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A Study on Prof. Mattessich's and Prof. Ijiri's Theoretical Researches with Regard to A Recent Book

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Abstract:

The recent book mentioned in the title is by Prof. Garcia Nohora, *Understanding Mattessich and Ijiri: A Study of Accounting Thought*, Emerald Publishing, Bingley, U. K., 2018. Richard Mattessich's "Accounting and Analitycal Methods" (1964) and Yuji Ijiri's "Theory of Accounting Measurement" (1975), contributed to the debate on the foundational research in accounting and management science. Through the axiomatics they introduced a requirement of a rigorous standard for effective and reliable accounting and management science knowledge. The major practical consequences are linked to the less rigorous FASB conceptual framework. Prof. Garcia investigates also the internal and external environmental conditions where Mattessich and Ijiri could develop their researches.

Keywords: analytical research, axiomatics, accountability, foundational accounting research

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1 Introduction

Prof. Garcia's book (2018) provides the foundations of scientific research of the two eminent scholars, who greatly influenced the accounting thought. As a matter of fact, the pre-1960s and 1960s accounting research was characterized as *a priori* as opposed to behavioral and market oriented inquiries of later years. In this paper it is argued that contemporary researchers have a debt to the "golden age" theorists (such as Mattessich, Ijiri, Chambers, Moonitz and others) for introducing the requirement of a severe standard of argument for effective and reliable accounting knowledge. In terms of the weight of contributions to the debate, the 1950s and 1960s are indeed "a golden age".

Specifically the ideas of two great books, *Accounting and Analytical Methods* and *Theory of Accounting Measurement* by two great scholars, respectively Richard Mattessich and Yuji Ijiri, are very relevant to day and offer a large avenue to excite the profession back to the foundational research in accounting and applied sciences; it is yet surprising how little Mattessich's and Ijiri's ideas have been developed over the years.

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The book under review bridges in a way the divorce between scholarly thoughts of two classical books by two prominent Authors and the current academic profession, mostly blind to its own heritage. The literature of accounting has become an important cultural manifestation of its own right; the big challenge is to reconcile the ever-increasing sophistication of theoretical accounting with the need of practice for relatively simple or, at least, transparent accounting systems; accounting is an *applied* discipline in the service of practical goals. And in such a "place", where history becomes truly alive, it is relevant to reserve one's attention, not only but first of all, to two of the most renowned personalities.

2 What Mattessich and Ijiri have in common

Let us first consider some common typical traits and features on the methodologies of the two eminent scholars. Nohora Garcia's book (Garcia, 2018) argued that contemporary researchers have a debt to theorists such as Prof. Richard Mattessich and Prof. Yuji Ijiri for introducing the requirement of a rigorous standard of argument for effective and reliable accounting and management science knowledge. They have also been stimulated by Mattessich's and Ijiri's efforts of introducing modern "measurement theory" to accounting. It is a formulation of accounting theory by means of a general and axiomatic framework (Mattessich 1957; 1964; Ijiri 1967; 1975).

The change of emphasis was primarily in the kinds of assumptions. Both scholars generally asked to accept many philosophical hypotheses and mantain confidence in the methods of mathematics and logic, with the required dependence on two-valued (and also three valued in the case of Ijiri) logic and the fear of contradiction. Particularly Mattessich's emphasis lies in demonstrating the need for distinguishing between basic assumptions and purpose-oriented hypotheses; the latter lands flexibility to the theory and makes an interpretation that relates means to ends, an idea indispensable for the "conditional normative accounting methodology". The distinction between basic assumptions and auxiliary assumptions is linked to the less rigorous conceptual framework of the FASB, which may be considered a preliminary compromise, and the major practical consequence, resulting from all the preceding axiomatic research [pp. 168–169].

Furthermore Mattessich and Ijiri emphasize that the FASB, or standard setters in general, need from researchers not only facts, concepts, theories, and frameworks but also identification and evaluation of alternatives as well as justifications.

A more general and rigorous approach to micro- and macro-accounting was suggested by Mattessich (during the 1950s and 1960s) and afterwards by Ijiri (in the 1960s). Then Ijiri began his defence of *historical cost* method. While recognizing that no one value is "best" for all uses, Ijiri suggests there is one valuation which is unique in terms of his practicality in measurement, i. e. the valuation model based on *historical cost* [pp.43–44; *passim*].

