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Factors affecting the selection of inventory cost flow assumptions

An evidence from listed companies on NASDAQ Helsinki Stock Exchange during 2015-2019

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Abstract:
The objective of this thesis was to investigate the influences of company size (Total assets), profitability ratios (Operating profit margin and Net profit margin), liquidity ratio (Current ratio), and company industry on the determination of inventory costing methods in Finnish listed companies on NASDAQ Helsinki Stock Exchange during 2015-2019. This thesis conducted a quantitative study with a sample of 45 Finnish listed companies during 2015-2019 collected by a purposive sampling technique. Data for the quantitative study were retrieved from official consolidated financial statements of the company samples during the observation period. This research conducted Binary Logistic Regression and Fisher's Exact Test of Independence for testing five formulated hypotheses. Overall Fit tests and Goodness of Fit measures were also implemented to evaluate the overall performance of the regression model. All statistical analysis in this study was run on the SPSS platform. The research results showed that there were no sensible evidences to conclude the influences of company size, profitability ratios, liquidity ratio, and company industry on the selection of inventory cost formulas in the Finnish company samples.

Keywords:	inventory cost flow assumptions, financial ratios, earnings management, NASDAQ Helsinki, Binary Logistic Regression, Fisher's Exact Test of Independence
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CONTENTS

FIGURES

TABLES

1 INTRODUCTION

1.1 Motivation

Earnings management stands for managers' considerations of implementing an appropriate accounting policy for a future use to meet different financial reporting purposes (Scott, 2003). Earnings and profit-related figures are monitored upwards or downwards by the choice of accounting policies to achieve specific motives. The choice of an inventory costing method is considered as one of earnings management tools for companies due to the influences on the disclosure of financial statements. There are many inventory valuation methods; however, First-in First-out (FIFO) (Weygandt et al., 2018) and Weighted Average Cost (WAC) (Weygandt et al., 2018) are the most widely applied in corporations (Young, 1966). A coverage of usage was reported from cases of companies following International Financial Reporting Standards (IFRS) that nearly 60% of IFRS companies utilize the WAC method and the remaining 40% of these firms use the FIFO method (Weygandt et al., 2018). In essence, companies utilize different valuation methods interchangeably in parts of inventories to execute a more optimizing valuation result (Weygandt et al., 2018). The choice of inventory costing methods affects the disclosure of *Cost of goods sold* (COGS) and *Ending inventory*, leading to subsequent influences on profit-related figures and *Tax expenses* on the Income statement. Additionally, the selection of inventory cost formulas is responsible for changes in reporting *Current assets*, *Total assets* on the Balance sheet. Financial ratios calculated from financial statement figures are also affected. Therefore, the choice of inventory costing methods is such a crucial decision in earnings management that it helps managers monitor earnings and financial figures according to their motives and expectations.

There have been attempts to study determinants of the selection of inventory cost flow assumptions among affected financial statement figures. However, the test results of previous studies were diverse and contradictory when similar research methodology and variables were tested on different data samples. For instance, Niehaus (1989) researched about the associations between company size, company variability , leverage, managerial ownership and the FIFO-WAC choices. According to the test results, company size and leverage did not have significant influences the choice of inventory costing meth-

ods (Niehaus, 1989). The managerial ownership, and company variability could explain the variance in the outcomes (Niehaus, 1989). With the similar variable firm size and leverage, Cushing and Leclere (1992) identified that these variables significantly affected the choice of inventory costing methods within the scope of their study. Other variables were also tested in Cushing and Leclere's study including tax savings estimation, inventory variability and materiality, and *Current ratio* (Cushing and LeClere, 1992). They were all concluded to have significant associations with the selection of inventory cost formulas.

The majority of previous research on this research topic was in Indonesia and America. These studies were not generalized for other companies outside the research scope. Therefore, key findings in Indonesian and American research are not generalized for the selection of inventory valuation methods in Finland. However, there have been few earlier studies about this topic in the Finnish setting. This thesis is motivated as an extension of previous studies to observe factors affecting the selection tendency of inventory costing methods in Finnish companies. Findings in this thesis are expected to identify a shred of data-driven empirical evidence in Finland and contribute more test results to this research topic.

1.2 Objectives and Scope of the study

The crucial goal of this thesis is to investigate factors affecting the choice of inventory cost flow assumptions in the empirical context. The aim is achieved by examining the following questions:

1. How do inventory cost flow assumptions affect Income statement and Balance sheet?

2. Do company's characteristics affect the choice of an appropriate inventory costing method?

Within the scope of this thesis, the inventory cost formulas are limited to include FIFO and WAC as regulated inventory cost formulas under IFRS (Weaver, 2014, p.17). This thesis covers theories of inventory accounting and understands the influences of FIFO-

WAC methods on financial statement figures. To achieve the main objective, the empirical work is conducted to observe company's features among the affected financial figures if they were significantly associated with the choice of inventory costing methods. The associations between the chosen company's factors and the selection of inventory cost formulas are explained by Positive accounting theory, and motives of managers.

This thesis aims at investigating the determinants of the selection of inventory costing methods in a country-specific scope. Therefore, the population of this thesis involves Finnish listed companies on NASDAQ Helsinki Stock Exchange during a five-year period from 2015 to 2019. Data samples are collected from the population by following specific sampling criteria. This empirical study focuses on studying potential relationships between the choice of FIFO-WAC methods and internal company's characteristics including company size, profitability ratios, liquidity ratio and company industry.

1.3 Significance of the study

This thesis is expected to uncover influential company's factors affecting the choice of inventory cost formulas within the scope of Finnish companies. The Author expects to provide readers with an empirical reflection of the Finnish context and a referential base for any internal corporate research. The thesis is supposed to contribute empirical test results for reconciliation and suggestions for future studies. In a broader scope, this research contribution is beneficial for the development of accounting and research fields.

1.4 Structure of thesis

This thesis is structured as follows. Section 2 presents a literature review as a theoretical base for all topics in the thesis. It is followed by a summary of prolific related works within the scope of study and a formulation of hypotheses in Section 3. Section 4 delineates research methodology and presents a clear description of data that are collected for the study. Data analysis results and their relevance to objectives are externalized in Section 5. Section 6 transpires conclusions along with a comprehensive critical reflection of limitations, reliability and validity of this thesis. Section 6 also summarizes suggestions for future studies.

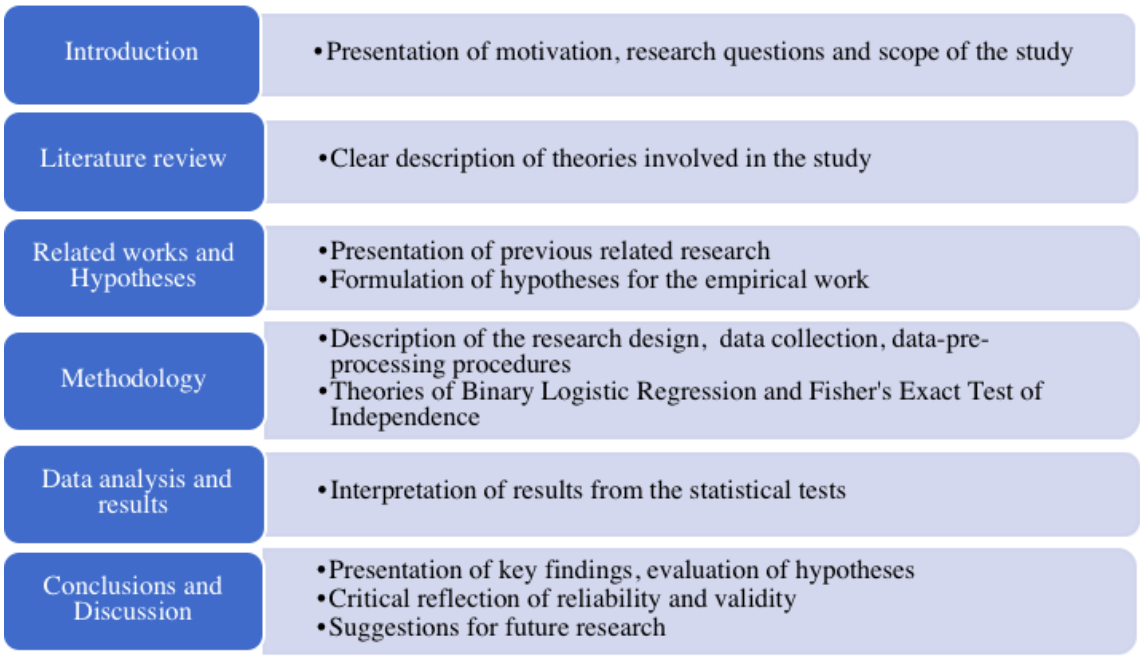

Figure 1. Structure of this thesis

2 LITERATURE REVIEW

The literature review signifies a ground of theories to support main topics of this thesis. All relevant theories are synthesized to provide readers with an imagination of the scope and relevant knowledge of the study. The theoretical framework in this thesis firstly indicates detailed theories of inventory accounting under the IFRS framework. It is followed by a study of the influences of different inventory cost flow assumptions on the presentation of financial statements and arising financial ratios. Theory of earnings management and managers' considerations when choosing an accounting policy for companies are also described to explain reasons behind a choice of inventory cost formulas.

2.1 Theories of inventory accounting

This section 2.1 is a cursory description of inventory accounting principles that international accountants should beware. Costs of items in inventories are firstly determined by involving all related costs, then accountants assign these costs to inventories in the accounting period by inventory valuation methods. Detail of each procedure is elaborated in the following sub-sections.

2.1.1 Cost determination of inventories

Inventories are a combination of commodities and materials purchased from suppliers and held for either trading or manufacturing purposes. Inventories are categorized as *Current assets* in corporations since their usage is less than a year, and their future value is revenue generation when goods are sold (Collings and Loughran, 2013).

