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Working Capital Management and Profitability:

The Telecom Case

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Abstract

The Working Capital Management should be carried out as efficiently as possible in order to maximize value creation for the various stakeholders. This relationship between efficiency and profitability has been examined by several authors who have attempted to establish this relationship through the analysis of three elements: current financial management policies, size and industry.

The purpose of this study is to examine empirically the specific relationship between profitability and efficiency of working capital management in the worldwide telecommunication services industry. The sample consists of 48 companies classified by Reuters® as Integrated Telecommunication Operators, resulting in 488 firm-year observations for the period 1998-2009.

Through the analysis of descriptive statistics, Pearson correlation and of the regressions performed by the Fixed Effects Model, it is possible to conclude that the Net Trade Cycle is a better measure of efficiency of Working Capital Management in the telecommunication industry, when compared with the Cash Conversion Cycle. Another conclusion is that increasing the Net Trade Cycle represents an enhance of profitability of the telecom operators. This increase at the Net Trade Cycle level can be generated by reducing the number of days sales of accounts payable.

Overall, the telecommunication services companies may be facing some needs for investment at the Working Capital level.

***JEL* Classification:** G30; M40

Keywords: Working Capital Management; Return On Assets; Net Trade Cycle; Cash Conversion Cycle

Resumo

A Gestão das Necessidades em Fundo de Maneio deve ser efectuada da forma mais eficiente possível, de modo a potenciar a criação de valor para os diferentes *stakeholders*. Esta relação entre eficiência e rentabilidade tem sido objecto de análise por parte de diversos autores, os quais têm tentado estabelecer esta relação através da análise de três elementos: políticas de gestão financeira corrente, dimensão e indústria.

O objectivo do presente estudo é analisar, empiricamente, a relação específica entre rentabilidade e a eficiência da Gestão das Necessidades em Fundo de Maneio no sector dos serviços de telecomunicações a nível mundial. A amostra contém 48 empresas classificadas pela Reuters® como Operadores Integrados de Telecomunicações, traduzindo-se em 488 observações empresa-ano, com referência ao período de 1998 a 2009.

Através da análise da estatística descritiva, da correlação de Pearson e das regressões efectuadas pelo Método dos Efeitos Fixos, é possível concluir que o Ciclo Financeiro de Exploração se apresenta como melhor medida de eficiência da Gestão das Necessidades em Fundo de Maneio no sector das telecomunicações, quando comparado com o Ciclo de Conversão Monetário. Conclui-se também que aumentar o Ciclo Financeiro de Exploração se traduz num acréscimo na rentabilidade dos operadores de telecomunicações. Este aumento ao nível do Ciclo Financeiro de Exploração poderá ser gerado pela redução do número de dias de vendas de contas a pagar a fornecedores.

Em termos globais, os operadores de telecomunicações poderão estar defronte de necessidades de investimento ao nível das Necessidades de Fundo de Maneio.

Classificação *JEL*: G30; M40
Palavras-Chave: Gestão das Necessidades em Fundo de Maneio; Rentabilidade dos Activos; Ciclo Financeiro de Exploração; Ciclo de Conversão Monetário.

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List of Abbreviations

NFM – Necessidades em Fundo de Maneio (PT)

RCP – Rentabilidade dos Capitais Próprios (PT)

RA – Rentabilidade do Activo (PT)

CFE – Ciclo Financeiro de Exploração (PT)

CCM – Ciclo de Conversão Monetário (PT)

CFO – Chief Financial Officer

OECD – Organization for Economic Co-operation and Development

ITU – International Telecommunication Union

GDP – Gross Domestic Product

CAPEX – Capital Expenditures

1G – First Generation

2G – Second Generation

3G – Third Generation

4G – Fourth Generation

FTTH – Fiber-to-the-Home

ARPU – Average Revenue Per User

NGN – Next Generation Networks

VoIP – Voice over Internet Protocol

MTR – Mobile Termination Rates

OPEX – Operating Expenditures

MDF – Main Distribution Frames

GPRS – General Packet Radio Service

LTE – Long-Term Evolution

SME – Small and Medium-Sized Enterprise

USD – United States Dollar (Currency)

EUR – Euro (Currency)

EBIT – Earnings Before Interest and Taxes

ROA – Return On Assets

CCC – Cash Conversion Cycle

DAR – Number of Days of Accounts Receivable

DINV – Number of Days of Inventory

DAP – Number of Days of Accounts Payable

NTC – Net Trade Cycle

DSINV – Number of Days Sales of Inventory

DSAP – Number of Days Sales of Accounts Payable

SGR – Sales Growth

OLS – Ordinary Least of Squares

FER – Fixed Effects Regression

RER – Random Effects Regression

CA – Current Assets

TA – Total Assets

CL – Current Liabilities

TL – Total Liabilities

Index

1. Sumário Executivo

A Gestão das Necessidades em Fundo de Maneio (NFM) representa uma forma eficiente de optimizar recursos que se encontram à disposição de uma empresa. Esta optimização permite às empresas de telecomunicações, neste caso em particular, uma maior flexibilidade financeira que lhes possibilita a focalização no crescimento quer organicamente, quer através de Fusões e Aquisições. Por outro lado, permite uma melhor adaptação a alterações nas condições de mercado como aquelas que se verificam desde o início dos anos 2000 até hoje.

O enfoque na optimização de recursos deve-se à necessidade que a gestão de uma empresa tem de acrescentar valor para os seus *stakeholders*, especialmente para os seus accionistas. Tal como nos é descrito por Gitman (2002), os gestores apenas devem levar a cabo as acções que podem gerar um aumento no valor das acções, *i.e.* aumentar o valor da empresa, aumentando também a rentabilidade dos investimentos dos accionistas.

De acordo com Nazir e Afza (2009), diferentes políticas de gestão financeira podem impactar ao nível da percepção dos investidores. No seu estudo, os autores referem que uma política de Gestão das NFM agressiva é valorizada pelos investidores. Se considerarmos que os investidores vão adicionar mais acções de determinada empresa ao seu portfólio tendo por base a racionalidade existente na gestão corrente, essa compra irá aumentar o valor de cada acção, e por conseguinte o valor da carteira dos actuais accionistas dessa empresa. No entanto, convém salientar que esta abordagem é vista de um ponto de vista da Rentabilidade dos Capitais Próprios (RCP), não sendo esta a medida de rentabilidade que serve de referência ao presente estudo.

Uma Gestão das NFM deve ser seguida através do balanço entre os três componentes que lhe são inerentes: gestão de contas a receber, gestão de inventários e gestão de contas a pagar. Tal como Deloof (2003) sugere, o equilíbrio entre estas variáveis, que constituem as NFM, deve ser conseguido de forma a maximizar o valor para os accionistas.

É neste contexto que é realizado o presente estudo, cujo objectivo é o de compreender de que forma as empresas de telecomunicações gerem os seus recursos de curto prazo

como forma de prosseguir o objectivo da criação de valor para os seus accionistas. O mesmo é dizer, como é que uma gestão financeira eficiente se traduz num incremento na Rentabilidade dos Activos (RA). A escolha deste sector para a análise deve-se essencialmente ao facto de existir uma grande riqueza ao nível dos comportamentos das diferentes rubricas. Por um lado, existe uma panóplia de macro e micro segmentos de clientes, os quais poderão ser analisados internamente como forma a compreender o seu impacto ao nível da gestão financeira de curto prazo. Por outro lado, existe uma diversidade de fornecedores dos quais as empresas de telecomunicações dependem para dar continuidade ao seu negócio, o que poderá tornar mais complexa a gestão corrente. Pode-se também identificar o potencial de sinergias entre as áreas de contas a receber e contas a pagar pelo impacto que uma gestão integrada de ambas as rubricas pode ter ao nível do investimento ou desinvestimento em NFM.

A análise efectuada, que visa estabelecer empiricamente a relação acima referida, está dividida em três momentos distintos: análise descritiva da amostra, análise da correlação entre as variáveis e análise da regressão estimada através do Modelo dos Efeitos Fixos. A análise tem por base uma amostra de 48 empresas consideradas pela Reuters® como Operadores Integrados de Telecomunicações, para os anos 1998-2009, contando com 488 observações empresa-ano.

Através da análise descritiva da amostra, verifica-se ao nível das rubricas associadas ao Ciclo Financeiro de Exploração (CFE), que o tempo de cobrança de dívida de clientes demora em média 80 dias de vendas, que o tempo médio de duração de inventários em função das vendas é de 7 dias e que o prazo médio de pagamentos a fornecedores é de 168 dias. Resultados semelhantes a estes são obtidos quando considerado o Ciclo de Conversão Monetário (CCM).

Na análise descritiva é também possível verificar que existe a possibilidade de os operadores de telecomunicações estarem a seguir uma política de gestão financeira agressiva, dado o elevado nível de Passivos Correntes face a Passivos Totais (40%), e o baixo nível de Activos Correntes face aos Activos Totais (12%). A confirmar-se este cenário, é possível que o seguimento de tal política se deva ao facto de os operadores de telecomunicações entenderem que os seus investidores dão importância à forma como é efectuada a gestão corrente da empresa.

Ao nível da análise de correlação, os resultados indicam que todos os componentes associados ao CFE estão significativamente e negativamente correlacionados com a

rentabilidade, sendo que o mesmo não acontece com os componentes do CCM. Verifica-se também uma correlação significativa e negativa entre o CCM e a RA, e uma relação significativa e positiva entre o CFE e a RA.

Embora a análise de correlação permita antecipar sinais da relação existente entre as variáveis, não permite retirar conclusões sobre causas e efeitos. Para tal, efectua-se então a análise à regressão estimada através do Modelo dos Efeitos Fixos, o qual foi seleccionado de entre os restantes modelos de análise de dados em painel através de ensaio de hipóteses.

Através da análise da regressão verifica-se que o CFE se apresenta como sendo mais completo para explicar a relação existente entre esta medida de eficiência e a rentabilidade, quando comparado com o CCM. É também possível concluir que o aumento em um dia no CFE se traduz num incremento de 0.047% na rentabilidade dos operadores de telecomunicações. Estes resultados contradizem os obtidos por autores como Shin e Soenen (1998), Deloof (2003) e Garcia-Teruel (2007), que apuram uma relação inversa entre as suas medidas de eficiência e a rentabilidade.

O resultado ao nível da relação positiva entre o CFE e RA poderá estar relacionado com a necessidade de mais investimento por parte dos operadores de telecomunicações nas NFM, o qual poderá ser efectuado pela redução do número de dias de vendas de contas a pagar a fornecedores.

2. Introduction

In the Corporate Finance literature, there are several occasions when issues related to capital structure and budgeting, dividend policy and financing of the companies are addressed. These topics are often discussed as a way to provide the future practitioners and professionals of the financial management areas the main background regarding a business valuation. Therefore, issues regarding the short-term management of a firm, which frequently allow a better knowledge of the firm's activities and their development potential, are usually considered less important, being the topics related to working capital analyzed only in an investment or divestment point of view.

Despite the fact that the non-current management of a company, which is usually related to long-term decisions about investment and financing, has a substantial impact on the firm's profitability and sustainability, the basic decisions regarding, for instance, trade credit, stock holdings and supplier payments management, should not be neglected by the company's managers. These decisions associated with the daily management of a firm, although having low expression in the short-term, can impact on the firm's liquidity.

All companies should pay attention to their liquidity management, which is highly influenced by the short-term management of a firm. The importance of the liquidity is associated with a sustainable development of a company's businesses, therefore with the future profitability of a company. These issues regarding liquidity and profitability are most relevant since the true motivation for the existence of a company is to create value for its stakeholders.

The idea that there is only one reason for the existence of a firm must not be considered reductive for the individual purpose of each of the stakeholders. In fact, different stakeholders, who apparently have diverse reasons for being associated with a company, require ultimately the success of that company which has to be measured by its sustainable continuation. If, like I mentioned before, a business sustainable development is only possible if the company has internally generated resources to grow, it is imperative to have an efficient liquidity management.

