

## *Review*

# **Yuji Ijiri's thoughts as a possible solution for the recent revolutions in accounting standards- A focus on accounting measurements**

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### Abstract

**This paper examines whether Yuji Ijiri's thoughts can serve as solutions to the current debates on accounting measurements. Countries around the world are adopting International Financial Reporting Standards. However, recent accounting and financial scandals show that fair value may not be the best measure for companies. The researcher compares and analyzes the differences between Ijiri's thoughts and major concepts provided in the IASB/FASB Conceptual Framework, IAS 1, and fair value accounting standards. The investigator shows that Ijiri's (1989) dynamic structure of accounting measurements includes both faithfully represented and relevant information. Ijiri and his co-authors in Demski et al. (2009) also suggest applying topology to provide objective accounting measurements and standards. Therefore, Ijiri's thoughts are possible solutions to the current debates on adopting fair value accounting.**

**Keywords:** Accounting measurement, fair value, historical cost, Yuji Ijiri.

## **INTRODUCTION**

I suggest Yuji Ijiri's thoughts as an alternative to the current trend of adopting fair value accounting. And in this paper, I provide comparisons between Ijiri's thoughts and major concepts provided in the IASB/FASB Conceptual Framework, [The IASB and the FASB are working on converging the two sets of conceptual framework and accounting standard. In this paper, both 'the IASB/FASB' and 'the Board' refer to their joint board] IAS 1, and Fair Value Measurement (Topic 820, FAS 157, and their replacements) to support my argument. There is currently a global attempt to adopt International Financial Reporting Standards (IFRS) that emphasize decision usefulness, but this is not the first time that the U.S. is adopting fair value accounting.

The 1929 Great Depression exposed the fact that capital assets had significantly appreciated in the 1920s. This led to the establishment of the Securities Exchange Commission (SEC), which started to oversee the financial Depression also caused companies to switch their focus

to historical cost accounting and matching principle, which provided an impetus to using the income statement as the primary financial statement. The 1960s and 1970s brought contention regarding whether price-level changes, a form of current value, should be recognized (Whittington 2008). This was around the period that Ijiri started to develop his thoughts on historical cost accounting.

It was not until the 2000s that the focus of financial reporting shifted again to fair value and decision relevance. In 2005, the European Union adopted International Financial Reporting Standards (IFRS), the core of which is fair value measurement. In addition, SFAS 157 in the U.S. became effective in January 2008, offering guidance on applying fair value to certain assets and liabilities. However, the recession and the collapse of global financial markets that ensued resulted in significant write-downs of financial assets and deep reporting of publicly traded companies. The Great declines in the regulatory capital of financial institutions.

Hence, the U.S. Congress suspended SFAS 157 in October 2008 to protect the public. On the other hand, the International Accounting Standards Board decided to supersede IAS 39 [IAS 39: Financial Instruments: Recognition and Measurement] with IFRS 9 (IFRS 9: Financial Instruments) in 2015 by taking another step towards fair value accounting. Currently, the IASB and the FASB allow a combination of various measurements for financial reporting.

In the early 2000s, academics arose and pointed out the advantages (e.g. Barlev and Haddad 2003) or disadvantages (e.g. Bostwick and Fahnstock 2011) of fair value accounting, while others criticized the IASB/FASB Conceptual Framework (e.g. Moehrie et al. 2010) or even suggested frameworks of their own (e.g. Ohlson et al. 2010, Bromwich et al. 2008, Whittington 2008). Yuji Ijiri was a big proponent of historical cost accounting but was also famous for his publications on triple-entry bookkeeping and momentum accounting, which provide relevant information in addition to historical cost. Yuji Ijiri was inducted into Ohio State University's Accounting Hall of Fame in 1989 (OSU). He was the only four-time recipient of AAA's Notable Contributions to Accounting Literature (1966, 1967, 1971, and 1976) (OSU). Yuji Ijiri retired in June of 2011 as the Robert M. Trueblood University Professor of Accounting and Economics at Carnegie Mellon University (Yuji Ijiri Facebook). However, no one has proposed using Ijiri's dynamic structure of accounting measurements as a solution to the current accounting revolution. Therefore, I provide comparisons between Yuji Ijiri's thoughts and the current accounting standards that focus on fair value accounting to support my proposal.

Ijiri and his co-authors in Demski et al. (2006) propose applying topology to setting more objective accounting standards so as to enhance the compliance of the standards. Ijiri (1975) argues for historical cost accounting and emphasizes the financial performance of management, i.e. the income statement. This includes measuring the changes in income, i.e. momentum accounting (1982). Ijiri's (1989) dynamic structure of accounting measurements provides both relevant (Sectors A1 to A4 of Table 1) and reliable (other Sectors in the table) information. Ijiri (1975) suggests that firms can record volumes at the time of transactions and then recognize prices under the desired measurement method when preparing financial statements. Ijiri (1975) also contends using standard calculations such as exponential smoothing models to avoid bias in measurements. Furthermore, quantum mechanics help investors estimate

uncertainty in future cash flows (Demski et al. 2009 with Ijiri as a co-author).

This paper allows the world to rethink the rationales behind Ijiri's thoughts before leaping into the latest trend of decision-usefulness accounting by completely abolishing historical cost accounting in this current age full of accounting scandals. Ijiri's (1989) dynamic structure of accounting measurements not only provides historical information, but also information which serves as a basis for estimating future information. The limitation to this study is that the thoughts have not been implemented and hence empirically tested. The remaining part of the paper is organized as follows. Section 2 provides discussions of Ijiri's thoughts in light of recent accounting standards. Section 3 concludes the paper.

## **Yuji Ijiri's Thoughts vs. Recent Accounting Standards**

### **Accounting Standards in General**

Ijiri and his co-authors in Demski et al. (2009) find that topology in the area of mathematics has the ability to assist with the development of prototype objects. That is, accounting regulators can use prototyping to anticipate the creation of new transactions or to systematically develop financial engineering prototypes such as new financial instruments (2009). This can assist firms in complying with new accounting standards because prototyping and simulating the weaknesses and strengths of internal control help firms in meeting the requirements of the Sarbanes-Oxley Act (Demski et al. 2009).