Inventories generally encompass raw materials, work-in-process and finished goods (Kemp and Waybright, 2015). Under International Accounting Standards 2 (IAS 2), raw materials are unprocessed materials for an awaiting production process (Qamruzzaman, 2016). Some incomplete or partially-complete assets in an ongoing production process are classified as work-in-process (Qamruzzaman, 2016). Finished goods include inventories purchased and held for ordinary resale purposes and self-manufactured finished goods (Qamruzzaman, 2016). The classification of inventories varies depending on the industry of companies. Regarding merchandising companies, their inventories are commodities purchased from suppliers and held for resale to customers. Manufacturing

companies have a more intricate inventory management system with various inventory categories ranging from materials utilized for the production process, work-in-process, and self-constructed finished products available for sale. Understanding the inventory classification of different company industries assists a precise recognition of the cost of goods involved.

In general, the cost of inventories encompasses costs of purchase, costs of conversion, and other costs involved in bringing goods to a salable condition (IFRS, 2003). Costs of purchase are expenses directly associated with acquiring either finished goods or materials. They include unit purchase price, import duties, taxes, transportation, and handling costs (*IAS plus*, 2012). Trade discounts received due to trade terms and conditions and rebates net off costs of purchase (*IAS plus*, 2012). Costs of conversion consist of prime costs, fixed and variable manufacturing overhead costs (Weetman, 2019). The prime costs are direct costs related to production units, such as the purchase price of materials and direct labor. Fixed manufacturing costs include relatively fixed indirect production costs irrespective of changes in the volume of production. Administrative costs and depreciation could exemplify fixed production overheads. Variable production costs are also indirect costs yet change accordingly with the volume of production. Other costs of inventories are measured due to their relevance to bringing specific products to the salable condition (IFRS, 2003). Non-production overheads could be allocated to other inventory costs because they are incurred in the process of formulating the current condition of inventories. Unallocated overheads in the production process are attributed to expenses in the period of occurrence. Administrative overheads are deducted from the cost of inventories because they are not involved in bringing inventories to the current location and condition (*IAS plus*, 2012). Cost of inventories also excludes storage expenses unless a certain number of necessary inventories are warehoused for subsequent production phases (*IAS plus*, 2012). Abnormal amounts of materials or labor and selling costs are also recognized as expenses (*IAS plus*, 2012).

There are certain differences in measuring inventories of different company industries. Cost of inventories of a merchandise company is recognized at the costs of purchase (Boyd, 2013). In manufacturing companies, raw materials are recognized at acquisition

costs, whilst costs for work-in-process and self-produced finished goods include all costs of conversion and other costs to manufacture finished goods from materials (Boyd, 2013). Inventories in a service provider are measured at the costs of production including all labor costs directly associated with providing services to customers. Selling costs and labor relating to administrative activities are recognized as operating expenses instead of the cost of inventories (Alexander and Nobes, 2020, p.214).

Cost of inventories after being determined will be assigned by various cost formulas based on their interchangeability and nature. Regarding goods in the inventory which "are not ordinarily interchangeable", a specific identification of costs is applied to allocate costs to specific items in the inventories (IFRS, 2003). However, the Specific identification method is unsuitable for larger quantities of "items that are interchangeable" (IFRS, 2003). Hence, cost of interchangeable inventories is assigned by other cost formulas, namely FIFO and WAC (IFRS, 2003). This thesis will solely focus on studying these two cost-based inventory valuation methods and identifying their certain influences on financial reporting in Section 2.1.2 and 2.2.

2.1.2 Inventory valuation methods

Both FIFO and WAC methods are based on a cost flow assumption to assign predetermined costs to interchangeable items (Horngren et al., 2013). Inventories are broken down by similar nature or use before companies determine a corresponding cost formula for all similar goods in an item category. For "inventories with the different nature or use", different cost formulas will be adopted (IFRS, 2003). Moreover, both cost formulas should follow a sequence of allocating *Ending inventory* before assigning COGS (Horngren et al., 2013). After the *Ending inventory* being allocated, companies determine the COGS based on the Formula 1 (BPP-Learning-Media-Staff, 2016, p.108). Details of accounting principles of inventory measurement and the applied cost formula are disclosed in the section *Notes to the consolidated financial statements*

$$COGS = Beginning\,inventory + Cost\,of\,goods\,purchased - Ending\,inventory \quad (1)$$

Lin Electronics
Astro Condensers

Date	Explanation	Units	Unit Cost	Total Cost
Jan. 1	Beginning inventory	10	HK$100	HK$ 1,000
Apr. 15	Purchase	20	110	2,200
Aug. 24	Purchase	30	120	3,600
Nov. 27	Purchase	40	130	5,200
	Total units available for sale	100		HK$12,000
	Units in ending inventory	(45)		
	Units sold	55		

Figure 2. Data description of the example (Source: Weygandt et al., 2018)

Regarding the FIFO valuation method, first units purchased or manufactured are assumed to be first sold (Robinson, 2020). The cost of the first finished units is assigned to COGS (Horngren et al., 2013). Hence, *Ending inventory* is thus constituted by the cost of recently purchased or produced items (Kemp and Waybright, 2015). The carrying amount of *Ending inventory* under the FIFO method is closely equal to the items' current market values (Horngren et al., 2013). In periods of increasing price, the latest unit costs are likely to move upwards, resulting in a higher value of the *Ending inventory* on the Balance sheet and a lower-reported COGS on the Income statement. A flow of accounting inventories bears no resemblance to the physical movement of goods, except that there is a coincidence (Carmichael and Graham, 2012, p.21). Figure 2 and Figure 3 illustrate the allocation of COGS and *Ending inventory* when adopting the FIFO cost formula. In the company case, Lin Electronics company's total goods available for sale are 100 units with a total value of HK$12000 (Weygandt et al., 2018). At the Balance sheet date, units in the *Ending inventory* are 45 units. COGS is then determined by subtracting *Ending inventory* from total goods available for sale (Weygandt et al., 2018). Under the FIFO method, 45 units in the *Ending inventory* are recognized at the latest unit costs, and 55 sold units are valued at the lower cost of initial inventory transactions. The number of *Ending inventory* and COGS are respectively reported on the case company's financial statements at HK$5800 and HK$6200. Regarding the WAC valuation method, companies assign the cost of inventories at a value of average unit cost. They firstly compute the total cost of opening inventory and arising purchases incurred, then divide the total by the number of

Step 1: Ending Inventory				Step 2: Cost of Goods Sold	
Date	Units	Unit Cost	Total Cost		
Nov. 27	40	HK$130	HK$5,200	Cost of goods available for sale	HK$12,000
Aug. 24	5	120	600	Less: Ending inventory	5,800
Total	45		HK$5,800	Cost of goods sold	HK$6,200

Figure 3. Example of allocation of costs under FIFO method (Source:Weygandt et al., 2018)

Step 1: Ending Inventory						Step 2: Cost of Goods Sold	
HK$12,000	÷	100	=	HK$120		Cost of goods available for sale	HK$12,000
		Unit Cost		Total Cost		Less: Ending inventory	5,400
Units						Cost of goods sold	HK$ 6,600
45		HK$120		HK$5,400			

Figure 4. Example of allocation of costs under WAC method (Source:Weygandt et al., 2018)

units available for sale to generate the average unit cost (Young, 1966). The formula for calculating the average unit cost of items is as follows:

$$Average\,unit\,cost = \frac{Costs\,of\,beginning\,inventory + Arising\,purchases}{Total\,units\,available\,for\,sale} \tag{2}$$

The recognition of both COGS and *Ending inventory*, therefore, remain steady because they are calculated based on the average cost despite price volatility during the period (Young, 1966). However, in times of rising prices, COGS under the WAC valuation method is overstated, and Ending inventory under WAC is understated compared to the FIFO assumption. Figure 4 is the allocation of COGS and *Ending inventory* in Lin Electronics company under the WAC method. The total cost of 100 units available for sale is HK$12000; hence, the weighted-average unit cost is HK$120 during the period (Weygandt et al., 2018). Ending inventory and COGS are then determined by multiplying the corresponding units with the weighted-average unit cost (Weygandt et al., 2018). The carrying amount of *Ending inventory* is HK$5400, while COGS in the accounting period is recognized at HK$6600.

Despite the choice of adopting the inventory valuation method, both FIFO and WAC ascertain that cost of goods available for sale equates to a sum of COGS and cost in *Ending*

inventory (Weygandt et al., 2018).Both inventory valuation methods exert no modification over the number of units available for sale; instead, the cost placed on units is changed. However, FIFO and WAC help companies present COGS and *Ending inventory* on financial statements for different reporting purposes and the pertinence to specific inventory parts. Many companies also combine FIFO and WAC for assigning costs to different inventory categories (Kemp and Waybright, 2015). Notwithstanding, companies should follow a consistency principle of using the chosen cost formula without changing continuously (Kemp and Waybright, 2015). This consistent adoption allows companies to compare financial figures of successive years (Weygandt et al., 2018).

2.2 The influences of inventory valuation methods on financial reporting

2.2.1 The influences of inventory valuation methods on financial statements

According to Weygandt et al. (2018), companies exhibit Income statement effects, tax benefits, and Balance sheet effects when adopting an appropriate cost-flow-based inventory method. The influences of cost formulas on the presentation of financial statements vary depending on changes in market trends and micro-economy. This thesis will examine the effects accordingly with inflation variation. A positive average annual inflation rate indicates the average growth rate of market prices and a strong economic condition. Reversely, a negative inflation rate presents a deflation in the economy where prices of goods and services decrease over time (Schmidt, 2020). The changes in prices of commodities and services will be discussed in relevance to the influences of FIFO or WAC on financial statements. Figure 5 is a summary of the influences of FIFO and WAC on financial statements in times of both rising and falling prices.