The telecommunication services industry, like many other sectors, is not apart from liquidity issues, meaning that these companies are also concerned about the

predictability of their cash-flows. In fact, the macroeconomic developments that occurred since the early 2000s until the present day have brought to the day-to-day business the problem of the scarcity of financial resources. As a result, companies like the telecoms, turn to their own businesses in order to optimize their financial management processes as a way to liberate cash resources to other investments. In these cases, resources have to be channeled to the infrastructure.
The optimization of processes of working capital management has to be mainly focused on the efficiency of receivables, payables and inventories.

The subject of the efficiency of working capital management has been addressed by many authors, which tested a relationship between working capital management efficiency and the profitability of the firms.
The purpose of this study is to analyze empirically the issue of the working capital management impact on telecommunication services companies' profitability.
This study is different from other studies because it is the first time that an empirical study is carried out by testing the hypothesis of an inverse relation between Working Capital Management efficiency and profitability for a specific industry: the telecommunication services sector.
Another difference between the present study and previous empirical studies regarding this subject is the choice, through empirical analysis, of one of two different measures of working capital management efficiency. The motivation of running such test is to supply evidence whether the efficiency measures differ from industry to industry.
Similarly to Deloof (2003), Padachi (2006) and Garcia-Teruel (2007) studies, in this study I also test the impact of each of the working capital management components on a firm's profitability. The purpose of such tests is to provide insight on the hypothesis of the potentially positive effects of a reduction in working capital management on the profitability, being related to: a reduction of the Current Assets (Accounts Receivable and/or Inventories), an increase in the Current Liabilities (Accounts Payable), or both.

3. Literary Review

The main purpose of this section is to introduce the working capital at the theoretical and empirical levels. For this, I analyze the key concepts associated with working capital management theory, and I verify the existent empirical background related to the relationship between short-term management efficiency and profitability, which will help define the main framework associated with this study.

3.1. Introducing the Working Capital Management Concept

In corporate finance literature we find extensive descriptions of methodologies for the evaluation of companies and projects, which are carried out considering different decision models whose purpose is to decide whether to invest or not. The evaluation analysis of these companies or projects usually has a considerable focus on long-term decisions. According to Ross, the aim of corporate finance is to answer three key questions: "what long-term investments (...)? Where will you get the long-term financing (...)? How will you manage your everyday financial activities?". (Ross *et al*, 2002: 4)

The focus on the long-term is not surprising when considering that the company is constituted without a predetermined closing time, or when considering that its existence must respond to the needs of the different stakeholders[1]. One of the major concerns of shareholders is the return on the investment made, therefore, the last issue addressed by Ross, related to the daily management of the company, is particularly important considering that "(...) the goal of financial management is to (...) add value for the owners". This concept of adding value to the shareholders reflects a maximization of "the current value per share of the existing stock", which is influenced by the financial managers decisions that impact in the short, medium and long terms (Ross *et al*, 2002: 11). Gitman also covers the impact of the financial decisions on share prices by suggesting that "financial managers should accept only those actions that are expected

[1] "A stakeholder is someone other than shareholder or creditor who potentially has a claim on the cash flows of the firm" (Ross *et al*, 2002: 16).

to increase share price", however, the financial manager has to take into account two main variables that are "return (cash flow) and risk", which implies that there must be a decision making process (Gitman, 2002: 15).

As part of running a business, there are times when managers are faced with issues related to the capital structure of the company, which means that they have to decide whether to use short term or medium-long term debt, or to resort to capital increases in order to finance the company's operations or to pursuit new projects or acquisitions in the financial markets. In fact, the issuance of debt or the capital improvements are easier ways to finance when the availability of internal cash is short, rather than changing the management policies in order to optimize the internal resources (when it is still possible to optimize).

The internally generated funds are strongly influenced by the Working Capital performance. Working Capital results from the difference between Current Assets and Current Liabilities of the company, and is then associated to the short term financial management. Ross suggests that the main concern of the short term financial management "is the firms short-run operating and financing activities". (Ross *et al*, 2002: 641) There are many reasons for a company to depend on internally generated funds instead of looking for external resources. Among them are "(...) the cost of issuing new securities" and "(...) the announcement of a new equity issue is usually bad news for investors". In fact, usually investors, shareholders and analysts follow the policies undertaken by the management teams given the impact of these decisions on future profitability, as well as on the performance of the shares in the stock markets. (Brealey *et al*, 2003: 379) Apart from these reasons, it is worth mentioning that the optimization of resources invested in Working Capital may impact on a greater financial flexibility, particularly with regard to growth strategies, and may lead to a better adaptability to changes in market conditions.

According to Shin and Soenen "the way in which working capital is managed can (...) impact on both liquidity and profitability" (Shin and Soenen, 1998: 37). In fact, the Working Capital's components, which will be discussed later, are directly related to the issue of liquidity[2] for the reason that "Current Assets are cash and other assets that are

[2] "The liquidity of a firm is measured by its ability to satisfy its short-term obligations as they come due. Liquidity refers to (...) the ease with which it can pay its bills" (Gitman, 2002: 54)

expected to convert to cash within the year" and that "Current Liabilities are obligations that are expected to require cash payment within one year", *i.e.* this is a matter of conversion of assets or liabilities in inflows or outflows that occur within a year. (Ross *et al*, 2002: 640; Gitman, 2002: 44)

3.2. Components of Working Capital Management

Earlier it was described that Working Capital is based on Current Assets and Current Liabilities, and these are related to liquidity concerns. It is possible to identify between Current Assets and Current Liabilities, the three fundamental components that constitute the core of Working Capital Management. On one hand we have the Suppliers that generate Accounts Payable, and that bring an input that is Inventory (other inputs can be considered, such as energy, water supply, equipment maintenance). On the other hand we have the Inventories that are later sold to the Customers, which generate Accounts Receivable. In his analysis, Deloof describes that "firms may have an optimal level of working capital that maximizes their value", which indicates that it is by optimizing these three components – Accounts Payable, Inventory and Accounts Receivable – that value is added to the company; hence for shareholders (Deloof, 2003: 573).

Taking into account the concept originally presented in which the Working Capital is based on both Current Assets and Current Liabilities, it is possible to frame the components mentioned before considering their accountancy category.

It is possible to consider that one of the most relevant Current Liability is Accounts Payable, *i.e.*, "outstanding payments to other companies" (Brealey *et al*, 2003: 853). The relevance of this component is the fact that it "arises from the normal course of business", so the company can "take advantage of these 'interest-free' sources of unsecured short-term financing whenever possible" (Gitman, 2002: 636).

Regarding the Accounts Payable component, Deloof notes in his study that "delaying payments (...) can be an inexpensive and flexible source of financing", which means that the existence of this component is associated with the financing policy of the Current Assets – Inventories in particular – in the sense that it is possible to delay the payment to the firm's suppliers in order to postpone the cash outflow. However, Deloof points out that the "late payment of invoices can be very costly if the firm is offered a

discount for early payment", which implies that the financial managers have to consider the opportunity cost of capital, *i.e.*, choosing between paying earlier and getting the discount at a specific rate or postpone the payment and use the cash on an investment with an equal or higher rate of return (Deloof, 2003: 1). It should be noted that the delay in payments to suppliers does not mean an easier financing way due to the bad negotiation position that most of the companies have in relation to their suppliers. Some suppliers have a good financial position that allows them to suspend the delivery of Inventory to their clients, which will affect the stability of the firms operations. However, this does not mean that "companies that are strapped for cash (...) solve the problem by stretching payables", *i.e.* that companies that face difficulties in obtaining short term loans (as commercial paper) or face complications on receiving from its customers, stand on the margin they have to extend payment terms to their suppliers (Brealey *et al*, 2003: 853).

Inventories are usually raw materials, finished goods and other products which are essential to a normal operational development. The Inventory is considered a Current Asset because it is expected to be converted in cash within the year. The company may have a reasonable stock management since the investments in Inventory are usually translated into a substantial capital tie. The issue of the allocation of capital in Inventory is also linked to the existence of a variety of risks, such as those described by Brealey, "(...) the risk of spoilage or obsolence". It should also be considered the incurred costs for the storage of the products that result in increases in the amount allocated to those Inventories. Regarding the issue of the capital allocation in inventories it should then be considered the opportunity cost of capital, when the rationale can be applied, since there may be a "rate of return offered by other equivalent-risk investment opportunity" (Brealey *et al*, 2003: 852).

Regarding the Accounts Receivable component, these are classified as Current Assets. The extent of this area is emphasized by Brealey, who describes it as "unpaid bills, or trade credit, makes up the bulk of accounts receivable", *i.e.* the size of this area is not only associated with the fact that there are policies and practices regarding the granting of trade credit[3] to customers, but also with the existence of customers debts who are in a

[3] Trade Credit is the sale of goods or services before the existence of any payments from customers. Hence, the seller provides short-term credit.

recovery phase (Brealey *et al*, 2003: 851). It should also be considered that the existence of claims from customers, when combined with a rational policy for granting loans, is related to a way of simplifying and encouraging customers to buy larger amounts of products, or at least a way to make customers anticipate their investments because of uncomplicated financing conditions. Nevertheless, it is important to keep in mind that the granting of trade credit to the customers normally represents a great financial effort, implying the existence of liquidity from the company's operations or funding of short or medium-term, depending on the funding policy followed by the company.

By defining the different components, it is possible to infer that Working Capital is something that is constantly changing. Therefore, it becomes essential the existence of measures that assess the efficiency of Working Capital Management. According to Deloof, "a popular measure of Working Capital Management is the cash conversion cycle, *i.e.* the time lag between the expenditure for the purchases (...) and the collection of sales" (Deloof, 2003: 2). Ross also describes the Cash Conversion Cycle (CCC) as "the difference between the operating cycle and the accounts payable period", which means that it is the time lag between the conversion of the product (as Inventory) in receivables that will generate cash inflows, and the period of accounts payable that will generate cash outflows (Ross *et al*, 2002: 643).

Another method to assess the efficiency of Working Capital Management is the Net Trade Cycle (NTC). Shin and Soenen suggests this measure as an alternative to the Cash Conversion Cycle because they consider that "(...) the CCC is an additive concept", that is a measure based on the addition of different time lags (Days of Inventories, Days of Accounts Receivable and Days of Accounts Payable) that are "not really useful". In fact, the Net Trade Cycle is a measure that contains components of the Cash Conversion Cycle but expressed as a percentage of sales. The Net Trade Cycle "(...) indicates the number of 'day's sales' the company has to finance its working capital", so it allows a better insight of the performance of Working Capital Management, since it takes into account the sales growth (Shin and Soenen, 1998: 38).

3.3. Working Capital Management Efficiency and Profitability

The efficiency of Working Capital Management is mainly based on the principles of receiving as soon as possible from customers and to pay as late as possible to suppliers. This rationale is implicit in the earlier mentioned measures of efficiency – Cash Conversion Cycle and Net Trade Cycle – since they pay a special attention to the periods of occurrence of cash inflows and outflows.

The concern about the timings of the occurrence of cash flows is not innocent, and is related to the issue of profitability. In fact, Ross refers that "the link between the firms cash cycle and its profitability can be easily seen by recalling that one of the basic determinants of profitability and growth for a firm is its total assets turnover"[4], *i.e.* the link between the Cash Conversion Cycle and Current Assets represents an impact on Total Assets, which implies an higher/lower Net Return on Assets[5] (Ross *et al*, 2002: 648). On the other hand, Shin and Soenen point out that "the shorter the NTC, the higher the present value of the net cash flow generated by assets and (...) the lower the need for external financing", suggesting that the lesser the resource to external financing the lower will be the average cost of debt, so the higher can be the shareholders return (Shin and Soenen, 1998: 38).

