Determining the Effective Organizational Characteristics on the Inventory Valuation Methods: Multinomial Logistic Regression Approach in an Emerging Economy

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Abstract

This study investigates the effective characteristics of the company on the choice type of inventory valuation methods and evaluates the probabilities of using these methods for companies listed on the Iraq Stock Exchange. 35 companies' data during 8 years from 2014 to 2021 was examined. In this research, inventory accounting methods are defined as dependent variables. FIFO, WAC, and moving average methods are the most commonly used measure for evaluating inventories by most Iraqi industrial companies. Considering that the dependent variable type is a multi-level qualitative, the Multinomial Logistic Regression (MLR) was used. According to the results of Multinomial Logistic Regression and simple method, the working capital, ROA, and current ratio have a significant effect on the choice of FIFO and WAC valuation methods, while the industry type has only a significant effect on the choice of WAC valuation method. According to the results of the Bootstrap method, ROA and current ratio have a significant effect on the choice of FIFO and WAC valuation methods, while the working capital and Industry type, have a significant effect on the choice of WAC valuation method. Analysis based on robustness checks and the t+1 test confirmed these results. In addition, the results show that companies are more likely to use the WAC method than other methods. There is still no clear idea as to the effective characteristics of the company on the chosen type of inventory valuation methods in emerging markets. This paper is intended as an initial step toward filling this gap. This study helps managers choose the proper methods based on the characteristics of their companies to have better economic consequences.

Keywords: Firm's characteristics, Inventory valuation methods, First-In-First-Out (FIFO), Weighted Average Cost (WAC), Inventory

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Introduction

companies Manufacturing play an important role in the economy and manufacturers' main source of income is from the sales of inventory, which has an important role in company performance (Suvannasing and Kazimoto, 2020). organizations Accounting and professional associations have confirmed that the inventory component has a significant impact on financial statements (Jihad et al., 2019). Since there are several choices for inventory costing methods, managers have flexibility in selecting inventory costing methods and the choice of inventory valuation methods have economic consequences. They consider an inventory costing method that shows the consequences that each method has on financial statements, income taxes. and cash flows (Suvannasing and Kazimoto, 2020). Empirical research (e.g., Holthausen and Leftwich, 1983; Lee and Hsieh, 1985; Simeon and John, 2018) has focused on identifying factors mostly nature. economic in as potential determinants of the choice of inventory valuation methods on profit and tax. The studies had mixed results. The selection process has been the use of a variety of alternative accounting treatments that can result in widely divergent results (Arcelus and Trenholm, 1991). Members who recognize that the choice of one method over another is not necessarily based on differences in circumstances find this incomprehensible and, as a result, have lost confidence in accounting standards (Trenholm and Arcelus, 1989).

The problem of inventory valuation is one of the essential issues that raises scientific controversy among many accountants because of the multiplicity of local and international accounting standards through the valuation methods emanating from them (Jihad et al., 2019). Inventory valuation deserves special attention and it issued directly affects the cost of production and it is therefore important that pricing be consistent (Igben, 2009). A large body of accounting studies investigates the implications to firm welfare of inventory policy choice (Ciftci and Darrough, 2022). The studies showed that the choice of inventory method has an important role hence the need for companies to critically examine the methods of inventory valuation before making a choice (Simeon and John, 2018). However, annual contracts for Iraqi companies are prepared each year, and conduct new tenders with different Thus. they used suppliers. annual replenishment for inventory which could affect the efficiency such as surplus or shortage in materials (Al-Zaidi et al., 2018), therefore, this study aimed to investigate and analyze the effective characteristics of the Iraq company that might potentially influence the choice of inventory costing methods such as First-In-First-Out (FIFO), Weighted Average and moving average Cost (WAC) methods that they are the most commonly used measure for evaluating inventories by most of the Iraqi industrial companies. There is still no clear idea as to the effective characteristics of the company on the chosen type of inventory valuation methods in emerging markets such as Iraq. This paper is intended as an initial step toward filling this gap. The firm is viewed with a set of valuation methods, from which one is selected by a set of characteristics reflecting the relative strength of the various interest groups managers, shareholders, such as government, and the like. One potential influence on the choice of inventory method that has not been investigated in prior empirical studies is the potential effect of a firm's characteristics. Hence, through this paper, the study highlighted the effective characteristics of the company in the choice type of inventory valuation methods. Since, the reliance on