As mentioned above, different cost formulas theoretically direct the determination of COGS on the Income statement and *Ending inventory* on the Balance sheet. The variation in assigning COGS and *Ending inventory* results in a difference in presenting other figures in financial statements. On the Income statement, a choice of cost formulas affects the presentation of COGS, *Operating profit*, *Profit/Loss before tax*, *Tax expenses*,

In times of inflation

	Comparison between FIFO and WAC
COGS	FIFO < WAC
Operating profit	FIFO > WAC
Profit/Loss before tax	FIFO > WAC
Tax expenses	FIFO > WAC
Net profit	FIFO > WAC
Ending inventory	FIFO > WAC
Current assets	FIFO > WAC

In times of deflation
Reverse trend

Figure 5. Influences of FIFO and WAC in financial statements' presentation

and *Net profit/loss for the period*. In times of rising prices, determination of COGS under the FIFO assumption is lower than WAC method leading to a higher *Operating profit* and *Profit/Loss before tax*. It is followed by a higher *Net profit/loss for the period* under the FIFO method although companies adopting FIFO assumption incur a higher amount of *Tax expenses* (Weygandt et al., 2018). Figure 6 shows the aforementioned differences in Income statement presentation under two inventory costing methods.

Regarding the effects on the Balance sheet in times of inflation, *Ending inventory* under the FIFO method is higher than it is under the WAC method due to the allocation of the latest prices to the carrying amount of *Ending inventory* under the FIFO assumption. Hence, the presentation of *Current assets* and *Total assets* on the Balance sheet are reported to be higher. In terms of deflation, these influences have reverse results compared to results in terms of inflation (Weygandt et al., 2018).

In summary, companies striving for presenting higher profitability and a stronger financial position are likely to adopt the FIFO method in times of inflation. There are many reasons that companies are likely to prefer a higher profit and total assets in their financial statement presentation. Better performance of income and total assets could assist companies in attracting investors and appealing lenders. The cost of goods available for sale remains unchanged; however, by adopting FIFO costing method, companies can present a lower COGS and higher profit on the Income statement as well as a higher Ending inventory on the Balance sheet. However, in the case of companies focusing on income tax savings and tax-relevant benefits, the WAC method is preferable. Companies will experience

Lin Electronics Condensed Income Statements		
	FIFO	Average-Cost
Sales revenue	HK$11,500	HK$11,500
Beginning inventory	1,000	1,000
Purchases	11,000	11,000
Cost of goods available for sale	12,000	12,000
Ending inventory	**5,800**	**5,400**
Cost of goods sold	6,200	6,600
Gross profit	12,300	4,900
Operating expenses	2,000	2,000
Income before income taxes*	3,300	2,900
Income tax expense (30%)	990	870
Net income	**HK$ 2,310**	**HK$ 2,030**

Figure 6. Example of the influences on Income statement (Source:Weygandt et al., 2018)

lower *Tax expenses* at the same tax rate applied into companies.

2.2.2 The influence of inventory valuation methods on financial ratios

The adoption of different inventory costing methods also has an influence on financial ratios because financial ratios are constituted based on financial statement figures. Directly-affected financial ratios are broken down into two main categories, including profitability and liquidity. Detail of the influences on financial ratios is summarized in Figure 7.

Regarding profitability ratios, the choice of FIFO or WAC exerts influences on *Operating profit margin*, *Net profit margin*, and *ROA*. *Operating profit margin* and *Net profit margin* are profitability ratios calculated by dividing *Operating profit* and *Net profit/loss for the period* by *Net sales/revenue* respectively (Harrison et al., 2017). In periods of inflation, while the denominators are identical, a higher-reported *Operating profit* and *Net profit/loss for the period* under the FIFO method result in higher *Operating profit margin* and *Net profit margin*. *ROA* is another profitability ratio calculated as follows (Harrison et al.,

In times of inflation

Features	Measurements	Comparison between FIFO and WAC
Profitability	Operating profit margin Net profit margin Return on assets	FIFO > WAC FIFO > WAC FIFO < WAC
Liquidity	Current ratio	FIFO > WAC

In times of deflation
Reverse trend

Figure 7. Influences of FIFO and WAC on financial ratios

2017):

$$ROA = \frac{Net\ profit\ /\ loss\ for\ the\ period}{Average\ total\ assets} X\ 100 \tag{3}$$

Under the FIFO formula , higher-reported values of *Net profit/loss* and *Current assets* contribute to the increases in both numerator and denominator of the Formula 3. However, *ROA* is expected to be lower when assigning cost of inventories by the FIFO method compared to the WAC assumption (Saint-Leger, 2016). In total, if market prices increase over time, the FIFO method mostly assists companies in strengthening their profitability ratios. The statement presentation of higher profit facilitates companies in attracting prospects and borrowing loans from banking systems. Moreover, higher profitability ratios strengthens a company's financial performance when being compared to other companies in the same industry.

Current ratio is classified as one of the liquidity ratios calculated by dividing *Current assets* by *Current liabilities* (McCrary, 2010). In times of rising prices, Ending inventory and Current assets under the FIFO method are higher leading to a higher *Current ratio* regardless of the *Current liabilities*. *Current ratio* gauges the liquidity level of companies in generating short-term, liquid assets to pay off their current liabilities or upcoming due-date payments (McLaney and Atrill, 2020). A firm possessing a higher *Current ratio* indicates that its assets are more liquidated (Atrill, 2019). Therefore, in comparison with other industry competitors, companies exhibit this benefit of the FIFO method to illustrate a stronger, liquid financial performance.

2.3 Earnings management and managers' motives for earnings management

According to Scott (2015), earnings management stands for companies' selection of appropriate accounting policies for their specific financial reporting purposes regarding retained earnings and net profit for the period. Earnings management is reasoned by a Positive accounting theory, which forms reasons for implementing a specific accounting policy and predicts the appropriate policy for future use (Hapsari, 2016). Under the Positive accounting theory, earnings stand chances of being reported at lower or higher to meet investors and shareholders' financial expectations (Carruth, 2011). When earnings are monitored to witness upward trends, companies are manipulating to generate additional profits and present a stronger financial position (Schnipper, 1989). Reversely, companies might choose a more appropriate accounting policy to reduce the earnings disclosure and earn tax benefits. From the Company's perspective, managers will take various motives into their consideration in the process of earnings management to gain specific economic benefits.

There are 3 main motivations for earnings management in the managers' viewpoint, namely Bonus scheme, Debt covenant, and Political costs.

2.3.1 Bonus scheme

According to Holthausen et al. (1995, p.61), there is a correlation between bonus schemes and earnings manipulation when managers strive to achieve the predetermined target profit to receive their bonus incentives. Bonus scheme awards are annual one-off payments to managers in the form of either cash payments or dividends (Luong, 2015). The bonus plan is the crucial motive for managers to choose a suitable accounting principle for reporting the higher profit in the financial statement disclosure.

2.3.2 Debt covenant

Debt covenant stands for an agreement between companies as borrowers and lenders (debtholders, creditors) stating that companies are required to manage their operations with underlying predetermined rules set by lenders. If firms fail to fulfill the requirements,

they are breaching the lending agreement or violating lending rules. In the event of debt covenant violation, creditors experience low costs, while borrowers incur relatively high costs (Dichev and Skinner, 2002). Lenders can demand an increase in an interest rate of principle (Mulford and Comiskey, 2002) or immediate repayment of loan principal (Palepu et al., 2003). Debtholders can renegotiate terms and conditions of debt covenant (Chen and Wei, 1993), and thus adjust the covenant constraints (Dichev and Skinner, 2002). Other serious breaches result in termination of the lending agreement or liquidation, which impairs the credit value of companies and their shareholders (Bouyahia, 2017)

Because of the high cost of violation for borrowers (Dichev and Skinner, 2002), managers have a pressure of decreasing the probability of violating debt covenant. Specifically, managers are responsible for monitoring certain financial ratios and the disclosure of financial statement figures which are utilized for calculating financial ratios. For instance, if firms are on the threshold of breaching debt covenants, their managers would prefer a financial reporting policy to reduce liabilities and increase income, assets, and equity (Taylor, 2013). It is explicit that there is a relationship between debt covenant and managers' financial reporting decisions.

2.3.3 Political cost

According to Mulford and Comiskey (2002), as the company size expands, managers should be more considerate about their earnings management strategies to avoid the attention of regulators. Particularly, the movement of large-cap companies in corporate social responsibility might become a controversial topic, and their tax and political cost obligations are scrutinized more carefully. Therefore, big companies supposedly choose a more conservative accounting approach by monitoring earnings and profit downwards (Arnold, 2009, p.83). It implies that these companies are likely to prefer the WAC method in times of inflation to reduce tax liability and incur the fewer political cost.

2.4 Summary of theories

The choice of inventory valuation methods has a certain influence on the disclosure of profit-related figures, income tax expenses and the assets on consolidated financial state-

ments. Hence, choosing an appropriate inventory method is one of earnings management tools of managers for their different financial reporting purposes. The empirical work of this thesis attempts to examine important factors among the affected financial statement figures that managers consider when choosing an inventory cost flow assumption. The associations between these company's features and the selection of inventory costing methods are reasoned by Positive accounting theory and managers' motives in earnings management.

3 RELATED WORKS AND HYPOTHESES

3.1 Prior studies

There are few previous studies about factors influencing the selection of inventory costing methods. Four following research are presented in this thesis as references for reconciling test results. These studies have similarities in research methodology and the theoretical framework. However, differences in data samples lead to the variation in test results and the hypotheses testing model.

