Chapter 5-Representational measurement and the going concern assumption

5.1- Introduction

The establishment of the conditions under which a process of measurement is carried out is fundamental to an understanding of the measures it produces. Measurement literature (e.g., Luce *et al*., 1971; Narens, 2002; Stevens, 1951) asserts that measurements should be evaluated with respect to the conditions under which they have been prepared. This is necessary since measurements may be made under non-standard conditions, such that comparisons or the evaluation of such measurements could lead to misleading inferences.

According to the IASB (2006) framework for financial reporting, accounting measurements that are necessary for the preparation of the financial statements of companies whose operations are expected to continue into the foreseeable future should be prepared under the going concern assumption. In other words, the construction of accounting measurements should take into account the effects of the going concern assumption. The going concern assumption asserts that unless there is evidence to the contrary, it is assumed that the firm will continue indefinitely (Wolk *et al*, 2001:138). The going concern assumption is made when a company is ordinarily viewed as continuing in business for the foreseeable future with neither the intention nor the necessity of liquidation. It can be inferred from this that the going concern assumes a business that survives into the foreseeable future and that it assumes a successful business.

Sterling (1968) points out that financial statements prepared under the going concern assumption are provisional and the truth of these statements is dependent on subsequent events. This suggests that the truth of accounting measurements made under the going concern assumption is also dependent on subsequent events. However, Sterling (1979) believes that all measurements occur at a specific point in time. He argues that the purpose of measurement is to discover the magnitude at that point in time, regardless of what has gone before

or what will happen afterwards. This means that the truth of measurements cannot be dependent on subsequent events. Indeed, it is clear that if financial statements prepared under going concern are dependent on subsequent events, it is doubtful whether accounting measurement actually takes place under the going concern assumption. In chapter 1 it was established that for accounting to be considered a measurement discipline, its measurements should be in harmony with representational measurement. Evidently, it is also questionable whether the concept of measurement in accounting is in harmony with the principles of the representational theory of measurement when it is practiced under the going concern concept.

The purpose of this chapter, therefore, is to investigate whether the going concern assumption is in harmony with the principles of the representational theory of measurement.

This chapter begins with a discussion of the representational measurement implications of the going concern assumption, in section 5.2. This is followed in section 5.3 by a discussion of the representational measurement implications of the concept of flowing business activities. The chapter goes on to explain the effects of the concept of futurity in accounting on the principles of representational measurement, in section 5.4. The implications of the concept of time under the going concern concept on representational measurement are discussed in section 5.5. The effects of the entity concept on the application of the principles of measurement in accounting under the going concern postulate are covered in section 5.6, and the foundations of representational measurement under the going concern postulate in section 5.7. The conclusions in section 5.8 close the chapter.

5.2 The going concern postulate and representational measurement

In section 5.1 above it was noted (Wolk *et al.*, 2002:138) that the going concern postulate assumes that unless there is evidence to the contrary a firm will continue to exist indefinitely. It is clear from this that assets and liabilities are recorded in the financial statements on the assumption that the company will be able to realize its assets and discharge its liabilities in the normal course of business. The firm will also have to exist in the future so that it can receive its benefits from the realization of its assets and give up benefits in the settlements of its liabilities. Sterling (1997:498) puts it in the following way:

> An asset is an asset because it will benefit the future and is valued on the present balance sheet on the basis of a past price. The firm will have to continue in the future in the manner expected at the present in order for the present allocations or past expenditures to be correct while the past allocations made on the basis of the past expectations of future events now need to be corrected to reflect present expectations of future events.

These words point out that an asset can only be considered to be such by a firm if the firm expects to continue for the foreseeable future. An asset can therefore only be classified as such under the going concern assumption. The extract also highlights the fact that financial statements prepared in the present under the going concern assumption do not contain empirical information. The information is provisional and has to be confirmed and verified at a future date. This perspective of going concern is in contrast to the principles of representational measurement. Narens (2002) asserts that all measurements must be a true reflection of the properties of the phenomena that they purport to represent. There must therefore be a one-to-one correspondence between measurements and the phenomena the measurements purport to represent. It is clear that the financial statements prepared under going concern cannot be empirically verified in the present and consequently they cannot be considered to be measurements. In chapter 2 it was noted that all measurable phenomena must be empirical. From this, however, it

can be concluded that accounting phenomena are not measurable under going concern.

Sterling (1979) believes that the determination of future economic benefits that are expected to be realized from assets and future economic benefits that are expected to be given up in settling liabilities is not a process of measurement. He argues that such a process is a forecasting process. This makes sense since the magnitude that is being quantified lies in the future. The use of the term "forecasting" indicates that the magnitude that is of interest in the present lies in the future. As a result, this magnitude cannot be empirically verified in the present. According to Decoene *et al.* (1995), magnitudes are historically and theoretically determined reflections of quantitative aspects of objectively existing entities and not merely the outcome of metricization or measuring procedures. It is evident from this line of reasoning that something that cannot be objectively determined cannot be measured. All future phenomena cannot be objectively determined, as they have not yet occurred. Thus, forecasts are not measurable. Therefore, values of assets and liabilities cannot be measured under the going concern postulates, as they are forecasts.

In addition, Sterling (1968:484) notes that income and position can only be estimated. He also argues that all statements prepared under going concern are provisional and dependent on subsequent events for the final and accurate statements to be prepared at liquidation. This means that under the going concern, the truth of accounting statements is dependent on future events. It is thus quite clear from this that the income statement and the statement of financial position are also dependent of future events. Luce *et al.* (1971:13) point out that the empirical relational structure should be seen as an objectively existing entity that is not bound by subjective assumptions of an individual. In other words, every empirical relational structure should be empirically testable. Therefore, if the information in the income statement and balance sheet under going concern is dependent on future events, this information cannot be considered to be objective. Hence it cannot be measurement information.

Paton and Littleton (1940) treated the going concern as an assumption and not as a factual statement. They argued that the going concern is of course a matter of assumption and this fact should not be lost sight of in the process of business reporting. An assumption is a belief or feeling that something is true or that something will happen although there is no proof (Hornby, 2005:77). No empirical evidence is required to make an assumption. Since the going concern is referred to as an assumption, then, this suggests that there is no proof of the existence of the going concern. It can also be inferred that there is no proof that the financial statements prepared under the going concern contain factual information. Thus, it is questionable whether financial statements contain measurement information.

As noted above (Sterling, 1968), in this section all statements prepared under going concern are provisional and inaccurate until the occurrence of some future events. Therefore, accounting measurements that occur under the going concern assumption cannot be considered an accurate reflection of the attributes of economic events. In chapter 2 the point was made that measurements should be a true representation of the properties of the objects that they purport to represent. Consequently, it follows that accounting quantifications that occur under going concern should not be considered as measurements.

Similarly, Gouws and Rehwinkel (2004:85) emphasize the view that it is not possible to produce accounting measurements under the going concern assumption when they state:

> The going concern concept imposes the danger that the concept of time, and more specifically of the past and the future, can be incorrectly interrelated. Thereby the disclosure of reality over a given period or at a given point in time may be distorted. Since financial statements are prepared according to historical cost measurement procedures and simultaneously adhere to the futuristic going concern concept, a rather odd state of affairs is devised, namely that financial statement figures contain

> provisional, estimated or contingent futuristic allocations that are based on historical cost measurements.

