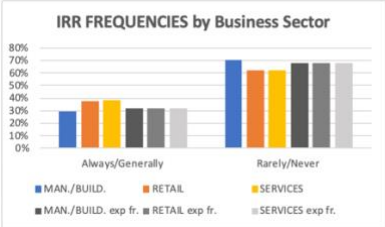
FIGURE 42: TEST C1 - Author's Elaboration

C2 H_0: $\pi 1 = \pi 2$

"the percentage of firms active in different Business Sectors that apply the IRR method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of firms active in different Business Sectors that apply the IRR method differs"



IRR used	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Always/Generally	55	11	21	*60*	*9*	*18*
Rarely/Never	132	18	34	*127*	*20*	*37*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of $\chi 2$ at $p = .05$	*5,991*
$\chi 2$ statistic	*2,006*
p value	*0,367*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

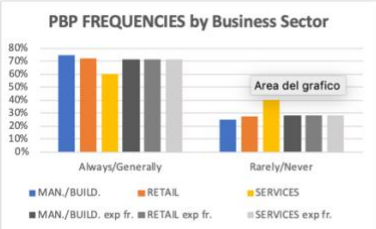
FIGURE 43: TEST C2 - Author's Elaboration

C3 H_0: $\pi 1 = \pi 2$

"the percentage of firms active in different Business Sectors that apply the PBP method is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of firms active in different Business Sectors that apply the PBP method differs"



	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Always/Generally	140	21	33	*134*	*21*	*39*
Rarely/Never	47	8	22	*53*	*8*	*16*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of $\chi 2$ at $p = .05$	*5,991*
$\chi 2$ statistic	*4,629*
p value	*0,099*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

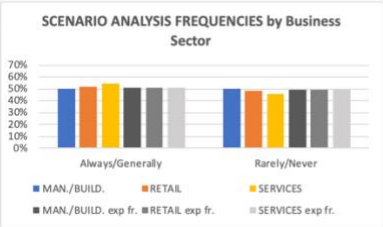
FIGURE 44: TEST C3 - Author's Elaboration

C4 H_0: $\pi 1 = \pi 2$

"the percentage of firms active in different Business Sectors that apply the Scenario Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of firms active in different Business Sectors that apply the Scenario Analysis differs"



	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Always/Generally	93	15	30	*95*	*15*	*28*
Rarely/Never	94	14	25	*92*	*14*	*27*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of $\chi 2$ at $p = .05$	*5,991*
$\chi 2$ statistic	*0,402*
p value	*0,818*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

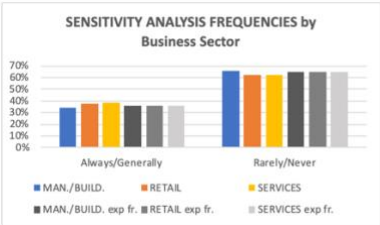
FIGURE 45: TEST C4 - Author's Elaboration

C5 H_0: $\pi 1 = \pi 2$

"the percentage of firms active in different Business Sectors that apply the Sensitivity Analysis is the same"

H_1: $\pi 1 \neq \pi 2$

"the percentage of firms active in different Business Sectors that apply the Sensitivity Analysis differs"



	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Always/Generally	64	11	21	*66*	*10*	*19*
Rarely/Never	123	18	34	*121*	*19*	*36*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of $\chi 2$ at $p = .05$	*5,991*
$\chi 2$ statistic	*0,380*
p value	*0,827*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

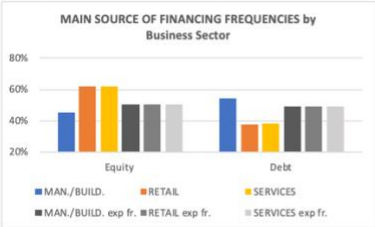
FIGURE 46: TEST C5 - Author's Elaboration

C6 H_0: $\pi 1 = \pi 2$

"the main source of financing of firms active in different Business Sectors is the same"

H_1: $\pi 1 \neq \pi 2$

"the main source of financing of firms active in different Business Sectors differs"