Normative accountants must decide which of the measurement rules are superior for the amalgam of users they are attempting to serve. A solution for Mattessich to a great variety of approaches to value measurement, each of which serves a specific purpose, is a functional approach to valuation which recognizes different objective-oriented valuation models, but which emphasizes the common features of all of them [pp. 111–113]. Ijiri, after having reviewed the different valuation criteria, assumes that it may be impossible for a particular use of accounting information, that one valuation method is better than another, and one valuation principle is not likely to satisfy all needs. In any case Ijiri reaches the conclusion that the historical cost accounting generally is satisfactory if not superior to the more rapid incorporation of market changes through current market value schemes; this defence of historical cost occurred also in a time when the FASB moved its conceptual framework towards current values. Certainly Ijiri's conclusions were influenced by historical factors. Doubtless the historical cost application is a useful surrogate for values.

Mattessich and Ijiri attribute to accounting not only a passive function of representation, under given aspects, of business-economic phenomena, in comparison with the real economic world, but also an active function, insofar as it can impact on the behavior of economic subjects. Consequently the accounting information, as to the choice of information criteria, should consider also the reactions these valuations can imply on the economic behavior of the operators and the "desirability" of these reactions.

As to the present review author, the development of "information economics" ran to mathematical model making with modification to incorporate modern probability theory. In this respect its output has been more in the tradition of early Mattessich with his emphasis on meta-models and abstraction from particular applications.

The application of basic concepts of modern measurement theory to accounting (not to be confused with "measure theory" of mathematics) has contributed to conceptual clarification of many accounting issues. Whether one regards accounting as a kind of measurement activity depends on one's viewpoint. For those who identify measurement with the quantitative description of objects and events, including expectations (as in

Mattessich, 1964; Ijiri, 1967; Mock, 1976; and others), accounting is measurement, while others (e. g. Chambers, 1966) oppose this view. Further light was shed in measurement issues especially by Mock (1976), who focused on income and wealth measurement. Another early paper on this subject by Mock (1971) drew attention to the fact that the concept of information value used in information economics is only one among several concepts or interpretations. Mock distinguished between various types of information (economic value of information, model value of information, and feedback value of information).

Ijiri's (1975 and 1989) publications comprised further axiomatic and postulational contributions (the second one includes three postulates – reconciliation, conservation, and attribution of momentum – for his theory of triple-entry and momentum accounting) [p. 206]. In the 1990s an attempt was made by Balzer and Mattessich (1991) to apply the "axiomatization methods of structuralism" to accounting.

One of Ijiri (1967) more significant contributions is the ability to extend his axiomatic structure of doubleentry into multidimensional bookkeeping; the valuation rules for conventional double-entry recording is merely one set of valuation rules which could be applied. Multiples sets would permit multiple valuations of the quantities of resources. This would insert into accounting measurements a degree of flexibility in the development of information for different uses [pp. 200–204].

This mathematical trend in accounting was reinforced by a series of other books and articles by Mattessich and Ijiri in the area of management accounting, as well as by a host of papers on matrix accounting and linear programming applications. Furthermore, empirical and other research of the 1970s tried to clarify accounting objectives and information goals; the efforts of "information economics" may be added the examination of auditing in the light of modern accounting theory.

There are alternative theoretical views that do not agree on the mathematical structure of accounting; for instance Gino Zappa's masterpiece on the "business income", Littleton's work on "the structure of accounting theory", W. A. Paton's classic essay on "accounting theory". Paton comes close to a postulational approach (i. e. without formal means) and was the first to search for the premises on which accounting rests. All these works do not include mathematical formulas, nevertheless they employ sistematically the mathematical logic with great rigour between premises and conclusions. Gottlob Frege (*Grundgesetze der Arithmetik* 1893), undoubtedly the most distinguished thinker in the field of mathematical logic, was the first to propound the *logistic thesis* that all mathematical concepts are definable in terms of logic, and that all mathematical propositions are deducible from those of logic.

After the presentation in dialogue form of his views on the close relationship between double-entry and historical cost principle, Ijiri (1975 and 1981) challenged the hypothesis of double-entry by extending it to – or even replacing it by – a multi-entry, particularly a triple-entry approach. In *Triple-Entry Bookkeeping and Income Momentum*, Ijiri (1982) claimed there is another relevant approach to accounting which may be called the "accountability approach" [pp. 141, ff.]. The pros and cons of implementing a triple-entry system must therefore be considered from this standpoint, too. So Ijiri extended his "accountability approach" and "triple-entry bookeeping" to what he called "momentum accounting", which is based on drawing parallels between phisics and accounting, and may will be Ijiri's most original contribution to accounting research; it was born of the same analytical spirit as double entry and it is an ingenious extension of the latter [p. 206].

