CHAPTER-4
RESEARCH METHODOLOGY
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4.1 PROBLEM STATEMENT
The problem generally refers to the area to which less attention has been paid. Researcher found, a research gap after reviewing the vast literature on working capital management practices of corporate across the world that so many studies have been made on working capital management After the keen observation of the manufacturing sector and its working capital management researcher found that all top companies seem panic to adopt the aggressive working capital strategy with strong receivables and payables management with the least blockage of funds in working capital to maximize their wealth but it is also true that working capital cannot be reduced to the minimum level without compromising the operational efficiencies. Therefore, Working capital management is a major concern of the companies now a days that initiated the researcher to measure its effect on profitability to explore the theories followed by the firms and their relationship with the profitability. However such relationships have not been studied in Indian manufacturing sector that means research gap is there to identify such relationships. Working capital management is the main focus of the study or simply it can be said. Accordingly, my problem statement is “What is the Impact of Working Capital Management on Profitability of Manufacturing Companies in India during the period of 2008-2013”

4.2 NEED AND SIGNIFICANCE OF THE STUDY
Being the existing gap that lies in this research area, the question to be answered is; why study relationship between working capital management and profitability for manufacturing firms rather than service industry that are also presumed to have great impact on an economy. This study on the Indian manufacturing companies listed on Bombay Stock Exchange is of special interest because India today’s rising market of south Asia, is a great potential for economic growth and becoming of the hub of economic activities being it a political stable and optimum allocation of resources.
Various studies have been made on Working capital management and its impact on productivity growth and profitability across the world but no comprehensive research exists for the Indian manufacturing industry. This lack of empirical evidence with reference to manufacturing industry of India stimulates for studying Working capital management practices and its impact on financial performance of firms on sectoral basis. To the best of researcher knowledge, the present study is a significant contribution to the existing literature on impact of working capital management on profitability of the manufacturing companies in India which is based on financial data extracted from the annual reports of firms listed on Karachi stock exchange and various financial portals that provide the detailed data of companies as per need of researchers as well as stakeholders, during period 2008-13, which has not been done earlier.

Sector-wise working capital management components as average collection period, inventory turnover, creditors payment policy, Cash Conversion Cycle, liquidity and profitability has been compared first time in present study.

Similarly, to the best of researcher’s knowledge, no research has been conducted with reference to manufacturing sector of India where, working capital management and its relationship with profitability has been measured using multiple regression model which can assist the policy makers to put up the deficient sectors according to level of working capital and amount of their profitability who can take remedial actions if any deficiency in their practices comes into their knowledge. So it will provide a standard to which firms can restructure their working capital policy accordingly. So need of the study can be summarized in following points as rationale of the topic of the study:

- Present study helps to develop an understanding of working capital practices in various commercial paradigms.
- The study will expose how various Working Capital Management policies affect the Indian manufacturing companies in terms of profitability.
- Study will frame a conceptual model that will provide basic guidelines for researchers, accountants and professionals, financial managers, and policy makers in the dynamic business environment of India.
• The study will suggest various working capital management techniques that can be adopted by Indian manufacturing companies to enhance their profitability.

4.3 OBJECTIVES OF THE STUDY

Present study is an empirical study of manufacturing industry of India for evaluating the impact of working capital management on profitability during the period of 2008 to 2013. The more specific objectives are:

1. To analyze the Operating profit margin of Indian manufacturing industry.
2. To analyze the Working Capital management of Indian manufacturing industry.
3. To investigate the impact of Working Capital Management on profitability of Indian manufacturing Companies.

RESEARCH METHODOLOGY

Research methodology is a set of procedures which deals specifically with the manner in which data is collected, analyzed, and interpreted. This study contains the following procedures:

4.4 Research Design:

As the purpose of research is to discover answers to questions through the application of scientific procedures, research objectives can be one of the following categories:

1. Exploratory or Formulative research to gain familiarity with a phenomenon or to achieve new insights into it.
2. Descriptive research is to portray accurately the characteristics of a particular individual, situation or a group.
3. Diagnostic research is to determine the frequency with which something occurs or with it is associated with something else.
4. Hypothesis testing research to test a hypothesis of a causal relationship between variables.