	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
Equity	85	18	34	*95*	*15*	*28*
Debt	102	11	21	*92*	*14*	*27*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*2*
Critical value of $\chi 2$ at $p = .05$	*5,991*
$\chi 2$ statistic	*6,275*
p value	*0,043*

the result is significant at $p < .05$	H1	$\pi 1 \neq \pi 2$

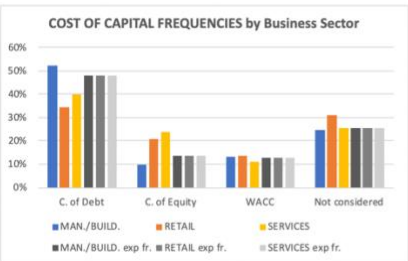
FIGURE 47: TEST C6 - Author's Elaboration

C7 H_0: $\pi 1 = \pi 2$

"firms active in different Business Sectors consider the different types of Cost of Capital in their analysis with the same proportions"

H_1: $\pi 1 \neq \pi 2$

"firms active in different Business Sectors do not have the same preferences for the different types of Cost of Capital"



	MAN./BUILD.	RETAIL	SERVICES	MAN./BUILD. exp fr.	RETAIL exp fr.	SERVICES exp fr.
C. of Debt	*98*	*10*	*22*	*90*	*14*	*26*
C. of Equity	*18*	*6*	*13*	*26*	*4*	*8*
WACC	*25*	*4*	*6*	*24*	*4*	*7*
Not considered	*46*	*9*	*14*	*48*	*7*	*14*
	187	*29*	*55*	*187*	*29*	*55*

Degrees of Freedom	*6*
Critical value of $\chi 2$ at $p = .05$	*12,592*
$\chi 2$ statistic	*10,510*
p value	*0,105*

the result is not significant at $p < .05$	H0	$\pi 1 = \pi 2$

FIGURE 48: TEST C7 - Author's Elaboration

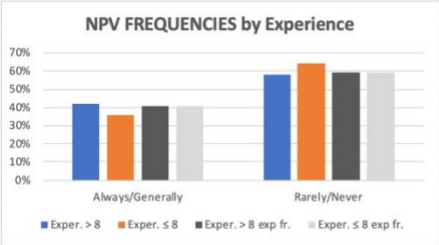
D) CORRELATION BETWEEN PERSONAL TRAITS AND USE OF NPV

D1 H_0: $\pi 1 = \pi 2$

"Experienced financial managers use the NPV method with the same frequency as non-experienced managers"

H_1: $\pi 1 \neq \pi 2$

"The frequency of use of the NPV method is different among experienced and non-experienced managers"



	Exper. > 8	Exper. ≤ 8	Exper. > 8 exp fr.	Exper. ≤ 8 exp fr.
Always/Generally	*84*	*19*	*82*	*21*
Rarely/Never	*117*	*34*	*119*	*32*
	201	*53*	*201*	*53*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,614*
p value	*0,433*

the result is not significant at p < .05	H0	π1 = π2

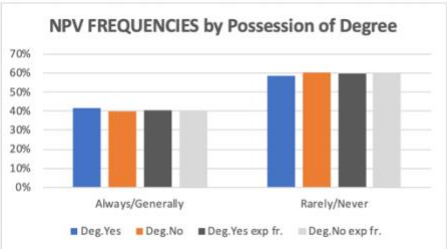
FIGURE 49: TEST D1 - Author's Elaboration

D2 H_0: $\pi 1 = \pi 2$

"Financial managers with a degree in economics related fields use the NPV method with the same frequency as managers without degree"

H_1: $\pi 1 \neq \pi 2$

"The frequency of use of the NPV method is different among Financial managers with and without a degree in economics related fields"



	Deg.Yes	Deg.No	Deg.Yes exp fr.	Deg.No exp fr.
Always/Generally	*55*	*48*	*54*	*49*
Rarely/Never	*78*	*73*	*79*	*72*
	133	*121*	*133*	*121*

Degrees of Freedom	*1*
Critical value of χ2 at *p = .05*	*3,841*
χ2 statistic	*0,075*
p value	*0,785*

the result is not significant at p < .05	H0	π1 = π2

FIGURE 50: TEST D2 - Author's Elaboration

With reference to the series of tests (A1 – A7) concerning the first categorization – Spa vs Srl – none of them show a statistical difference in the response rates of the groups. Thus, there is no correlation (at least at *p=.05*) between the legal form of companies and their use of financial techniques, risk analysis methods, preferred source of financing or Cost of Capital configurations. The only test which saw a χ_2

statistics close to the critical value is *TEST A5*, but it is not enough to statistically confirm the higher frequency of use of Sensitivity Analysis for Spa against Srl.
The difference percentual values of the observations are simply due to the sample of respondents.