This extract underlines the point that financial reporting that occurs under the going concern concept incorrectly interrelates the time of occurrence of events. It also contends that figures relating to past and future events are aggregated to each other. Consequently, such an aggregation creates a result that reflects neither the past nor the future. According to Sterling (1997), measurement is the discovery of an extant position that requires a present act. He argues that future magnitudes can be predicted and verified as they occur, but that measurements need to be made in the present. According to this, future events are not measurable. It is also clear that only phenomena that currently exist are measurable. Accounting figures that represent future events are structurally different from those that represent past or current events. It can therefore be concluded that financial statements prepared under the going concern assumption are not in harmony with the principles of the representational theory of measurement.

5.3- Representational measurement and the flowing accounting events

This section discusses the concept of flow in accounting. Hawker (2003:236) describes flow as “moving steadily and continuously in a current or stream”. This means that the movement that is described as flow should be uniform and unbroken. According to Goldberg (2001:261), the concept of flow is primarily associated with liquids, but it can also be legitimately applied to gases and to granular substances such as sand or sugar. He also points out that the flow of occurrences which accountants take cognisance of is more analogous to that of a granular substance than that of a liquid or a gas. This viewpoint indicates that in a liquid, the constituent particles are homogeneous and they cannot be distinguished from each other structurally. Although gases and other granular substances can flow, their constituent particles are not homogeneous. They are distinguishable from each other structurally. It is evident that in this case the flow

in accounting is constituted by separate events that are not homogeneous. That is, accounting events flow through a business during its lifetime, but they are heterogeneous. Goldberg (2001:261) puts it as follows: “Each occurrence can be likened to a grain of sand and can be readily dissociated from any other, if need be, and does not merge and completely lose its separate identity in the totality of activity”. In other words, each accounting transaction is unique, separate and identifiable. It can also be reasoned from this that although different economic events keep their separate identities they have a homogeneous purpose. The purpose of economic events is to create profit for the business and it follows that the income from different economic events must be identical.

Kirk (2005) argues that under the going concern postulate a firm is assumed to continue indefinitely unless there is evidence to the contrary. It is also alleged that the true income of a firm cannot be calculated until the firm is dissolved (Sterling, 1968). Thus, one can infer that income can only be calculated once the flow of business activities has stopped. It follows from this that the going concern concept is necessary for flow of business activities. Moreover, the going concern concept is only possible if one assumes homogeneous business activities.

If individual business activities were viewed as independent and isolated, it would imply that the income produced from them should also be viewed as different. This view of business transactions makes income produced by all business transactions homogeneous. If, as outlined earlier (Sterling, 1968), the true income of an entity can only be measured at liquidation, it means that the creation of income is a continuous process, and at the point of liquidation, when it is possible to measure income, it would follow that all income has to be homogeneous. This perspective that suggests homogeneous income from business transactions is evidenced by the concept that all periodic income is aggregated to give the total income for the period.

If all business activities are seen as homogeneous, it would seem logical to assume that an identical method of measurement is used for measuring identical

attributes of different business activities. But evidence from accounting literature indicates that there are numerous measurement methods that could be used at the same time on different business transactions. For example, Staubus (1985:53) states:

> If a scientist in a field far removed from accounting asked an accountant to tell him the central ideas of accounting measurement practices, what could the accountant say? Could he say that historical cost is the basis of accounting measurement? Surely he could not feel that he has conveyed the essence of the subject by reference to a principle that applies to a minority of balance sheet items.

This suggests that there are numerous methods of measuring the attributes of accounting phenomena. If this was the case, it would defeat the point of seeing the income they produce as homogeneous. It would make sense if periodic income were classified according to the different classes of transactions or activities that produced it. It is senseless to use different measurement methods on identical phenomena. It makes sense, however, to suggest that different business transactions produce different income. It would make sense, then, to employ different measurement methods for different phenomena.

Furthermore, Staubus (1985) contends that to his knowledge no one has woven accounting measurement practices into a comprehensive and coherent theory. This perspective highlights the fact that the underlying phenomena that are being measured are structurally different. That is to say, the phenomena themselves might be different and as a result they require different measurement methods and procedures. This leads to the development of different measurement theories for these phenomena. In addition, it should also be noted that there is no operation available in accounting that permits the aggregation of income produced by different accounting transactions. An operation that permits addition should indicate that the attributes that are used in the measurement of income are identical and that they are measured using an identical scale of measurement.

Luce (1996) also points out that the homogeneity axiom requires that numerical representations of elements that are structurally different cannot be added to each other. This emphasizes that it is necessary to verify that measurements on an identical scale are representations of an identical phenomenon before they are added to each other. In this case, it seems that the numerical representations of the attributes of accounting phenomena are structurally different. If they were added, it could lead to disharmony with the homogeneity axiom of extensive measurement.

5.4- Measurement and the problem of futurity in accounting

The problem of futurity in accounting is directly linked to the going concern assumption. The going concern postulate provides a context for valuation. Wolk *et al.* (2001:138) stress that the reporting of liquidation values for assets and equities is in violation of the postulate. This suggests that the values of assets and liabilities of an entity should be reported in the financial statements on a basis that reflects that an entity will be able to realize its assets and discharge its liabilities in the normal course of business. The entity therefore has to exist in the future in order to realize benefits from its assets and to discharge its liabilities. It also follows that the measurement of future benefits cannot occur in the present, as these do not exist.

The phraseology of the going concern concept implies stability of the firm and the economy. Sterling (1968) argues that the implementation of present plans under the going concern postulate requires that future events be much the same as expected, i.e. costs; prices, technology, etc. must remain fairly stable. This point of view highlights the importance of using expectations to represent magnitudes of future phenomena. It also indicates that under the going concern assumption expectations should be accurate predictions of the magnitudes of future events. But Sterling (1979) asserts that predictions are not measurements: future events do not represent reality and as a result their attributes are not measurable. Orbach (1978) believes that expectations have legitimate properties in the present

that are measurable. This suggests that the properties of expectations are real and are therefore measurable. But it should be noted that expectations of future events are not future events. Future events still remain immeasurable.

The going concern concept does not inherently mean continuing in an indefinite manner. No firm can continue forever. According to Sterling (1968), the length of continuity into the future is irrelevant to the going concern proposition. He argues that the significant point is that accountants are interested in the status of the firm at a given point in time in terms of its earning potential measured, to the extent possible, at the same point. It is this attempt to measure the earning potential of a firm at a given point in time that presents a measurement problem under going concern. Goldberg (2001) clearly points out that accounting transactions flow into the business entity until the point of liquidation. Before the point of liquidation, the accounting transactions flow non-stop through the business. As has been outlined above (Sterling, 1968), it is alleged that the true value of a firm is indeterminate prior to liquidation. Thus, legitimate properties of the income of the firm can only be obtained during liquidation.

Moreover, Sterling (1968) contends that present magnitudes under going concern are dependent upon subsequent events He also argues that present magnitudes can never be known because subsequent events always lie in the future. This suggests that the measurement of the real attributes of accounting phenomena is only possible at liquidation. It follows that one cannot measure a magnitude that lies in the future: it is only the expectation that can be measured. It is not possible to independently verify a magnitude that lies in the future. Furthermore, measurement magnitudes are historically and theoretically determined reflections of quantitative aspects of objectively existing entities and not merely the outcome of metricization or measuring procedures (Decoene *et al.*, 1995). Indeed, one can see that representational measurement is only possible with empirical phenomena. It is clear then from this that the measurement of future phenomena is definitely excluded.