Concerning the connection between profitability and the timing of the cash-flows caused by Current Assets and Current Liabilities, Deloof suggests that "managers can create value for their shareholders by reducing the number of days accounts receivable and inventories to a reasonable minimum", which implies that customers must pay sooner or that the company must have a trade credit policy that enhances the company revenues. About Accounts Payable, Deloof concludes that "the negative relation between accounts payable and profitability is consistent with the view that less profitable firms wait longer to pay their bills", *i.e.* a late payment policy may not be converted into profitability, hence may not create value for shareholders' (Deloof, 2003: 9).

The issue of the profitability that can be generated by an efficient Working Capital Management usually brings up issues related to the managements' policies that are

[4] The Total Assets Turnover Ratio is Net Sales divided by Total Assets.
[5] The Return on Assets ratio results from Net Income divided by Total Assets, and "measures the overall effectiveness of management in generating profits with its available assets" (Gitman, 2002: 65).

carried out by companies. Garcia-Teruel states that the companies can choose between two different strategies of Working Capital Management, "they can minimize working capital investment or (...) adopt working capital policies designed to increase sales", that is, companies can pursue strategies that have a direct impact on investments and that can be translated into reductions to safety margins of each working capital components, or alternatively, companies can pursue policies that permit a rational expansion of daily operations. Basically, the choice between these two strategies can be summarized in following: an aggressive or a conservative approach to Working Capital Management. Garcia-Teruel specifies that the choice between the two approaches must be based on the evaluation of the "trade-off between expected profitability and risk" (Garcia-Teruel *et al*, 2007: 166).

The real difference between the Aggressive and the Conservative strategies is essentially supported on the balance between the weight of Current Assets and Current Liabilities. Weinraub (1998) reveals that an Aggressive Strategy "results in capital being minimized in current assets versus long-term investments" and makes use of "higher levels of normally lower cost short-term debt and less long-term capital". Thus the strategy is focused on minimizing the Current Assets as much as possible and, on the other hand, maximizing the use of short-term financing, as commercial paper, bank financing or accounts payable. Unlike an aggressive policy, an "conservative policy places a greater proportion of capital in liquid assets" and "uses higher cost of capital but postpones the principal repayment of debt", which means that a Conservative Strategy is based on an higher level of Current Assets due to their liquidity, and on a lower level of short-term financing, avoiding the cash outflows that result from the principal repayment of, for instance, commercial paper (Weinraub *et al*, 1998: 12).

Concerning the link between the strategies adopted within the Working Capital Management and Profitability, Garcia-Teruel points out that "aggressive policies would positively affect the profitability of the firm, by reducing the proportion of its total assets in the form of net current assets". Actually, a reduction in the Current Assets (when considering optimal levels of Inventory and Accounts Receivable) provides a decrease in the Total Assets producing, *ceteris paribus*, a superior Return on Assets (Garcia-Teruel *et al*, 2007: 166). In contrast, ALShubiri suggests that an conservative strategy "yields a lower expected profitability resulting in a lower risk" given that a "company's finance is going to be relatively high cost", meaning that this kind of

strategies can signify an increase in funding costs as a way to increase the Current Assets. An increase in the Inventory levels and a more comfortable trade credit policy may generate a boost in sales which will cause a higher Net Income. So basically an augment of these two variables can generate an increase in Return on Assets (ROA), therefore shareholders' will have a better return on their investment with a higher level of liquidity (ALShubiri, 2011: 41).

3.4. Working Capital Management, Market Conditions and Industry Specifications

When Working Capital Management is being evaluated, it must be taken into account the specifics of each company and each industry sector. The strategies described earlier should also be followed depending on the needs and difficulties faced in each sector.

As previously mentioned, Working Capital is in constant change. This change results not only from the Working Capital components (Inventory, Accounts Receivable and Accounts Payable) but also from external factors. As indicated by Darun, "while external macro-factors are affecting all companies, regardless of the industry, only companies within a particular industry are affected from external micro-factors", hence there are specificities that may affect a particular sector more than others, thereby generating different reactions by financial managers (Darun, 2008: 7). The facts referred to are also described by Filbeck, that in his study states that "significant differences exist between industries in working capital measures across time" and that "measures for working capital change significantly within industries across time", pointing to the presence of specific factors that influence different policies associated with the Working Capital Management. Filbeck also notes that "industry factors may impact firm credit policy, inventory management and (...) some firms may be better suited to minimize receivables and inventory, while others maximize payables", which implies that each firm will tend to adopt different optimal policies at the level of the components of Working Capital depending on the market in which it operates (Filbeck *et al*, 2005: 11).

Alternatively, it must also be considered the existence of differences involving the Working Capital Management practices in large companies and in SMEs'[6] given the impact that such policies may have in companies facing different obstacles. Garcia-Teruel, in his study on the effects of Working Capital Management practices in SMEs', concludes that "working capital management is particularly important in the case of small and medium-sized companies". He emphasizes that the importance is due to the fact that "most of these companies assets are in the form of current assets" and that "current liabilities are one of their main sources of financing", *i.e.* it appears that this type of companies have the possibility of running Working Capital Management more efficiently (Garcia-Teruel *et al,* 2007: 175). Howort in a similar study concludes that "small firms are not a homogenous group with regard to working capital management routines", which implies that the scale factor can be associated with a certain level of development and specialization of Working Capital Management between companies (Howort *et al*, 2003: 108).

3.5. Previous Empirical Studies

There are several studies that have addressed the issue of Working Capital Management and its relationship with Profitability. These have tried to answer different questions, addressing different issues that have impact on the daily management of enterprises. In reality, several authors have sought to establish whether this relationship is more strong when different current management policies are undertaken, or if it is more strong depending on the company size, or ultimately, if it really depends on the sector on which the company is allocated.

Nazir and Afza (2009) addressed the relationship between working capital management policies and profitability by analyzing a sample of 204 non-financial Pakistani firms with complete data for the period 1998-2005. The authors conclude that there is no creation of value to the shareholders through the adoption of aggressive working capital management policies. In spite of this conclusion, the authors realize that investors give

[6] It is considered an Small and Medium-sized Enterprise a company that has less than 250 workers and a turnover of at least of 50 million euro or a Balance Sheet total of at least 43 million euro (European Commission definition of SME)

more value to firms that adopt this kind of policies; hence aggressive working capital management policies add value "through increased market performance" (Nazir and Afza, 2009: 27).

ALShuribi (2011) also investigates the relationship between aggressive/conservative working capital management policies and profitability, adding to his study the risk component. The analysis is made over a sample of 59 industrial firms and 14 banks for the period of 2004-2008. The author concludes that, as Nazir and Afza (2009) did, firms yield negative returns if they follow an aggressive working capital management policy. Furthermore, he concludes that there is no significant relationship between the different policies of firms and their operational and financial risk.

By analyzing a sample of 1.009 "large Belgian non-financial firms", Deloof (2003) concluded that it is possible to create value for the shareholders by reducing the number of days accounts receivable and inventories, and that companies with lower profitability take more time to pay their bills (Deloof, 2003: 9). On the other hand, Garcia-Teruel (2007), based on an 8.872 Spanish SMEs' sample, concludes that a decrease in the Cash Conversion Cycle (CCC) to a reasonable minimum enhances the profitability in the SMEs'. In his study, the author addresses the issue of the company scale factor in the ability of companies to generate value, even concluding that "large size firms seem to favor the generation of profitability" (Garcia-Teruel *et al*, 2007: 174).

Padachi (2006) also addresses the issue of company size, through his study on Small and Medium-Sized Enterprises. However, in his study he gives a strong focus on the characteristics of the sectors where his 58 companies sample are divided, indicating that there are significant differences between sectors that may constitute an index of best practices among companies in the same sector. Filbeck (2005) seeks as well, through his study based on data from the CFO Magazine, differences between the Working Capital efficiency measures used by the CFO Magazine, and whether these differences change over time from industry to industry. The author concludes that there is a consistency in how industries gather against each other over time and that there are significant movements across the sample over time, which can be explained by the impact that macroeconomic conditions may have in Working Capital Management.

4. The Telecommunication Sector

In this section I analyze the different factors that are relevant to better understand the functioning of telecommunication sector. This analysis contains a brief history of the sector, both in a financial and technologic point of view, which will facilitate the comprehension of the obtained results and will help establish better cause-effect relationships.

4.1. The Telecommunication Services Market

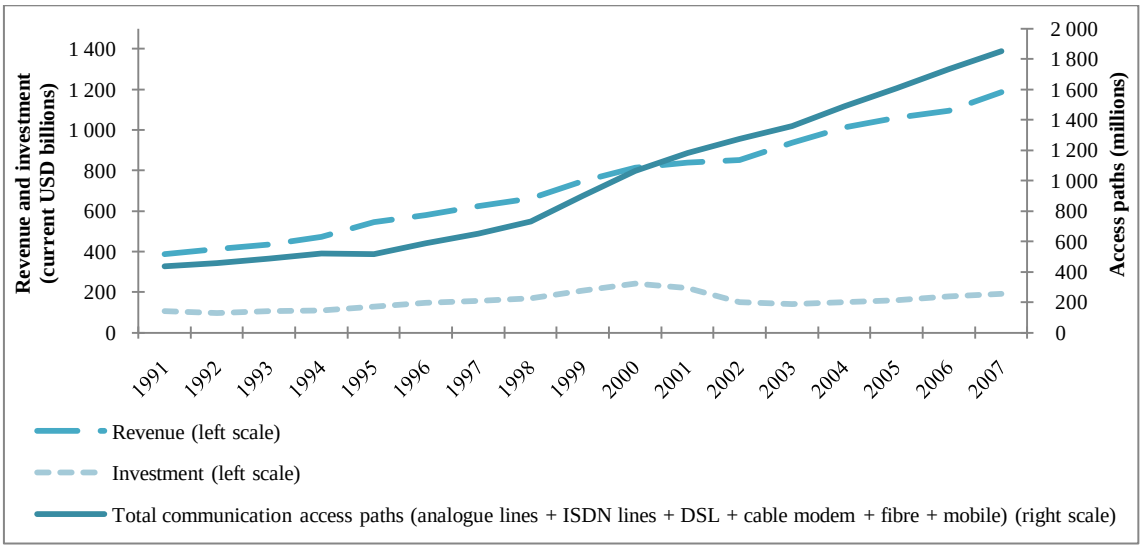
In recent years, the telecommunications sector has proved to be a solid sector on many levels. Since 1990, the sector has a compound average growth rate of 6% (OECD, 2009: 72), which is surprising since there is a general decline of per-minute charges for calls. This consistency was notorious during the outburst of the *dot-com* bubble in 2000-2003, and during the 2008 financial crisis, denoting the resilience of the sector to adverse market conditions.

The importance of the sector in the global economy is due to the facilitating role that it has on many other sectors. According to the International Telecommunication Union (ITU) report on the effects of the 2008 financial crisis, the overall sector represents "up to 7.5% of GDP worldwide (depending on which sectors and services are included)" and has given a great contribution to the world GDP growth (ITU, February 2009: 33).

The *dot-com* bubble came to prove a challenge for most of the telecommunication providers, due to the investments and development phase in which most were. The majority of the telecommunication providers were making large investments on their networks, essentially because of the need of organic growth; other companies were on a Merger & Acquisition phase. This phase was mainly due to the maturity of their domestic markets, but also because many of the developing countries were starting to enter in a privatization stage of their fixed line operators. These facts resulted on many concerns regarding the size of their debt. Most of the issues were overcome by issuing

equity, by the redesign of growth strategies (the Foreign Direct Investment collapsed in many countries because the consolidation moment stopped), and by conservative capital expenditures and efficient cost management. Nonetheless, the impact of such constraints at the operational level was minimized by a sustainable growth in the number of subscribers, which was already observed since 1997, and that was replicated at most of the company's revenues level (Figure 4-1). However, the industry's post-2001 reliance on consumers and businesses made revenues more volatile than in past cycles.