Tests on possible different investment behaviour given the different relative size of surveyed companies (B1 – B7) gave an interesting result.
TEST B2 in fact confirmed (at $p=.05$) that the IRR method is used with different frequencies by Large medium size companies and Small medium size companies. Considering the percentual observations it can be affirmed that financial managers of the first group make a broader use of this technique. The importance of this result, beyond explicitly confirming the existence of a positive correlation between relative size and IRR method, has to be addressed to the fact that it gives an explanation to what arose in the descriptive part concerning the overall frequencies of the methods. The IRR technique as mentioned had an overall weighted value of 2.08, close to the frequency of the NPV method – 2.24. With the literature claiming IRR a method more popular among Large firms (note "large" here means true large companies and not large medium size companies), it was expected its fourth place in the ranking of options but not its closeness to the NPV value.
The explanation for this is that the value is pushed by Large medium size business. Since the criterium applied in this work to divide firm among large and small is the amount of sales (with the discriminant threshold fixed at 25 million €) it is probable that those companies classified as Large medium size business share financial practices and habits with true Large firms that have higher sales, at least with reference to the adoption of the IRR method. Hence, there is statistical evidence to affirm that a correlation among this financial technique and the relative size among medium size firms exists.
All the other tests show no difference in the response rates and thus, on overall, neither this classification suggests the existence of a different investment behavior.

The last series of tests (C1 – C7) aimed at spotting differences in the response rates among firms of different business sectors, as in the previous cases, does not suggest

the existence of an overall heterogeneous investment path. Almost all the statistics do not confirm the observed differences as relevant. The only test which saw a statistically significant result is *TEST C6* – Firms active in different Business Sectors have had not the same principal source of financing. Looking at the different percentual values observed it can be affirmed that companies active in Manufacturing and Building Sector show a preference for Debt financing.

Even these two last series of tests (B – C) present some χ^2 statistics close to their respective critical values, e.g. B1, B5, B7, C1, C3, C5. However, given $p=.05$ they are not enough to refuse their associated Null hypothesis.
At $p=.10$, tests B1, B5, B7, C3 would see statistically confirmed the difference of the response rates. With this *p-value* and with particular reference to the B-series of tests, this work would have 4 tests out of 7 confirming the correlation among relative size and differences in the investment behavior.
Anyway, this study wants to be aligned with the statistics literature which suggests the adoption of a *p-value* of .05 in these kinds of analysis and thus being in accordance also with the works presented in the financial literature.

Given the statistical results, what emerges with a confidence level of 95%, from the statistical tests that investigated the three different categorizations of firms - Legal Form, Relative Size, Business Sector of Activity - is that the Capital Budgeting Process of Medium Size Companies located in North East Italy is overall homogeneous and thus the Hypothesis of different investment behaviors accordingly to specific variables/features of the medium size firms has to be rejected. Of 21 tests, only two gave significant results to affirm that there is a different investment behaviour among categories, not enough to claim the existence of a heterogeneous Capital Budgeting Process depending on businesses' characteristics.

With regards to the correlation between personal traits of financial managers and use of NPV technique, the two Chi Squared tests do not confirm the hypothesis. From the analysis, the possession of a Degree in Economics related fields do not

address managers to adopt with higher frequency the NPV method. Neither the experience of managers seems to be correlated to the use of this technique. Explanations for these findings could be found in the literature. As mentioned, many authors observed that the NPV (and IRR) method is widely popular among Large businesses. Therefore, the discriminant variable that leads the adoption of this technique could be the size of the company and not the Education/Experience of managers. The assumption that NPV could be linked to the variable "Education" was born from the logic association of the following statements:

1- *"Large Firms widely use NPV"*
2- *"Financial Managers of Large companies are mostly graduated in economics related fields"*

Hence: "The adoption of NPV method is correlated to the possession of a Degree in economics related field."

This association proved to be false for what concerns medium size companies. As said, probably, the unique discriminant is the size of companies and personal traits of respondents are not correlated.

5.4 Conclusions and Limitations of the Study

Capital Budgeting is an important activity that consists in searching, evaluating, assessing, implementing and monitoring projects. These projects represent the long-term investment of any business and thus, financial managers and all the people involved in the decisional path must put the maximum effort to assure that the best one is undertaken. Wrong investments, given their size, could lead the company to financial distress and bankruptcy. A bad evaluation of future cashflows may arise from several causes such as the misuse of financial techniques, the non-consideration of risk or the presence of behavioral biases in the investment decision. Managers should limit the possibility of incurring in bad investments through the execution of a well-defined Capital Budgeting Process. Each one of the four main steps of the process has its objectives and has to be aligned with the others, from the Identification of Investment opportunities phase to the post implementation Monitoring.