an appropriate method to calculate the cost of the goods sold affects the determination of the value of the inventory and the increase in the tax proceeds (Jihad et al., 2019), this study helps managers have flexibility in selecting inventory costing methods, and choice the proper methods to have better economic consequences. In Iraq, the International Accounting Standard (IAS) No.2 (the amended international standard) and the Iraqi Local Accounting Rule No. 5 are related to the choice of inventory valuation methods. Since, multinationals, securities, and capital markets, all call for more uniform standards across national borders, this study can help standard regulators to reduce the diversity of accounting valuation choices and improve financial information comparability. The results of this study also help Iraqi companies to develop the competence of their accountants to follow up on proper methods in evaluating the inventory and pricing methods.

Iraqi data is used in the present study, and the variables used to define these characteristics, as well as the sources of data used in their measurement are discussed in the next section. In the following sections, the literature review and proposal organizational characteristics are explained first. The research methodology is described in the third section. Then the research findings are performed in the fourth section. Finally, the discussion and conclusion are presented.

2. Literature review and proposal of organizational characteristics

Based on past studies related to inventory costing methods, there is an impressive body of evidence documenting reasons as to which inventory costing method can be an optimal choice. Most of these studies focused on companies that adopted the FIFO and LIFO (Ibarra, 2008) and companies may choose the best alternative to value their inventories (Nisha, 2015). Some studies developed tax benefits (Hughes and Schwartz, 1988) and other factors like firm size and inventory variability (Cushing and LeClere, 1992) as a strong rationale behind the choice. Some studies (e.g., Bar-Yosef and Sen, 1992) identified a mixed strategy that is, partly FIFO and partly LIFO, and claimed the weighted average method to be the optimal choice. studies (e.g., Morse Some and Richardson, 1983; Hunt, 1985; Lee and Hsieh, 1985; Dopuch and Pincus, 1988; Kuo, 1993) concluded tax benefits, firm size, and high debt levels are the reasons behind the choice of inventory costing methods. Morse and Richardson (1983) showed that firms of similar size and in the same industry tend to choose the same inventory costing method.

In 2015, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU), Inventory (Topic 330) to simplify the measurement of inventories and to align their accounting treatments to IAS 2 of International Financial Reporting Standards (IFRS). However, the IAS 2 and the ASU do not appear completely standard aligned. The US allows corporations to evaluate their inventories using LIFO, which was banned by IAS 2 in 2003, because of tax matters and the higher transaction costs of its repeal (Lucchese and Carlo, 2020; Harris Ananthanarayanan, 2019). and The accounting rule in Iraq was approved by the Iraqi Accountants and Auditors Association in 1985 to adopt IAS in a manner that does not contradict local legislation, rules, and standards (Al-Jabari, 2005). Iraqi Local Accounting Rule No. (5) is for the measurement and valuation of inventory, and it is related to the choice of inventory valuation methods and their impact on costing the value of the inventory at the end of the accounting period and its disclosure in the financial statements and comparing the effect of the methods used for evaluating the inventory according to the International and Local Accounting Standards (Jihad et al., 2019).

This study does not aim to develop any predictive model or discuss the reasons behind the choice of inventory costing methods and their effects on the financial statements, aims to examine the influence of selected characteristics of firms listed on the Iraqi Stock Exchange as emerging economy on the choice of Inventory Costing Method. The variables used to define these characteristics are discussed follow.