Figure 4-1 – Subscriber, revenue and investment growth 1991-2007



Source: Adapted from OECD Communications Outlook, 2009.

The reaction of the Telecom Operators during the financial crisis that erupted with the bankruptcy of the investment bank Lehman Brothers in 2008, was similar to the reaction during the *dot-com* bubble, since many of the problems encountered previously were intensified, especially with regard to debt.

The 2008 crisis resulted in a shortage of credit and, in other cases, an increase in financing costs. The credit shortage has brought many problems to the program of investments in the infrastructure network, since in most cases these would be achieved through increases in debt. The urgency of these investments was due to the needs of increased network capacity caused by increasing demand in terms of broadband. It also brought issues regarding the refinancing of the debt of the operators, leading them to consider the sale of non-core businesses (ITU, February 2009: 39).

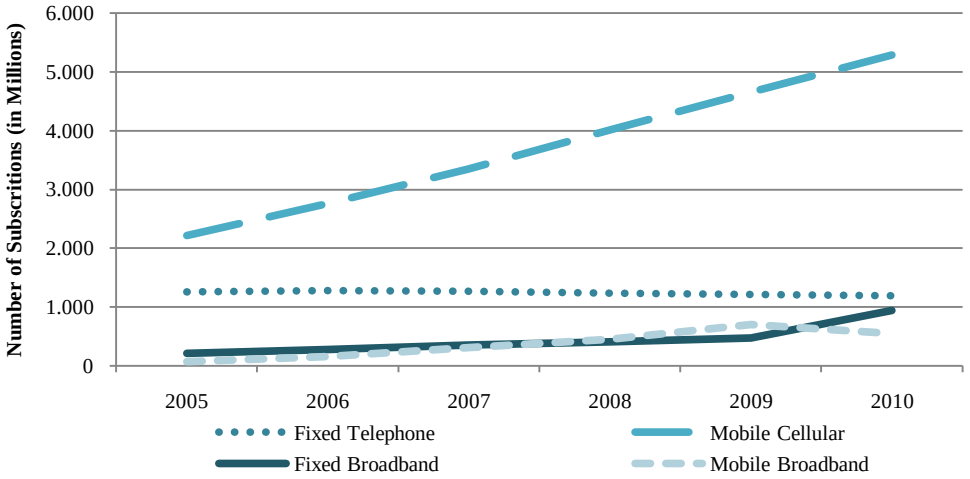
The plans to delay investments in network infrastructure have led many governments to support the operators in the financing of those investments, with the argument that these would stimulate economies with a reasonable replication effect – as mentioned previously, the telecommunications sector corresponds to about 7.5% of the world GDP and has an important role on other sectors.

Most of the difficulties mentioned above were experienced in the fixed network operators. The mobile network operators did not resented as much since they have greater flexibility in terms of Capital Expenditures (CAPEX)[7] – the investments in 3G network upgrades were relatively low compared to those found in fixed networks. In addition, the low equipment prices and the sharing of infrastructure has supported the improvement of services in terms of network coverage, and allowed a greater market penetration of the mobile services (ITU, February 2009: 44).

The 2008 crisis led to several bankruptcies resulting from the scarcity and price of the credit. Predictably, many consumers saw their incomes decline resulting from unemployment. These events brought a growing need of prepaid services, which allow users to control their costs, and of flat-rate packages.
The unemployment exacerbated the phenomenon of fixed-mobile substitution, which caused the fixed network operators to put more urgency in investing in Fiber-to-the-Home (FTTH) as a way to accelerate the convergence of services and increase the supply of bundled services. Despite the rising unemployment, the number of subscribers continued to rise at rates that allowed sustainable domestic revenues, resulting from the materialization of new services and equipment that enable the concept of multiple-play (Figure 4-2).

[7] "A capital expenditure is an outlay of funds by the firm that is expected to produce benefits over a period of time greater than 1 year", and normally these expenditures are done in order to expand or replace fixed assets or other tangible assets (Gitman, 2002: 356).

Figure 4-2 – Worldwide number of subscribers per Telecommunication Service



Source: Adapted from International Telecommunication Union (ITU), 2010.

Overall, it is possible to identify many of the characteristics that explain the buoyancy of the telecommunications providers in adverse economic conditions. The telecommunication services are increasingly seen as non-discretionary spending items, which means that in times of economic downturns, the consumers look for other ways to cut on their budget. This fact is also supported by the application of durations above 12 months on the services contracts, which is also a way for the providers to recover the costs of the equipment supplied to their customers. Contracts with higher durations are usually provided by operators with a financial structure that can compensate a reduced current Average Revenue Per User[8] (ARPU) with future revenues. The growth of bundled services also have supported the enhance of revenues and promoted the customers loyalty.

As mentioned before, one of the areas that is more sensible to economic downturns is the Investment on Capital Expenditures, due to the fact that in this sector the companies initially need to invest large amounts that are not replicated on their revenues in the short-term, but only on the medium-long terms. One of the best examples of the time gap between the investment and the real impact on revenues is the investment made in the 3G Mobile Network, which is only now beginning to actively contribute to the revenues of the mobile operators.

[8] The Average Revenue Per User (ARPU) is a measure mostly used to survey the amount of revenue generated per cell-phone user (or per fixed-line). This measure is useful when an investor or manager needs to identify which products are high or low revenue generators.

4.2. Regulatory Environment

The sector is characterized by a small number of large firms, many of them resulted from the liberalization of the market in many countries in the 1990's, so these firms were mainly state monopolies and considered "natural monopolies"[9]. The transition from that regime to the present system with competition has required the existence of more regulation. Nevertheless, it is important to refer that, as Duffy suggests in his study about technology in the telecommunication sector, this change resulted from a deregulation need given that most of these firms had "exclusive rights to operate telecommunications services" (Duffy, 1997: 27).

According to ITUs' study on the trends in the telecommunication reform, the main objective of the Regulators is to create "an enabling environment for investment, fostering market growth", meaning that the purpose of the regulation is to increase the competition in the market by promoting the investment (ITU, 2010: 7).
The main trends regarding the regulation of the telecommunication sector are related to the introduction of new technologies, like the New Generation Networks (NGN) and the opening of the Voice over IP (VoIP) to the market. The regulation issues regarding these aspects have a slight impact on the firms' net income, because they are related with processes that can impact on their cost structures. But there is a regulation issue that is becoming a problem to the firms: the policy regarding termination rates that can have a real impact on revenues. The ITUs' report on the trends in the telecommunication reform refers that the "mobile termination rates (MTRs) have become a concern in many countries throughout the world", resulting in the introduction of "price controls for mobile interconnection charges" in the European Union (ITU, 2010: 19). According to OECD, the use of voice service in the mobile phones is the most used telecommunication access path in the world and the main growth driver in the industry hence, policies similar to those undertaken by the European Union will certainly affect the revenues of the sector (OECD, 2009: 73).

[9] The telecommunication sector was considered a natural monopoly because of the "large necessary investments for setting up national telecommunication systems" and because "there are increasing returns to scale created on the production as well as consumption side" (ICT Regulation Toolkit, http://www.ictregulationtoolkit.org/en/Section.2478.html).

4.3. Technologic Environment

The increasing in the competition and in the number of subscribers has been one of the main drivers of the technological change. In fact, the increase in competition leads to the necessity of new and more innovative concepts in order to preserve the customers' loyalty to the company. These new concepts normally imply more network capacity. The increase in the network capacity, as well as up and downlink speed, are a response for the increase in the number of subscribers. Therefore, to respond to these needs firms must invest in new fixed and mobile networks.
Another factor that brings the need for new networks is the cost efficiency that those networks offer, producing a lower cost per bit than older technologies and providing a base for the converged services. So basically, the introduction of new networks over the existing ones can also help the firms reduce their Operating and Capital Expenditures (OPEX and CAPEX).

4.3.1. Fixed Networks Technology

As mentioned before, the innovation in the telecommunication sector has been based on the convergence of services, *i.e.* the creation of aggregated services or bundled services provided by a single company. This reality is known as "multiple-play", and the emergence of this concept is mainly related to the decrease in revenues from fixed lines. This decrease results from falling call rates that are a consequence of the growth in competition and the transition to other services such as VoIP.
The existence of the multiple-play is the base of the preservation of fixed lines in some segments, and has brought the need of more bandwidth per user, forcing the service providers to new investments on their networks has a way to support new services and to create new revenue streams.

Initially, the fixed networks were copper-based and were built to support voice traffic. Their evolution process made them able to "support large volumes of voice as well as data" in order to respond to the boost in the amount of data that resulted from the increases in the number of users (Duffy *et al*, 1997: 62).

In the last decade, the fixed networks have been submitted to a progressive upgrade by the implementation of the optical fiber, which provides a higher bandwidth for converged services. The investment on optical fibre has begun on 1995, being installed on high capacity Backbones (main network connection), but only after the year 2000 the service providers started to connect the fiber directly to their customers buildings. So, until recently, most of the consumers had only copper-based network connecting "them" to the Backbone. Only after the *dot-com* bubble, the service providers considered seriously starting the expansion of the fiber networks right to the consumer, by using Fiber-to-the-Home (FTTH)[10]. Considering the ITU's NGN Report, the investment on FTTH assumes that "the entire copper loop is replaced by fiber, along with the main distribution frame (MDF) and street cabinets", meaning that most of the network is upgraded to this technology from the Backbone to the end point (the home network of the consumer) (ITU, December 2009: 7).

When comparing the optical fiber network with the other existing fixed network technologies, it is possible to conclude that it allows a greater capacity regarding the communication transport, and it is easier to expand the network using fiber. The optical fiber is able to support high speed data, as well as high definition and voice, hence it is able to increase the capacity of the up and downstream when comparing to the existing on other network technologies.

In some countries, the investments on optical fiber networks are related to the development of New Generation Networks (NGN). In relation to the NGN, ITU considers in the NGN Report that it is a "network that allows unfettered access to all communication products and services, irrespective of the service provider or network connection", so there are alternative technologies, in addition to optical fiber, that are capable of supporting the NGN access, like coaxial cable, the mobile and the fixed wireless networks (ITU, December 2009: 7). The investment on NGN also offers economic benefits by lowering "substantially operating costs" and allowing "operators to develop services more quickly and more cheaply". These will have an impact on the cost structure of the firms and will potentiate the design of new and more innovative services creating new revenue streams (Gavosto *et al*, 2007: 6).

[10] The ITU NGN report defines Fiber-to-the-Home (FTTH) as "an end-to-end fiber solution to end-user premises".

4.3.2. Mobile Networks Technology

The convergence of telecommunication services is seen as a set of services that include fixed and mobile voice, fixed broadband, mobile broadband and television. The convergence brings the need for the development of infrastructures that support fixed and mobile services as a way to track the growth of this concept, which is expected to generate a bigger flow of data and, ultimately, an increase of ARPU (remember that one of the main goals of most of the Telecom is to increase the ARPU).

The technology related to the mobile networks has evolved since 1980 with the purpose of allowing greater mobility for the users, better transmission quality and signal, and increased functionality of the equipment.

The First Generation Networks (1G) that appeared in early 1980's, were characterized by not allowing enough privacy and security and by only enabling voice services. This analog network also had little capacity in terms of traffic and there were no technologic standards, so it did not provide roaming. In fact, different countries used different systems (*e.g.* the U.S., Canada and Mexico used the AMPS system, and Germany, Austria and Portugal used the C-Netz system).