Chambers (1997) notes, that, every particular measurement scheme requires the specification of the property of a class of objects that is of use and interest to the measure. A precise knowledge of the property that is being measured is thus necessary for measurement to occur. If a property lies in the future, a specific and precise definition of such a property in the present is impossible. One of the defining features of representational measurement is the belief that questions of measurement must be grounded in reality (Decoene *et al.*, 1995). It is quite clear from this that all measurable phenomena must be empirical. That is to say, they should all be objectively existing entities at that moment in the present. It is thus clear that it is not possible to measure a future property in the present.

In addition, every particular measurement scheme requires the specification of a scale of some kind, making it possible to distinguish the extent to which every object in the class possesses the specified property (Chambers, 1997). This indicates that it is necessary to specify scales of measurement in a measurement process. It follows that it will be impossible to specify the scale of measurement for an unspecified property that cannot be empirically tested and that also lies in the future. A scale specifies the relationship between the empirical relational structure and the numerical relational structure. If a property lies in the future, its relationship with a numerical relational structure cannot be precisely specified. The reason for this is that a phenomenon lying in the future cannot be defined precisely as it does not exist. If such a relationship cannot be specified, measurement cannot take place. It is quite clear that the empirical relational structure of future events cannot be specified. It is only the expectations of future phenomena that have legitimate properties in the present that are measurable. In addition, it is not possible to specify the unit in the scale, and the conditions under which unit measurements shall be deemed to be of equal significance, as such measurements cannot be made.

5.5 The concept of time in accounting

The issue of time is of paramount importance in deciding whether or not the attributes of accounting phenomena are measurable. The classification of accounting phenomena is dependent on the concept of time. According to Gouws and van der Poll (2004), accounting phenomena are constituted by two types: namely: observed reality and simulated reality. They argue that time in accounting distinguishes between observed reality and simulated reality. The move from observed reality to simulated reality defines a change of time from the past to the present and to the future. In chapter 2 it was noted that the concept of representational measurement is applicable to phenomena that exist. It is clear then, that in accounting simulated reality is not measurable: it does not have attributes that are empirical. Only observed reality has attributes that are empirical and is therefore measurable.

The implications of the concept of time in accounting have been illustrated diagrammatically by Gouws' (2003) accounting arrow of time. Figure **5.1**, which illustrates the arrow of time**,** was adapted from Gouws (2003). From this diagram it is clear that predicted or foreseen happenings become clearer as the future approaches. This is because our knowledge and information of the past comes from the fact that the procedures we use to arrive at beliefs about the past are generally more reliable than those generating predictions of the future (Gouws and Van der poll, 2004). As the future approaches different rules of employing the mathematical model of measurement in accounting measurement will be used. The arrow of time is illustrated in Figure **5.1** below:

Figure 5.1 Accounting arrow of time (Gouws, 2003:11)

	PAST / PRESENT →	FUTURE →
	REALITY	**SIMULATED REALITY**
Created by Accounting phenomenon	• Real (pure) events • Physical happenings • Occurrences • Transactions	• Artificial (non) events • Simulated happenings • Predictions • Contingencies • Allocations • Provisions and reserves
Method	• Double entry	• Book entry through DE
Orientation	• Matter-oriented • Resource-flow oriented	• Mind-oriented • No flow
Outcome	• Certainty	• Uncertainty
Paradigm	• Accountability	• Decision Usefulness

Source: Gouws (2003)

The diagram indicates that in accounting, in the past and present, there are physical happenings, occurrences and transactions that represent reality. It is also clear from the diagram that reality can be empirically verified. The diagram also highlights that there is simulated reality in the future. The arrow of time also indicates that predictions, contingencies, allocations, provisions and reserves characterize accounting phenomena in the future, and that future phenomena are not based on reality. Consequently, future phenomena cannot be empirically verified, as they do not exist. In chapter 2 it was noted that measurement is

applicable to empirical phenomena only. Thus, accounting reality has attributes that are capable of being measured while simulated reality does not.

For measurement to occur it is necessary to have a full knowledge of the phenomenon that is being measured. Margenau (1959:165) points out that prior to measurement a precise theoretical construction of the attribute that is of use and interest to measure is necessary. That is to say, it is only the attributes of observed reality that are empirical and therefore they are measurable. With regard to simulated reality, the attributes of future events exist in the future and therefore, they cannot be measured in the present. Decoene *et al.* (1995) assert that magnitudes are historically and theoretically determined reflections of quantitative aspects of objectively existing entities and not merely the outcome of metricization or measuring procedures. This means that only existing phenomena are measurable. Orbach (1978:31) points out that expectations have legitimate properties at the present moment that are measurable. Future events have properties that lie in the future that cannot be empirically tested in the present and therefore are not measurable in the present. It is only the expectations of future events that can be measured in the present.

Decoene *et al.* (1995) emphasize that representational measurement requires the specification of an empirical relational system that can be represented by a numerical relational system. This requires an adequate understanding of the qualitative structure describing the attributes of the phenomenon to be measured. In order to form an adequate understanding of a qualitative structure, it is essential that the phenomenon being studied is empirical. But, if the phenomenon does not exist it cannot be fully understood. Caws (1959:8) notes in similar vein: “One has first a concept of some quality and looks afterward for quantitative expressions of it.” It can be inferred from this that it is necessary to have precise knowledge of the object of measurement before measurement takes place. Once this precise knowledge has been established, one searches for a numerical relational structure that can be used to represent the attributes of the phenomenon. Therefore, if under going concern the attributes of accounting

phenomena lie in the future, the empirical relational structure of these accounting phenomena cannot be specified and as a result the numerical relational system that corresponds to the empirical relational system cannot be known. For these reasons measurement cannot be said to have taken place. Therefore, representational measurement cannot take place currently under going concern.

5.6- Representational measurement and the accounting entity

In chapter 2 it was noted (Luce *et al.*, 1971) that every pair of the representation and uniqueness theorems involves a choice of a numerical relational structure. It was also argued that the choice of this structure is a matter of convention and that the conventions are strongly affected by considerations of computational convenience. It is evident from this that the choice of a numerical relational structure is arbitrary, and varies with the viewpoint of the parties doing the measuring. It also follows that the proofs of the representation and uniqueness theorems for the measurement of value in accounting are dependent on an arbitrary choice of the numerical relational structure. It can also be inferred that the choice of a numerical relational structure that can be used to represent an empirical relational structure varies across different social settings. Moreover, in chapter 4 the point was made that the construction of a scale of measurement depends on the choice of a numerical relational structure. Therefore, if the choice of a numerical relational structure is arbitrary, this implies that the construction of a scale of measurement is also arbitrary.

In the discipline of accounting the choice of the numerical relational structure is also dependent on the accounting entity. According to Staubus (1985), the accounting entity is an economic unit under one management. He also argues that the scope of the management determines the boundaries of the entity. It can be inferred from this that the nature of the economic activities occurring in a business entity are dependent on the social context of that business entity. Tinker (1985) points out that the purpose of accounting is to resolve social conflicts. It follows that the nature of accounting measurement is dependent on

the type of social conflicts to be resolved. The choice of a numerical relational structure for a pair of the representation and uniqueness theorems in the measurement of the value of economic phenomena is thus also dependent on the type of social conflicts to be resolved. It is also evident from this that the construction of a scale of measurement is dependent on the wishes of management. One can go as far as to say that different economic entities may have different scales of measuring value. If the scales of measuring value are different for different entities, then value measurements made across these different entities cannot be compared unless they are converted to a common scale of measurement.