In Demski et al. (2006), Ijiri and his co-authors contend that the more objective the principles are, the more the people are willing to abide by them. Since physics' principles are more objective than accounting principles (2006), understanding the former helps in developing the latter. However, Stamp (2009) does not think that accounting needs to become a science area such as physics. In summary, accounting regulators can refer to prototyping as promoted in Demski et al. (2009) with Ijiri as a co-author in setting accounting standards and in enhancing firm compliance with the standards.

### **Target Users and Objectives**

The Board states that the target users of financial information are 'existing and potential investors, lenders and other creditors' [OB2, OB: The objective of general purpose financial reporting]. The Board explains that this

**Table 1. Dynamic Structure of Accounting Measurements**

A DYNAMIC STRUCTURE OF ACCOUNTING MEASUREMENTS											
	12/31	12/31		12/31	12/31		12/31	12/31		12/31	12/31
	19x0	19x1		19x0	19x1		19x0	19x1		19x0	19x1
[Sector A1] $\Delta^{-3}\dot{w}$			[Sector B1] $\Delta^{-2}\dot{w}$			[Sector C1] $\Delta^{-1}\dot{w}$			[Sector D1] $\dot{w}$		
Benefit 3rd Derivatives			Wealth 2nd Derivatives			Momentum Derivatives			Forces		
	$\$/mo^2$	$\$/mo^2$		$\$/mo^2$	$\$/mo^2$		$\$/mo^2$	$\$/mo^2$		$\$/mo^2$	$\$/mo^2$
Financial			Cash		-0.5	Revenue			Owners'		
Benefits		-0.5	Equipment			Depreciation			Contribu-		
Trading Benefits			Loans Payable			Operating Expense		-0.5	tions		
			Capital Stock			Interest Expense			A Computers		-0.2
			Dividends						B Computers		-0.3
Benefit 3rd			Wealth 2nd			Momentum					
Derivatives	0	-0.5	Derivatives	0	-0.5	Derivatives	0	-0.5	Net Forces	0	-0.5
[Sector A2] $\Delta^{-2}\dot{w}$			[Sector B2] $\Delta^{-1}\dot{w}$			[Sector C2] $\dot{w}$			[Sector D2] $\Delta\dot{w}$		
Benefit 2nd Derivatives			Wealth Derivatives			Momenta			Impulses		
	$\$/mo$	$\$/mo$		$\$/mo$	$\$/mo$		$\$/mo$	$\$/mo$		$\$/mo$	$\$/mo$
Financial			Cash	20	35	Revenue	30	52	Owners'		
Benefits	20	35	Equipment	-10	-20	Depreciation	-10	-20	Contribu-		
Trading Benefits	-10	-20	Loans Payable			Operating Expense	-9	-15	tions	3	3
			Capital Stock			Interest Expense	-1	-2	A Computers	7	5
			Dividends						B Computers		7
Benefit 2nd			Wealth						Cumulative		
Derivatives	10	15	Derivatives	10	15	Net Momenta	10	15	Impulses	10	15

[Sector A3] $\Delta^{-1}\dot{w}$		[Sector B3] $w$		[Sector C3] $\Delta\dot{w}$		[Sector D3] $\Delta^2\dot{w}$					
Benefit Derivatives		Wealth		Income		Actions					
	$\$$	$\$$	$\$$	$\$$	$\$$	$\$$	$\$$				
Financial			Cash	244	226	Revenue	360	852	Owners'		
Benefits	-120	-190	Equipment	240	460	Depreciation	-120	-300	Contribu-		
Trading Benefits	240	460	Loans Payable	-100	-200	Operating Expense	-108	-252	tions	36	72
			Capital Stock	-300	-300	Interest Expense	-12	-30	A Computers	84	156
			Dividends	36	84				B Computers		42
Benefit									Cumulative		
Derivatives	120	270	Earned Wealth	120	270	Cumulative Income	120	270	Actions	120	270
[Sector A4] $\int wdt$		[Sector B4] $\Delta \int wdt$		[Sector C4] $\Delta^2 \int wdt$		[Sector D4] $\Delta^3 \int wdt$					
Benefits		Wealth Utilization		Income Utilization		Action Utilization					
	$\$/mo$	$\$/mo$		$\$/mo$	$\$/mo$		$\$/mo$				
Financial			Cash	1602	4047	Revenue	1980	8610	Owners'		
Benefits	-3000	-5295	Equipment	3660	8130	Depreciation	-660	-2910	Contribu-		
Trading Benefits	3660	8130	Loans Payable	-1200	-3000	Operating Expense	-594	-2574	tions	198	828
			Capital Stock	-3600	-7200	Interest Expense	-66	-291	A Computers	462	1902
			Dividends	198	858				B Computers		105
Benefits	660	2835	Wealth						Action		
			Utilization	660	2835	Income Utilization	660	2835	Utilization	660	2835

(Source: Ijiri 1989, pg.78-79, Table 6B)

focuses on the needs of capital market participants who have the most and immediate need for information [BC1.16, BC: Basis for Conclusions on Chapter 1: The objective of general purpose financial reporting] This further indicates that the main users of accounting information are external to the firm. However, Johnson (2005) and Young et al. (2008) state that such a view ignores the reporting entities themselves and auditors as financial statement users.

Ijiri's primary target users of financial information are internal to the firm (Ijiri 1989, pg. 99), yet Ijiri (1975, pg. 34) also contends that performance measures are not used only by the firm itself, but also by other units in the same firm, by the internal audit division, and by outside parties such as shareholders, creditors, governmental agencies, and the public. This is broader than the Board's target users of financial information. In addition, the Board assumes that financial statements are prepared for information users who have a reasonable level of understanding [QC32, QC: Qualitative Characteristics of Useful Information], which is consistent with Ijiri's argument that firms should provide information on a *caveat emptor* basis (1975, pgs.30 - 31).