According to the "Debt/equity hypothesis", the larger a firm's debt/equity ratio, the more likely the firm's manager is to select accounting procedures that shift reported earnings from future periods to the current period (Watts and Zimmerman, 1986). With the increase in the debt-to-equity ratio, managers are income-increasing likely use to accounting methods. An increase in the ratio of debt to equity will increase the pressures and restrictions included in the borrowing contract, and as a result, the possibility of violating the terms of the contract and paying fines and late will follow. payments Therefore, managers use accounting information in the contract process to reduce late fees and fines, which is also effective in choosing accounting methods. Gopalakrishnan (2012) argued that leveraged companies are more likely to choose the FIFO accounting method. So, according to the presented theoretical foundations. leverage, and total liabilities have been investigated as the effective organizational characteristics of the inventory valuation methods.

According to the "Size hypothesis" (also known as the political cost hypothesis), the larger the firm, the more likely the manager is to choose accounting procedures that defer reported earnings from current to future periods (Watts and Zimmerman, 1986). The methods used to consider firm size should fit into the type of business (Mottershead et al., 2012). The SIZE variable is likely to be positively related to an inexpensive accounting such as FIFO method (Gopalakrishnan, 2012). So, according to the presented theoretical foundations, the firm's size and market value of the company have been investigated as the effective organizational characteristics of the inventory valuation methods.

Several analysts consider profitability to be the main focus of their analysis. The higher the Return on Assets (ROA) ratio, the more profit is earned by a particular level of assets. However, using the Weighted Average Cost Method would result in a lower return on assets ratio (Robinson et al., 2020). So, the ROA and net income of the company have been the effective investigated as organizational characteristics of the inventory valuation methods.

Choosing the inventory method is considered an important resource for improving financial performance and it can help to improve the performance of organizations by understanding its effective management. and correct Financial management decisions play an essential role in the company's performance in the short term, and the efficient use of working capital has an important impact on the choice of inventory valuation methods (Deloof, 2003). So, the working capital of the company has been investigated as the effective organizational characteristics of the inventory valuation methods.

The accounting inventory method is one of the important things that should be decided by the company. The positive theory of accounting provides hypotheses that relate financial accounting method choices to several firm and industry characteristics (Holthausen and Leftwhich, 1983) and firms of similar size within an industry tend to choose the same accounting methods (Wicaksono, 2007). So, the industry type of the company has investigated been as the effective organizational characteristics of the inventory valuation methods.

The current ratio represents a firm's ability to repay short-term debts when they become due. Using the Weighted Average Cost Method lowers this ratio since inventory has a lower carrying value than with FIFO (Suvannasing and Kazimoto, 2020). So, the current ratio of the company has been investigated as the effective organizational characteristics of the inventory valuation methods.

Inventory turnover shows the number of times in a year a firm can turn its average inventory into sales (Chang, 2010). It also indicates how efficiently a firm manages its inventory to meet the need of customers and the shortage of inventory should be appropriate. A higher suggests that management is ratio reducing the amount of inventory on hand, relative to the cost of goods sold (Kimmel et al., 2019). FIFO gives a better explanation regarding the turnover of inventory items since it divides the cost of goods sold by average inventory, which reflects both current costs and recent costs (Wahlen et al., 2014). So, the inventory turnover of the company has been investigated the effective as organizational characteristics of the inventory valuation methods.

3. Research methodology

The statistical population of this paper is all listed firms on the Iraqi Stock Exchange. The listed firms are assessed during the 8 years from 2014 to 2021. In this paper, the firms under study should not be affiliated with investment firms, financial intermediaries, holdings, banks, and leasing. Thus, 35 companies were selected.

3.1. Model and variables understudy for testing

In this research, inventory accounting methods are defined as dependent variables. FIFO, WAC, and moving average methods are the most commonly used measure for evaluating inventories by most Iraqi industrial companies.