As has been noted in section 5.2 (Wolk *et al.*, 2001), the financial statements of entities whose operations are expected to continue indefinitely should be prepared under the going concern assumption. This indicates that the measurement of the values of the elements of the financial statements for a company whose operations are expected to continue indefinitely is also done under the going concern assumption. Sterling (1968) argues that the financial statements prepared under the going concern assumption are provisional and their truth is dependent on the occurrence of subsequent events. Sterling's argument suggests that the nature of accounting phenomena in the present, under the going concern postulate, depends on the occurrence of future events. That is, the empirical properties of accounting phenomena can only be known with certainty under the going concern postulate on the occurrence of subsequent events. If this is the case, the contents of financial statements prepared under the going concern postulate do not represent economic reality but rather a simulation of economic reality. It is only a speculation of what might happen in the future. Speculations are subjective and highly dependent on the view of the speculator. Consequently, the integrity of the information will suffer.

Luce *et al.* (1971) point out that it is only empirical phenomena that are measurable. This suggests that speculations about the future are not

measurable as they are not empirical. Earlier in this section (Staubus, 1985), it was noted that the scope of the management's influence determines the boundaries of the entity. This suggests that the wishes of management determine the nature of the speculations that are made under going concern. This makes expectations about future events highly dependent on the views of management. Consequently, measurement under the going concern postulate is highly dependent on the views of management.

The specification of a homomorphism in a process of measurement is specific to an entity. Luce *et al.* (1971: 13) highlight the fact that the numerical scales of measurement are subject to arbitrary conventions. They also argue that these conventions are strongly affected by considerations of computational convenience. Thus, it can be inferred from this that the measurement choices of an accounting entity are relative to a specific entity. Mattessich (1964:79) also classifies accounting measurements as measurements by fiat. This implies that accounting measurements are relative to a specific environment and consequently they should be evaluated relative to that environment. According to Stevens (1951), measurement is an especial preoccupation of psychophysics, not only in the narrow sense of the term, but in its older and broader spirit, which attempts to reveal rules relating the responses of organisms to the energetic configurations of the environment. This indicates that the general economic environment and the specific environment of a specific business entity affect accounting measurement, and that accounting measurements are unique to a specific entity.

Given the vast differences between firms (Sterling, 1968), it is difficult to conceive of identical conditions of measurement for of them. This view is consistent with the view that representational measurement equates measurement with numerical coding. Decoene *et al.* (1995) assert that numerical coding always involves a conventional component, that is, the agreement to code certain empirical attributes with certain numbers, and certain empirical relations with certain numerical ones. The use of the term "coding" indicates that a particular group of

people could agree to measure a phenomenon in a way that is unique and understandable to them. This suggests that individuals who are not part of that group might not be familiar with the coding system used by the group. Therefore, unless there is an agreement across different accounting entities, accounting measurements can never be common across them and consequently, they cannot be among different users.

5.7-The foundations of representational measurement under the going concern assumption

The discussion in this section focuses on the importance of foundations of measurement in a process of measurement on whether accounting measurement under going concern is based on foundations that can be empirically tested. According to Luce *et al.* (1971), every process of measurement must be based on specified foundations of measurement that can be empirically tested. In chapter 1 it was pointed out (e.g., IASB, 2006; Wolk *et al.*, 2001) that accounting is a measurement discipline and that accounting measurement occurs under going concern. If accounting measurement occurs under going concern, then there must be empirically testable foundations of measurement under going concern. Luce *et al.* (1971:13) argue that in analyzing the foundations of measurement one of the main concerns is formalization. They point out that in analyzing foundations there is a need to formalize the choice of an empirical relational structure as an abstraction from the available data, the choice of an appropriate numerical relational structure, the discovery of suitable axioms and the construction of numerical homomorphisms. These recommendations are discussed as follows:

- The choice of an empirical relational structure as an abstraction from the available data-The specification of an empirical relational structure is essential because it provides the empirical identity of the properties that are subject to measurement. Its formalization ensures that the individuals in that particular community of measurement are aware of the object of measurement. Such formalization guarantees that measurements are

meaningfully compared. Measurement symbolism must be agreed upon before measurements from different frames of measurement are compared.

- The choice of an appropriate numerical relational structure- The need to formalize a numerical relational structure ensures that the nature of the representation is familiar to the users of the measurement information. Luce *et al.* (1971: 13) point out that every pair of representation and uniqueness theorems involves a conventional choice of a numerical relational structure. They argue that these choices are entirely arbitrary and depend on the considerations of computational convenience. The use of the term "arbitrary" indicates that the numerical relational structure can be chosen without the use of any set rules or plans. This indicates that unless there is an agreement in measurement symbolism between different measurement frames, measurements cannot be compared.
- The discovery of suitable axioms- Axioms are true statements about the attributes of an empirical relational structure. They specify the true statements of the characteristic that is being measured. If axioms were not specified measurement would not be possible. The formalization of axioms ensures that the individuals in the same community of measurement have identical views about the characteristics of the empirical relational structure that are being measured. It facilitates the comparability of measurements in a community of measurement.
- The construction of numerical homomorphisms- A homomorphism is a scale of measurement (Luce *et al.*, 1971). A scale specifies the relationship between the empirical relational structure and the numerical relational structure. The formalization of the construction of homomorphism ensures that an identical scale of measurement is used by a particular group of people in the same community of discussion.

In the accounting literature, there are suggestions that the properties of accounting phenomena are not empirically testable and that it is thus not

possible to establish an empirical relational structure from accounting data. Heath (1987) asserts that notions such as income and owner's equity are concepts without any reality behind them. Since measurement is only possible with empirical phenomena, this suggests that they are not measurable under any circumstances. Sterling (1968:4) also claims that,"with rare exceptions accounting numerals do not represent phenomena, any phenomena". The use of the phrase "rare exceptions" suggests that many accounting phenomena are not measurable. Willet (1987) points out that the attribute that is currently being measured in accounting is not known. This indicates a representation problem in accounting. That is to say, it is not known what accounting quantifications represent. He argues that the only thing that is measured in accounting is the numerosity of monetary units, and it is not known exactly what this numerosity represents. It is evident from this that the rare exception of measurement in accounting is the numerosity of monetary units.

Goldberg (2001) argues that economic transactions flow into a business entity during its lifetime. The concept of "flow" introduces the idea of motion into the accounting discipline. This reflects the entrenched belief in the accounting discipline that accounting events are in motion. Ijiri (1989) attempted to base the foundations of accounting measurement on the physical laws of motion. This attempt to base the foundations of accounting measurement on the structure and terminology of laws of motion in physics is open to criticism. The initial criticism comes from the viewpoint that accounting is a social science and its foundations of measurement are currently not analogous to that of a natural science. Ijiri (1989) regards accounting wealth as corresponding to the physical quantity of mass times distance. This is not compatible with the representational measurement principles of additive conjoint measurement. For instance, according to Luce *et al.* (1971:245), the concept of momentum is a composite entity that is composed of several elements. They point out that their mass and velocity affect the attribute "momentum" of a physical object. Thus momentum is not a phenomenon that has a separate existence from its mass and its velocity. Rather, momentum exists as a result of the mass and velocity of the object. That

is, there is no apparent empirical relational structure of momentum. The empirical relational structures that are apparent in momentum are those of mass and velocity. Luce *et al.* (1971) believe that for momentum to be measurable, the two components that constitute it must be independently realizable. This means that these components (mass and velocity) must be capable of being measured independently of each other. In the determination of momentum, these two components can be measured independently (see, Luce *et al.,* 1971:246). Therefore, if wealth is a composite entity that is analogous to the physical quantity of mass times distance, then its components should be specified and they should be capable of being measured independently of each other, just like mass and velocity in the determination of momentum. But since it is not known currently what wealth is in accounting (McLean, 2006; Tinker, 1985), it is currently not possible to assert that wealth is measurable.