Ijiri states that accountability [Ijiri (1975, pg. 32) states that a businessman is expected to keep records for the sake of people whose money is invested in the firm.] is the underlying goal of accounting (Ijiri 1975). That is, records are kept to account for managers' behavior. This is due to his 1989 concept of income sustainability, which is a component of management's responsibility. Since income sustainability is similar to the concept of capital maintenance in the 2010 Conceptual Framework (henceforth, Framework), this indicates that accountability is an accepted concept of the Framework [The Board decided not to use the term stewardship... (BC1.28). On the other hand, Abdel-Khalik (2011) distinguishes between stewardship and accountability. This paper disregards the difference in definition since it is not the focus of the paper]

The AICPA Study Group (1973, pg. 24) states that the objective of financial information is to help users predict, compare, and evaluate reporting firms' earnings power. Ijiri (1989, pg. 99) explains that earnings power includes a firm's ability both to earn income and to sustain income. The 2010 Conceptual Framework (henceforth, Framework) states that both the IASB's and the FASB's objectives are to guide firms in providing useful information to financial statement readers for making economic decisions (2010, pg. 6). Also, OB3 states that financial information users need information that helps them estimate the amount, timing, and uncertainty of an

entity's future net cash flows so as to predict future returns (OB3). In other words, the Board's objective is to help information users predict future cash flows.

The Board stresses that information regarding past performance and regarding how managers have carried out their responsibilities in the past are helpful in predicting future returns (OB16). This is similar to the accounting equation underlying Ijiri's (1982) temporal triple-entry accounting, where  $\text{future} = \text{present} = \text{past}$ , or  $\text{budget} = \text{wealth} = \text{capital}$ . For example,  $\$200 - \$50 = \$150 = \$100 + \$50$ , where \$200 is the budgeted capital a year later, \$150 is the current capital, \$100 is the capital a year before, and \$50 is the increase in capital each year (1982). To Ijiri (1982), future performance can be accounted for by present performance, and present performance can be accounted for by past performance. Sectors A1 to A4 in Ijiri's dynamic structure of accounting measurements (see Table 1) allow internal and external users to estimate budget and future information (1989). [In Table 1, Ijiri's (1989) dynamic structure of accounting, a sector is a set of accounts and measurements. He explains that the accounts are the same vertically, but different horizontally. And each sector is the difference of the sector to its left and is the time derivative of the sector below it. In the structure, momentum measurement is the time derivative of wealth and shows the time rate at which earned wealth is increasing/decreasing (Ijiri, 1989). And force measurement is the time derivative of momentum which shows the time-rate at which momentum is increasing/decreasing (Ijiri, 1989). From the rate that earned wealth is increasing/decreasing, we can estimate the future wealth of a firm, assuming that the rate does not change (1989). Similar methods can be applied to estimating future numbers of other accounts (Ibid.)]

Market measures such as market price increases are not only what information users are interested in, but also reflect a firm's cash generating ability. In OB3, the Board states that investors make decisions depending on expected returns such as 'market price increases.' Furthermore, 'Information about... financial performance... may also indicate the extent to which... changes in market prices or interest rates have increased or decreased the entity's economic resources and claims, thereby affecting the entity's ability to generate net cash flows' both in the past and in the future (OB18).

Financial performance in Table 2 helps users analyze an entity's rates of return, whereas Sector C1 in Table 1 presents information on income acceleration (1989). Ijiri's (1989) causal triple-entry bookkeeping provides

**Table 2.** Rates of Return Statement

		RATES OF RETURN			
Wealth Utilization		Income		Rates of Return	
Sm0		\$		Monthly	Annual
19*0					
	Revenue		360		
Cash	1602	Depreciation	-120		
Equipment	<u>3660</u>	Operating Expense	<u>-108</u>		
Total Assets	5262		132	2.5%	30.1% Return on Assets
Loans Payable	<u>-1200</u>	Interest Expense	<u>-12</u>	1.0%	12.0% Interest Rate
Owner's Equity	<u><u>4062</u></u>	Net Income	<u><u>120</u></u>	3.0%	35.5% Return on Owner's Equity
19*1					
	Revenue		492		
Cash	2445	Depreciation	-180		
Equipment	<u>4470</u>	Operating Expense	<u>-144</u>		
Total Assets	6915		168	2.4%	29.2% Return on Assets
Loans Payable	<u>-1800</u>	Interest Expense	<u>-18</u>	1.0%	12.0% Interest Rate
Owner's Equity	<u><u>5115</u></u>	Net Income	<u><u>150</u></u>	2.9%	35.2% Return on Owner's Equity
19*0 and 19*1					
	Revenue		852		
Cash	4047	Depreciation	-300		
Equipment	<u>8130</u>	Operating Expense	<u>-252</u>		
Total Assets	12177		300	2.5%	29.6% Return on Assets
Loans Payable	<u>-3000</u>	Interest Expense	<u>-30</u>	1.0%	12.0% Interest Rate
Owner's Equity	<u><u>9177</u></u>	Net Income	<u><u>270</u></u>	2.9%	35.3% Return on Owner's Equity

(Source: Ijiri, 1989, P.80, Table 6C)

causes for changes in wealth accounts (Table 1, Sector B3) via income accounts (Table 1, Sector C3). [Ijiri's (1989) dynamic structure of accounting includes causal triple-entry bookkeeping, where the three sectors in Table 1 are: wealth (B3), income (C3), and actions (D3). He elaborates that each sector provides the causes of changes in information to its left. In another word, each sector provides information regarding the effects of changes in that to its right (1989). Hence, actions explain changes in income, and income explains changes in wealth (Ibid.). Table 3 provides a demonstration of the application of triple-entry bookkeeping to a company's financial statement (1989).] That is, firms can design Sector C3 so that changes in wealth accounts can be explained by changes in market prices or interest rates (1989). Ijiri (1975, pg. 33) states that accountability is not limited to past performance, as it also applies to future plans, budgeting, projected activities, and financial forecasts (1975). In harmony with Ijiri's argument, information regarding past performance is critical not only for accountability purposes, but also for predicting the

future in temporal triple-entry bookkeeping. In distinguishing between the past and the future, Ijiri's 1989 (pg. 91) work describes allocating joint costs or benefits between the future and the past as being possible only when the future can be estimated.