For Mattessich and Ijiri only empirical variables will be either directly or indirectly *observable* (including legal evidence and so on), and hopefully also measurable. Indirect observability, in turn, leads to the question about what they call "proxies" or "surrogates" and "surrogate relations" or what is known in modern science as "indicators" and "indicator hypotheses". Specifically Mattessich call them "surrogate assumptions", which are empirically empty but *hold the place* for specific pragmatic or instrumental hypotheses (formalized means-end relations).

Ijiri (1967: 29) observes that the problems of measurement can be usefully developed only when the relationships between business phenomena to be represented are known, which means that the study of these phenomena and their relationships in the economic system of the entity is necessary to investigate the accounting measurements. Mattessich (1964: 206), in the same sense, deals with the relation between the valuation of given objects and the system to which the values refer to and with the character of additivity of values as well.

3 An overview of the book

Prof. Garcia's book provides the foundations of scientific research of the two prominent scholars, with special reference to two of their classical works, respectively *Accounting and Analytical Methods* (AAM, 1964) and *Theory of Accounting Measurements* (TAM, 1975). They constitute outstanding works, which greatly influenced the accounting thought. The work under review goes in the history and in the foundation of accounting and man-

agement science, stressing also all the environmental conditions (economic, social, political, antropological, technical, philosophical and so on and so forth) and intellectual influences as well, underlying them.

The volume consists of eight chapters.

Chapt. 1, "Introduction", points out there has existed a certain disdain about studying illustrious Authors with rigorous scientific methodology, such as Mattessich, Ijiri, Raymond Chambers, Henry Hatfield, the Dutch Théodore Limperg, the Italian Gino Zappa and many others [p. 2], while the foundational accounting investigation is essential for scientific research programs and education processes. On the other hand this research serves in helping to reorient accounting studies after the overwhelming capital market research.

Chapt. 2, "On Approaches for Analysing Intellectual Work", covers some methodologies of science in general, included the critical-interpretative school, but not all the relevant ones. Anyway it contributes to the reconstruction of the internal and external contexts in which Mattessich's AAM and Ijiri's TAM were created. These seminal works "have had different trajectories through different Countries for different reasons" [p. 3] and the main purpose of the Author is to understand how Mattessich and Ijiri reached their relevant results. Chapt. 3, "An Illustration of Studies in Accounting Thought", tries (a) to analyse sistematically Mattessich's and Ijiri's methodologies through a unique framework and (b) to review different works, personalities, ideas and publications on accounting thought in the light of Mattessich's and Ijiri's research. There are selected examples of an heterogeneous research mix (concept of accounting, income smoothing, comments on A. C. Littleton's, and K. McNeal's works and so on), which should help in realizing how Mattessich contributed to a "general theory of accounting" and how Ijiri stressed the relevance of the "accountability approach", in contrast to the "decision-oriented approach", that reflected the mainstream view since the appearance of *A Tentative Statement of Accounting Principles Affecting Corporate Reports* by AAA (1936).

Chapt. 4, "R. Mattessich: A Combination of Academic Interests", explores the background and premises of AAM, while chapt. 5, "The Search for a General Theory of Accounting", effectively captures the essence of AAM. The same holds for chapt. 6, "Ijiri and Accountability" and chapt. 7, "How can Conventional Accounting be Preserved?", both related to Ijiri's TAM. Chapt. 8, "Conclusion", deals with AAM, TAM and the literature on accounting thought, as well as with the planned future research.

4 On Mattessich

Chapt. 4 specifically discusses the involvement of Richard Mattessich in a composite combination of interests in mathematics, economics, management science, accounting, operation research, electronic data processing, philosophy of science, history, behavioral sciences and so on (reflecting wide interdisciplinary scholarship),¹ in order to explain his scientific research. The Author [p. 88] makes the following remarks:

Mostly, his article of (1957) [*Towards a general and axiomatic foundation of accountancy: With an introduction to the matrix formulation of accounting systems*] shows deficiencies in the [received] definition of axioms. As a result, accounting theorems were not properly supported.