Ijiri (1989:85) also takes income momentum (called “momentum” = growth rate of wealth per time unit) to correspond to linear momentum (mass times velocity=mass distance per time). Currently, however, the quantity income momentum cannot be known because one of its components, “wealth”, is not known. Furthermore, there are no specifications of the attributes of wealth that correspond to mass and the attributes that correspond to distance when the analogy of wealth to mass times distance is made. The mass of an object remains constant while distance changes with motion. Therefore, what is constant in wealth and income is not specified in any way. From the discussion above, it seems that the mathematical principles of natural philosophy are not relevant to accounting measurement. It is also important to note that the concept of momentum is only applicable to a phenomenon that exists: only a phenomenon that exists can possess mass and velocity. Income is a non-existent phenomenon and cannot therefore possess momentum. For example, Stamp (1981) points out that, income is an ambiguous concept that is not an intrinsic property of an accounting entity. There is no agreement among researchers in the field of accounting on the meaning or relevance of income. The IASB (2006, Para 70) framework for financial reporting defines income as

follows: “Income is increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in increases in equity, other than those relating to contributions from equity participants.” If income is an enhancement of assets and the benefits from assets are enjoyed in the future, it means that the benefits of income also exist in the future and do not exist in the present (IASB, 2006). It follows that it is not possible to have an income momentum in the present. In addition, the concept of income cannot be precisely defined (Tinker, 1985; Stamp, 1981), but the particles in physics have a precise definition. This means that no meaningful analogy can be made between accounting phenomena and physical phenomena.

Gouws and Rehwinkel (2004:82) also assert that no meaningful analogy can be made between natural and man-made phenomena when they state:

> The accounting product is a human artifact and not a natural phenomenon, which has more bearing on the classical sciences. Its product is art (hence the definition), a perception of reality.

This extract points out that accounting values cannot be inferred through natural laws: accounting values are not natural phenomena. It is clear that the properties of accounting values cannot be compared to the properties of natural phenomena. Accounting values cannot be measured using the same principles that are used to measure natural phenomena. Waldrop (1992:39) supports this view:

> Classical science focuses on explanation and on laying bare the fundamental mechanics of nature. That is what biologists, geologists and astronomers do in their fields.

This points to the fact that natural phenomena can be inferred through natural laws, and that natural phenomena have characteristics that are different from artificial phenomena. It is thus clear that no sensible analogy can be made between natural and artificial phenomena. Consequently, there can be no analogy between accounting and classical sciences.

The discussion in this section presents the apparent lack of accounting measurement foundations. It seems that the accounting discipline is not clear on exactly what is measured in accounting. It is therefore not possible to classify accounting as a measurement discipline until such time that there is clarity on what is measurable and what is not in accounting.

5.8 -Summary and Conclusions

Literature in the discipline of accounting currently outlines that the going concern assumption is necessary for the preparation of the financial statements of an entity that is expected to continue in operation for the foreseeable future. Accounting literature also indicates that it is possible to measure the attributes of accounting phenomena under the going concern assumption. However, it has been argued in this chapter that this is in fact not possible. A summary of some of the main points is given below:

- Under the going concern principle, business activities are assumed to flow non-stop through a business entity until the point of liquidation.
- Income is considered to be an ambiguous concept that is not an intrinsic property of an accounting entity. As a result, there is no agreement among accountants about the meaning or relevance of income.
- The going concern concept assumes profitability. It has been argued that nobody would expect a firm that is continuously making losses to continue into the foreseeable future. The going concern assumption is only possible if one assumes that the status quo of business activities will be maintained in the future. The phraseology of the going concern concept implies stability of the firm and the economy. However, the fact that accounting phenomena have always happened in a certain way does not logically lead to the conclusion that this will be the case tomorrow. The problem with the going concern principle is that of generalizing from a limited number of observations. There are many unknown variables in the

future and as a result it is difficult to conceive that the business will continue in the future in the manner that is expected of it in the present.

- Assuming a going concern automatically implies the existence of a liquidating entity. Therefore, the intuitive beliefs that stem from the economic environment suggest the existence of a business world consisting of specific entities.
- The concept of measurement is only applicable to empirical phenomena.

The discussion in this chapter has highlighted the fact that many accounting variables are not directly observable as they lie in the future. Some authors have attempted to base the foundations of accounting measurement on the foundations of physics, but without success. Accounting is a social science and currently its foundations cannot be analogous to those of a natural science. As a result, it is necessary to develop foundations for accounting measurement that are based on its status as a social science.

Chapter 6- Measuring the values of accounting phenomena: An empirical challenge

6.1 Introduction

The area of accounting that deals with the determination of the values of elements of financial statements requires conceptual clarification. The difficulty lies in the general reference by the literature accounting to the measurement of value. The IASB framework for financial reporting (2006: Para 83) states that, "An item that meets the definition of an element should be recognized if the item has a cost or value that can be measured with reliability." This suggests that value is measurable. It is also clear from this that a theory of value measurement exists in accounting. It can also be inferred that financial statements contain measurement information about the values of the elements of financial statements.

Contrary to this belief, however, is the fact that there is no evidence in the accounting literature to suggest that value can be measured. Instead, a critical analysis of accounting literature indicates that the values of the elements of financial statements are not measurable. In particular, there is consensus in the literature (e.g.Gilman, 1939; Ijiri, 1975, 1967; Littleton, 1953; Paton and Littleton, 1940; Staubus, 2004; Sterling, 1966; Willet, 1987) that accounting researchers have not succeeded in creating a theory of accounting measurement from the observation of accounting practices of value measurement. Nor have accounting researchers currently succeeded in moulding accounting practices into a theory of accounting measurement.

According to authors such as Ryan *et al.* (2002) and Luce *et al.* (1971), every process of measurement must have an underlying theory of measurement. If this is the case, the lack of success by accounting researchers in creating a theory of accounting measurement suggests that accounting value is not currently being measured in the discipline. Authors such as Willet (1987) and Orbach (1978) point out that it is the amount of monetary units that are being measured in the

accounting discipline. This indicates that there is a theory of measuring monetary units but no theory for measuring value in accounting. On the other hand, authors such as Abdel-Magid (1979), Mattessich (1964) and Wolk *et al.* (2002) believe that monetary units are a measure of value in the financial statements. It is evident from this that there is a theory of value measurement in accounting that is based on the numerosity of monetary units. This creates confusion about whether or not the value of an element of the financial statement is currently measurable in the accounting discipline.

Value is outlined in the accounting literature (IASB, 2006; Wolk *et al.*, 2001) as the object of measurement in accounting. This means that a theory of accounting measurement depends on the ability of the accountants to measure value. The purpose of this chapter is to investigate whether accounting value is currently being measured in the discipline by comparing accounting principles of value measurement to the principles of the representational theory of measurement.