Projects considered must follow the strategy footprint and should be looking at the long term. Sizable investments with a short-term horizon could be a signal that the firm is overwhelmed by the competition and it is striving to survive, hence in a not sustainable situation.

In accordance to the peculiarities of the projects, these should be financially measured through the adoption of the right techniques. None of the methods is always the best one, it is up to the managers to know their advantages and criticalities and hence to apply them in the correct way.

Then, after the decision of investment, firms should set up a detailed plan to break up the project into individual activities and tasks to be performed, each one with a person at the lead who has to assure the respects of deadlines and budgets.

Finally, projects must be monitored in order to spot the reasons of misalignment between actual and expected results.

This thesis focused on the Capital Budgeting Process of 271 Italian medium size companies located in the north-east. The aim of the analysis was twofold: understanding if the observations of the financial literature were true even for these firms and finding evidence of a different investment behaviour among them in relation to some variables/characteristics. All the data have been collected through an online questionnaire sent to 2214 companies.

With reference to the first objective, the results reflect the literature.

The Payback Period proved to be the most popular technique even for medium size companies and with the NPV and IRR that show low frequency of use.

In line with other authors' researches, "Identification & Filtering of Investment Opportunities" phase is the step of the process deemed as the most critical one by financial managers, this highlights the difficulties that companies face daily to innovate themselves.

The configuration of the Cost of Capital applied in the computations of managers is often the Cost of Debt, as the literature says. This even if the present work observed an almost equal split among Debt and Equity as the main source of capital of the company analyzed.

The second aim was tackled through a statistical analysis of the responses focused on more financial topics, such as techniques and cost of capital.

χ^2 tests were conducted to find a correlation among the investment behavior and firms' traits namely the Legal Form (Spa/Srl), the Relative Size (Large Medium Size Companies/Small Medium Size Companies), the Business Sector (Manufacturing & Building/Retail/Services).

Out of 21 tests, only two confirmed the existence of a different investment behavior among groups. Specifically: the relative size is correlated to the use of the IRR method, "large" medium size companies show a higher frequency of this technique; firms active in the Manufacturing & Building sector rely more on Debt Financing and conversely the others show a preference for Equity funded projects.

Anyway, these findings are not enough to validate the Hypothesis of a different investment behaviour.

The same conclusion arises from χ^2 tests about the possible correlation among personal traits of financial managers and the use of the NPV technique. Neither the possession of a Degree in economics related fields nor the years of tenure (experience) are variables statistically significative to validate the Hypothesis.

This study individuated medium size firms accordingly to the criteria of the European Union, which fixes thresholds on the number of employees together with the amount of sales *or* the total value of assets. Anyway, one of the main classifications object of the study, Large medium size firms vs Small medium size firms, was based solely on one criterion: the amount of sales. Medium sized companies in accordance with the EU requirements were further divided by looking at the amount of sales, with the discriminant threshold of 25 million €. This amount is completely arbitrary and different values could result in different conclusion.

Another limitation of the research is given by its greater focus (both theoretical and analytical) on the financial evaluation phase rather than on other steps equally relevant, as the Identification of opportunities step or the Monitoring step. As a partial justification this work has a corporate finance framework and thus more attention has been put on financial concerns.

An additional limitation, this one more technical than conceptual, arises from those technical problems encountered by some respondents (which number is not clear – at maximum they could weight a 3,5% of the total recipients, but they are probably lower) that were for this reason unable to subscribe the questionnaire. These "lost" answers could have led the research to other conclusions. Anyways, the author claims the response rate obtained (12,2%) as significant for the purposes of analysis.

This work, with its focal point on Italian medium size firms has enlarged the financial literature on the Capital Budgeting Process. Only a couple of papers tackled more or less the same topic and had the same scope of analysis, both of the same cited author (cf. Rossi 2014, 2015).

This is why this thesis with its originality, could inspire other students and researchers to expand the analysis or to better focus on some of its aspects. For example, a comparison with same size firms of other regions could be done or the other steps of the Capital Budgeting Process could be better investigated, always with the main objective to spot the existence of a different investment behavior correlated to particular characteristics of the companies or personal traits of their managers.

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