3.1.1 Theories in prior studies

Theories of prior studies are constituted based on inventory accounting policy, Positive accounting theory, agency theory, and definition of earnings management. According to Prastika (2014), the study covers theories of inventory accounting and earnings management. Hapsari (2016) expanded the scope of theories to include also agency theory and Positive accounting theory. Theories of inventory accounting and influences of different inventory cost formulas on financial statements were additionally dictated in Hapsari's research. In 2019, Putra and Carolina, and Rioni based the theoretical framework of their studies solely on Positive accounting assumptions and theories of inventory costing methods.

3.1.2 Data samples and variables in prior studies

There are five variables in Prastika's study in 2014 including firm size (*Ln Total assets*), capital intensity, variability of COGS, inventory variability and *Gross profit margin*. Data samples were collected from financial statements of manufacturing companies on BEI stock market during 2009-2012. By purposive sampling, the population of 134 manufacturing companies were sized down to 40 company samples. In 2016, Hapsari conducted the research with different variables including financial leverage, liquidity ratio (*Current ratio*, income before taxes. Hapsari continued studying the influence of company size *Ln Total assets* on selecting inventory cost formulas. These variables were tested based on data samples of 16 retail companies on Indonesia Stock Exchange during 2012-2014. The purposive sampling technique was also used in this study. Putra and Carolina (2019) conducted a comprehensive study of the impact of company size (*Ln Total assets*), inventory

intensity, COGS variability, *Gross profit margin*, liquidity ratio (*Current ratio*), leverage, and especially managerial ownership. Their samples included manufacturing companies on Indonesia Stock Exchange during 2015-2018. By purposive sampling, 162 companies in the population were reduced to 73 companies. In the meantime, Rioni (2019) implemented the study with a smaller number of variables including company size, *Net profit margin* and inventory intensity. The samples of the study were industrial firms on Indonesia Stock Exchange during 2015-2017.

3.1.3 Research methodology in prior studies

All aforementioned research used the Wald's test for Binary Logistic Regression as a partial test. It was followed by Goodness Of Fit measures for Logistic Regression as simultaneous tests. The significance level in their studies was 5% (α= 0.05)

3.1.4 Key findings in prior studies

According to test results in Prastika's study, variable firm size and COGS variability were significantly associated with the choice of inventory cost formulas. There was no significant impact of inventory variability, capital intensity and *Gross profit margin* on the choice of inventory methods. Hapsari concluded in the research that there were no significant associations between company size, liquidity ratio, income before taxes and the choice of methods. If the significance level was adjusted to 10%, financial leverage was concluded to be responsible for the selection of inventory cost formulas. With the significance level of 5%, Putra and Carolina concluded that company size and inventory variability significantly contributed to the FIFO-WAC choices, while COGS variability, *Gross profit margin*, liquidity ratio, leverage and managerial ownership did not significantly affect the selection of inventory valuation methods. In Rioni's research, results indicated that company size, *Net profit margin*, and inventory intensity had significant associations with company's decision of inventory cost formula.

3.1.5 Suggestions for future research in prior studies

After drawing conclusions from data samples, Hapsari suggested that future studies should observe longer-period data and consider other external factors in the studies. Putra and Carolina recommended future researchers to test other variables for more test results.

Study	Samples	Key findings
Analysis Factors Affecting Selection of Inventory Accounting Methods On Manufacturing Company Registered in BEI (Prastika, 2014)	40 manufacturing companies in BEI during 2009-2012	Significant: Variable firm size, COGS variability Insignificant: Inventory variability, capital intensity, *Gross profit margin*
The influence of company size, leverage, liquidity ratio, and income before taxes towards the selection of inventory cost flow assumptions in retail companies listed on IDX period 2012-2014 (Hapsari, 2016)	16 retail companies on IDX during 2012-2014	Significant: Financial leverage Insignificant: Company size, liquidity ratio, income before taxes
Inventory accounting methods: Factors affecting basis of the choice (Putra and Carolina, 2019)	73 manufacturing firms on ISE during 2015-2018	Significant: Firm size, inventory variability Insignificant: COGS variability, *Gross profit margin*, liquidity ratio, leverage, managerial ownership
Factors affecting the selection of inventory valuation methods in industrial companies in Indonesia Stock Exchange (Rioni, 2019)	Industrial companies on IDX during 2015-2017	Significant: Company size, inventory intensity, *Net profit margin*

Table 1. Prior studies

This thesis is conducted as a contribution of test results within the scope of Finnish companies. Observations are expanded to a five-year period from 2015 to 2019, which is longer than previous studies. In addition, the thesis will re-test *Ln Total assets*, *Current ratio*, *Net profit margin* and examine other variables.

3.2 Hypotheses

According to the literature review and references from previous studies, this thesis proposes five hypotheses examining the relationships between some company's features and the choice of inventory cost formulas. Developed hypotheses in this study are synthesized in the Table 2

3.2.1 Company size

Company size can be determined by *Total assets* (Putra and Carolina, 2019). According to Hapsari (2016), earnings management strategies might be influenced by the scope of

businesses. For instance, big companies would tackle more significant risks because their business systems are more intricate. Moreover, big companies deal with more tax matters compared to smaller companies (Hapsari, 2016). The bigger the firm size is, the more political costs they incur annually (Hapsari, 2016). Therefore, managers of these companies focus on an accounting policy which allows them to report profit-related figures lower on financial statements. Lower-reported profit contributes to a reduction in tax expenses. Reversely, smaller companies' goal is to polish financial statements; hence, managers of these companies prefer the higher profit in financial reporting. *Total assets* might be a factor affecting the managers' selection of inventory cost formulas.

H_0: Total assets does not have a significant impact on the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

H_1: Total assets has a significant impact on the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

3.2.2 Profitability ratios

Profitability ratios gauge companies' annual financial performance, so that these ratios are likely to draw investors' attention. The roles of managers are to keep track on profitability ratios and balance between the disclosure of these ratios and tax savings. If their profitability ratios are high enough, managers focus on reducing political costs. Reversely, managers are likely to choose an accounting policy to report a higher profit because of the annual bonus scheme or the pressure of debt covenant. Hence, there are potential associations between profitability ratios and the choice of inventory methods for different financial reporting purposes. Profitability ratios included in this thesis are *Operating profit margin* and *Net profit margin*.

H_0: Operating profit margin does not have a significant impact on the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

H_2: Operating profit margin has a significant impact on the selection of inventory cost flow assumptions in Finnish listed companies during 2015-2019

H_0: Net profit margin does not have a significant impact the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

H_3: Net profit margin has a significant impact on the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

3.2.3 Liquidity ratio

As mentioned above, the *Current ratio* is one of liquidity ratios which measures the capability of companies in liquidizing assets to cover short-term liabilities (Miller-Nobles et al., 2018). A low *Current ratio* indicates that companies should focus on increasing profit and *Current assets*. In the period of inflation, FIFO assists managers in reporting a lower COGS and a higher *Ending inventory*, so that figures for profit and *Current assets* are enhanced by using the FIFO. Reversely, if companies currently have high liquidity, managers' priority is to save tax expenses. A lower-reported profit reduces the tax liability. The profit reduction in financial reporting does not lead to a material reduction in *Current ratio* and their liquidity level.

H_0: Current ratio does not have a significant impact the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

H_4: Current ratio has a significant impact on the selection of inventory cost flow assumptions in Finnish listed companies during 2015-2019

3.2.4 Company industry

There has been few studies about the influence of company industry on the choice of inventory methods. Hence, this thesis will test a potential association between company industry and the selection. A company chooses an appropriate inventory cost flow assumption correspondingly with its inventory categories. Because companies in different industry sectors have different inventory natures, their selection tendency of inventory methods may vary.

H_0: Company industry does not have a significant impact on the selection of inventory cost assumptions in Finnish listed companies during 2015-2019

Company's features	**Description**	**Hypotheses**
Company size	Company size is measured by *Total assets*	H_1
Profitability	Profitability is measured by *Operating profit margin* and *Net profit margin*	H_2 H_3
Liquidity ratio	Liquidity is measured by *Current ratio*	H_4
Company industry	The company samples are divided into industry sectors in accordance with Finnish Foundation for Share Promotion's industry classification	H_5

Table 2. Hypotheses of the study

H_5: Company industry has a significant impact on the selection of inventory cost flow assumptions in Finnish listed companies during 2015-2019

4 RESEARCH METHODOLOGY

4.1 Research design

This thesis follows a deductive reasoning approach. It is initiated by a theory review of secondary academic materials including textbooks, articles, and scientific journals along with a reference from the prior research. Hypotheses are then formulated from the theoretical base, and the thesis will conduct an empirical experiment for the hypotheses testing. In the empirical study, this thesis deploys a quantitative research to withdraw conclusions by collecting numerical data and testing hypotheses by statistical methods (Bryman and Bell, 2011). With the quantitative research method, researchers could either contribute different statistical perspectives, or reconcile results with the previous research (Saunders et al., 2007).

The nature of this research design is an explanatory study, which focuses on studying patterns of relationships between variables (Saunders et al., 2007, p.134). As mentioned above, this thesis attempts to give possible explanations for the relationships between company's characteristics and the selection of inventory cost flow assumptions in the context of Finnish listed companies. Company's characteristics involved in this thesis are company size (*Total assets*), profitability ratios (*Operating profit margin* and *Net profit margin*), liquidity ratio (*Current ratio*) and company industry. Hypotheses of potential associations between these company's features and the selection of inventory cost formulas are formulated for the hypotheses testing.

To examine the independence between company industry and the choice of inventory methods, the thesis deploys Fisher's Exact Test of Independence. To investigate the potential impact of the other factors on the selection of inventory cost formulas, the thesis conducts a Binary Logistic Regression. Outcomes of both statistical methods are expected to present a data-driven analysis of any potential associations between company's features and the choice of inventory valuation methods.