Leverage, Size, profitability, working capital, industry type, and current ratio were used as effective characteristics of the company. The hypotheses of this research examine the impact of the independent variables of company characteristics (i.e., Leverage, Size. Profitability, Working capital, Industry type, and Current ratio). Considering that the dependent variable type is a multilevel qualitative, the Multinomial Logistic Regression (MLR) should be used to test. The MLR model for testing is as follows. Eq. (1) shows the probability of what kind of inventory accounting methods are used.

$$Pr(Accounting = j) = \frac{e^{\beta_{j}x_{i}}}{1 + \sum_{k=1}^{2} e^{\beta_{k}x_{i}}}$$
(1)

Eq. (1) can be broadly written in the following three formulas. Eq. (2) shows the probability that the inventory accounting method is FIFO. Eq. (3) shows the probability that the inventory accounting method is WAC. Eq. (4) shows the probability that the inventory accounting method is a moving average.

$$Pr(Accounting = 1) = \frac{e^{\beta'_{1}x_{i}}}{1 + \sum_{k=1}^{2} e^{\beta_{k}x_{i}}}$$
(2)
$$Pr(Accounting = 2) = \frac{e^{\beta'_{2}x_{i}}}{1 + \sum_{k=1}^{2} e^{\beta_{k}x_{i}}}$$
(3)
$$Pr(Accounting = 3) = \frac{1}{1 + \sum_{k=1}^{2} e^{\beta_{k}x_{i}}}$$
(4)

LEV: Leverage is calculated as total debt divided by the total assets.

SIZE: Firm size is calculated as the natural logarithm of total assets.

ROA: Return on assets is defined as the net profit divided by the total assets.

NI: is the net income of the company scaled total assets.

WC: is Working capital. It is measured as the difference between a company's current assets and its current liabilities scaled total assets.

IND: is the industry type of company.

CUR: is the current ratio. It is measured as current assets divided by current liabilities.

TOL: is the total liabilities of the company scaled total assets.

INV: is the inventory turnover of the company. It is calculated by dividing the cost of goods sold by the average Inventory.

MV: is the market value of company scaled total assets.

4. Empirical results

4.1. Data descriptive statistics

Descriptive statistics of the main variables of this research are presented in Table 1. The results show that the mean of SIZE is 18.215. Furthermore, the mean LEV is 0.312.

Table 1. Descriptive statistics of main variables

Variable	Mean	Median	Standard deviation	Minimum	Maximum
SIZE LEV WC	18.215 0.312 0.052	18.177 0.221 0.261	1.214 0.241 0.150	14.985 0.018 -0.261	21.622 0.795 0.408
ROA	0.128	0.106	0.134	-0.172	0.594
CUR	0.432	0.160	0.466	0.017	1.650
NI	0.155	0.122	0.136	-0.124	0.562
INV	0.510	0.124	0.470	0.289	0.859
TOL	0.042	0.017	0.021	0.011	0.316
MV	2.942	2.215	0.231	0.514	13.774

Source: Research findings

4.1. Data analysis and main results

In this research, Eq. (1) was estimated based on two dependent variables (i.e., FIFO and WAC), using Multinomial Logistic Regression and the Bootstrap method. It should be mentioned that the estimation of coefficients is not presented for all three levels of the dependent variable. Table 2 shows the analysis of Logistic Regression. Multinomial According to Table 2, the coefficient of determination (Pseudo R2) is equal to 0.319, which shows that the independent variables explain approximately 31.9 percent of the changes in the dependent variable. Also, the likelihood-ratio (LR) test assesses the goodness of fit of two competing statistical models based on the ratio of their likelihoods. The significance of the LR statistic is 828.439, which indicates the significance of the estimated model with 99% confidence. The results show that the working capital (sig < 0.05and coefficient = -0.915), ROA (sig <0.1and coefficient = 0.418), and current ratio (sig < 0.01 and coefficient = -1.311) have a significant effect on the choice of FIFO valuation method. Furthermore, the working capital (sig <0.01 and coefficient = -1.336), Industry (sig <0.1 and coefficient = 0.329), ROA (sig <0.01 and coefficient = 0.557), and current ratio (sig <0.01 and coefficient = -1.272) have a significant effect on the choice of WAC valuation method