Certainly in Mattessich's set-theoretical axiomatization (see also Appendix A of AAM) there are some weaknesses; but a constructive technical clarification and improvement of Mattessich's axiomatic system came through an exchange of ideas between Prof. S. Saito (1972 and 1973) and Prof. Mattessich himself (1973). And particularly Prof. Garcia's issue that "accounting theorems were not properly supported" [p. 88], let us consider the Kurt Godel's *incompletability theorem* and proof (*On Formally Undecidable Propositions of Principia Mathematica and Related Systems*, 1931).

Godel presented the proof that neither in Whitehead and Russell's nor in any other comprehensive analytical system it is possible to prove or disprove *all* derived propositions as being validly inferred. That means, any axiomatic system, of even moderate complexity, will posses undecidable propositions, namely those of which neither their affirmation nor their contradiction can be proved within the specified system.

Doubtless Mattessich's set-theoretical formulation, as well as those of Ijiri, Raymond Chambers and others, constitutes a *quasi* axiomatic approach, not a complete one.

Another interesting and stimulating remark of Prof. Garcia [p.88] concerns the lack of realism of Mattessich's axiomatized system, but Mattessich's approach is not empty formalism without empirical substance (a general framework for exploring issues about reality is in Mattessich, 2014). He tried to induce the structures behind such empirical phenomena as economic transactions. That such endeavours were not invain, proved itself best on the practical side, such as the simulation of budgeting and accounting matrix models that led ultimately to a series of best selling spread-sheet computer simulation models (cfr. Galassi & Mattessich, 2015); further evidence comes from the above mentioned long-standing search of the Financial Accounting Standards Board for a conceptual framework of accounting, which expresses the need for multiple accounting models.

Furthermore, it does not seem any contrast [p. 67] between the statement that mathematics is based on logic (and is the most precise way of describing structures, any structures), and the quoted issue from Mattessich and Galassi (2016: 31) "that in varied academic disciplines there is a trend to trust more 'on mathematical consistency than on empirical verification'".

Chapt. 5, "The Search for a General Theory of Accounting", discusses questions about the nature of income and capital (wealth) and the income concept accepted in Mattessich's *Accounting and Analytical methods*. The Author emphasizes [p. 113] that Mattessich "focused excessively on the economic approach" to income. In this way he "did not make conceptual progress in the field of accounting theory" [p. 113]; moreover he "could not define social income or corporate income or individual income" [p. 133].² But the "general theory of accounting" can be referred not only to business entities but also to non-business entities such as households, "public territorial entities", other economic institutions and even society in general, along the lines of Italian school of *economia aziendale* (cfr. Zappa 1937; 1956–1957; Biondi, 2002). Furthermore the "general theory of accounting" makes possible the application of accounting methodology even to the recording and representation of non-economic phenomena, phisical, astronomical, biological and so on (cfr. widely D'Auria, 1949; Florentino, 1965). This is also the position of Ijiri (1967:33).

On the other hand Prof. Garcia recognizes that "this extended notion of accounting [in a general prospect, the variety of accounting systems] enabled scholars to broaden their understanding of accounting and practitioners to extend their work to other fields of professional practice"[pp. 132–33].

5 On ljiri

Chapt. 6, "Ijiri and Accountability", deals with Ijiri's biography, with *Theory of Accounting Measurement*, its background, premises and preconditions and with other Ijiri's works published before TAM. Likewise Richard Mattessich, Ijiri's interdisciplinary knowledge, culture and wide-ranging interests led him to search in phisics for the solution of accounting problems and to develop his triple-entry bookkeeping employing Newtonian mechanics. Furthermore the two eminent scholars investigated different accounting applications of quantum information.

Prof. Garcia emphasizes [p. 153] Ijiri's concept of objectivity and reliability. As to the former rather than speaking of objective or non-objective accounting measurement, one should speak of measurement more or less objective, noting that the reliability of accounting measurements is in relation to their usefulness for the intended use, wheras objectivity is independent from the utility for a given employment; in fact we can speak more exactly of "reliability", "tentativeness", "consistency" of quantities, also in connection with the character of objectivity. Mattessich (1964: 145) remarks how the objectivity, that some would attribute, for instance, to current market prices, does not correspond to the notion of objectivity as accepted in science; so measurement involves adhesion to its aim, precision, timeliness and is subject to a cost-benefit criterion.