The Board also states that information on the variability and components of returns is influential in estimating future cash flow uncertainty (OB16). Sector C2 in Table 1 provides information on the components of returns (1989). That means Ijiri's (1989) dynamic structure of accounting measurements also helps to predict future cash flow uncertainty. In terms of forecasting uncertainty, quantum information theory assists in estimating the probability of events by using a combination of different probability amplitudes that interfere with one another, as stated by Ijiri and his co-authors in Demski et al. (2006).

Topology aids accountants in understanding more about qualitative information, as argued by Ijiri and his co-authors in Demski et al. (2009). They contend that the reliance of FASB's Conceptual Framework on

**Table 3.** Triple-entry Bookkeeping

A 3*8*5 ARRAY FOR THE WEALTH-INCOME-ACTION SECTORS						
Income	Wealth					Cumulative Income
	Cash #1	Equipment #2	Loans Pay #3	Capital Stc #4	Dividends #5	
Action 1: Owners' Contributions						
#6 Revenue						0
#7 Depreciation						0
#8 Operation Expense	72					0
#9 Interest Expense	300			-300		72
#10 Contributions by Owners	-84				84	0
#11 Distributions to Owners						0
#12 Borrowings						0
#13 Equipment Purchases						0
Earned Wealth	288	0	0	-300	84	72
Action 2: A Computer Project						
#6 Revenue	684					684
#7 Depreciation		-240				-240
#8 Operation Expense	-204					-204
#9 Interest Expense	-84					-84
#10 Contributions by Owners						0
#11 Distributions to Owners						0
#12 Borrowings	100		-100			0
#13 Equipment Purchases	-360	360				0
Earned Wealth	136	120	-100	0	0	156
Action 3: B Computer Project						
#6 Revenue	168					168
#7 Depreciation		-60				-60
#8 Operation Expense	-48					-48
#9 Interest Expense	-18					-18
#10 Contributions by Owners						0
#11 Distributions to Owners						0
#12 Borrowings	100		-100			0
#13 Equipment Purchases	-400	400				0
Earned Wealth	-198	340	-100	0	0	42

(Source: Ijiri, 1989, P.63, Table 5B)

qualitative characteristics of information causes the Framework to be unhomeomorphic to (different from) the economic forces that impact the underlying accounting information systems. Hence, future application of topology in developing dynamic and temporal action accounts of transactions is necessary (2009). Sectors D1-D4 (action accounts) in Table 1 provides reasons for changes in income accounts and hence are underlying economic forces (1989).

In summary, similar to the Board's objective, Ijiri's

objective is to provide useful information and to help managers account for their performances. Although the primary audience of Ijiri's (1989) dynamic structure of accounting measurements is internal users, he does list different external parties as users of his dynamic structure. Ijiri's structure provides both past information and information that helps to predict the future. His structure also presents reasons for changes in the present and the future information, and components of future cash flow uncertainty. Furthermore, Ijiri and his

co-authors argue that quantum accounting can help estimate probabilities (Demski et al. 2006) and hence the uncertainty of future cash flows. Also, topology helps in understanding the qualitative information of a firm (Demski et al. 2009).

### Characteristics of Financial Information

In Chapter 3 of the Conceptual Framework, the Board emphasizes that the main characteristic of information is to be 'useful,' of which the fundamental characteristics are relevance and faithful representation. [The Boards use the phrase 'faithful representation' to replace the more ambiguous and generally used term 'reliability.'] Relevant information is one of the characteristics of useful information and has the ability to influence information users' decision making (QC6). This type of information has predictive value, confirmatory value, or both (QC7). However, predictive information need not be a prediction or forecast on its own (QC8). It can just be an input to predict the future (QC8). Confirmatory financial information provides feedback regarding previous evaluations (QC9).

Ijiri (1975, pg. 46) also argues that feedback from past performance can be used in designing goals for the future. His temporal triple-entry equation links the future with the present and the past, i.e.  $\text{future} = \text{present} = \text{past}$  as mentioned before (1982). In addition, Sectors B1 to C1, B2 to C2, and B3 to C3 in Ijiri's dynamic structure of accounting measurements (see Table 1) provide confirmatory information, while Sectors A1 to A4 allow for calculation of predictive information (1989). Overall, relevant information is a part of Ijiri's dynamic structure.

Faithfully represented financial information, the second characteristic of useful information, is information that is complete, neutral, and free from error in describing an entity's financial performance (QC12). A complete depiction means that all information necessary to understand an event is available to users (QC13). To provide useful and complete information to users, the Board pushes firms to provide a broad variety of information to users so that the latter can utilize applications such as eXtensible Business Reporting Language (XBRL) to create financial statements that fit their individual needs (BC1.5). However, the Board admits that providing different information to meet different users' needs or to make all information available to different users is costly.

Users also assume the costs of obtaining needed information (QC36). The Board deems relevant and

faithfully represented information as being helpful to users in making decisions, resulting in more efficient capital markets, lowering the cost of capital for the economy (QC37), enhancing users' confidence in financial information, and hence leading to financial stability (BC1.23). However, general purpose financial statements are still the most effective and cost efficient way to provide information to different users (BC1.6). Information users may create different financial statements to suit their own needs by taking information from Ijiri's dynamic structure of accounting measurements (see Table 1) (1989). Ijiri (1989) mentioned that there are complications in estimating sectors in the dynamic structure. But if accounting standard setters can solve the complications in calculating and estimating sectors in the dynamic structure, which includes double-entry bookkeeping, then it would not be too costly for firms to provide information for users to create customized financial statements. This will allow users to obtain information at a low cost.