Table 2. Analysis of Multinomial Logistic Regression and simple method

		Accounting= 1				Accounting= 2			
Variable	Coefficient	Standard deviation	Wald statistic	Sig.	Coefficient	Standard deviation	Wald statistic	Sig.	
_cons	1.644***	0.458	12.867	0.000	2.808***	0.452	38.678	0.000	
SIZE	3.711	3.778	0.965	0.326	4.378	3.770	1.348	0.246	
LEV	-0.068	0.189	0.131	0.718	-0.089	0.172	0.270	0.603	
WC	-0.915**	0.376	5.932	0.015	-1.336***	0.371	12.972	0.000	
IND	0.269	0.187	2.080	0.149	0.329*	0.170	3.729	0.053	
ROA	0.418*	0.228	3.369	0.066	0.557***	0.211	6.992	0.008	
CUR	-1.311**	0.562	5.445	0.020	-1.272***	0.423	9.059	0.003	
NI	-0.033	0.308	0.011	0.915	-0.062	0.291	0.045	0.831	
INV	-0.565	1.082	0.273	0.602	-0.500	1.064	0.221	0.638	
TOL	1.339	2.673	0.251	0.616	0.694	2.669	0.068	0.795	
MV	-0.012	0.680	0.0001	0.986	0.341	0.651	0.275	0.600	
LR statistic				828.43	9 (0.000)				
Pseudo R ²				0.	319				

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Research findings Using Eq.s (2)-(4) and the coefficients of Table 2, the probabilities in all three of the dependent variable (i.e., FIFO, WAC, and moving average), are calculated as follows. In these Eq.s, some variables are significant in Table 2. Eq.s (5)-(7) show the probabilities that the inventory valuation method is FIFO, WAC, and moving average methods, respectively. The results show that companies are more likely to use the WAC method than other methods.



According to Table 3, the coefficient of determination (Pseudo R2) is equal to 0.306. The significance of the LR statistic 825.216. which indicates is the significance of the estimated model with 99% confidence. The results show that the ROA (sig <0.1 and coefficient = 0.418) and current ratio (sig <0.05 and coefficient = -1.311) have a significant effect on the choice of the FIFO valuation method. In addition, the working capital (sig <0.01 and coefficient = -1.336), Industry (sig < 0.05 and coefficient = 0.329), ROA (sig < 0.05 and coefficient = (0.557), and current ratio (sig < 0.05 and coefficient = -1.272) have a significant effect on the choice of WAC valuation method. Eq.s (8)-(10)show the probabilities that the inventory valuation method is FIFO, WAC, and moving

average methods, respectively. The results based on the Bootstrap method also show that companies are more likely to use the WAC method than other methods.

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Table 3. Analysis of Multinomial Logistic Regression and Bootstrap method

	A	ccounting= 1		Accounting= 2				
Variable	Coefficient	Standard deviation	Sig.	Coefficient	Standard deviation	Sig.		
cons	1.644***	1.446	0.005	2.808***	1.442	0.001		
SIZE	3.711	6.831	0.360	4.378	6.841	0.290		
LEV	-0.068	0.182	0.700	-0.089	0.165	0.574		
WC	-0.915	0.702	0.102	-1.336***	0.700	0.007		
IND	0.269	0.187	0.142	0.329**	0.165	0.034		
ROA	0.418*	0.297	0.099	0.557**	0.287	0.021		
CUR	-1.311**	0.811	0.031	-1.272**	0.706	0.022		
NI	-0.033	0.469	0.950	-0.062	0.458	0.889		
INV	-0.565	1.720	0.604	-0.500	1.742	0.668		
TOL	1.339	7.378	0.685	0.694	7.404	0.826		
MV	-0.012	3.665	0.990	0.341	3.703	0.784		
LR statistic		825.216 (0.000)						
Pseudo R ²	0.306							

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Research findings



4.2 Additional analyses and robustness checks

Table 4 shows the analysis based on t+1. The results show that only the working capital (sig <0.01 and coefficient = 1.557) and the Industry (sig <0.01 and coefficient = 1.555) have a significant effect on the choice of the FIFO valuation method. However, the Industry (sig <0.01 and coefficient = 1.128) has a significant effect on the choice of the choice of the WAC valuation method.