The evolution to the Second Generation Networks (2G), which replaced the 1G in the early 1990's, has introduced the digital technology to the mobile networks. This new generation of mobile networks brought safer communications and data communications (*e.g.* the Short Message Service), and its introduction implied a great effort of standardization, which resulted on the possibility of using roaming within the same technology. With the introduction of this technology, the equipment manufacturers began producing mobile phones in bulk, making them cheaper, and leading to a greater proliferation of these products to the market. This enlarged the market for the Telecom Operators, who thus saw the number of subscribers increase substantially. The fact that the 2G had slow data transmission led to an upgrade, with the introduction of the General Packet Radio Service (GPRS)[11] that amplified the transmission rates for the data communications and introduced new features designed for the data services (this development is the base of the 2.5G and 2.75G concepts).

[11] The GPRS system is based on packet switching and allows better transmission rates for applications based on data, such as access to Internet/Intranet and downloads.

The technology most widely used is the 2G, although the Telecom Operators have invested heavily in Third Generation Networks (3G) in the early 2000s. As it was previously pointed out, only now the 3G is beginning to actively contribute to the revenues of the mobile operators, due to higher use of data services (*e.g.* Short Message Service, Multimedia Message Service and Mobile Internet). However, and according to the OECD Communications Outlook 2009, the operators are making an effort in order to convince users to migrate from the 2G to the 3G mobile equipment. In fact, the 3G technology was designed to allow higher transmission rates, better quality on the voice services, and to allow the use of multiple services simultaneously. It also permits the use of roaming within the existent mobile network technologies.

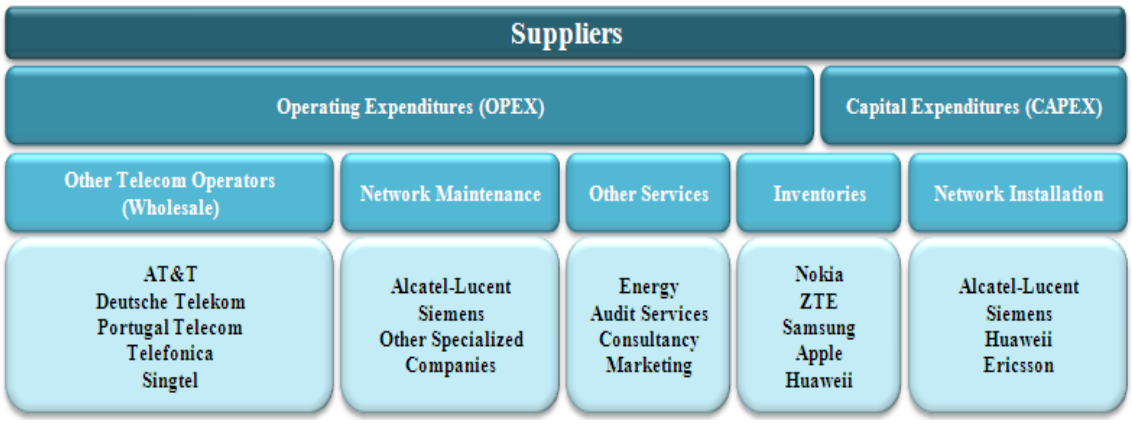
The 3G is also capable of supporting the NGN access. However, some Telecommunication Operators are opting on developing their networks by using the Long-Term Evolution (LTE), which is considered by some to be the Fourth Generation Network Technology (4G). The firms opted for the LTE because it permits fixed-mobile convergence for new real-time applications (like VoIP, messaging with video and two-way video telephony), *i.e.* it simplifies the deployment of all-IP real-time services, which is considered one of the main trends in the Telecom sector. The choice for this technology is not only caused by the new revenue streams that it enhances, but also because it is a cost effective network and facilitates the integration with non-wireless networks.

4.4. The Working Capital Components in the Telecommunication Sector

The environment previously described may have an impact on the different components of working capital – Accounts Receivable, Inventories and Accounts Payable. In this sense, it is important to summarize how the components are reflected in the telecommunication sector.

In terms of Current Liabilities, items related to Suppliers are the major part of this component mainly because this type of companies require high levels of investment in Fixed Assets (essentially fixed and mobile networks). However, there are other types of Suppliers besides the CAPEX related ones that make this component quite relevant within the Current Liabilities (Figure 4-3).

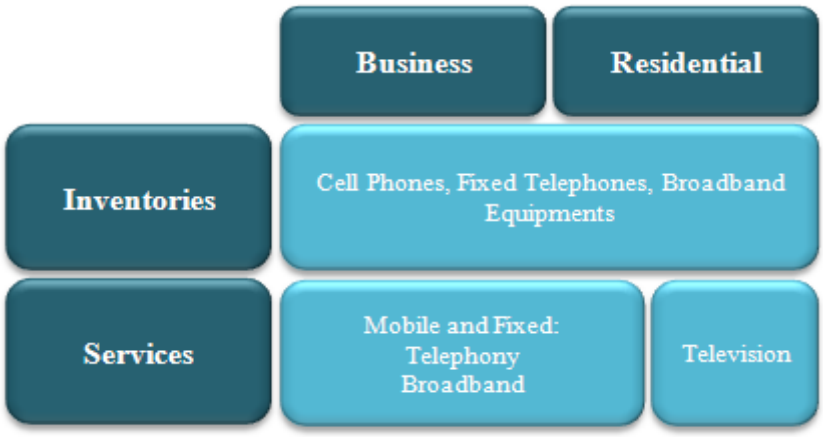
Figure 4-3 – Types and examples of Suppliers



In order to keep the networks running it is necessary to resort to suppliers of maintenance and energy, which represent a significant operational cost. Besides maintaining the network, the telecom operators themselves represent a major share of operating costs. To provide the connection involving networks and countries (of different national and international telecom operators), the service providers need to use other operators' networks. Usually there are contractualised conditions at the price and payment terms levels, and in most of these cases there is a customer-supplier relationship.

The Accounts Receivable corresponds to an important share of the Current Assets in the telecommunication operators Balance Sheets. As previously mentioned, the number of subscribers is increasing at a steady pace since 1997, and this means a growth at the sales level and at the accounts receivable level. In spite of the global economic changes that have been occurring since the *dot.com* bubble, the two main segments on which the consumers can be allocated have been growing (Figure 4-4). On one hand, the positive evolution of the Business Segment has been based on the fact that most of the companies need the telecommunication services in order to develop their businesses. The Business Segment is divided into four micro-segments: Other Telecom Operators (Wholesale), Corporate, Small and Medium-Sized Enterprises and Government/Public Companies. On the other hand, the positive evolution of the Residential Segment, which corresponds to a mass market segment, is due to the proliferation of new and cheaper technologies, which made possible for anyone to access Internet.

Figure 4-4 – Types of Sales to the Macro-Segments



The increase in the number of subscribers, as well as the proliferation of new technologies, turned out to have some influence on the Inventories Management that most of the Telecom Operators have to do. For instance, the Mobile Business has witnessed a steady decrease in the life cycle of the terminal equipment (mobile phones), which means that the companies' often have to renew its offer as a way to fit the needs of consumers. As for the Wireline Business, through the dissemination of concepts associated with the multiple-play, operators had the need to invest in equipment whose goal was the install in the customers' facilities. However, this equipment is not sold to the customers, but leased for a specified period. Normally, equipment like Set-Top Boxes, which are used to provide Pay-TV services, before the install on the customers facility is considered Inventory, and after the installation is considered network equipment, which means it is considered a Fixed Asset (CAPEX).

5. Research Methodology

In this section I provide a full description of the sample and the main variables that were used to perform the empirical study, that is presented in the next section. I also describe the methodology that will be used to perform the empirical study.

5.1. Data

The data was obtained from the Reuters 3000 Xtra® database. The market has 432 listed companies classified by Reuters as Integrated Telecom Operators, with a total market capitalization of 1,42 trillion dollars (about 1,02 billion euro[12]). The companies that I initially considered were the ones that had a market capitalization above 2 billion dollars (about 1,45 milliard euro[12]) and that had available financial information for each year of the 1998-2009 period. From this first criterion resulted an initial sample of 50 companies.

Besides the market capitalization criteria and the availability of financial data, other filters were applied. From the sample were excluded observations regarding companies that had misleading information in their financial statements, meaning that there were abnormal, extreme or non-existing values in the factors I considered important to compute the different variables.

Following the suggestion of Garcia-Teruel (2007) and Nazir and Afza (2009), it was also introduced in the sample the world's Gross Domestic Product annual growth rate in order to bring in the effects of economic cycles on the investment in Working Capital. The information on the GDP annual growth rate was obtained from the World Bank databases.

[12] It was taken into account the USD/EUR exchange rate of the March 14th, 2011 since the market capitalization was expressed in US Dollars (1 EUR = 1.3992 USD)

After all the adjustments made, the final sample include 48 companies, with financial information for the period 1998-2009 and 488 observations. It is important to refer that the firms included in the sample account for about 73% of the total market capitalization.

The data obtained includes Revenues, Operating Costs, Earnings Before Interest and Taxes (EBIT), Receivables, Inventories, Payables, Total Assets and Total Liabilities, which were used to determine all the variables.

5.2. Variables

As suggested by Garcia-Teruel (2007) and Nazir and Afza (2009), the impact of the working capital management efficiency on the firms profitability is analyzed through the Return on Assets (ROA). Therefore, this accounting measure of profitability is considered the Dependent Variable, and is defined as the ratio of Earnings Before Interest and Taxes (EBIT) and Total Assets.

In what concerns the Explanatory Variables, the working capital management can be measured using three major components (as explained previously). The computation of these components depends on the efficiency measure that is being used.
If we consider the components that are used to calculate the Cash Conversion Cycle (CCC), the main explanatory variables are the number of days of accounts receivable (DAR), number of days of inventories (DINV) and number of days of accounts payable (DAP). When the Net Trade Cycle (NTC) is considered, the principal explanatory variables are the number of days of accounts receivable (DAR), number of day sales of inventories (DSINV) and number of day sales of accounts payable. These explanatory variables are calculated using (1), (2) and (3) for the CCC components, as suggested by Deloof (2003) and Garcia-Teruel (2007), and using (1), (4) and (5) for the NTC components, as suggested by Shin and Soenen (1998).

$$Number\ of\ Days\ of\ Accounts\ Receivable\ (DAR) = \frac{Accounts\ Receivable}{Revenues} \times 365 \quad (1)$$

$$Number\ of\ Days\ of\ Inventories\ (DINV) = \frac{Inventories}{Operating\ Costs} \times 365 \quad (2)$$

$$Number\ of\ Days\ of\ Accounts\ Payable\ (DAP) = \frac{Accounts\ Payable}{Operating\ Costs} \times 365 \quad (3)$$

$$Number\ Day\ Sales\ of\ Inventories\ (DSINV) = \frac{Inventories}{Revenues} \times 365 \quad (4)$$

$$Number\ Day\ Sales\ of\ Accounts\ Payable\ (DSAP) = \frac{Accounts\ Payable}{Revenues} \times 365 \quad (5)$$

The number of days of accounts receivable (DAR) measures the average time that the company takes to collect payments from its customers. The higher the value, the higher the investment the company needs to have in accounts receivable.

As for the number of days of inventories (DINV), it measures the average time that the company takes between the acquisitions/production of goods and the selling of these to customers. Similarly to what happens with the accounts receivable, the higher the value, the higher is the investment needed in inventories.

Regarding to the number of days of accounts payable (DAP), it represents the average time that the firms take to pay their suppliers. The higher the value, the longer the firms take to settle the accounts with their suppliers.

The interpretation suggested for each variable mentioned above can be used to understand the variables associated to the Net Trade Cycle (NTC) – the number of days of accounts receivable (DAR), the number of day sales of inventories (DSINV) and the number of days sales of accounts payable (DSAP). However, one should consider, in these cases, that the DAR corresponds to number of days needed to finance accounts receivable in order to generate one euro of revenues, that the DSINV signifies the number of days of investment in inventories that are necessary to generate one euro of revenues, and that the DSAP represents the number of days of finance obtained from suppliers that generate one euro of revenues.