The study adopted the diagnostic research design. Diagnostic research tries to determine the association of the subject matter with something else (Kothari, 2004).
This is the Empirical study which is exploratory in nature which went through secondary data collection and analysis thereof using various statistical as well as accounting tools to assess the impact of working capital management on profitability of Indian manufacturing companies.

4.5 Hypothesis:
Following hypothesis have been set regarding this study

H01: There is no relationship between Operating Profit Margin and size of manufacturing companies of India.

H02: There is no relationship between Operating Profit Margin and Debt Ratio of manufacturing companies of India.

H03: There is no relationship between Operating Profit Margin and Assets Turnover Ratio of manufacturing companies of India.

H04: There is no relationship between Operating Profit Margin and Current Ratio of manufacturing companies of India.

H05: There is no relationship between Operating Profit Margin and Debtors Turnover Ratio of manufacturing companies of India.

H06: There is no relationship between Operating Profit Margin and Inventory Turnover Ratio of manufacturing companies of India.

H07: There is no relationship between Operating Profit Margin and Creditors Turnover Ratio of manufacturing companies of India.

H08: There is no relationship between Operating Profit Margin and Cash Conversion Cycle of manufacturing companies of India

4.6 Source of data:
According to Hussey and Hussey (1997) Data refers to known facts or things used as a basic for inference or reckoning. Data may be quantitative or qualitative but in present study only quantitative data has been used explaining phenomena analyzing numerical data with the help of mathematical or statistical methods (Creswell, 1994). The task of data collection is performed after taking into consideration the nature of research, objective and scope of inquiry, financial resources, available time and the desired degree of accuracy. Data may also be categorized into two parts, as given below, on the basis of source of collection
1. **Primary Data**: Data collected from original source is known as primary data e.g. observation, interviews, personal discussion, filling up of questionnaire etc. Generally Primary data is used when study is qualitative or phenomenological in nature.

2. **Secondary Data**: Generally all published and circulated data is known as secondary data which gets off from the original source e.g. newspapers, journals, magazines, websites, company’s annual reports etc. Zikmund (2003) defined the secondary data as data collected by someone else prior to the access of the current researcher. hey are usually historical and don’t need the researcher to reach the respondents or subject. The secondary data enables researchers to gather reliable information from the easily available source with the saving of time and cost.

Present study is based on Secondary data collected from Newspapers, Magazines, Journals or company’s websites, Annual reports of companies etc. The various Financial Portals i.e. ETIG database, CMIE, Rediff moneywiz, money control, Business Standard etc. were accessed to collect the company’s financial data. The main source of information on financial indicators of business activity is financial reports of enterprises on the grounds of which economic activity and financial standing of an enterprise have been evaluated and possibilities of future development have been determined.

4.7 **Sampling**:

The parameters of interest in a research study must be kept in view while deciding the size of the sample. It should neither be excessively large, nor too small. It should be optimum means it should be representative of entire population so it should be decided on the basis of size and type of population. Sampling of present study is as follow:

- **Target Population**:

As study aims at assessing the impact of Working Capital Management on Profitability of manufacturing companies in India. Here all manufacturing companies listed at BSE have been taken as population of the study because BSE is the oldest stock exchange of India where almost companies are listed. 1,000 top companies engaged in manufacturing sector categorized into various
sub-sectors, listed at BSE have been taken as size of population of the study. Listed companies were taken suitable for the study because they are public entities running under stringent corporate governance regulations, ensuring their financial and accounting disclosures reliability at large. The companies listed at BSE but not traded since more than 30 days were excluded from the size of population determined. Present study also totally excludes the service industry as well as financial firms.