This chapter commences in section 6.2 with a brief discussion of the representational measurement implications of the concept of value. The credibility of monetary units as measures of value is discussed in section 6.3. This is followed in section 6.4 by a discussion that contrasts measurement to value indicators to highlight whether accounting practices of value measurement are measurements or indicants of value. The chapter goes on to determine in section 6.5 whether the bases of accounting measurement are in harmony with the principles of the representational theory of measurement. In the subsections of section 6.5 the credibility of the individual accounting bases of measurement and the principles of representational measurement is discussed. The measurability of the dimensions and qualities of the elements of financial statements is discussed in section 6.6. The subsections of section 6.6 cover the measurability of dimensions and qualities of the individual elements of the financial statements. Finally, conclusions close the chapter in section 6.7.

6.2 Applying the representational theory of measurement to the concept of value: The ambiguous nature of value

Value is currently described as the amount of money that something is worth (Hawker, 2003:678). In other words, the value in a commodity is the amount of monetary units that is paid to acquire a commodity. The measurement of value is currently fundamental to the preparation of financial statements in accounting. The basis of accounting measurement is based on the premise that value can be determined and measured objectively. This belief is reflected in current accounting literature. IASB (2006) points out that an item that meets the definition of an element should be recognized in the financial statements if it is probable that any future economic benefits associated with this item will flow to or from the entity, and if the item has a cost or value that can be measured with reliability. Abdel-Magid (1979) and Mattessich (1964) also point out that the value of a commodity is measured by the amount of monetary units paid to acquire it. This suggests that monetary units are a true representation of the scaled value of the value of a commodity. It would be expected that the accounting practices of value measurement would comply with the principles of the representational theory of measurement.

However, the nature of value is such that it cannot be measured objectively by the amount of monetary units paid to acquire a commodity. Authors such as Stamp (1981) and McLean and Ryan *et al.* (2002) contend that value is a subjective concept. This means that value cannot be objectively determined. Authors such as Dobbs (1937) and Tinker (1985) also note that the concept of value lacks invariance and that all theories of value do not facilitate the comparability of different value measures. They argue that a theory of value must provide a single metric that allows comparisons to be made. This means that currently there is no theory of value that facilitates the comparability of different measurements. It follows that current theories of value give rise to numerous metrics for value measurement. Similarly, Ryan *et al.* (2002) note that there is no general agreement relating the amount of monetary units paid to acquire a commodity and

the amount of value in a commodity. It would seem that the relationship between monetary units and value cannot be empirically verified. If this is the case, it is clear that it is not possible to verify independently the amount of value that is represented by a particular quantity of monetary units. Consequently, the concept of value cannot be empirically identified nor can the axioms stated in terms of the concept of value be empirically tested. This indicates that the qualitative structure of value and its properties are not invariant. Indeed, it is clear that the qualitative structure of value varies with the agreement of the parties to the transactions.

This lack of invariance of the value of an accounting phenomenon is also reflected at an auction. For instance, different amounts of monetary units can be offered for a commodity. This reflects the fact that different individuals have different perceptions of value. As a result, it is difficult to determine whether the different amounts of monetary units offered for a commodity reflect the idea that different individuals see different amounts of value in a commodity, or that different amounts of monetary units are paid for the same amount of value. There is a serious difficulty in attempting to measure value in order to establish a scale which relates certain amounts of value to a particular quantity of monetary units. The amount of value in a commodity exists in the mind of the parties to the transaction and it changes with the opinion of those parties, and therefore value is not invariant.

Invariance is a concept that is fundamental to the establishment of the representation, uniqueness and the meaningfulness principles of modern measurement theory (Luce *et al.*, 1990). The representation principle is satisfied in a process of accounting measurement if it can be empirically verified that a particular numerical relational structure represents a specific empirical relational structure. But in the accounting discipline the relationship between monetary units and value is not known. It is clear, then, that it is currently not possible empirically to verify that monetary units represent the value of a commodity. The uniqueness principle is satisfied in a process of measurement once the unit in the scale of measurement is specified. However, in the accounting discipline the scale of

measuring value is not specified. This suggests that monetary units assigned to represent the value of a commodity are not unique. In chapter 2 it was noted that measurements are meaningful once a scale of measurement is specified. It follows then that the concept of meaningfulness is satisfied in a process of accounting measurement if the scale of measurement is specified. But it has also been noted in chapter 4 that in the accounting discipline there are no specified scales for measuring value. Monetary units can therefore not be meaningful measures of value. If invariance is absent in the concept of value it means that value is not measurable.

Wittmann (1956) also questions the claim by the accounting discipline that monetary units are a measure of the value of a commodity. He argues that value cannot be determined independently except through recourse to a phenomenon (price paid) that it ought to explain. It is evident from this that the process of value measurement is reversed: Instead of being able to determine price by way of value, the magnitude of the value has to be deduced from the price. There is definitely a need for a scale of value from which units of value can be matched against the amount of monetary units that ought to be paid for them. The process of measurement is possible only in the presence of a scale of measurement. Therefore, the amount of monetary units cannot be a measure of the value of a commodity unless an accounting scale of value is specified.

A review of the work of Debreu (1959) and Arrow and Debreu (1954) demonstrates the lack of attention given to the relationship between the amount of monetary units paid to acquire a commodity and the amount of value in a commodity. In both these studies the amount of monetary units paid to acquire a commodity is considered to be a measure of its value. No discussion is provided of the association between the value of a commodity and its price, apart from the revelation that a price is paid in order to acquire a commodity at market equilibrium in a perfectly competitive market. There is no specification of exactly what the price represents. In addition, there is no specification of the measurement axioms that describe how value is represented by the amount of

monetary units paid for the commodity, so that they can be empirically tested. Furthermore, value should not be induced from the amount of monetary units paid for the commodity, but the amount of monetary units to be paid should be induced from the amount of value in a commodity. This is because the principles of the representational theory of measurement require the specification of the attribute that is of use and interest to measure, before any measurement can take place (Luce and Narens, 1994). Therefore, the point of view in the accounting discipline of "measuring" first, before the specification of the attribute to be measured, is certainly not consistent with the principles of the representational theory of measurement.

Tinker (1985) notes that value is one of the most frequently used terms in accounting vocabulary. He claims that the concept of value is not adequately defined in accounting and few accountants understand the meaning of value. Accountants do not know the precise meaning and definition of value. In chapter 2 it was noted that the object of measurement must be known precisely before measurement can take place. Unless accountants know the meaning of value precisely, it will not be possible for them to measure value.

Discussions about value in the accounting literature also reflect that value is subjective. Sabine (1987) claims that the concept of value is like beauty: he argues that value is in the eye of the beholder. Similarly, Smith (1956) argues that the value of a dollar bill is not an absolute quantity but depends more on the circumstance in which it is exchanged. It can be inferred from this that if value is like beauty, the concept of value lacks a precise definition as it exists in the perception of an individual. Bohm (1983) contends that what is thought about has an existence that is independent of the process of thought. He argues that while an individual can create and sustain an idea as a mental image by thinking about something, the individual does not create and sustain a real thing in this way. ideas created in the mind of an individual do not represent reality. It follows that it is not possible to create a reality from thinking about the concept of value. That is to say, value does not come into being by thinking about it. Consequently, it can

be inferred that value is not real but a creation of the mind. Value cannot therefore be given an empirical identification.