As previously mentioned in this study, the Cash Conversion Cycle (CCC) is considered one measure of working capital management efficiency (Deloof, 2003; Padachi, 2006; Garcia-Teruel, 2007). It expresses the time lag between cash outflows and cash inflows. An extended CCC implies that a higher investment in working capital is needed. This explanatory variable can be calculated using (6).

$$Cash\ Conversion\ Cycle\ (CCC) = (DAR + DINV - DAP) \quad (6)$$

In their study, Shin and Soenen (1998) used the Net Trade Cycle (NTC) as a measure of working capital management efficiency. The shorter NTC is, the lower the company needs to finance externally its operations. The NTC variable can be computed using (7).

$$Net\ Trade\ Cycle\ (NTC) = DAR + DSINV - DSAP \quad (7)$$

Many authors suggest the introduction of Control Variables, like a proxy for the size of the firms, the sales growth and the GDP annual growth (Garcia-Teruel, 2007; Nazir and Afza, 2009). The size (SIZE) is measured as the logarithm of Total Assets; the sales growth (SGR) is measured as the ratio of sales of year *t* and sales of year *t-1*, minus one. The Gross Domestic Product (GDP) variable is the worldwide GDP annual growth rate and reflects changes in the global economic conditions. A decline in the rate represents a recession, while a positive change in the rate is a sign of economic expansion.

5.3. Panel Data Methodology

This study analyzes the relationship between profitability of the Telecommunication Services Companies and working capital management efficiency by using the Panel Data Methodology. According to Wooldridge, "a panel data (or longitudinal data) set consists of a time series for each cross-sectional member in the data set", which means that the set includes a given number of variables that are tracked over time. (Wooldridge, 2009: 10) As previously mentioned, the database used includes yearly financial data of 48 companies and worlds Gross Domestic Product (GDP) annual growth rate between 1998 and 2009.

There are several advantages of using the Panel Data Methodology. For example, the existence of multiple observations for the same variables allows us to control for unobserved characteristics[13]. This means that all the individuals, firms, states or countries are heterogeneous, hence there is no risk of having unbiased results. By using Panel Data it is also possible to monitor the lags in behavior or the results of different policies (Baltagi, 2005; Wooldridge, 2009).

[13] According to Wooldridge (2009), the unobserved factors are all the time constant factors that affect the dependent variable.

In order to analyze panel data sets, there are some regression models that can be applied, like the Pooled Ordinary Least of Squares (OLS) Regression, the Fixed Effects Regression (FER) or the Random Effects Regression (RER). Whereas is not the purpose of the present study to examine the characteristics of each regression model, it is important to decide which is better suited for the analysis. In order to decide for one of the methods that can be used, the estimates and statistics for equations (8), (9), (10), (11), (12), (13) and (14) were obtained by using the different mentioned regression models.

$$ROA_{it} = \beta_0 + \beta_1 DAR_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (8)$$

$$ROA_{it} = \beta_0 + \beta_1 DINV_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (9)$$

$$ROA_{it} = \beta_0 + \beta_1 DAP_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (10)$$

$$ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (11)$$

$$ROA_{it} = \beta_0 + \beta_1 DSINV_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (12)$$

$$ROA_{it} = \beta_0 + \beta_1 DSAP_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (13)$$

$$ROA_{it} = \beta_0 + \beta_1 NTC_{it} + \beta_2 GDP_{it} + \beta_3 SIZE_{it} + \beta_3 SGR_{it} + a_i + u_{it} \quad (14)$$

In the notation, i represent the company and t the time period. The β is the coefficient that establishes the effect of the explanatory variables on the dependent variable. The variable ROA_{it} corresponds to the Return on Assets, DAR_{it} the number of days of accounts receivable, $DINV_{it}$ the number of days of inventories, DAP_{it} the number of days of accounts payable, CCC_{it} is the cash conversion cycle, $DSINV_{it}$ is the number of days sales of inventories, $DSAP_{it}$ is the number of days sales of accounts payable, NTC_{it} is the net trade cycle, GDP_{it} the worlds gross domestic product annual growth rate, $SIZE_{it}$ the company size and SGR_{it} the sales growth. Each of these variables is calculated as previously mentioned. As for a_i, this variable corresponds to the unobserved effects or unobserved heterogeneity and it is a constant factor, which is why it has no t subscript. The error u_{it} corresponds to the idiosyncratic error and it represents the unobserved factors that affect ROA_{it}.

After the computation of the estimates of each equation, I used the tests (15), (16) and (17) in order to understand which of the regression models should be considered.

$$\text{F-test: } \begin{cases} H_0: Pooled\ Regression \\ H_1: Fixed\ Effects\ Regression \end{cases} \quad (15)$$

The test presented in (15) corresponds to the F-test, and to reject or not the null hypothesis the probability associated to F has to be bellow or above the significance level, respectively.

$$\text{Breusch-Pagan test: } \begin{cases} H_0: Pooled\ Regression \\ H_1: Random\ Effects\ Regression \end{cases} \quad (16)$$

The Breusch-Pagan (1980) Lagrangian Multiplier test is applied to find evidence of the inclusion or exclusion of the Random Effects Regression (RER). In the case of (16), in order to reject the null, the probability associated to the χ^2 must be below the significance level considered by default.

$$\text{Hausman test: } \begin{cases} H_0: Random\ Effects\ Regression \\ H_1: Fixed\ Effects\ Regression \end{cases} \quad (17)$$

As suggested by Baltagi (2005), the Hausman (1978) test presented in (17) can be applied to test the consistency of the Random Effects estimators. The rejection of the null, which means that the Random Effects estimators are not consistent, occurs when the probability associated to the χ^2 is below the significance level.

The values in Table 5-1 correspond to the significance levels obtained by running in STATA the Fixed Effects Regression and the Random Effects Regression for each equation. Therefore, it provides the probability associated to the F-test, the probability associated to the χ^2 for the Hausman (1978) test and the probability associated to the χ^2 for the Breusch-Pagan (1980) test. The significance level considered by default is 1%. Since we reject the null in both F-test and Breusch-Pagan (1980) tests for all the Regression Equations, it is possible to conclude that the Fixed Effects Model is better suited for the Panel Data Analysis that will be carried out in this study.

Table 5-1 – Probabilities associated to the F-test, Hausman (1978) test and Breusch-Pagan (1980) test. Regression Models were performed using the whole 1998-2009 sample

The table presents the probabilities associated to the F-test, Hausman (1978) and Breusch-Pagan (1980) tests for each of the regression equations. Estimates were known by performing on STATA the Fixed Effects and Random Effects regressions using the whole 1998-2009 sample of telecommunication companies considered by Reuters® as Integrated Telecommunication Operators.

Tests	F-Test (15)	Hausman test (16)	Breusch-Pagan test (17)
Regression Equation	Prob > F	Prob > Chi2	Prob > Chi2
(8)	0,0000	0,0000	0,0000
(9)	0,0000	*	0,0000
(10)	0,0000	*	0,0000
(11)	0,0000	*	0,0000
(12)	0,0000	0,0000	0,0000
(13)	0,0000	0,0001	0,0000
(14)	0,0000	*	0,0000

* Model fitted on these data fails to meet the asymptotic assumptions of the Hausman test

6. Empirical Results

In order to understand if working capital management impacts on the profitability of the telecoms, in this section I conducted an empirical study that I divided in three major phases. First, the main descriptive statistics for all variables and for the entire sample are analyzed to help the interpretation of the results. Second, I analyze the Pearson Correlation Coefficients for the whole sample and variables with the purpose of understanding the possible relationships that can be established between them. At last, a multivariate analysis using robust for heteroskedasticity and autocorrelation Fixed Effects Regressions is made, in order to: provide a better insight on which of the working capital management efficiency measures is more valuable to explain the profitability and understand the performance of the different working capital components that impact on efficiency.

6.1. Descriptive Statistic Analysis

With the purpose of better understanding the dispersion on the observation values and the variables used, Table 6-1 presents some descriptive statistics for the main variables and for the whole sample.

The Return on Assets (ROA) is about 8.5%, which means that on average the telecommunication operators generate a EBIT that corresponds to 8.5% of the Total Assets book-value.

Regarding the working capital management components, it is possible to conclude that the telecommunication operators collect receivables from their customers on average in 80 days, have stocks for about 9 days and pay to their suppliers (both CAPEX and OPEX related) on an average of 198 days. Hence, there is the possibility that the companies in this sector rely on their suppliers to finance their current operations. On the other hand, the increase in the number of subscribers that was mentioned earlier explains an increase in Revenues, and also an increase in the Accounts Receivable.

Increases in these two items on different proportions can lead to higher average collection periods, or superior number of days of accounts receivable.
About the DSINV and DSAP variables, that are related with the NTC, it is possible to state that there are some similarities between their results and the CCC components results. A substantial difference is found between the results for the number days of accounts payable (DAP) and for the number of days sales of accounts payables (DSAP). By the DSAP point of view, on average the telecommunication companies are obtaining finance from their suppliers for 168 days.
Considering the Cash Conversion Cycle (CCC) and the Net Trade Cycle (NTC), the negative values are in line with what was reported for the DAR, DINV, DAP, DSINV and DSAP variables, and are consistent with the possibility that the telecommunication operators are financing their activities by maximizing their accounts payable management.

The global economy, measured by the GDP, developed at an average rate of 5.88%, meaning that in the period of 1998 and 2009 there was a global economic expansion. However, it should be noted that during this period there was some economic downturns (like the 2001 *dot-com* bubble and the 2008 financial crisis) which made the global economy decline to 5.23%, which is the minimum value of the world's GDP.

The telecommunication operators in the sample have seen their sales grow at an average rate of 10.39% in the period under review. As I previously mentioned, this fact is by far explained by the growth of the number of subscribers and of the revenues between 1998 and 2009.

In Table 6-1 is also possible to make a brief analysis on the type of working capital policy that the telecommunication services companies follow.
Taking into account that an aggressive working capital management strategy is focused on minimizing the Current Assets and maximizing the Current Liabilities by using more short-term financing, it is possible to assume that the telecoms are following this type of strategy. This can be explained by the low ratio of Current Assets to Total Assets (CA/TA) – where the Current Assets correspond on average to 11.86% of the Total Assets – and the considerably high ratio Current Liabilities to Total Liabilities (CL/TL) – where the Current Liabilities represent on average 40.99% of the Total Liabilities.

The ratio between Current and Total Assets can be explained by the amount that is invested by these type of companies in fixed assets (such as network infrastructures), which means that the value of these assets correspond to the major amount of the Total Assets.

As for the ratio between Current and Total Liabilities, as I mentioned earlier, the number of days of accounts payable are probably a first indicator that the telecoms rely on their suppliers to finance their activity and investments, which can explain the value. The investments in CAPEX can also explain the amount allocated to the suppliers.