- **Sample Size:**

Therefore, data obtained from this study were panel data on 790 firms’ observations. The 158 firms come from 10 sectors of manufacturing industry: Steel, Metal & Engineering, Automotive & Anciliaries, Chemicals & Fertilisers, Cotton & Textiles, Cements, Electrical / electronic Equipments, Pharmaceuticals, Consumer Goods/ Personal Care, Health, Food & beverages and Miscellaneous; the number of firms in each sector is shown in Table 1 as below

**Table 6: Sectoral Classification of Sampled Firms (in %)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Sector</th>
<th>No. of Sampled Companies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steel, Metal &amp; Engineering</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>Automotive &amp; Anciliaries</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Chemicals &amp; Fertilisers</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Cotton &amp; Textiles</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Cements</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Electrical / electronic Equipments</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Pharmaceuticals</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>Consumer Goods/ Personal Care</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Health, Food &amp; beverages</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>Miscellaneous</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>
Sampling Type:
Samples have been chosen on the basis of non-probability/ purposive sampling as well as random sampling. As we know The Economic Times issues ET List of Top 500 Indian companies every year on the basis of the company's performance. All 130 companies of manufacturing sector existing in this list, have been chosen on the basis of purposive sampling taking hem the representative of big part of the manufacturing industry and remaining 28 companies have been selected randomly on the basis of strata sampling to bring the study near to accurate results.

Study Period:
In order to investigate the industry impact, we include all major sectors of manufacturing industry with the final sample consisted of 790 firm -year observations that include the observation of 158 firms for the 5 years from 2008 to 2013.

4.8 Key Variables And Parameters of the Study
To accomplish this research work, editing, classification and tabulation of the above-stated sources were done as per requirement of the study. For analyzing the data simple mathematical tools like ratios, percentages etc were used. Following variables in form of ratios relating to the measurement of the performance of working capital management have been used in the study:

1. Independent Variables:
Independent variables are foremost dynamic and static liquidity determinants and controlling variables. Static measures consist of Current Ratio (CR), and leverage measured in terms of Debt Ratio (DR). Dynamic liquidity refers to Cash Conversion Cycle (CCC), Inventory Turnover Ratio (ITR), Creditors Turnover Ratio (CTR), Debtors Turnover Ratio (DTR) and Asset Turnover Ratio (ATR) which are the major components of working capital management. Firm's Size is a control variable because it is the firm's inherent characteristic that can have the impact on firm's profitability in addition to the independent variables as mentioned above.

a) Debt ratio:
Leverage defines the capital structure of the company, indebtedness of the company. The logic for including this variable is that debt provides the company with the tax shield, which has a positive impact on profitability.
Leverage of company has been measured by debt ratio. Rehman and Afza (2010) used debt ratio in his study and found negative relationship between debt ratio and profitability it means higher the debt leads to less the profit.

b) **Assets Turnover Ratio:** This ratio is calculated with reference to sales. It shows that how many times the sales is of total assets. It has been taken as a control variable as well as independent of which effect is to be measured on the operating profit margin.

c) **Current Ratio:**

Current Ratio is computed as relation of current assets to current liabilities: 
\[ CR = \frac{\text{Current Assets}}{\text{Current Liabilities}} \]
This measure shows the company’s ability to cover short-term liabilities with liquid assets. A sound financial position of the firm requires this ratio to be greater than one; if it is below one, the company lacks working capital to continue operations. Current ratio has been taken as liquidity criterion. Current Ratio (CR) as measured by current assets over current liabilities was used as control variables because they have certain impacts on firm’s profitability. Higher the liquidity of the company needs less investment in working capital because company is able to pay its immediate liabilities and creditors but on other hand more liquidity leads to less investment in inventory and less sales. It is explored that there is a direct relationship current ratio and profitability of company (Rehman and Afza, 2010).

d) **Debtors Turnover ratio:**

Liberal credit policy can boost sales as it permits more time for customers to test the goods from the supplier before making the payment (Long, Malitz and Ravid, 1993; Deloof and Jegers, 1996). Customers have the benefit of longer credit terms instead of taking a loan from financial institution (Petersen and Rajan, 1997). Therefore debtor turnover ratio significantly affects the profitability of the company (Deloof 2003).