Decoene *et al.* (1995) point out that one of the defining features of the representational theory of measurement is the belief that questions of measurement must be grounded in how reality is structured. This suggests that the empirical relational structure of a phenomenon must be known before it is measured. If this is the case, the principles of representational measurement cannot be applied to the measurement of accounting value, as it is not real. Value cannot be given an empirical identity and so it is not measurable. Therefore, it can be concluded that monetary units cannot be a measure of value.

6.3-The credibility of monetary units as measures of value

It is believed by accountants that exchange value is measured in an exchange transaction by the monetary numerosity at the time of exchange. Abdel-Magid (1979:355) puts it as follows:

> The property subject to measurement in an exchange transaction is exchange value, which is measured by the monetary numerosity at the time of exchange. At the time of exchange, the equality of ratios can be verified by an empirical operation.

This points out that the amount of monetary units paid to acquire a commodity is considered to be a measure of the commodity's value. This means that monetary units represent the properties of value. It should be noted that the numerosity of monetary units is based on the system of counting, which is based on extensive measurement (see, Luce *et al.,* 1971). Therefore, the extract is suggesting that exchange value can be measured through extensive measurement. At the time of exchange the equality of rations can be verified. Ratio scales preserve relative ratios (Stevens, 1951). This also suggests that value is measured on the ratio scale by the numerosity of monetary units. It is clear that accounting literature views value as a phenomenon that is measurable on an extensive scale.

However, this thinking is flawed by the fact that the amount of currency in an exchange transaction measures the numerosity of monetary units and not value. It is true that value is believed to be an important variable influencing the amount of currency that can be paid for a commodity, but it is incorrect to say that the amount of currency paid for a commodity is a measure of value. The problem with the use of currency as a measure of exchange value is that exchange value is ambiguous and not an intrinsic property of an accounting entity (Stamp, 1981). The concept of measurement is applicable to phenomena that can be empirically verified. Phenomena that cannot be empirically verified cannot be measured, because it is not possible to specify a scale of measurement for phenomena that are not empirical. Without a scale of measurement there can be no agreement among the users of the measurement information on how a numerical relational structure relates to an empirical structure. As a result, there can be no general agreement among accountants on the relationship between monetary units and value. It follows that attempts to assign scale values of monetary units to the value of a commodity create a representation problem. This gives rise to numerous indices of the exchange value of the same commodity. The problem with these indices is that they are not monotonically related.

The concept of monotonicity is fundamental to extensive measurement. Luce *et al.* (1971) point out that the existence of the monotonicity or the homogeneity axiom is a necessary condition for extensive measurement. No extensive measurement can occur in the absence of the monotonicity condition. From Luce's (1996) perspective, homogeneity is the view that particular elements of a specified set cannot be distinguished structurally from one another. If this is the case, it follows that the perspective that value is a subjective property suggests that indicators of value from different individuals are structurally different from each other. Therefore, it can be concluded that statements involving the measurement representations of value are subjective because they depend on the opinion of the measurer.

It should also be noted that the ratio scale character of the monetary unit measurement is based on the numerical representation of monetary unit intervals so that the value associated with the concatenation of adjacent intervals is the sum of values associated with those intervals. However, this does not mean that the number of monetary units as a measure of accounting value is also a ratio scale. The subdivision of the amount of currency paid for a commodity into small intervals defined by the monetary unit has, as far as is known, nothing empirically to do with exchange value. Ryan *et al.* (2002) point out that the pound sterling or the dollar has a standard scalar but there is no agreement relating them to a concept of value. This means that, currently, value is not known in accounting. Therefore, the intuition that exchange value can be represented numerically is pre-theoretical. There is a ratio scale for the measurement of the amount of monetary units, but there is no independent theory for the measurement of value, except for the pre-theoretic conjecture that exchange value is a monotonic function of the amount of monetary units. Therefore, it can be concluded that it is necessary to have a theory of value measurement first, before monetary units can be regarded as a measure of value.

6.4- Measurements versus indicants

The debate in section 6.3 suggests that physical measurements are used in the accounting discipline in a way that does not engage the full measurement structures that underlie them. In this case, monetary units are thought to be an order-preserving index of a hypothetical underlying quantity (value), which itself has not received full measurement analysis. Such indices are not measurements. They fall under the category of indicants. Indicants are effects or correlates related to psychological dimensions by unknown laws (Stevens, 1951). These indicants are commonly confused with measures in accounting. Abdel-Magid (1979) confuses an indicant with a measure when he argues that the property subject to measurement in an exchange transaction is exchange value, which is measured by the monetary numerosity at the time of exchange. In this case, the relationship between value and the number of monetary units paid for the value is

not known. Value is a hypothetical quantity that has not received full measurement analysis. An agreement among participants in a process of measurement about the relationship between an empirical relational structure and the numerical relational structure used to represent it implies the presence of a scale of measurement. According to Willet (1987), there is no agreement relating monetary units to value. This suggests that there is no scale of measurement in accounting that relates monetary units to value. Furthermore, in section 6.2 it was mentioned that value is subjective. It is clear that value is a hypothetical quantity whose empirical structure is not yet fully understood. As a result, there is no general agreement among accountants on the relationship between monetary units and value. It can thus be concluded that value is currently related to the quantity of monetary units by unknown psychological laws.

Measurement only occurs when the relationship between the indicant and the dimensions of the entity in question are known (Stevens, 1951). Stevens also argues that the difference between an indicant and a measure is that the former is a presumed effect or correlate that bears an unknown (but usually monotonic) relation to some underlying phenomenon, whereas the latter is a scaled value of the phenomenon itself. This indicates that measurements are verifiable while indicants are not. In addition, measurement magnitudes are historically and theoretically determined reflections of quantitative aspects of objectively existing entities and not merely the outcome of metricization or measuring procedures (Decoene *et al*., 1995). It is clear then that a measure of a phenomenon emerges from an explicit theory into which that phenomenon is incorporated. All indicants are thus pre-theoretical.

Since Staubus (1985) points out that researchers in accounting have not succeeded in developing a comprehensive and coherent theory for the measurement of value, it can be inferred from the above discussion that so-called accounting measurements are not measurements at all but indicants. It should be noted that there is nothing incorrect in the use of indicants in a discipline. Luce *et al.* (1990) point out that the use of indicants for pre-theoretical variables may be a

useful initial step towards such a theory but should not be confused with the measurement of the variable. The use of indices may eventuate in the dissolution of the hypothetical variable into many related concepts as the theory about its measurement develops. The confusion that is currently prevalent in the discipline accounting arises from the fact that the amount of monetary units that is paid for the value of a commodity is considered to be a measure of the value of that commodity, but is instead merely an indicant. It is recommended that the accounting discipline should drop the claim (e.g., Abdel-Magid, 1979; IASB 2006) that it is capable of measuring value until such time that a theory of value measurement has been developed in the field.

6.5 The bases of accounting measurement

6.5.1 Elements, attributes and the bases of accounting measurement

Every measurement discipline requires the precise specification of the object of measurement. Narens (2002) supports this when he says that it is essential to specify the qualitative structure of the object of measurement before measurement can take place. It is clear from this that one must have precise knowledge of the object of measurement. Furthermore, Luce and Narens (1994) point out that measurement refers to the measurement of the attributes of objects and not the objects themselves. But it seems there is confusion in the accounting discipline as to whether it is the objects themselves or the attributes of these objects that are being measured. In outlining the principles of accounting measurement the IASB's (2006, Para 99) framework for financial reporting states:

> Measurement is the process of determining the monetary amounts at which the elements of the financial statements are to be recognized and carried in the income statement and balance sheet. This involves the selection of the particular basis of measurement.