4.2 Research data

4.2.1 Data collection

All data for the literature review and the empirical study in this thesis are secondary data. The theoretical base is constituted by the secondary data from related textbooks, articles and other scientific journals. The sources of these documents are reliable to maintain the validity of this research. Data for the quantitative study are retrieved from consolidated financial statements of companies listed on NASDAQ Helsinki Stock Exchange during 2015-2019. Financial statements of the observation period are disclosed publicly on companies' official websites. The thesis collects restated figures on financial statements to eliminate errors in the financial reporting procedures. All numerical data are collected in million euro.

The population of this thesis includes listed companies on NASDAQ Helsinki Stock Exchange that release financial statements under IFRS during 2015-2019. There is no limitation regarding company industry, company size, profitability or other financial figures. The thesis aims at studying the selection tendency of inventory costing methods by a country-specific scope. However, only listed companies are involved in this thesis due to their accessible, transparent financial data and their compliance with IFRS in financial reporting. In total, there are 133 Finnish listed companies with five years of observations in this population.

The samples of this study are collected by the purposive sampling technique. Purposive sampling is chosen to ascertain a sufficient inclusion of important information for the empirical study (Maxwell, 2012). According to Saunders et al. (2007, p.230), purposive sampling allows researchers to collect the most appropriate data for solving research questions in case of small samples. Purposive sampling technique also saves time and effort for the data collection process (Taherdoost, 2016). Due to a limited scope of study regarding the population and time, samples in this thesis are collected deliberately based on the following inclusion criteria:

1. There was the *Inventories* account in consolidated financial statements during 2015-2019

Description	Total companies
Companies listed on Helsinki Stock Exchange following IFRS during 2015-2019	**133**
There was not *Inventories* account in consolidated financial statements during 2015-2019	**(28)**
Financial statements during the observation period did not disclose the cost formula used	**(13)**
Companies used more than one inventory costing method during 2015-2019	**(19)**
Financial statements were not reported consecutively during 2015-2019	**(7)**
There was not a constant usage of the inventory cost formula in five years of observations	**(5)**
Companies did not use EUR currency in financial reporting during 2015-2019	**(1)**
There was not an availability of financial statements in English during 2015-2019	**(15)**
Total qualified companies	**45**

Table 3. Steps of sampling in the study

2. Financial statements during the observation period disclosed the cost formula used

3. One of inventory cost formulas (FIFO or WAC) was used during 2015-2019

4. Financial statements were reported consecutively during 2015-2019

5. There was a constant usage of the inventory cost formula in five years of observations

6. EUR currency was used in financial reporting during 2015-2019

7. There was an availability of financial statements in English during 2015-2019

Only 45 companies out of 133 Finnish listed companies meet the predetermined criteria. Thus, only 34% of Finnish publicly listed companies are involved in this empirical study. Table 3 elaborates on the detailed number of companies which are excluded from this study.

4.2.2 Data description

There are 225 samples distributed over 45 qualified companies during five years of observation period. In the raw data, each sample has 10 features including company's name, its industry according to NASDAQ Helsinki Stock Exchange, its inventory cost formula, year, *Net sales*, *Total assets*, *Operating profit*, *Net profit/loss for the period*, *Current assets*, and *Current liabilities*.

Data for the hypotheses testing drop the company's name and year because of their irrelevance to the choice of inventory cost flow assumptions. Data for the Binary Regression model are pre-processed to extract required feature variables. Due to the small sample size, company industries are re-categorized to be used in the Fisher's Exact Test of Independence. Detail of data pre-processing can be found in Section 4.2.3.

All financial statement figures (*Net sales*, *Total assets*, *Operating profit*, *Net profit/loss for the period*, *Current assets*, and *Current liabilities*) over five-year period from 2015 to 2019 are numerical variables . The chosen inventory cost formula is a dichotomous variable representing FIFO or WAC. The company industry is a nominal/categorical variable.

4.2.3 Data pre-processing

In the scope of this thesis, raw data are pre-processed for testing aforementioned hypotheses by the Binary Logistic Regression. The natural logarithm (Ln) of *Total assets* is calculated to replace *Total assets* variable to respond the skewness of this variable . New company's features are extracted from the raw data collected directly from consolidated financial statements. The new features include *Operating profit margin*, *Net profit margin*, and *Current ratio*. Calculations of these features are presented in Table 4

The industry classification on NASDAQ Helsinki Stock Exchange is specific. It results in a small number of samples per industry, which affects the result of the Independence test. For the Fisher's Exact Test of Independence, the 45 companies of the study are firstly re-categorized into 8 industry sectors accordingly with the Finnish Foundation for Share Promotion (FFSP) 's industry classification (*Pörssin Toimialaluokitus*, 2012). The

New features	**Unit**	**Type of data**	**Calculation**
Operating profit margin	%	Numerical, continuous	$\frac{Operating\ profit}{Net\ sales} X\ 100$ (4)
Net profit margin	%	Numerical, continuous	$\frac{Net\ profit\ /\ loss}{Net\ sales} X\ 100$ (5)
Current ratio	No unit	Numerical, continuous	$\frac{Current\ assets}{Current\ liabilities}$ (6)

Table 4. Calculations of extracting features for hypotheses testing

Industry sector	**Number of companies**	**Percentage**
Basic resources	4	8.9%
Consumer goods	7	15.6%
Consumer services	6	13.3%
Healthcare	4	8.9%
Industrial goods and services	16	35.5%
Services of general interest	1	2.2%
Technology	4	8.9%
Telecommunications services	3	6.7%
Total	**45**	**100%**

Table 5. Industry division of the samples

industry sectors encompass "Basic resources", "Consumer goods", "Consumer services", "Healthcare", "Industrial goods and services", "Services of general interest", "Technology", and " Telecommunications services". According to the Table 5, the majority of company samples is operating in the "Industrial goods and services" industry, while there is only one company operating in the "Services of general interest" industry in the samples.

The Author continues categorizing these 45 companies into two bigger categories, namely industrial and non-industrial companies. Industrial companies include companies in the

"Basic resources", "Consumer goods", "Industrial goods and services", and "Technology" industry sector (Pyrrö, 2019). Non-industrial companies encompass companies in the "Consumer services", "Services of general interest", "Telecommunications services", and "Healthcare" (Pyrrö, 2019). As a result, there are 31 industrial companies and 14 non-industrial companies in total.

4.3 Data analysis techniques

All statistical analysis in this thesis is conducted on the Statistical Package for the Social Sciences (SPSS) platform. This quantitative study uses Binary Logistic Regression for testing hypotheses H_1-H_4 and Fisher's Exact Test of Independence for hypothesis H_5. Specifically in the Binary Logistic Regression model, descriptive statistics is firstly generated to illustrate an overall view of independent variables in the regression model. It is followed by a formulation of the regression equation to study potential causal relationships between the dependent variable and independent variable(s) (Saunders et al., 2007, p.451). By using the Binary Logistic Regression equation, changes in the dependent variable can be statistically explained by modifications in independent variables (Saunders et al., 2007, p.468). Overall Fit tests are then implemented to test the fitting improvement of the prediction model with given independent variables compared to the baseline, intercept-only model. Significance tests are ultimately conducted as Goodness Of Fit measures of the regression model before withdrawing conclusions.

4.3.1 Binary Logistic Regression

Binary Logistic Regression model is a statistical model for binary classification, which predicts the probability of one class (*Simple Guide to Logistic Regression in R and Python*, 2015). There are two classes including FIFO and WAC which are encoded as 0 and 1 respectively in the data. In this regression model, the dependent variable is the log odd of class 1 (WAC). Independent variables in this regression model are *Ln Total assets*, *Operating profit margin*, *Net profit margin*, and *Current ratio* in the numerical forms. These variables in this study are independent of each other to ascertain one of Logistic Regression requirements (*Assumptions of Logistic Regression*, 2020).

The descriptive statistics is firstly carried out to describe briefly the overall picture of

No.	Company's name	Industry (FFSP)	Industry
1	Afarak Group Oyj	Basic resources	Industrial
2	Alma Media Oyj	Consumer services	Non-industrial
3	Apetit Oyj	Consumer goods	Industrial
4	AS Tallink Grupp FDR	Consumer services	Non-industrial
5	Aspo Oyj	Basic resources	Industrial
6	Aspocom Group Oyj	Technology	Industrial
7	Atria Oyj	Consumer goods	Industrial
8	Biohit Oyj	Healthcare	Non-industrial
9	Bittium Oyj	Technology	Industrial
10	Cargotec Oyj	Industrial goods and services	Industrial
11	Caverion Oyj	Industrial goods and services	Industrial
12	Componenta Oyj	Basic resources	Industrial
13	Consti Oyj	Industrial goods and services	Industrial
14	Elisa Oyj	Telecommunications services	Non-industrial
15	Enedo Oyj	Industrial goods and services	Industrial
16	Exel Composites Oyj	Industrial goods and services	Industrial
17	F-secure Oyj	Technology	Industrial
18	Fiskars Oyj	Consumer goods	Industrial
19	Fortum Oyj	Services of general interest	Non-industrial
20	HKScan Oyj	Consumer goods	Industrial
21	Honkarekenne Oyj	Consumer goods	Industrial
22	Huhtamäki Oyj	Industrial goods and services	Industrial
23	NoHo Partners Oyj	Consumer services	Non-industrial
24	Nokia Oyj	Telecommunications services	Non-industrial
25	Nokian Renkaat Oyj	Consumer goods	Industrial
26	Olvi Oyj	Consumer goods	Industrial
27	Oriola Oyj	Healthcare	Non-industrial
28	Orion Oyj	Healthcare	Non-industrial
29	Outokumpu Oyj	Basic resources	Industrial
30	Plc Uutechnic Group Oyj	Industrial goods and services	Industrial
31	Ponsse Oyj	Industrial goods and services	Industrial
32	Raute Oyj	Industrial goods and services	Industrial
33	Reka Industrial Oyj	Industrial goods and services	Industrial
34	Revenio Group Oyj	Healthcare	Non-industrial
35	Robit Oyj	Industrial goods and services	Industrial
36	Sanoma Oyj	Consumer services	Non-industrial
37	Scanfil Oyj	Industrial goods and services	Industrial
38	Stockmann Oyj	Consumer services	Non-industrial
39	Tecnotree	Technology	Industrial
40	Teleste Oyj	Telecommunications services	Non-industrial
41	Tokmanni Group Oyj	Consumer services	Non-ndustrial
42	Tulikivi Oyj	Industrial goods and services	Industrial
43	Uponor Oyj	Industrial goods and services	Industrial
44	Valmet Oyj	Industrial goods and services	Industrial
45	Wärtsilä Oyj	Industrial goods and services	Industrial

Table 6. Finnish listed companies included in the study

independent variables. The descriptive statistics illustrates only minimum, maximum, mean and standard deviation of each independent variable. This step provides readers with a cursory description of data scope, yet reflects no correlation between variables. It is unnecessary that the Author conducts a test of normality for independent variables in a regression model beforehand (Grace-Martin, 2020) .