e) **Inventory turnover ratio:**

It is obvious that low inventory result in high liquidity but keeping high inventory escapes firm from stock out and consequently it increases sales. Many scholars have taken Number of Days in Inventory (NDI) as one of the
major component of working capital management stating that there is a negative relationship between NDI and operating profit margin (OPM) of the firm (Deloof, 2003).

f) **Creditors Turnover Ratio:**

No of days allowed by the creditors/ suppliers is also an important component of working capital management. It generates more liquidity and firm gets the chance to inspect the quality of goods before making payment to their creditors but another negative aspect is they lose the cash discount offered by the creditors on prompt payment. Padachi (2006) and Deloof (2003) in their studies found the significant relationship between Average Payment Period and profitability of the firm.

g) **Cash Conversion Cycle:**

Cash Conversion Cycle determines how long time the company requires completing the cycle of inventory purchasing, production and sales of goods. It starts with materials purchase and ends with receivables collection. Companies with comparatively short CCC can rapidly regain an access to the funds which can be used to carry on operations. CCC consists of three main components, each having different effect on operating profitability. Those are Inventory Turnover, Accounts Receivable Turnover and Accounts Payable Turnover. One of measures of effectiveness of net working management is Cash Conversion Cycle (CCC) which is first used by Richards and Laughlin (1980). This measure refers the period between the point of purchasing inventory, transforms it to finished products, selling them and the point of collecting the account receivable. The firm with shorter cash conversion cycle has to invest less in working capital, so its financing cost is normally lower, and profitability is better (Deloof -2003). Cash Conversion Cycle (CCC) equals Receivable Period (RP) plus Inventory Period (IP) minus Payable Period (PP).

2. **Dependent Variable**

Dependent variable is that variable which varies with impact of other variables. In present study profitability is dependent variable which has been measured in terms of operating profit margin.
Operating profit margin:
To investigate the relationship between working capital management and firm’s profitability, operating profit (OP), which is calculated as the operating profit divided by total operating assets (total assets minus total financial assets), was used as the dependent variable. We use this variable instead of earnings before interest, tax, depreciation and amortization (EBITDA) or earning before tax or after tax (EBIT) because gross profit is the primary indicator of firm’s operating “success” or “failure” regardless of financial activities. Moreover, this variable has a close relation with other operating variables such as cash conversion cycle. Several studies have used GOP as a proxy for firm’s profitability such as Deloof (2003), Raheman and Nasr (2007), Dong, Huynh Phuong and Jyh-tay Su (2010), Garcia, Martins and Brandao (2011). This research, like that of Lazaridis and Tryfonidis (2006), also employed GROSS to proxy firms’ profitability rather than earnings before interest tax depreciation amortization (EBITDA) or profits before or after taxes. This was because GROSS relates more closely to the cash conversion cycle and its components, various measurements of working capital management. Furthermore, it is also the reason why financial assets are subtracted from the total assets (Lazaridis and Tryfonidis, 2006).

For measuring the working capital level of the selected companies more precisely a comprehensive rank test considering both average and consistency measures through arithmetic mean and coefficient of variation have been used.

3. Control Variable
Control variables are those variables of which effect on dependent variable can be controlled. In present study there are also some control variables as

Firm’s size: Natural log of Sales has been taken to determine the size of the companies. It is assume that bigger the size more the profit. Shin and Soenen (1998), Deloof (2003) and Padachi (2006) also took sale as a measure of company’s size and established positive and highly significant relationship between sales and company’s profitability.
### Table 7: showing the Variables, their computations and Abbreviations