A piece of neutral information is unbiased in the selection of the presentation of information in order to increase or decrease the favorability by users (QC14). I will discuss this part in detail in the next subsection, called measurement. A piece of faithfully represented information does not mean that it is accurate in all respects (QC15). An estimate can be faithful as long as the amount is described clearly and accurately, and that no errors have been made in the process of developing the estimate (QC15). Faithfully represented financial information also means that the information depicts the substance of an economic phenomenon (BC3.26). Ijiri's (1989) dynamic structure of accounting measurements contains clearly defined calculation of sectors which makes the numbers and estimates derived from them faithful. Demski et al. 2006 with Ijiri as a co-author contend that quantum information can help in making estimations. In quantum information, error correction codes are an objective way to correct mistakes (Demski et al. 2006 with Ijiri as a co-author). This is more objective than auditors in accounting practice (Ibid.).

Bostwick and Fahnestock (2011) state that representational faithfulness implies that financial statements should portray an entity rather than the marketplace. In other words, historical cost, which depicts transactions that an entity enters into (Ijiri, 1975), is a more faithful representation than fair value accounting, which measures the value of assets and liabilities in the marketplace. Additional qualities of information as stated in IAS 1 include fair presentation of information, which means that a piece of information is

relevant, faithfully represented, comparable, and understandable (IAS1.15, 1.17). Comparability, verifiability, timeliness, and understandability are additional qualitative features that further enhance the usefulness of information (QC19).

Ijiri (1975) promotes the use of historical cost accounting, which is in fact more verifiable than fair value accounting. The Board states that firms should disclose information comparative to that of previous period(s) (IAS1.38). Bostwick and Fahnestock (2011) contend that using different models in estimating fair value, the changes between different levels of inputs. [In 820-10-35-40, Level 1 inputs are quoted prices in active markets of identical assets or liabilities at the measurement date. In 820-10-35-47, Level 2 inputs are inputs other than those included in Level 1 that are directly or indirectly observable for the asset or liability. Input 3 is used when observable inputs are unavailable. Hoffman (2009) shows that users deem Level 3 inputs as less reliable than Level 1 or Level 2 inputs. In addition, Song et al. (2010) find that Level 1 and Level 2 fair values are more value relevant than Level 3 inputs] under fair value, and different measurements under the 'highest and best use' concept for non-financial assets actually hurts the comparability and consistency of financial information.

Ijiri (1975, pg.99) provides ways to increase comparability of information. First, quantities for transactions can be recorded at the time of transactions. Then, when financial statements are being prepared, prices based on different measurement bases (e.g. historical cost, fair value) can be multiplied by quantities to create financial information under different valuation methods (1975). Using the same measurement basis at different points in time enhances the comparability and timeliness of information. Second, in Ijiri's (1975, pg.100) dynamic structure of accounting measurements resource accounts (stock accounts) present the status of resources at a certain point in time. Conversely, activity (flow) accounts show the flow of resources in terms of volume between two points in time (1975). Profit-and-loss accounts are an example of activity accounts. Hence, activity (flow) accounts are also mechanisms that increase comparability. In addition, all calculations in the dynamic structure are standardized and therefore comparable. Third, Ijiri (1975, ch.7) derives the linear function  $y = p_1q_1 + p_2q_2 + \dots + p_nq_n$ , where  $p$  is price,  $q$  is quantity and  $y$  is the aggregated number. The 1975 function helps to aggregate different resources and reduce the number of dimensions, e.g. resource classes, so that an  $n$ -dimensional vector can be reduced to a one-dimensional scalar ( $y$ ). This helps aggregate

information when it lacks comparability and consistency.

Ijiri's dynamic structure of accounting measurements has the majority of the characteristics that the Board designed for financial information. These characteristics include being useful, the components of which include relevance and faithful representation. The core of Ijiri's matrix, i.e. double-entry bookkeeping, provides reliable information (or faithfully represented information), and its expansion (see Table 1) offers relevant information. These meet the Board's information usefulness criteria.

Ijiri's (1989) proposes utilizing information with characteristics of fair presentation, which include being comparable and understandable. This includes implementing his dynamic structure of accounting measurements, suggesting firms to record prices under a desired measurement method when preparing financial statements, and applying linear functions (1975). His (1989) structure provides information that is verifiable and cost efficient since its calculation is standardized. Again, Demski et al. (2009) with Ijiri as one of the co-authors argue that FASB's Conceptual Framework relies on qualitative characteristics, such as relevance and faithful representation, which do not mirror the underlying economic forces affecting accounting information.

## Measurement

Historical cost accounting and fair value accounting are seemingly contrasting measurement approaches under current debates. The measurement school is tightly connected to the double-entry structure with relevance and reliability as the central characteristics (Demski et al. 2006 with Ijiri as a co-author). However, when the perfect and complete market breaks down, so does the perfect accounting measurement (Ibid.). Historical cost accounting is a measurement approach where exchanges are recorded at cost, which is the amount of current investors' resources that managers are accountable for (2006).

Accrual accounting, a major component of historical cost accounting, describes the effects of transactions and other occurrences and situations on a reporting firm's economic resources and claims (OB17). This seems to imply that both entity-related (transactions) and market-related events (other occurrences and situations) are included in accrual accounting, the latter of which is beyond management's control. In fact, accrual accounting is better than cash flow information on its own in evaluating a firm's past and future performances

(OB17). [Please also see the results of Bowen, Burghstahler, and Daley (1987) in that accruals have incremental explanatory power over cash flows.] Therefore, except for the statement of cash flows, firms should prepare their financial statements based on accrual accounting (IAS1.27).

Under accrual accounting, the income statement is the result of information users' emphasis on performance and is the result of applying the matching principle. Earnings performance is also the most common measure for evaluating both entity performance and management stewardship (SFAC1, FASB 1978 para. 53). This is consistent with Ijiri's view that historical cost accounting enables the accountability of management performance. On the other hand, Fair value accounting is a valuation approach where, in the statement of financial position, assets and liabilities are measured under fair value or discounted future cash flows. This is the current measure of future benefits expected to be received from the assets and liabilities, which is of interest to potential investors who want to compare the potential benefits of alternative investments (Abdel-Khalik 2011). Under this approach, a firm's financial performance and changes in the values of assets and liabilities (OB15) create income and expenses, including gains and losses, (IAS1.109).