The Logistic Regression model studies and represents the association between the dependent variable and independent variables by a regression equation (Formula 7). Based on the estimated value of the dependent variable (the natural logarithm of the odd to select WAC) given specific values of independent variables, the probability to select WAC ($P(WAC)$ or P) can be calculated by Formula 8. The probability to select FIFO ($P(FIFO)$) is $1-P$. The outcomes of dependent variable in the regression model are between 0 and 1 (Hosmer et al., 2013, p.7). In the scope of this thesis, the cutoff boundary θ is set as 0.5 to determine the classification. Specifically, the choice of method is estimated to be WAC if $P >= \theta$, and FIFO if $P < \theta$.

$$\ln \frac{P}{1-P} = \alpha + \beta_1 TA + \beta_2 OPM + \beta_3 NPM + \beta_4 CR + e \tag{7}$$

In which:

- P: Probability of choosing an inventory cost flow assumption method 1 (WAC)
- α: Regression constant
- $\beta_1 ... \beta_4$: Regression coefficients
- TA: Natural logarithm (Ln) of Total assets
- OPM: Operating profit margin (%)
- NPM: Net profit margin (%)
- CR: Current ratio

- e: Error

$$P = \frac{e^{log(odds)}}{1 + e^{log(odds)}} \tag{8}$$

From the learnt model, the coefficients and p-values of the independent variables imply their contribution to the explanation of the variance of the dependent variable (Saunders et al., 2007, p.451). The Author could thus derive the influences of features/ independent variables on the choice of inventory cost flow assumptions.

This thesis uses SPSS to fit the observation data into the Logistic Regression model. The p-value is a key indicator of significance in the SPSS output of this model. It bases a decision boundary for hypotheses testing. Hypotheses in the study are tested with a significance value of 5% (α= 0.05). If the p-value is lower than 0.05 , the null hypotheses are rejected indicating that independent variables and the choice of inventory cost formulas are statistically significant. Reversely, if the p-value is higher than 0.05, the null hypotheses are accepted. In this circumstance, there is no evidence that independent variables and the choice of methods are statistically significant.

The regression model is re-tested by -2 Log-Likelihood test and Classification tables to assess an improvement of the overall fit in the model with the independent variables compared to the null, intercept-only model. Regarding the -2 Log Likelihood test, SPSS output values of -2 Log-Likelihood at Step 0 and Step 1 are compared. A reduction in the value of -2-Log-Likelihood in the Step 1 implies a better-fit regression model. It is followed by an analysis of the Classification tables at Step 0 and Step 1. If an overall percentage in Step 1 increases, the preciseness in classifying outcomes of the regression model is higher than the baseline model.

Goodness Of Fit measures are ultimately conducted by SPSS before withdrawing conclusions to test if observation data fit the regression model. The Goodness of Fit tests included in this study are the Logistic Regression Nagelkerke R^2 and the Hosmer-Lemeshow method. The Nagelkerke R^2 figure implies the extent of variation in the outcomes explained by the regression model. The Hosmer-Lemeshow method ascertains

that the regression model is a good fit to the observation data. In the SPSS outcome of Hosmer-Lemeshow test, the p-value of significance is a key indicator to determine if the regression model fits the empirical data. With the significance level of 5%, if the p-value is lower than 0.05, the model fails to fit the set of data (Hilbe, 2016, p.72). If the p-value is higher than 0.05, the regression model fits the observed data (Hilbe, 2016, p.72) . These Goodness of Fit measures are examined to ascertain the reliability and validity of conclusions from the regression model with given independent variables.

4.3.2 Fisher's Exact Test of Independence

To examine the potential association between company industry and the choice of inventory valuation methods, the Fisher's Exact Test of Independence is chosen. The test is suitable for studying the connection between two categorical variables with two levels (2x2 contingency table). The Fisher's Exact Test of Independence in this thesis is conducted by the SPSS platform. Samples for the test are the choice of inventory cost formulas of 45 Finnish listed companies categorized into the industrial and non-industrial sector. The key result in the SPSS output of Fisher's Exact test is the Significance (2-sided) p-value. This significance value is compared to the chosen significance level of 5%. If the p-value is lower than 0.05, the null hypothesis is rejected. The company industry and the choice of inventory methods are concluded to be statistically significant. If the p-value is higher than 0.05, the Author accepts the null hypothesis. In this case, there is no association between company industry and the selection of inventory cost formulas.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Lntotalassets	225	2.46197915	10.7122154	5.99603217	1.94048262
Operatingmargin	225	-47.925963	70.7873928	5.58265651	11.7020981
Netprofitmargin	225	-155.14759	952.815377	7.86601630	66.1231813
Currentratio	225	.199143747	8.88419405	1.71213824	1.34358825
Valid N (listwise)	225				

Figure 8. Descriptive statistics of independent variables

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Lntotalassets	.132	.075	3.045	1	.081	1.141
	Operatingmargin	-.020	.014	2.006	1	.157	.980
	Netprofitmargin	.004	.003	1.449	1	.229	1.004
	Currentratio	-.286	.126	5.134	1	.023	.751
	Constant	-.186	.529	.124	1	.724	.830

a. Variable(s) entered on step 1: Lntotalassets, Operatingmargin, Netprofitmargin, Currentratio.

Figure 9. Result of Logistic Regression

5 DATA ANALYSIS AND INTERPRETATION OF RESULTS

5.1 Data analysis

5.1.1 Binary Logistic Regression

Firstly, the table of descriptive statistics (Figure 8) describes briefly the scope and attributes of data through minimum, maximum, mean and standard deviation of each independent variable in the Binary Logistic Regression. In regression models, there is no need of testing of normality for independent variables because of no awareness of the distributions of these variables (Grace-Martin, 2020). Hence, this thesis conducts no test of normality of variables.

The thesis uses the Binary Logistic Regression approach to model the association between the choice of inventory cost formulas and a set of independent variables. Result of the Logistic Regression model is illustrated in Figure 9 and Formula 9:

$$\ln \frac{P}{1-P} = -0.186 + 0.132TA - 0.02OPM + 0.004NPM - 0.286CR + e \quad (9)$$

In which:

- P: Probability of choosing an inventory cost flow assumption method 1 (WAC)
- TA: Natural logarithm (Ln) of Total assets
- OPM: Operating profit margin (%)
- NPM: Net profit margin (%)
- CR: Current ratio
- *e*: Error

Based on the Figure 9, only significance value of *Current ratio* is lower than significance level 5% (0.023 < 0.05). Hence, the null hypothesis of *Current ratio* is rejected and H_4 is accepted. According to the regression model, the result shows that *Current ratio* and the choice of inventory methods are statistically significant. Significance value of *Ln Total assets* is 0.081. If the significance level is adjusted to 10%, the null hypothesis of *Ln Total assets* is rejected and H_1 can be accepted.

Figure 9 describes that significance values of other independent variables including *Operating profit margin* and *Net profit margin* are higher than α= 0.05. Hence, null hypotheses of those variables are accepted and H_2,H_3 are all rejected. According to the result of the regression model, there might be no associations between these company's factors and the selection of inventory cost formulas.

Before withdrawing conclusions of the regression model, the Author implements the Overall Fit tests to ascertain the improvement of the regression model in comparison with the null model. Based on Figure 10 and Figure 11, there is a reduction in the value of -2 Log-Likelihood from 311.805 to 299.055. The decrease in -2 Log-Likelihood indicates

Iteration History[a,b,c]

Iteration		-2 Log likelihood	Coefficients Constant
Step 0	1	311.805	.044
	2	311.805	.044

a. Constant is included in the model.

b. Initial -2 Log Likelihood: 311.805

c. Estimation terminated at iteration number 2 because parameter estimates changed by less than .001.

Figure 10. -2 Log-Likelihood of the null model

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	299.055[a]	.055	.073

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Figure 11. Nagelkerke R^2 of the regression model

that the regression model with independent variables is an improvement from the null, constant-only model.

The classification table of the regression model shows that the model is likely to classify precisely the outcome for 57.8% of cases (Figure 13). In the null, intercept-only model, the overall percentage of classifying correctly two categories is 51.1% (Figure 12). Hence, there is an improvement in the accuracy of classification in the regression model, although the difference is insignificant. In summary, based on the Overall Fit tests, the regression model with given independent variables is considered as a data-fitting improvement compared to the baseline model.