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Variables</th>
<th>Formula</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Independent:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Static</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Debt ratio</td>
<td>Debt / Equity</td>
<td>DR</td>
</tr>
<tr>
<td></td>
<td>Assets Turnover Ratio</td>
<td>Sales / total assts</td>
<td>ATR</td>
</tr>
<tr>
<td></td>
<td>Current Ratio</td>
<td>Current assets / Current Liabilities</td>
<td>CR</td>
</tr>
<tr>
<td></td>
<td><strong>Independent Explanatory</strong></td>
<td><strong>(Dynamic)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Debtors Turnover ratio</td>
<td>Net Credit Sales / Average (Debtors + Accounts Receivables)</td>
<td>DTR</td>
</tr>
<tr>
<td></td>
<td>Inventory turnover ratio</td>
<td>Cost of Goods Sold / Average Inventory</td>
<td>ITR</td>
</tr>
<tr>
<td></td>
<td>Creditors Turnover Ratio</td>
<td>Net Credit Purchases / Average (Creditors + B/P)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cash Conversion Cycle</td>
<td>Receivable Period (RP) plus Inventory Period (IP) minus Payable Period (PP).</td>
<td>CCC</td>
</tr>
<tr>
<td>2</td>
<td><strong>Dependent:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating profit margin</td>
<td>GP – Operating Expenses</td>
<td>OPM</td>
</tr>
</tbody>
</table>

Where Receivable Period (RP) = (Account Receivable/Net Sales)*365
Inventory Period (IP) = Inventory / Cost of Goods Sold)*365
Payable Period (PP) = (Account Payable/ Cost of Goods Sold)*365
4.9 Tools of Analysis and Interpretation of Data

It refers to the computation of certain measures along with searching for patterns of relationship that exist among data-groups. Following tools and techniques have been used to analyze the data:

- **Tabulation of Data**: one of the simplest and most revealing devices for summarizing data and presenting them in a meaningful fashion is the statistical table which will be used for simplifying complex data, for comparison etc.

- **Mean/average**: It is an attempt to find one single figure to describe whole of figures. Simple arithmetic mean will be used to compute the central value of the data. Mean or average value of data for the time period of the study i.e. 5 years has been taken to make the figure free from the short term fluctuations.

- **Ratio Analysis**: Various ratios have been computed for the purpose of analyzing the working capital management of companies selected as its components i.e. Current Ratio, Assets Turnover Ratio, Debtor's Turnover Ratio, Creditor's Turnover Ratio, Stock Turnover Ratio, Average Collection/Payment Period, etc. and operating profit margin as a measure of profitability.

- **Correlation & Regression Analysis**: Correlation determines the direction and degree of association between two or more variables whereas Regression is the measure of the average relationship between two or more variables in terms of the original units of the data. It will be used to compute the value of dependent variable as \( Y=a+bX \), where \( Y \)=Dependent variable, \( a \)=intercept of \( Y \), \( b \)=slope of regression, \( X \)= Independent variable.

Pearson Correlation and Multiple Linear Regression both have been used in present study to establish the relationship among the variables. Pearson Correlation has been used first to understand the degree of relationship between working capital management and firm's profitability but its major shortcoming is it cannot establish the relationship between cause and effect of phenomena. So after application of correlation multiple linear regression analysis has been used to measure the actual impact of many independent variables (Size, DR, CR, DTR, ITR, CTR & CCC) or predictor variables on a
dependent or criterion variable (OPM), correlation has been applied first before regression model (Deloof, 2003; Huynh su, 2010; Padachi, 2006; Annuar & Abdul Rahim, 2009; grill & mathur, 2010; hayajneh & Yassine, 2011)

- **ANOVA**: F-values have been computed to measure the variation within the different values or segments.

- **T-test**: It is used to determine whether the mean of a sample drawn from a normal population deviates significantly from a stated value (the hypothetical value of the population mean), it has been used for inferential purpose.

Data has been analyzed with the help of statistical package for social science (SPSS, version latest). Two types of analysis have been performed i.e. descriptive and quantitative. Descriptive analysis presents the average and standard deviation of the different variables which was used in the study. Descriptive analysis also present the Minimum and Maximum values of the variables which help in getting a picture about the maximum and minimum values a variable can achieve. Quantitative analysis has been done using models and testing the validity of the results with various tests i.e. ANOVA, T-test etc.