Two months after the issuance of SFAS 157 in 2006, the IASB published a discussion paper on fair value measurement, using SFAS 157 as the starting point (Cooper et al. 2009). Since then, the FASB and the IASB have been making efforts to issue common standards on fair value measurements and disclosures, so that financial statements prepared under the two different sets of standards can be comparable. In May 2011, the FASB issued Fair Value Measurement (Topic 820)-Amendments to Achieve Common Fair Value Measurement and Disclosure Requirement in U.S. GAAP and IFRSs. The common standard applies to assets, liabilities, equity, financial assets, non-financial assets, and financial liabilities that are required to be reported under fair value. Other standards that require using fair value apply to examples such as the recognition of financial assets and financial liabilities (IFRS 7) and property, plant, and equipment (IAS 16).

Although IAS1.27 states that firms should prepare their financial statements, except for the statement of cash flows, using the accrual basis of accounting, in IAS1.118 the Board allows companies to use different measurement bases for different financial statement items with sufficient disclosure. These bases include historical cost, current cost, net realizable value, fair value, or recoverable amount. [It is important for an entity to inform

users of the measurement basis or bases used in the financial statements...because the basis...significantly affects users' analysis...it is sufficient to provide an indication of the categories of assets and liabilities to which each measurement basis is applied' (IAS1. 118).] Hence, the Board accepts both historical cost accounting (accrual basis) and fair value accounting. Topic 820, a fair value standard, allows measurements based on market, cost, income, and fair value approaches (BVR). Fair value is applied where appropriate and where there is sufficient information for the measurement (BVR).

With regards to estimating future cash flows, in Topic 820 of May 2011, fair value measurement is the exit price at the measurement date from the perspective of a market participant who holds the asset or liability. However, assumptions need to be made as to how market participants would price the asset or liability, including risk assumptions (Topic 820). Although quantitative disclosures need to be made regarding the assumptions, they are likely to be subjective and hence unreliable. Other estimates such as the transaction price at the measurement date and risk premiums, for the purpose of making risk adjustments (Topic 820), are also subjective and unreliable. Hence, Young et al. (2008) and Bostwick and Fahnstock (2011) state that fair value measurements are not more relevant in terms of assisting users in estimating the amount, timing, and uncertainty of cash flows for an entity.

Although Ijiri's focus is on historical cost accounting, he also proposed recognizing prices for transactions on a historical cost or present value basis at the time of preparing the financial statements (1975). In addition, Ijiri's (1989) dynamic structure of accounting measurements includes both historical cost information and information for budgeting and forecasting (Sectors A1 to A4 in Table 1). This provides users with information under alternative measurements and both relevant and faithfully represented information.

Some argue that fair value accounting measures Financial statement items from the perspective of market participants rather than measuring the operating result of an entity. For example, SFAS 157 [SFAS 157 (Topic 820) provides a standard definition of fair value that previously varied across different standards (Business Valuation Resources, BVR 2009).] stipulates that, similar to previous standards, fair value refers to the exit value of a hypothetical transaction at the measurement date (BVR). That is, changes in the value of assets and liability may lead to recognition of gains and losses. BVR states that fair value is a market-based measurement instead of an entity-specific measurement.

[820-10-05-1B states that ‘fair value is a market-based measurement, not an entity-specific measurement.’] In other words, gains and losses measured under fair value can be a result of market events instead of entity performance (Bostwick and Fahnestock, 2011). However, SFAC 8, Conceptual Framework for Financial Reporting, issued by FASB in 2010, stresses that the focus of financial reporting should be the reporting entity instead of the value of the entity (FASB 2010, para. OB2). Fair value accounting hence conflicts with both SFAC 8’s (2010) and Ijiri’s view of accountability, which measures entity-specific manager performance via transactions that constitute operating activities [Bostwick and Fahnestock (2011) contend that transactions are components of operating activities].

One case of measuring from the perspective of market participants involves instruments categorized under shareholders’ equity. The fair value of these instruments should be measured using the fair value of the entity’s own equity instrument from the view of market participants who hold the instruments as assets (Topic 820, 2011). When measuring the fair value of financial instruments, which are managed within a portfolio, the reporting firm should apply premiums or discounts when market participants would do so, in the absence of Level 1 input (Topic 820, 2011). In addition, the amendment prohibits applying premiums or discounts related to characteristics of the reporting entity (Ibid.). Again, these are inconsistent with Ijiri’s view that financial statement items should be measured based on accountability, i.e. the reporting entity’s view.

Another example of fair value is the ‘highest and best use’ concept and valuation premise of fair value measurement, which are relevant only for measuring the fair value of non-financial assets (Topic 820, 2011). This is because these assets have alternative uses and their fair values depend on their utilization within a set of other assets or liabilities (Ibid.). However, Bostwick and Fahnestock (2011) state that the ‘highest and best use’ in measuring fair value of non-financial assets does not faithfully represent the operating value of the entity, arguing that it only reports the market value of entities. The result of applying the ‘highest and best use’ concept of fair value may not be consistent with firms’ intended use of these assets (Bostwick and Fahnestock, 2011), which is also inconsistent with Ijiri’s view of accounting for management’s performance.

Fair value has not proven to be helpful to users in practice, although academic research has supported the use of decision useful fair value accounting (e.g. Barth et al. 1996, Graham et al. 2003).

The first case of fair value failure in the early 2000s was when Morgan Stanley used a more optimistic measure provided by independent appraisers, instead of fair market value, in recognizing its aircraft leasing impairments as a result of the September 11, 2001 terrorist attack. This is an example of a conflict of interest where biased information is produced when GAAP stipulates the use of fair value. It lacks the neutrality characteristic of information.