Significance tests including Nagelkerke R^2 and Hosmer-Lemeshow method are then examined to test a difference between the observed data and the regression model. Hence, the model is accepted and *Current ratio* and *Ln Total assets* can explain the variance in the selection of inventory valuation methods. Based on the result of the Logistic Regression R^2 (Figure 11), only 7.3% of variance in inventory cost flow assumptions is explained by

Classification Table[a,b]

Observed			Predicted: Method 0	Predicted: Method 1	Percentage Correct
Step 0	Method	0	0	110	.0
		1	0	115	100.0
	Overall Percentage				51.1

a. Constant is included in the model.

b. The cut value is .500

Figure 12. Classification table of the null model

Classification Table[a]

Observed			Predicted: Method 0	Predicted: Method 1	Percentage Correct
Step 1	Method	0	53	57	48.2
		1	38	77	67.0
	Overall Percentage				57.8

a. The cut value is .500

Figure 13. Classification table of the regression model

the regression model with the independent variables. There is a likelihood of 92.7% that the choice of inventory methods is explained by other independent variables outside the scope of this study. Although in the result of the Hosmer-Lemeshow test (Figure 14), this regression model is a good fit to the observation data because the significance value is higher than 0.05 (0.328 > 0.05).

5.1.2 Fisher's Test of Independence

The following cross-tabulation shows that there is a little difference in the selection of inventory cost formulas in 45 Finnish company samples (Figure 15). In the meantime, Figure 16 illustrates that the significance value is higher than 0.05. Hence, the null hypothesis

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	9.176	8	.328

Figure 14. Result of Hosmer-Lemeshow test

Industry * Choiceofmethod Crosstabulation

Count

		Choiceofmethod		
		FIFO	WAC	Total
Industry	Industrial company	15	16	31
	Non-industrial company	7	7	14
Total		22	23	45

Figure 15. The choice of inventory methods by company industry

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.010[a]	1	.920		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.010	1	.920		
Fisher's Exact Test				1.000	.587
N of Valid Cases	45				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.84.

b. Computed only for a 2x2 table

Figure 16. Result of Fisher's Exact test

of company industry is accepted and H_5 is rejected. There is no relationship between the company industry and the selection of inventory cost flow assumptions.

5.2 Interpretation of results

The Overall Fit tests indicate that the regression model with given independent variables is an improvement in data-fitting compared to the null, intercept-only model. The Hosmer-Lemeshow test also illustrates that the regression model is a good fit to the observation data. However, in the Nagelkerke R^2 test, the independent variables in this study only explain 7.3% of the variation in the FIFO-WAC outcomes. Hence, there is a weak empirical evidence that independent variables in the regression model can determine the choice of inventory cost flow assumptions in Finnish company samples during 2015-2019, although these variables are associated with the target outcomes in the regression model. Details of the results are described according to company's features as follows:

5.2.1 Company size

Company size in this regression model is determined by *Ln Total assets*. If confidence level is 90%, *Ln Total assets* and the selection of FIFO-WAC methods are statistically associated. However, based on the result of Nagelkerke R^2 test, *Ln Total assets* can only explain 7.3% of variation in the FIFO-WAC outcomes of these company samples. Therefore, the *Ln Total assets* does not have a significant impact on the choice of inventory costing methods. This actual result aligns with Hapsari's study in 2016, although company size theoretically influences the decision of mangers of inventory cost methods. The empirical result contradicts findings in Prastika's, Putra and Carolina' and Rioni's study, when these researchers investigated a statistically significant association between variable company size and the selection of inventory costing methods in their data samples.

5.2.2 Profitability ratios

Profitability is measured by *Operating profit margin* and *Net profit margin* in this regression model. Based on the data analysis of the Binary Logistic Regression model, there are no statistically significant relationships between *Operating profit margin* , *Net profit margin* and the choice of inventory costing methods. The result of *Net profit margin* in this thesis contradicts Rioni's study when Rioni identified an association between the choice of inventory costing methods and *Net profit margin*. The difference in this finding might result from different sampling criteria when Rioni only collected financial data of profitable companies.

5.2.3 Liquidity ratio

Liquidity is measured by *Current ratio*. In the regression model, only the association between *Current ratio* and the choice of inventory costing methods is statistically significant with significance level 5%. However, due to the result of Nagelkerke R^2 test, the *Current ratio* in this regression model can only statistically explain 7.3% of the variance in the choice of inventory costing methods. Hence, there is a weak evidence for the influence of liquidity ratio on selecting inventory cost formulas in the Finnish listed company samples during 2015-2019. This result aligns with Hapsari's study in 2016 and the empirical analysis of Putra and Carolina in 2019.

5.2.4 Company industry

There has been no previous research about the influence of the company industry on the choice of inventory costing methods. Inventory natures and categories vary in different industry sectors, and accountants of companies consider choosing inventory cost flow assumptions as corresponding treatments. Hence, the choice of inventory costing methods might be reasoned by the company industry. However, after conducting an empirical Fisher's Exact Test of Independence with the samples of 45 listed companies on the NASDAQ Helsinki Stock Exchange, there is no evidence to conclude that the company industry is significantly associated with the choice of inventory methods in the Finnish company samples.

6 CONCLUSIONS AND DISCUSSION

6.1 Conclusions

This thesis acknowledged the influences of different inventory cost formulas on financial statement figures for various financial reporting purposes. In times of rising and decreasing prices, the selection of inventory cost flow assumptions affects the disclosure of *Operating profit*, *Tax expenses* and *Net profit/loss for the period* on the Income statement. On the Balance sheet, financial reporting of *Ending inventory*, *Current assets* and *Total assets* are affected. Because profitability ratios and liquidity ratio are financial ratios based on aforementioned financial statement figures, these indicators are thus affected under different inventory cost flow assumptions. Hence, companies take advantage of inventory cost flow assumptions as an earnings manipulation method to adjust values of financial ratios accordingly with companies' reporting purposes. This study aimed at investigating important features among the affected financial statement figures when managers consider an inventory cost flow assumption. In this thesis, the Author tested company size (*Total assets*), profitability ratios (*Operating profit margin*, *Net profit margin*), liquidity ratio (*Current ratio*), and company industry if they were factors affecting the choice of inventory methods. The associations between these company's characteristics and the selection of inventory cost flow assumptions were theoretically explained by the Positive accounting theory and managers' motives in earnings manipulation.

The study was implemented with data samples of 45 Finnish listed companies on NASDAQ Helsinki Stock Exchange during 2015-2019. The samples were collected by the purposive sampling technique with sampling constraints. Data analysis techniques were Binary Logistic Regression model and Fisher's Exact Test of Independence conducted on the SPSS software. The regression model was used to test the associations between company size (*Total assets*), profitability ratios (*Operating profit margin*, *Net profit margin*), liquidity ratio (*Current ratio*) and the selection of inventory methods. Company industry and the choice of FIFO-WAC methods were tested by the Fisher's Exact Test of Independence if they were independent or dependent on each other.

Results of the regression model showed that H_1 and H_4 were accepted at the significance

level of 10% and 5% respectively. The results in the learnt model implied that *Ln Total assets* and *Current ratio* were significantly associated with the FIFO-WAC choices. However, results of the learnt regression model only reflected 7.3% of variance in the choice of inventory cost formulas. Based on the statistical evidences, H_1 and H_4 were thus rejected. In the meantime, H_2, H_3 and H_5 were rejected at the significance level 5% stating that *Operating profit margin*, *Net profit margin* and company industry did not have significant influences on selecting inventory costing methods. In summary, all hypotheses in the study (H_1- H_5) were not supported by the observation data. There were no significant evidences to conclude that company size, profitability ratios, liquidity ratio, and company industry are determinants of the selection of inventory cost formulas in the Finnish company samples during 2015-2019.

6.2 Critical reflection

6.2.1 Limitations

In this thesis, merely two inventory valuation methods based on cost flow assumptions were taken precedence over a Specific identification method and Last-in First-out (LIFO) due to their impermissibility under IFRS (Li and Sun, 2016). The quantitative research in this thesis solely collected data from publicly listed companies in Finland with predetermined sampling criteria. Therefore, this study consisted of only 45 qualified companies in 8 different industry sectors holding 34% of all Finnish listed companies. According to Saunders et al. (2007, p.230), findings of this empirical experiment which used the purposive sampling technique did not statistically represent the total population of Finnish listed companies during 2015-2019. Generalizability or external validity (Saunders et al., 2007, p.151) was thus limited in this empirical study. Additionally, small data samples limited the results of data analysis tests, especially the Fisher's Exact Test of Independence. In the scope of this study, the Author emphasized solely on the influence of internal features on the FIFO-WAC choices. There was no consideration of external, non-financial factors in the data analysis tests.

6.2.2 Reliability and Validity

This section discusses the reliability and validity of the thesis to ascertain the credibility of the main findings in the empirical work (Saunders et al., 2007). Reliability is assessed by stable findings after performing data collection and analysis techniques (Saunders et al., 2007, p.149). Results should be stably re-produced when the empirical study is conducted under similar conditions and constraints (Heale and Twycross, 2015). In addition, to ascertain the reliability of research, there should be transparency in the raw data (Saunders et al., 2007, p.149). Having acknowledged the measures of reliability, this thesis firstly retrieved transparent raw data from public audited financial statements of Finnish listed companies during 2015-2019. The list of Finnish listed companies was accordingly with NASDAQ Helsinki Stock Exchange and financial statements were available on official websites of the company samples. Only accessible information on financial reports was used in this empirical study. The Author had no control over the truth and fairness of financial reporting in the involved companies. By following data collection, data pre-processing, and analysis procedures in Section 4, the results of this thesis are stably reproducible.