### 4.10 Modeling Framework:

After reviewing existing literature, the following best suited variables have been determined to assess the impact of working capital management on profitability, and the equation to investigate the relationship between working capital management and profitability is as follows:

\[
OPM_{it} = \beta_0 + \beta_1 \text{Size}_{it} + \beta_2 \text{DR}_{it} + \beta_3 \text{ATR}_{it} + \beta_4 \text{CR}_{it} + \beta_5 \text{DTR}_{it} + \beta_6 \text{ITR}_{it} + \beta_7 \text{CTR}_{it} + \beta_8 \text{CCC}_{it} + \epsilon_{it}
\]

Where OPM is the Operating Profit Margin
Size is Natural Logarithm of Sales
DR is Debt Ratio
ATR is Assets Turnover Ratio
CR is the Current Ratio
DTR is the Debtors Turnover Ratio
ITR is the Inventory Turnover Ratio
CCC is the Cash Conversion Cycle
CTR is the Creditors Turnover Ratio
CCC is the Cash Conversion Cycle
Where OPM is the dependent variable and remaining are independent.
The E is the error term.

\( \beta_0 \) is constant term for the independent variables
\( \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7 \) are the regression model coefficients of independent variables i.e. size, Debt Ratio, assets Turnover Ratio, Current Ratio, Debtors Turnover Ratio, Inventory Turnover Ratio, Creditors Turnover Ratio and Cash Conversion Cycle respectively.

\( t_i \): The different independent variables for working capital Management of firm \( i \) at Time \( t \)

\( t : Time = 1, 2, \ldots, 5 \) years

Common Effect Model has been used to calculate the explanatory power of various variables for operating profit margin for the sample period 2008-13. The explanatory variables were Debtors Turnover Ratio, inventory turnover Ratio, creditors Turnover Ratio, cash conversion cycle, size, debt ratio and current ratio were tested through a multiple regression model.

Fixed effect regression model (Huynh & Su, 2010) is used to capture the industry effect as well as time effect.

4.11 Research Limitations:

- **Sample Size:**
The sample size of 158 companies consisting of various sectors of manufacturing industry is relatively small as compared to around 1,000 companies listed at BSE in 2009 which slightly limits the generalization of the results of the study. So it may not be appropriate representative of the industry selected for the purpose of the study.

- **Time Period:**
The study consists of only five years data that might not be adequate to ascertain the relation in a very significant manner.
• **Data Availability:**
There might be some data that is not widely available, that could have impact on the analysis in a significant manner.

• **Type of Data:**
The study is based on secondary data not primary (i.e., communication with the financial executives of the company selected would depict the picture and management style etc has not been considered).

• **Macro Economic Factors:**
A little attention has been paid to Financial markets and financial instruments as they play major role on financing the working capital.

• **Ignorance of Qualitative Aspect:**
Study ignores the Qualitative (Phenomenological) aspect that provides the more realistic results of subject.

• **Data Source:**
The researcher being an external analyst was dependent totally upon the data extracted from secondary sources. So, it is subject to all limitations that are natural in the ready-made published financial statements. Hence, grouping or sub-grouping and annualisation of data may slightly affect the results.

• **Tools & Models:**
This study was mainly based on accounting ratio, correlation and regression analysis which have its own limitations.

• **Inflation Factor:**
The Inflation factor has not been considered in present study. It was not possible to revise the relevant financial data with the inflation rate because of insufficient availability of satisfactory information regarding this.

### 4.12 Uniqueness of Value
To the best of the researcher's insights present study is a unique in nature in the Indian manufacturing Sector that determines the impact of working capital management on profitability of manufacturing companies in India and bridges the gap existing in literature.
4.13 References


• Zorianna Podilchuk, “Impact Of Liquidity Management On Profitability: Evidence From Ukraine”, 2013....View Link


• http://www.slideshare.net/ChandraMohantv/proiect-on-working-capital-management