The second case is the financial crises in 2007, which reduced the value of banks’ financial assets. This was due to management’s discretion in using mathematical models to estimate fair value (Magnan and Thornton 2010) and managers’ misapplication of accounting standards when there were no longer active markets (Bostwick and Fahnestock 2011). Bostwick and Fahnestock note that discounted future cash flows should have been used instead of market values. Therefore, the SEC suspended SFAS 157 in October 2008 and issued FSP FAS 157-3 [FSP FAS 157-3: Determining the Fair Value of a Financial Asset when the Market for that Asset is Not Active] and FSP FAS 157 - 4. [FSP FAS 157-4: Determining Fair Value When the Volume and Level of Activity for the Asset or Liability Have Significantly Decreased and Identifying Transactions That Are Not Orderly]. However, the latter two staff positions use the price at liquidation date, rather than at measurement date, if the securities are in inactive markets or are undergoing disorderly transactions.

IAS1.125 requires the disclosure of assumptions regarding major sources of uncertainty that may have significant influences in estimating the carrying values of assets and liabilities. As long as the underlying assumptions are disclosed, the use of price at the liquidation date is allowed (Ibid.). In addition, firms should prepare financial statements on a going concern basis (Ibid.), which is in contrast with FSP FAS 157-3 and FSP FAS 157-4. Therefore, the staff positions were later superseded by FSPs FAS 107-1 [FAS 107-1: Interim Disclosures about Fair Value of Financial Instruments], FAS 115-2, [FAS 115-2: Recognition and Presentation of Other-Than-Temporary Impairments] and FAS 124-2, [FAS 124-2: Recognition and Presentation of Other-Than-Temporary] which help companies move most of their losses from financial assets to other comprehensive income and leave only credit losses in the income statement. This reduces fluctuations in the income statement. Inputs Levels 1 to 3, which form the hierarchy when measuring fair value, are still retained in the IASB’s and the FASB’s May 2011 Topic 820 even though these were eliminated from FSP FAS 107-1, FSP

FAS 115-2, and FSP FAS 124-2. Furthermore, IFRS 9 will supersede IAS 39 in 2015 by requiring Level 3 inputs to be measured by fair value.

Bonaci et al. (2010) defend fair value by commenting that fair value itself is not to be blame and that it is the messengers, e.g. accountants, who are at fault for the recent financial crises. People are more likely to violate ethical standards when there are conflicts of interest or when one is under great pressure and when they have the opportunity to do so. And fair value accounting, which gives managers more latitude in terms of judgment, also gives managers more room for earnings manipulation (Laux and Leuz 2009). For example, Enron was able to cover up its exploitation of 'mark-to-market' accounting policy in manipulating its earnings. And fair value as stipulated by SFAS 157 is readily manipulative (Benston 2008). Cortese-Danile et al. (2010) argue managers need to hold high ethical standards to prevent themselves from being over-optimistic in fair valuing when markets are inactive.

Ijiri (1975) advocates the presupposition that information can be biased and that standardized measures are needed. Standardizing Ijiri's (1989) exponential smoothing models  $[p_t = \alpha y_{t-1} + \alpha(1-\alpha)y_{t-2} + \alpha(1-\alpha)^2 y_{t-3} + \dots + \alpha(1-\alpha)^{t-1} y_0]$ , where  $y_t$  is the income in period  $t$ ,  $p_t$  is the momentum in period  $t$ ,  $\alpha$  is the smoothing constant, and  $(1-\alpha)$  is the discount factor.] to measure momentum reduces bias in the measurement process. His 1989 dynamic structure of accounting measurements uses historical cost as the basis, which provides faithfully represented information. Sectors A1 to A4 in his structure provide relevant but objectively calculated information that enables users to estimate future information. Ijiri and his co-authors in Demski et al. (2009) state that aggregated information as provided by topology is less detailed and hence less subjective. They also argue that in quantum physics, error correction codes can objectively correct for mistakes. But in accounting, auditors are responsible for correcting mistakes, and managers may affect the correction results (Ibid.). This may make the results less neutral and more uncertain than those in physics (2009). This is something that accountants can dwell on in improving accounting information (Demski et al. 2009).

Ijiri and his co-authors in Demski et al. (2006) argue that there is a reason to preserve old principles since they may be used for economic reasons and that not many alternative options are available. This seems to imply that historical cost accounting has its own reason to be retained even if fair value accounting is used. On the other hand, they also argue that fair value accounting can

be employed via the application of quantum information. They state that quantum information looks at the interaction between a measure and its environment. Since there is a greater level of interaction between accounting measures and their environment for fair value accounting relative to historical cost accounting, quantum information can enhance the objectivity of fair value accounting (Demski et al. 2006).

### Presentation of Financial Statements

This section provides discussion regarding financial statements available under IFRS, GAAP, and Ijiri's thoughts. In terms of the income statement, the main purpose of financial reporting is to present an entity's financial performance via comprehensive income and its components (BC1.31). Information regarding a firm's financial performance, i.e. financial statements, helps users measure how effective and efficient managers (OB16) are at utilizing an entity's economic resources (Concepts Statement 1, paragraph 43). That is, how well managers are in discharging their responsibilities in generating returns (OB16). This is consistent with Ijiri's view that financial performance is the focal measurement of management accountability.

Ijiri (1989) stresses the use of momentum accounting, where the time-rate of change in income, i.e. the derivative of income with regards to time, is called momentum. Momentum presents the rate at which revenues are earned or expenses are incurred at a certain point in time (Ibid.). Ijiri (1989, pg.96) states that recurring income should be the only source of the momentum measurement. Therefore, recurring and non-recurring income should be separated (1989). When momenta records only recurring revenues and expenses, it can inform users of persistent earnings, i.e. a company's earnings power.

IAS 1.11 contends that all financial statements are equally important, whereby the statement of financial position is equally important as the statement of comprehensive income and the income statement. However, fair value accounting partly reduces the importance of the income statement since, under fair value accounting, changes in the value of net assets equal income. In other words, the changes between the fair value of certain assets and liabilities are included in income and expenses (Scott, 2009), meaning that income can be indirectly calculated from a fair value statement of financial position. Hence, the statement of financial position and only the relevance of its information seem to

**Table. 4** Wealth Statement

Wealth Statement		
Assets		
Current Assets	\$90	
Long-term Assets	80	\$170
Liabilities		
Current Liabilities	-10	
Long-term Liabilities	-40	-50
Total Wealth		\$210

(Source: Ijiri, 1982, P.25, Table 4-1)

be stressed, although the 2010 Conceptual Framework notes that useful information consists of both relevant and faithfully represented information. This is contrary to Ijiri's view, which places more emphasis on the financial performance of a firm, i.e. the income statement.