Table 4. Analysis of Multinomial Logistic Regression based on t+1

	Accounting= 1			A			
Variable	Coefficient	Standard deviation	Sig.	Coefficient	Standard deviation	Sig.	
cons	-1.604**	0.678	0.018	1.742***	0.164	0.000	
SIZE	-6.416	5.365	0.232	-0.775	1.596	0.627	
LEV	-0.164	0.218	0.451	-0.106	0.142	0.456	
WC	1.557***	0.566	0.006	0.145	0.366	0.692	
ND	1.555***	0.251	0.000	1.128***	0.159	0.000	
ROA	-0.144	0.288	0.618	0.087	0.163	0.594	
CUR	0.228	0.587	0.698	-0.697	0.545	0.201	
NI.	-0.108	0.351	0.758	0.092	0.220	0.677	
NV	1.499	1.328	0.259	-0.008	0.394	0.984	
TOL	0.244	3.756	0.948	0.684	1.397	0.624	
νIV	-0.715	1.996	0.720	0.526	0.399	0.188	
.R statistic	718.302 (0.000)						
Deaudo D2	0.231						

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Source: Research findings

5. Discussion and conclusion

According to the results of Multinomial Logistic Regression and simple method, the working capital, ROA, and current ratio have a significant effect on the choice of FIFO and WAC valuation methods, while the industry type has only a significant effect on the choice of WAC valuation method. Studies show the WAC would result in a lower return on assets ratio (Robinson et al., 2020), so firms will lean towards using FIFO. Several studies (e.g., Deloof, 2003) showed working capital has an important impact on the choice of inventory valuation methods. According to the results of the Bootstrap method, ROA and current ratio have a significant effect on the choice of FIFO and WAC valuation methods, while the working capital and Industry type, have a significant effect on the choice of WAC valuation method.

Neither other characteristics of the company (i.e., total liabilities, leverage, firm size, market value, net income, and inventory turnover) had any influence on the chosen type of inventory valuation methods. This is opposite to the findings of some studies. For instance. Gopalakrishnan (1994) found that firm size was likely to be positively related using FIFO Method. However, the results of this study aligned with the study of Zinkevičienė and Rudžionienė (2005). They found no support for the notion that the higher a firm's financial leverage, the more likely it was to use the FIFO Method.

A firm could choose an Inventory valuation method for circumstances that may be better disclosed by a different valuation method. Different different circumstances require accounting before treatments. but standards are altered, the circumstances for which each treatment should be used must be first identified and explained (Arcelus and Trenholm, 1991). Further studies will be necessary in the future to elucidate this point.

This study contributes to extant research on inventory valuation policy choice. This study provides new evidence of the emerging market environment and helps a relevant contribution to academic researchers in making strategic decisions. This study helps managers choose the methods proper based on the characteristics of their companies to have better economic consequences. This study can help standard regulators to reduce the diversity of accounting valuation choices improve financial information and comparability.

There are certain limitations in this study. First, the generalization of the results with other time constraints should be made with the necessary caution. Since this study's focus was on Iraqi companies, the results reflect Iraq's economic and business environment characteristics. The influence of the choice of accounting inventory method in this research is only expressed by the characteristics of a company. It is suggested that other variables such as the firm's growth and firm's risk are also included in future research. In addition, the Islamic State of Iraq and Syria (ISIS) group's arrival in Iraq and the insecurities and political instability that it has created in this country, the business unit's performance has been severely disrupted to a great extent. The political and economic instability has created serious problems for the economic, political, security, and performance dimensions (Heißner et al., 2017). These crises In Iraq, have been considered a wake-up call and this political-economic instability can have a significant impact on Iraqi firms' performance and their managers' perspective which in this research, its effects have not been investigated.

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