The sections of this chapter discuss the "accountability approach" in contrast to the "decision-oriented approach" that reflected the mainstream view; it presents the features of "accountability" or "stewardship" and the implications for the regulation of financial statements, together with the related debates. Ijiri's *Theory of Accounting Measurement* stressed accountability, as it can suitably explain the roles of the parties involved in accounting. There are some questions that need attention before the concept of accountability can be used effectively as a relevant accounting goal. In the process of struggling for answers the following subsidiaries questions arise. Accountability *for* what, *of* whom, *to* whom? Turn now to the contention of Ijiri that historical costs are often appropriate for the purpose of accountability.

On the other hand in this regard Mattessich attempts a rigorous treatment of accounting purposes, or a structural reconstruction of accounting theory, through an interdisciplinary effort (Balzer & Mattessich, 1991); it is a search for the appropriate axiomatization of accounting theory by revealing its logical structure and empirical claims in a clearer way than previously done.

Chapt. 7, "How can Conventional Accounting be Preserved?", discusses accounting as a system designed to facilitate the smooth functioning of accountability relationships among interested parties, entity and decision makers, in contrast to the widespread idea that accounting is a system to produce useful information only for decision makers, whereas the central purpose of accounting information is the measurement of the entity economic performance.

The chapter offers a discussion on the role of logic in accounting theory construction, some extension of historical cost accounting, covering topics as aggregation and price level accounting, accounting for future financial prospects, problems concerning multiple goal, historical cost and probability, triple-entry bookkeeping and income momentum [p. 206] (Ijiri 1982; 1989). It debates the hallmark of Ijiri's theory [pp. 190–94], that is his orientation towards traditional acquisition cost valuation and his reliance on valuation axioms (control, quan-

tities, and exchange) from which he deduces eight simple valuation rules, in a way that his axiomatic basis is mainly limited to valuation aspects, that is to the "axiomatic structure of historical cost valuation".³

It follows a discussion on the relation between valuation principles and the aims of accountability, performance measurement and other economic decisions. Apart the Ijiri (1981) continuing defence of the historical cost approach, Prof. Garcia stresses [pp. 199–200] the introduction by Ijiri of "fair value" principle through the extension of the "exchange axiom", replacement cost, realized value, realizable value, alternative valuation methods tailored for specific decisions, a kind of multidimensional accounting. She points out [p. 194] that Ijiri associated the measurement of performance with business income determination, as it was also defended by Paton and Littleton, Eugen Schmalenbach and Gino Zappa. By the way, the reader will be interested in the correspondence [p. 191] between Paton and Ijiri.

Chapt. 8 is the "Conclusion".

6 Mattessich and Ijiri: Heterodox scholars

Doubtless Mattessich and Ijiri are heterodox scholars. The present reviewer shares the proposition of Prof. Garcia [p. 217] that "if Mattessich work is not being studied by the new generations of academics in the US, it is not because his work is difficult to understand, but mainly because of the institutionalization of positive accounting theory, in the training of researchers in accounting. This assertion reinforces the finding that knowledge is legitimized by institutional ... and material aspects ... rather than because of its intellectual essence and rigour". And the same is exactly true for Ijiri's work.

The relevance of the two works, and the preminence of the two scholars, to today researchers is much more clear in comparing them with the current institutionalized "positive accounting theory" (in particular such a contrast is very evident in the area of accounting policy). This is foremost a methodology and hardly covers empirical accounting research in general, that is wide and broad-minded enough to encompass not only positive but also instrumental hypotheses, which connect means to ends.

While empirical research is by no means inconsistent with a conditional-normative accounting methodology, "positive accounting theory" seems to reject categorically any kind of theory that attempts to incorporate value judgements (except for "prescientific" ones, necessary for scientific research in general) in its premises. In other words, a pure science cannot accept value judgements as premises but can only incapsulate them in observed facts. Looking at the obsession with which many of the younger researchers were trying to cling the term "positive", one cannot help guessing a sort of overcompensation for some professional inferiority complex.

In the narrow sense, the term "positive" refers to no theory at all but to a special methodology that forbids normative premises even to a theory of accounting, the very essence of which consists of prescriptions. These limitations should incite academics to extend this theory toward inclusion of normative premises.