To ensure a high construct validity or measurement validity in the research design (Bryman and Bell, 2011, p.42), the thesis consistently followed these measures. The theoretical framework in the Section 2 was retrieved from reliable textbooks, scientific journals, and course literature. Company's features were chosen as independent variables to have relationships with inventory costing methods based on the existing Positive accounting theory, companies' motives in earnings management, and findings of earlier studies. Hypotheses for the empirical work were thus developed based on the existing theoretical background and previous related research. The Author then chose appropriate statistical methods for testing hypotheses. Conclusions of possible causal relationships between the dependent variable and independent variables were withdrawn based on a statistical, data-driven ground to maintain unbiased results and internal validity of the study.

6.3 Suggestions for future research

An expansion in data samples is suggested in future studies for better experiment results. Samples can be collected in a larger scope or in the longer-period observation data; hence, results of this thesis can be improved. If the number of samples per industry are big enough, future research could study determinants of the selection of inventory costing methods by a specific industry. The study also suggests tests of other internal and external variables to contribute more test results to this research field. Furthermore, to test the performance of the regression model, future studies could consider randomly splitting data into training and testing data. Training data are used to train the regression model, and testing data are intended for testing the performance of the Logistic Regression model. This performance testing method is especially suggested for future studies where a large number of samples are available.

7 REFERENCES

Alexander, D. and Nobes, C., 2020. *Financial Accounting- An International Introduction*. 7th ed. Toronto: Pearson.

Arnold, V., 2009. *Advances in Accounting Behavioral Research*. 1st ed. Vol. 12. Emerald Publishing Limited.

Assumptions of Logistic Regression, 2020 [Online]. Available from: https://www.statisticssolutions.com/assumptions-of-logistic-regression [Accessed April 15, 2021].

Atrill, P., 2019. *Financial Management for Decision Makers*. 9th ed. Pearson.

Bouyahia, A., 2017. *Debt Covenants of Finnish Companies and Their Reporting in Financial Statement* [Online]. English. Bachelor's Thesis. Available from: http://urn.fi/URN:NBN:fi:aalto-201803281820.

Boyd, K.W., 2013. *Cost Accounting For Dummies*. 1st ed. Wiley.

BPP-Learning-Media-Staff, 2016. *FIA Foundations of Financial Accounting FFA (ACCA F3): Interactive Text*. 5th ed. United Kingdom: BPP Learning Media Ltd.

Bryman, A. and Bell, E., 2011. *Business Research Methods*. 3rd ed. New York: Oxford University Press Inc.

Carmichael, D.R. and Graham, L., 2012. *Accountants' Handbook, Financial Accounting and General Topics*. 12th ed. Wiley.

Carruth, P., 2011. Earnings Management: The Role Of Accounting Professionals. *International Business Economics Research Journal (IBER)* [Online], 1. Available from: https://doi.org/10.19030/iber.v1i3.3899.

Chen, K.C.W. and Wei, K.C.J., 1993. Creditors' Decisions to Waive Violations of Accounting- Based Debt covenants. *The Accounting Review*, 68(2).

Collings, S. and Loughran, M., 2013. *Financial Accounting for Dummies*. 1st ed. Wiley.

Cushing, B.E. and LeClere, M.J., 1992. Evidence in the Determinants of Inventory Accounting Policy Choice. *The Accounting Review*, (2).

Dichev, I.D. and Skinner, D.J., 2002. Large-Sample Evidence on the Debt Covenant Hypothesis. *Journal of Accounting Research*, 40(4).

Grace-Martin, K., 2020. *The Distribution of Independent Variables in Regression Models* [Online]. Available from: https:/www.theanalysisfactor.com/the-distribution-of-independent-variables-in-regression-models/. [Accessed April 14, 2021].

Hapsari, L.N., 2016. *The influence of company size, leverage, liquidity ratio, and income before taxes towards the selection of inventory cost flow assumptions in retail companies listed on IDX period 2012-2014*. Thesis (Bachelor's Degree in Economics). President University, Indonesia.

Harrison, W.T., Horngren, C.T., Thomas, C.W., and Tietz, W.M., 2017. *Financial Accounting, Global Edition*. Pearson.

Heale, R. and Twycross, A., 2015. Validity and reliability in quantitative research. *Evidence-Based Nursing* [Online], 18(3), pp.66–67. Available from: https://doi.org/10.1136/eb-2015-102129.

Hilbe, J.M., 2016. *Practical Guide to Logistic Regression*. 1st ed. CRC Press.

Holthausen, R.W., Larcker, D.F., and Sloan, R.G., 1995. Annual bonus schemes and the manipulation of earnings. *Journal of Accounting and Economics*, 19, pp.29–74.

Horngren, C., Sundem, G., Elliott, J., and Philbrick, D., 2013. *Introduction to Financial Accounting:Pearson New International Edition*. Pearson Education Limited.

Hosmer, D.W., Lemeshow, S., and Sturdivant, R.X., 2013. *Applied Logistic Regression*. 3rd ed. Wiley.

IAS plus, 2012 [Online]. Available from: https://www.iasplus.com/en/standards/ias/ias2 [Accessed March 23, 2021].

IFRS, 2003. *IAS 2 Inventories, Standard 2021 Issued* [Online]. Available from: https://www.ifrs.org/issued-standards/list-of-standards/ias-2-inventories [Accessed March 23, 2021].

Kemp, R. and Waybright, J., 2015. *Financial Accounting, Global Edition*. 3rd ed. Pearson.

Li, J. and Sun, M., 2016. LIFO Distortions in the Manufacturing Industry. *Accounting and Finance Research* [Online], 5(1). Available from: https://doi.org/10.5430/afr.v5n1p191.

Luong, L.T., 2015. *Earnings management through accrual-based analysis: case study: stockmann oy abp from 2005-2014*. Thesis (B.B.A). Arcada University of Applied Sciences, Finland.

Maxwell, J.A., 2012. Qualitative research design: An interactive approach. 41, pp.214–253.

McCrary, S.A., 2010. *Mastering Financial Accounting Essentials: The Critical Nuts and Bolts*. Hoboken, New Jersey: John Wiley and Sons, Inc.

McLaney, E. and Atrill, P., 2020. *Accounting and Finance: An Introduction*. 10th ed. Pearson.

Miller-Nobles, T.L., Mattison, B.L., and Matsumura, E.M., 2018. *Horngren's Financial Managerial Accounting, The Financial Chapters, Global Edition*. 6th ed. Pearson.

Mulford, C. and Comiskey, E., 2002. *Financial Number Game: Detecting Creative Accounting Practices*. New York: John Wiley Son. Inc.

Niehaus, G.R., 1989. Ownership Structure and Inventory Method Choice. *The Accounting Review*, 64(2).

Palepu, K.G., Healy, P.M., and Bernard, V.L., 2003. *Business Analysis and Valuation Using Financial Statements: Text and Cases*. 3rd ed. South-Western College Pub.

Pörssin Toimialaluokitus, 2012 [Online]. Available from: https://www.porssisaatio.fi/en/testpage/ [Accessed March 30, 2021].

Prastika, A.M., 2014. *Analysis Factors Affecting Selection of Inventory Accounting Methods On Manufacturing Company Registered in BEI*.

Putra, R.A.M. and Carolina, A., 2019. Inventory Accounting Methods: Factors affecting basis of choice. *Journal of Auditing, Finance, and Forensic Accounting* [Online], 7(1). Available from: https://doi.org/https://doi.org/10.21107/jaffa.v7i1.6145.

Pyrrö, J., 2019. *Environmental responsibility disclosure of publicly listed companies in Finland*. Thesis (M.B.A). Aalto University, Finland.

Qamruzzaman, M., 2016. Inventory Valuation and IAS-2 Compliance in Bangladeshi Manufacturing Industries. *The Cost and Management*, 44, pp.4–12.

Rioni, Y.S., 2019. Factors affecting the selection of inventory valuation methods in industrial companies in Indonesia Stock Exchange. *Accounting and Business Journals*, 1(2).

Robinson, T.R., 2020. *International Financial Statement Analysis*. 4th ed. Wiley.

Saint-Leger, R., 2016. *What Impact Does the Inventory Method Have on Financial Ratios?* [Online]. Chron.com. Available from: https://smallbusiness.chron.com/impact-inventory-method-financial-ratios-30861.html [Accessed March 26, 2021].

Saunders, M., Lewis, P., and Thornhill, A., 2007. *Research methods for business students*. 4th ed. Harlow, England: Pearson.

Schmidt, J., 2020. *What Is Inflation And How Does It Work?* [Online]. Forbes.com. Available from: https://www.forbes.com/advisor/investing/what-is-inflation/ [Accessed March 26, 2021].

Schnipper, K., 1989. Commentary on earnings management. *Accounting Horizons*, 3, pp.91–102.

Scott, W.R., 2015. *Financial Accounting Theory*. 7th ed. Toronto: Pearson.

Simple Guide to Logistic Regression in R and Python, 2015 [Online]. Available from: https://www.analyticsvidhya.com/blog/2015/11/beginners-guide-on-logistic-regression-in-r/ [Accessed April 14, 2021].

Taherdoost, H., 2016. Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *SSRN Electronic Journal*, 5(2).

Taylor, P., 2013. What Do We Know About the Role of Financial Reporting in Debt Contracting a and Debt Covenants? *Accounting and Business Research*, 43(4).

Weaver, L., 2014. *Managing the Transition to IFRS-Based Financial Reporting: A Practical Guide to Planning and Implementing a Transition to IFRS or National GAAP*. 1st ed. Wiley.

Weetman, P., 2019. *Financial and Management Accounting*. 8th ed. Pearson.

Weygandt, J.J., Kimmel, P.D., and Kieso, D.E., 2018. *Accounting Principles: ifrs version*. 1st ed. Wiley.

Young, L.A., 1966. Inventory pricing and its influence on financial statements. *ETD Collection for AUC Robert W. Woodruff Library*, (423).