Regarding equity items, IAS 1 requires all owner changes in equity to be presented in a statement of changes in equity. On the other hand, the Board requires all non-owner changes in equity to be presented in 1) one statement of comprehensive income or 2) an income statement and a statement of comprehensive income (IAS1.IN6). For example, dividends are owner-related and therefore presented in the statement of changes in equity (IAS1.IN9). This emphasizes the importance of management accounting for the use of owners' resources, which is consistent with Ijiri's argument for the main purpose of financial statements. This is similar to Sectors C1 to C4 in Ijiri's (1989) dynamic structure of accounting measurements (see Table 1), where revenues and expenses are non-owner-related. On the other hand, owner-related sectors are included in Sectors B1 to B4 and D1 to D4 in Table 1 (1989).

Ijiri (1989, Ch. 4) compares three of his financial statements with the commonly used financial statements. The wealth statement (see Table 4) is similar to the statement of financial position without capital accounts, such that the wealth statement includes assets and liabilities, but not equity accounts (1982). The capital statement (see Table 5) includes an income statement, a statement of changes in shareholders' equity, and a statement of changes in retained earnings (1982). It accounts for changes in wealth for the period. The force statement (see Table 6) also accounts for the difference between beginning and ending wealth and may include

customized details of income momentum (1982). Similar to the current emphasis of differentiating between recurring income and non-recurring income, in Ijiri (1982), forces may be further categorized into recurring forces and non-recurring forces.

To help investors understand the amount of capital available for management utilization, Ijiri's (1989) utilization measures in Sectors B4, C4, and D4 in Table 1 include 'wealth utilization,' 'income utilization,' and 'action utilization'. These are proceeds from wealth, income, and action that are available for management utilization (Ibid.). Ijiri (1989, pg. 81) defines benefit sectors A1 to A4 in Table 1 as long-term benefits that an entity can enjoy by holding/utilizing wealth. The benefit sectors are equivalents of the statement of financial position in wealth accounting (1989). Benefits are further segregated into financial benefits and trading benefits (Ibid.). This is a categorization similar to that for the newly revised statement of cash flows, by IASB and FASB, where its items are generally categorized as financial versus non-financial items.

In Ijiri's co-authored work, Demski et al. (2009) state that new financial instruments will inevitably be created and available. Hence, they suggest that topology can be applied to categorizing and classifying accounts. In the process, topology can assist in understanding the qualitative characteristics of information, the logic and structure of concepts, and the extraction of the approximately correct information (i.e. abstraction) (Ibid.). However, manager opportunism may lead to changes in topology (Demski et al. 2009).

In summary, although the current trend of moving towards fair value leads to a focus on the statement of financial position, this is contrary to Ijiri's emphasis on the

**Table 5.** The Capital Statement

Capital Statement		
Beginning Wealth		\$75
Income		
Revenues	\$70	
Cost of Sales	-20	
Other Expenses	<u>-5</u>	
Net Income		45
Dividends Declared		-
New Stock Issues		-
Ending Wealth		<u>\$120</u>

(Source: Ijiri, 1982, P.26, Table 4-2)

**Table. 6** The Force Statement

Force Statement		
Beginning Wealth		\$75
Last Year's Income	\$25	
Increase in Income	<u>20</u>	
This Year's Income		<u>45</u>
Ending Wealth		<u>\$210</u>

(Source: Ijiri, 1982, P.27, Table 4-3)

accountability of management via financial performance through the income statement. Ijiri developed three financial statements which are comparable with the current financial statements. They are the wealth statement, the capital statement and the force statement (see Ijiri, 1989). In addition, Ijiri (1989) stresses the use of momentum accounting, which looks into the rate of change in income. Ijiri and his co-authors in Demski et al. (2009) argue that topology can be applied to categorization of new accounts as they appear with the creation of new financial instruments.

## CONCLUSION

Ijiri's thoughts serve as solutions to the current accounting debates, especially with regards to accounting measurement. The current trend for both the IASB and the FASB (the Board) is to use fair value accounting. This leads to the statement of financial position as the main financial statement. However, this focuses on the valuation of entities rather than on their performances.

Consistent with the 2010 Conceptual Framework, Ijiri (1975) argues for the accountability of management as the underlying goal of accounting. This supports the use

of historical cost accounting in that management is evaluated by past transactions. Ijiri's (1982) temporal triple-entry bookkeeping and column A in his (1989) dynamic structure of accounting measurements enable users to utilize past information in estimating future returns, as required by OB16. In addition, users can look at the causes-and-effects of resources that managers are accountable for and create customized financial statements from the dynamic structure of accounting (1989). Therefore, Ijiri's dynamic structure of accounting measurements includes both faithfully represented (past) and relevant (future) information, which fulfills the Board's required characteristics of financial statements.

The emphasis on the relevance of information may allow room for bias in information. Ijiri promotes several ways to resolve the bias problem. These include: 1) using standardized calculations such as linear functions (1975), 2) recording transactions by volumes on the dates of actual transactions and then recognizing prices based on the desired measure on the financial statement preparation date (1975), 3) using derivatives and integrals of financial statement items to prepare customized financial statements, which assist in objectively estimating future information (1989), and 4) using aggregated and less biased measures as provided by topology quantum information (Demski et al. 2009 with Ijiri as a co-author).

Quantum information helps in making predictions of future returns and cash flows via probability estimations (Demski et al. 2006 with Ijiri as a co-author). Ijiri also developed momentum accounting to assist users in analyzing the income momenta of a firm (1989). As a result, the financial performance of a firm, rather than the financial position of a firm, is the focus of the accountability view of accounting. Hence, Ijiri's thoughts deserve to be considered as solutions to recent debates on accounting measurements. The limitation of this study is that Ijiri's thoughts have not been implemented and therefore no empirical test has been conducted to examine the effectiveness of these inventions.

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