Another disadvantage of the "economics-based accounting" of "positive accounting theory" (the methodology used is that of neoclassical economics) is the overriding influence of a single objective, namely, wealth maximization. A related issue is the neglect of environmental and social issues, so that the economists' wealth maximization becomes short term instead of long term maximization; and the disastrous consequences of this can be seen everywhere in the economic life. There should be reason enough to shift again to the more basic issues of "accountability" and ethics. This criticism toward "positive accounting theory" is primarily directed against its methodological stance rather than to its empirical research and could constitute a "positive"(that is, progressive or at least refreshing) impact on the future of accounting research.

In this regard it may be worth mentioning two writings by Mattessich (2014: chapt. 10) and Ijiri *et alii* (Ijiri & Lin, 2006: 64–78). Prof. Mattessich examines the differencies and similarities between the recent ontologicalevolutionary approach in accounting and its counterpart in economics (with extension to "ecological economics" and the critical realist school as well as the "new Keynesian school"). He concentrates on the difference between the more traditional *environmental* economics and the more radical *ecological* economics. Thus traditional economics (including *environmental* economics – as distinct from *ecological* economics) is seen by economic ecologists as the main culprit in the present crisis of the biosphere; so they call for a new multi-disciplinary effort for solving *environmental* problems.⁴

In the same spirit, on a more specific accounting level, Prof. Ijiri *et alii* (Ijiri & Lin, 2006) mainly contrast and integrate *conventional* accounting with *environmental* accounting to construct the "symmetric accounting" framework, which includes not only "goods", resources that are of positive value to entities, but also "bads", items that are detrimental to entities. Bads include environmentally hazardous items as well as impared goods with high closure costs. It is formulated the accounting equation to account for *environmental* and other negatively-valued items; they propose ways to sistematically introduce this negativity in the double-entry framework. This is done solely for the accounting measurement purposes. From a more practical perspective, the "symmetric accounting" provides a different approach to treat accounting and control issues for *environmental*-related costs and expenditures.

7 Concluding remarks

The Author states [pp. 208]: "It is likely that Ijiri's (1975) formulation of accounting theory emulated Mattessich (1957 and 1964) ... It is true that Ijiri's ... proposition was simplified and that he intended to generalize conventional accounting". And [p. 218]: "The question of whether Ijiri's (1975) theory of conventional accounting can be extrapolated to all accounting systems remains open to debate". As to the criticism to the "general theory of accounting" from many quarters [pp. 159–60; 217–18], it is worthwhile to remember, at least in the case of Mattessich, that a systematic interpretation of the "general theory of accounting" requires further analytical as well as empirical research. All these axiomatic attempts by Mattessich, Ijiri, as well as Chambers, Moonitz and others, led during the sixties and after to a great number of related publications of other scholars at national and international level, such that one still speaks of "a golden age of *a priori* research in accounting" when referring to this period.

The study under review refers to two classic works, Ijiri (1975) and Mattessich (1964). "However, the reader may realize that much remains to be done in terms of examining their later works and how they might have influenced other researchers in accounting theory" [p. 222]. The book deals also with so many other scholars, schools of thought in the field of accounting, economics, management science, epistemology and so forth, which results in a very wide spectrum of research. The present reviewer agree with the Author's research project, reported in the above mentioned quotation, and hopes it will be implemented.

There are several issues that the Author could beneficially attend to. *First*, many repetitive statements should be removed. *Second*, although the monograph offers an understanding of Mattessich's and Ijiri's theorising, it refers mainly to one work, among so many, for each scholar. *Third*, the work presents a wide spectrum of historical and environmental events where Mattessich and Ijiri could develop their researches; in this regard a more synthetic treatment of the internal and external environmental condititions would be desirable.

The monograph should satisfy the expectations of a broad readership, specifically academics, doctoral students of accounting, management science, economics and related disciplines, professionals, theoretical inclined practitioners, interested in the foundational research.

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Notes

1 For Richard Mattessich's research methodolgy, his scientific inquires and contributions see Galassi (2017).

2 For valuation problems see widely Mattessich (1995), chapt. 6.

3 Many relevant issues and references can be found in the "Memorial Symposium for Prof. Yuji Ijiri", which includes two reprints of Ijiri's articles: "Axioms and Structures of Conventional Accounting Measurement" (1965, pp. 29) and "An Introduction to Corporate Accounting Standards: A Review" (1980, pp. 12), Accounting, Economics, and Law: A Convivium, vol. 8, Issue 1 (March 2018).

4 Although the discipline is still developing, the difference between traditional economics and ecological economics is fundamental and difficult to bridge.

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