Table 6-1: Descriptive Statistics for firm-specific and macroeconomic variables for the full sample

The table presents the descriptive statistics of firm-specific and macroeconomic variables for the whole 1998-2009 sample of telecommunication companies considered by Reuters® as Integrated Telecommunication Operators. *ROA* is defined as the ratio of Net Income to Total Assets. The *DAR* is measured as the ratio of Accounts Receivable and Revenues times the number of days of one year. *DINV* is measured as the ratio of Inventories and Operating Costs times the number of days of one year. *DAP* corresponds to the ratio of Accounts Payable and Operating Costs times the number of days of one year. The *CCC* is obtained by sum *DAR* to *DINV*, less the *DAP*. The *DSINV* is measured as Inventories divided by Revenues times the number of days of one year. *DSAP* corresponds to the ratio of Accounts Payable and Revenues, times the number of days of one year. The *NTC* can be obtained by the sum of *DAR* and *DSINV* less the *DSAP*. *GDP* is annual Gross Domestic Product growth rate obtained in the World Banks' databases. *SIZE* is measured as the logarithm of the Total Assets. *SGR* corresponds to Sales of time t-1 less the Sales of time t, divided by Sales of t-1. The *CA/TA* is measured as Accounts Receivable plus Inventories, divided by Total Assets. The *CL/TL* is obtained by Payables divided by Total Liabilities. Computations are made considering that one year has 365 days.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	488	0,0847	0,0759	-0,4959	0,3299
DAR	488	79,83	35,06	19,63	234,23
DINV	488	8,61	6,82	0,55	74,02
DAP	488	197,64	65,02	70,03	365,15
CCC	488	-109,20	58,66	-298,80	77,99
DSINV	488	7,41	6,76	0,53	87,00
DSAP	488	168,80	62,70	58,91	523,82
NTC	488	-81,55	52,98	-483,10	30,46
GDP	488	0,0588	0,0574	-0,0523	0,1291
SIZE	488	23,07	1,43	17,46	26,05
SGR	488	0,1039	0,4206	-0,6824	4,9719
CA/TA	488	0,1186	0,0530	0,0283	0,4448
CL/TL	488	0,4099	0,1624	0,0833	0,9324

6.2. Correlation Analysis

In order to examine the existent relationship between the different variables I initially used the Pearson Correlation Matrix. In Table 6-2 and Table 6-3 is possible to observe the Correlation Coefficients and the significance levels on which they are included. The approach I used, which separates the components of the Cash Conversion Cycle and the components of the Net Trade Cycle, was made with the purpose of facilitate the interpretation of the values, since I considered that the correlation between those variables adds no value to the analysis. Even though the coefficient values can be used as indicators for the relationship among the variables, they do not provide a reliable sign of association between them.

By analyzing Table 6-2 and Table 6-3, it is possible to see that there is a significant negative correlation between the profitability measure (ROA) and the number of days of accounts receivable (DAR). This result is consistent with the view that receiving earlier has a positive impact on the firm's profitability. However, and in contrast with Deloof's (2003), Padachi's (2006) and Garcia-Teruel's (2007) findings, there is no significant correlation between profitability and the number of days of inventory (DINV) and the number of days of accounts payable (DAP), despite the negative coefficients.
In Table 6-3 it is also possible to observe that there is a significant negative correlation between ROA and the components of the Net Trade Cycle (NTC). Even though Deloof (2003), Padachi (2006) and Garcia-Teruel (2007) apply the formulas related to the Cash Conversion Cycle (CCC), these established relations are in accordance with their findings regarding the correlation between each of this components and profitability.

It is also possible to see in Table 6-2 and Table 6-3 that there is a significant positive correlation between the profitability measure (ROA) and one of the working capital management efficiency measures, the NTC. The result contradicts Shin and Soenen (1998) findings, where a significant negative relationship between NTC and the profitability measure was established. In contrast with the correlation between ROA and the NTC, there is a negative correlation between profitability and the CCC. This result is compatible with Deloof's (2003), Padachi's (2006) and Garcia-Teruel's (2007) findings, and is consistent with the view that lowering the time lag between receivables and payables, while having optimized stocks, increases profitability.

In Table 6-2 and Table 6-3 I identify correlations near ±1, which are significant at a 1% significance level. Principally, there is a significant strong negative correlation between the CCC and DAP, between the CCC and DSAP, and a significant negative correlation between NTC and DAP, meaning that low number of days of accounts payable are associated with high values of CCC and NTC. There is also a strong positive correlation between the CCC and the NTC.

Table 6-2 – Correlation Matrix for firm-specific variables and macroeconomic variables for the full sample: Cash Conversion Cycle and its components

The table presents the Pearson correlation coefficients of firm-specific and macroeconomic variables for the 1998-2009 sample of telecommunication services companies considered by Reuters® as Integrated Telecommunication Operators. *ROA* is defined as the ratio of Net Income to Total Assets. The *DAR* is measured as the ratio of Accounts Receivable and Revenues times the number of days of one year. *DINV* is measured as the ratio of Inventories and Operating Costs times the number of days of one year. *DAP* corresponds to the ratio of Accounts Payable and Operating Costs times the number of days of one year. The *CCC* is obtained by sum *DAR* to *DINV*, less the *DAP*. The *NTC* can be obtained by the sum of Accounts Receivable and Inventories less Accounts Payable, divided by Revenues, times the number of days of one year divided by Revenues. *GDP* is annual Gross Domestic Product growth rate obtained in the World Banks' databases. *SIZE* is measured as the logarithm of the Total Assets. *SGR* corresponds to Sales of time t-1 less the Sales of time t, divided by Sales of t-1. Computations are made considering that one year has 365 days.

	ROA	***DAR***	***DINV***	***DAP***	***CCC***	***NTC***	***GDP***	***SIZE***	***SGR***
ROA	1								
DAR	-.2289***	1							
DINV	-.0378	.1979***	1						
DAP	-.0047	.4319***	.2167***	1					
CCC	-.1360***	.1429***	-.0058	-.8257***	1				
NTC	.3453***	.0733	.0170	-.6853***	.8054***	1			
GDP	.0904**	-.1499***	-.1397***	-.0914**	-.0045	.0378	1		
SIZE	-.0127	.1065**	-.2012***	.1992***	-.1806***	-.0745	-.0034	1	
SGR	.0209	.0565	.1203***	.0482	-.0056	.0050	-.1199***	-.0265	1

* Correlation is significant at the 10% level; ** Correlation is significant at the 5% level; *** Correlation is significant at the 1% level

Table 6-3 – Correlation Matrix for firm-specific variables and macroeconomic variables for the full sample: Net Trade Cycle and its components

The table presents the Pearson correlation coefficients of firm-specific and macroeconomic variables for the 1998-2009 sample of telecommunication services companies considered by Reuters® as Integrated Telecommunication Operators. *ROA* is defined as the ratio of Net Income to Total Assets. *DAR* formula is Accounts Receivable divided by Revenues times the number of days of one year. The *DSINV* is measured as Inventories divided by Revenues times the number of days of one year. *DSAP* corresponds to the ratio of Accounts Payable and Revenues, times the number of days of one year. The *CCC* is obtained by the number of days accounts receivable plus the number of days of inventories minus the number of days of accounts payable. The *NTC* can be obtained by the sum of *DAR* and *DSINV* less the *DSAP*. *GDP* is annual Gross Domestic Product growth rate obtained in the World Banks' databases. *SIZE* is measured as the logarithm of the Total Assets. *SGR* corresponds to Sales of time t-1 less the Sales of time t, divided by Sales of t-1. Computations are made considering that one year has 365 days.

	ROA	***DAR***	***DSINV***	***DSAP***	***CCC***	***NTC***	***GDP***	***SIZE***	***SGR***
ROA	1								
DAR	-.2289***	1							
DSINV	-.1777***	.2490***	1						
DSAP	-.4389***	.5240***	.2524***	1					
CCC	-.1360***	.1429***	.0756*	-.5924***	1				
NTC	.3453***	.0733	-.0065	-.8046***	.8054***	1			
GDP	.0904**	-.1499***	-.1288***	-.1296***	-.0045	.0378	1		
SIZE	-.0127	.1065**	-.2351***	.0972**	-.1806***	-.0745	-.0034	1	
SGR	.0209	.0565	.1062**	.0388	-.0056	.0050	-.1199***	-.0265	1

* Correlation is significant at the 10% level; ** Correlation is significant at the 5% level; *** Correlation is significant at the 1% level

6.3. Regression Analysis

Previously in this study I decided which regression model was going to be used in this analysis. As a result, the estimates were obtained through the Fixed Effects Regression model for the different equations that were previously formalized. Though, and in accordance with Wooldridge, there are some issues that may affect the fixed effects estimation, which are related to the assumptions that make the OLS analysis valid. The assumptions that stand out are the heteroskedasticity and the serial correlation of the errors u_{it}. To prevent such issues, the obtained estimators are robust to both correlation and heteroskedasticity; for this reason, we can consider that "the fixed effects estimator of the β_j is the best linear unbiased estimator" (Wooldridge, 2009: 504) .

After running the fixed effects regression robust for correlation and heteroskedasticity on the different equations on STATA, the statistical validity of each model is verified using the F-test. To assess whether the model is statistically valid, I used the test of hypotheses represented in (18). If the null is rejected, then we can conclude that the model is statistically valid.

$$\begin{cases} H_0: \beta_0 = \beta_1 = \beta_j = 0 \\ H_1: \beta_j \neq 0 \end{cases} \quad (18)$$

Where β_j is the coefficient that establishes the effect of each of the explanatory variables on the dependent variable.

In Table 6-4 and Table 6-5 it is possible to observe the estimators obtained by running the fixed effects regression over the different equations, and using the 1998-2009 sample period. Regarding the overall statistical validity of each model, it is possible to conclude through the examination of the probability associated to the F-test, that the models (8), (12), (13) and (14) are significant at a 5% significance level. Consequently we reject the null hypothesis, *i.e.* there is at least one statistically relevant explanatory variable that explains the behavior of the dependent variable. It is possible to conclude the same for the model (11), when considering a 10% significance level.

The comparison between the results of the CCC and the NTC on Table 6-4 and Table 6-5 provides an insight on which of the different working capital management efficiency measures is better suited for explaining the behavior of profitability. The results of the models (11) and (14) are used to proceed with this analysis.
Previously, I referred that both models are globally statistically valid. Despite the fact that this happens when considering different significance levels, I can infer that there is at least one explanatory variable that explains the profitability performance. Regarding model (11), which includes the CCC, it is statistically valid only when a significance level of 10% is being considered, implying that the existence of a pre-determined maximum for the significance level of 5%, excludes this model.
With regards to the predictive power of each model, we verify by analyzing the R^2 that model (11) is able to explain about 2.27% of the profitability behavior, and model (14) is able to explain about 15.3% of the variability in the Return On Assets (ROA).

In terms of the statistical relevance of the coefficients of the explanatory variables considered in models (11) and (14), it is possible to conclude that the CCC variable in model (11) is not statistically significant, while the NTC is statistically significant at a 5% significance level.
Overall, model (14), which includes the NTC as explanatory variable, seems to better explain the relationship between working capital management efficiency and profitability.

The findings presented in Table 6-5 regarding the regression (14) suggest that, *ceteris paribus*, an increase in one day in the Net Trade Cycle (NTC) is associated with a 0.047% raise in the profitability of the telecommunication companies. Despite of different efficiency measures, this result is different from Deloof (2003) and Garcia-Teruel (2007) findings, where they proved an inverse relation between working capital management efficiency and profitability. The result specially contrasts with Shin and Soenen (1998) findings, where an inverse relation between NTC and ROA signifies that lowering the NTC increases profitability.

The models presented in Table 6-5, besides model (14), show that there are highly significant interactions between the Return on Assets (ROA) and the different components of the Net Trade Cycle (NTC). By analyzing each of the models we can better understand which is the component of the NTC that affects more the profitability, and then we can really understand what is behind the overall model of the NTC (14).
With regards to model (8), whose purpose is to find a relation between the number of days of accounts receivable (DAR) and the Return on Assets (ROA), it is possible to observe that there is a negative interaction between DAR and ROA, where DAR coefficient is considered statistically significant at a 1% significance level. The R^2 associated with model (8) shows that the model explains about 8.36% of the variation in profitability. The relationship established is in line with the negative significant correlation that was previously identified between this variable and profitability. The obtained result is also consistent with Deloof (2003), Padachi (2006) and Garcia-Teruel (2007) findings, where they conclude that lengthening the average collection period affects negatively the profitability, despite the size of the company.
The findings presented in Table 6-5 concerning equation (8) suggests that, *ceteris paribus*, an increase by one day in the number of days sales accounts receivable (DAR)

is associated with a drop of 0.065% in the profitability of the telecommunication companies. The relevance of this impact at the profitability level must be considered when managing this working capital feature on the telecoms. For this reason, the companies in this sector may consider different kinds of policies that allow them to reduce the average collection period. More restrictive trade credit conditions, limitation of the voice and data traffic on both fixed and mobile services, expansion of the offer of prepaid services and flat rate plans on the mobile services, implementation of credit scoring, and promotion of the direct debit payment systems are some examples that can help reduce the number of days of accounts receivable.

As previously mentioned, model (12) tries to establish the relation between inventories management, which is measured by the number of days sales of inventories, and the profitability of telecom companies. There is a negative relation between DSINV and ROA, where DSINV is statistically significant at a 5% level. In Table 6-5 it is possible to see that the inventories management explains about 5.84% of the variation of profitability. While this is not a value considerably high, one should not neglect the fact that, *ceteris paribus*, an increase by one day in the number of days of investment in inventories is associated with a decrease of 0.231%.

With regards to the inverse relation between inventories management and profitability, Deloof (2003) suggests that this can result from a decrease in revenues, which leads to higher inventories and lower profits. However, I believe that this is not the case in the telecommunications services industry, since the revenues and the number of subscribers have been growing since 1997. In fact, there are some reasons, which correspond to particularities of the telecommunication services sector that can explain such effect of the inventories management on profitability. For instance, the mobile telecommunication providers face difficulties on managing their inventories efficiently since there is a short life cycle of mobile phones. The evolution of the life cycle of products to shorter periods can harm in some way the profitability when considering that from some point the company stops selling the older products.

There can also exist issues regarding the relations with the equipment suppliers due to volume requirements or the existence of contractual requirements regarding the time lag between the acquisition of equipment.

On Table 6-5, the model (13) appears to be the one that explains more of the variation of profitability. To be more precise, the model that set up the relationship between accounts payable management and profitability explains about 24.36% of the variation of profitability, which is the highest explanatory influence on profitability of the three components.

The accounts payable management has an inverse impact on profitability. This means that an increase in one day in the number of days sales of accounts payable (DSAP) impacts on profitability by provoking a decrease of 0.057%. There are many reasons that can explain the inverse relation between the accounts payable measure and profitability. Authors like Deloof (2003), Padachi (2006) and Garcia-Teruel (2007) mention in their studies that there is the possibility of less profitable firms taking longer periods to pay to their suppliers. However, this assumption may not fit to the telecommunication services companies. As I mentioned earlier, the telecoms use a wide range of suppliers to keep the business running, and this is translated into the need for professional management at the accounts payable level. While financial management may not be done in the most efficient way in some companies, it has an impact at the level of the average payment period to suppliers and at the liquidity level of the company. Companies without defined policies regarding the accounts payable may have problems regarding their liquidity, thus with their profitability. Overall, one could state that less profitable firms tend to invest fewer in their accounts payable management, *i.e.* invest little on the definition of strict accounts payable policies, which has an impact on liquidity and profitability.

When comparing the result of model (13) with the results of models (8) and (12), it is possible to infer that the accounts payable, measured by the variable DSAP, can be responsible for most of the Net Trade Cycle impact on profitability.

By recalling the fact that, under *ceteris paribus* condition, an increase by one day in the NTC increases the profitability of a telecom company, it should be noted that this is in line with the result obtained for the DSAP, *i.e.* decreasing in one day the accounts payable increases profitability. As a consequence, a reduction of the DSAP causes an increase in NTC, which makes the accounts payable management an efficient way of enhancing the Net Trade Cycle (NTC).

Table 6-4 – Fixed Effects Regression results obtained to the determinants of corporate profitability for the full 1998-2009 sample: Cash Conversion Cycle and its components

The table presents the Fixed Effects Regression results for firm-specific and macroeconomic variables for the 1998-2009 sample of telecommunication services companies considered by Reuters® as Integrated Telecommunication Operators. The sample has 48 firms with a total of 488 firm-year observations. Firms may enter or leave the panel during the sample period 1998-2009. The dependent variable is *ROA* and is defined as the ratio of Net Income to Total Assets. The *DAR* is measured as the ratio of Accounts Receivable and Revenues times the number of days of one year. *DINV* is measured as the ratio of Inventories and Operating Costs times the number of days of one year. *DAP* corresponds to the ratio of Accounts Payable and Operating Costs times the number of days of one year. The *CCC* is obtained by sum *DAR* to *DINV*, less the *DAP*. *GDP* is annual Gross Domestic Product growth rate obtained in the World Banks' databases. *SIZE* is measured as the logarithm of the Total Assets. *SGR* corresponds to Sales of time t-1 less the Sales of time t, divided by Sales of t-1. Computations are made considering that one year has 365 days. T-test values are reported in parenthesis.

ROA	**(8)**	**(9)**	**(10)**	**(11)**
DAR	-0,00065***			
	(-3,45)			
DINV		-0,00050		
		(-0,33)		
DAP			-0,00012	
			(-0,88)	
CCC				-0,00003
				(-0,16)
GDP	0,03922	0,08657	0,08033*	0,09464*
	(0,74)	(1,55)	(1,89)	(1,91)
SIZE	0,00660	0,00645	0,00890	0,00801
	(0,44)	(0,35)	(0,55)	(0,47)
SGR	0,01506*	0,01468*	0,01384*	0,01392*
	(1,95)	(1,97)	(1,79)	(1,82)
C	-0,01979	-0,06648	-0,10248	-0,11015
	(-0,06)	(-0,15)	(-0,28)	(-0,29)
R-squared (within)	0,0836	0,0241	0,0321	0,0227
F-value	4,70***	1,36	1,40	1,97*

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

Table 6-5 – Fixed Effects Regression results obtained to the determinants of corporate profitability for the full 1998-2009 sample: Net Trade Cycle and its components

The table presents the Fixed Effects Regression results for firm-specific and macroeconomic variables for the 1998-2009 sample of telecommunication services companies considered by Reuters® as Integrated Telecommunication Operators. The sample has 48 firms with a total of 488 firm-year observations. Firms may enter or leave the panel during the sample period 1998-2009. The dependent variable is *ROA* and is defined as the ratio of Net Income to Total Assets. . *DAR* formula is Accounts Receivable divided by Revenues times the number of days of one year. The *DSINV* is measured as Inventories divided by Revenues times the number of days of one year. *DSAP* corresponds to the ratio of Accounts Payable and Revenues, times the number of days of one year. The *CCC* is obtained by the number of days accounts receivable plus the number of days of inventories minus the number of days of accounts payable. The *NTC* can be obtained by the sum of *DAR* and *DSINV* less the *DSAP*. *GDP* is annual Gross Domestic Product growth rate obtained in the World Banks' databases. *SIZE* is measured as the logarithm of the Total Assets. *SGR* corresponds to Sales of time t-1 less the Sales of time t, divided by Sales of t-1. Computations are made considering that one year has 365 days. T-test values are reported in parenthesis.

ROA	**(8)**	**(12)**	**(13)**	**(14)**
DAR	-0,00065***			
	(-3,45)			
DSINV		-0,00231**		
		(-2,34)		
DSAP			-0,00057***	
			(-3,48)	
NTC				0,00047**
				(2,16)
GDP	0,04	0,06309	0,0173	0,07679*
	(0,74)	(1,14)	(0,44)	(1,93)
SIZE	0,00660	-0,00182	0,00718	0,01067
	(0,44)	(-0,11)	(0,57)	(0,70)
SGR	0,01506*	0,01707**	0,01164*	0,01048
	(1,95)	(2,29)	(1,94)	(1,66)
C	-0,01979	0,13833	0,01255	-0,12887
	(-0,06)	(0,36)	(0,04)	(-0,37)
R-squared (within)	0,0836	0,0584	0,2436	0,1530
F-value	4,70***	6,22***	3,89***	2,43**

* Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

7. Conclusion

In the empirical analysis made in the previous section it was seen how working capital management efficiency affects the profitability of the telecommunication services industry. The hypothesis of an efficient short-term financial management having an inverse relation with profitability was tested, and I found empirical evidence that this hypothesis is not satisfied for this specific industry.

Regarding the efficiency measures, the results suggest that the Net Trade Cycle (NTC) is a more accurate variable to study the relationship between working capital management efficiency and profitability. Other empirical studies, such as Deloof (2003), Padachi (2006) and Garcia-Teruel (2007), established previously in their study the Cash Conversion Cycle (CCC) as efficiency measure, without empirically testing the differences in results between the two measures (NTC and CCC).

Concerning the relation between short-term management efficiency and profitability, I conclude that an increase by one day in the Net Trade Cycle (NTC), under *ceteris paribus* condition, has a positive impact on Return on Assets (ROA). These means that the telecommunication companies need to invest more on their working capital, which will generate more profitability. Therefore, the hypothesis of the potentially positive effect of a reduction in working capital management on the profitability is not fulfilled, since increases in the Net Trade Cycle (NTC) are associated with increases in profitability (ROA).

With regards to the components of working capital management, the empirical results suggest that the number of days sales of accounts payable (DSAP) explain an important share of the profitability variation, and that these variable has an inverse relation with profitability. Despite the fact that these results are consistent with the idea that less profitable firms wait longer to settle the commitments with their suppliers, as suggested by Deloof (2003) and Garcia-Teruel (2007), I propose that this is not valid for the analysis of the telecommunication sector for some reasons, such as the idea that less

profitable companies will invest lower amounts in their accounts payable management, having a negative impact on liquidity and profitability.

Even though accounts receivable management – measured by DAR – and inventories management – measured by DSINV – explained less variation of the profitability, these aspects must not be forgotten in order to purse an efficient short-term management, since there must be a synchronization between the three major components of working capital management.

The results related to the number of days sales of accounts payable (DSAP) suggest that this variable can be more efficient if telecommunication companies want to increase their Net Trade Cycle (NTC), which will have an impact on profitability.

This analysis regarding working capital management efficiency for telecommunication services companies is a useful tool for the financial managers of the sector to analyze how their managing is being used to increase profitability and if useful results can be achieved from an efficient short-term management. In spite the fact that this study did not analyze year-of-year changes of working capital management efficiency results, managers have to consider that changes in policies over time can have an important impact on the medium-long terms, since short-term decisions also impact on liquidity and profitability. Further analysis regarding this issue should be pursued in order to complement the analysis for the telecommunication services industry.

8. Final Comments

This study is a contribution to the field of financial management as it allows a deepening of the themes associated with the short-term management of businesses. Through an analysis focused on a single industry it is possible to better understand the specificities of that sector and how they impact directly or indirectly in the behavior of each variable.

Some limitations in this study can be recognized, which are mainly related with methodological issues, particularly in terms of the definition of other variables that could also be considered.

Considering the issue of adding value for shareholders in the case of the telecommunication services companies is not only done by the natural robustness of the Balance Sheets of these companies, but also by the ability to pass to the potential and current investors the positive impacts of their management, variables associated with market performance or profitability could be used to test the relationship between Working Capital Management efficiency and profitability, in this case in a financial market point of view.

The way how investors or shareholders interpret the signals and the information provided by the telecommunication services companies' managers could also have been analyzed, particularly with what concerns the impact of different working capital management policies in the firms' profitability. Such information could lead to a wider conclusion at the level of the working capital management in the telecommunication industry and could provide a better insight for the financial managers of the companies in this sector.

The sample size and the type of firms that were considered can also constitute a limitation of the analysis, since the sample includes some of the biggest telecommunication companies and their working capital management policies can be considerably different from the rest due to their size.

Despite the fact that the limitations on the present study can also constitute a first motivation for future investigation improvements, I consider that other issues could be addressed in future investigations such as empirical studies with telecommunication companies mentoring with the objective of establishing a qualitative and quantitative benchmark.

Other studies could also address the same subject but consider year-of-year or quarterly changes in the analysis, or focusing on other industries specifications.

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