This underlines the fact that the properties of monetary units are used to represent the elements of the financial statements. It is evident that the extract above does not specify the attributes of the elements of financial statements that are represented by the monetary amounts. In this case, it can be argued that the elements are considered to be attributes that are the subject of measurement. It follows that what needs to be specified are the objects whose attributes are the elements of the financial statements. The 1ASB's (2006:Para 83) framework for financial reporting also outlines that an item that meets the definition of an element of the financial statement should be recognized if the item has a cost or value that can be measured with reliability. The value or the cost of an element is the attribute that is the subject of measurement in accounting and not the element itself. This creates confusion as to the exact identity of what is being measured in accounting. It is not clear whether cost or value can be equated with an element of financial statements or whether it could be that cost or value are attributes of the elements of financial statements.

The extract above also points out that the assignment of monetary units to accounting phenomena is guided by the selection and use of a particular basis of accounting measurement. A basis is defined as "a foundation or a support" (Hawker, 2003:48). If there are bases of accounting measurement then there are foundations of accounting measurement. However, accounting research (e.g., Chambers, 1997; Orbach, 1978; Staubus, 2004) indicates that there are no foundations of accounting measurement. This casts doubt on the existence of bases of measurement in accounting. Therefore, given the confusion about whether or not bases of measurement exist in accounting, it follows that it is necessary to determine whether such bases are compatible with the principles of the representational theory of measurement.

6.5.2-The historical cost basis of accounting measurement

The IASB's (2006) framework for financial reporting considers the historical cost concept as one of its bases of accounting measurement. It was noted in section 6.5.1 that measurement in accounting is the process of assigning monetary units to the elements of financial statements. According to the IASB (2006:Para 100) framework for financial reporting, historical cost is a basis of accounting measurement that prescribes that assets should be recorded at cash paid at date of acquisition and liabilities at the amount of proceeds received in exchange for the obligation or the amount of cash expected to be paid to satisfy the liability. This perspective holds that the monetary units paid to acquire an asset are a measure of the value of an asset. It is also clear from this that the amount of proceeds received in exchange for an obligation or the amount of cash expected to be paid to satisfy the obligation is also considered to be a measure of the value of a liability. It is evident from this that under the historical cost basis, monetary units paid to acquire an asset are considered to be a measure of the value of that asset and the amount of monetary units received in exchange for an obligation is considered to be a measure of the value of a liability. If this is true, historical costs would be expected to be compatible with the principles of representational measurement.

In chapter 2 it was noted (Luce *et al.*, 1971) that a basis of measurement should specify the domain of the measurement function, the measurement function and the value of the measurement function. Therefore, if the historical cost basis of accounting measurement is the basis for this assignment of monetary units to the value of assets and liabilities, it can be inferred that the historical cost basis should specify these characteristics. The characteristics are discussed in relation to historical cost as follows:

- **The domain of the measurement function**- In every process of measurement the domain of the measurement function must be specified. According to Luce *et al.* (1971), measurement cannot take place unless the domain of the measurement function is known with certainty. If the object of

measurement is known with certainty, the domain of a measurement function is known. Narens (2002) points out that the domain of a measurement function is known if the qualitative structure of the phenomenon to be measured and all its attributes are known. This implies that if the historical cost concept is a basis of measurement, it must have a specified domain of a historical cost measurement function. However, accounting research has indicated that there is no specified attribute that is of use and interest to measure under the historical cost basis of measurement. Willet (1987) asserts that it is not known what the monetary amounts in the financial statements represent. This indicates that the object of measurement in accounting is not known. Orbach (1978) argues that measurement theory requires the specification of at least one empirical attribute that induces a non-metrical order on the assets or liabilities such that the order is preserved by the historical cost function. He notes that no such specification is made by historical cost. It is therefore clear that the historical cost basis of accounting measurement falls short of the requirements of representational measurement.

- **The measurement function**- In every process of measurement it is necessary to specify the measurement function. A measurement function is a scale of measurement (Narens, 2002). It specifies how an empirical relational structure is mapped onto a numerical relational structure. Luce *et al.* (1971) point out that every process of measurement must have a scale measurement. A scale of measurement specifies the relationship between the numerical relational structure and the empirical relational structure. If this relationship is not known, measurement cannot take place. Authors such as Ryan *et al.* (2002:118), Chambers (1997) and Willet (1987), note that the relationship between monetary units and the value of an element of the financial statement is not known. The absence of a specified scale between monetary units and value indicates that the measurement function

is not specified in accounting. It is evident from this that the historical cost concept is not a basis of measurement.

- **The value of a measurement function**- The value of a measurement function indicates the type of representation of the empirical relational structure. Luce *et al.* (1990:267) believe that a measurement is unique once the unit of measurement has been specified. The value of the measurement function indicates the units of measurement. These units of measurement make a particular measurement representation meaningful. For example, the height of a person is meaningless unless a particular representation is specified, e.g., centimetres or metres. In the accounting discipline the abstract structure onto which the value of an element of the financial statements is mapped is monetary units. This indicates that statements about the measurement representations of the value of an element of the financial statement are meaningless unless the units of measuring value are specified. Authors such as Willet (1987), Chambers (1997) and Ryan *et al.* (2002) have noted that there are no units of value measurement. It is therefore clear that the historical cost basis does not specify the units of measuring value in accounting.

The discussion above indicates that the historical cost concept has not specified the domain of the measurement function, the measurement function nor the value of the measurement function. Narens (1985) believes that representational measurement consists in specifying homomorphisms of some qualitative (or empirical) structure into a numerical one. This viewpoint highlights the point that the specification of homomorphisms is a necessary condition for measurement. In chapter 2 it was noted (Bhattacharya, Jain and Nagpaul, 1986) that a homomorphism is a mapping between two algebraic structures in such a way that the result obtained by applying the operations to the elements of the first set is mapped onto the result obtained by applying the corresponding operations to their respective images in the second. For a homomorphism to be specified, the

domain of the measurement function and the abstract structure onto which the domain can be mapped must be known. The attribute that is being measured should be specified in order to verify whether the measurement process has appropriately mapped the structure of the attribute. One can see that a lack of specified attributes of measurement in accounting makes it impossible to know whether the mapping preserves the structure of the attribute that is measured.

Representational measurement theory also requires that the object of measurement should be given an empirical identity (Luce and Narens, 1994). This means that if the attributes that are useful to measure are not specified, they cannot be empirically identified. Furthermore, it will also be impossible to formulate measurement axioms that are useful in accounting measurement. Measurement axioms can only be formulated if the domain of the measurement function is known. In the case of historical cost, the domain of the measurement function is unknown. It can therefore be concluded that a lack of a specified attribute of measurement in accounting (e.g., Chambers, 1997; Ryan *et al.,* 2002; Staubus, 2004) means that it is not possible to verify the existence of homomorphisms in accounting measurement that map the value of an element of financial statements onto the monetary units.

It should be pointed out that the historical cost basis of accounting measurement does not recognize the difference between the domain of the measurement function and the measurement function itself. The recording of assets at cash paid at date of acquisition indicated above in this section (IASB, 2006) makes historical cost the value of a measurement function. But there is no specified measurement function in the accounting literature that has historical cost as its value. Jones and Walker (2003) assert that historical cost is an attribute of an asset or a liability. This assertion makes historical cost the domain of the measurement function. This indicates that the accounting discipline is not sure of the identity of historical cost. This highlights the problem of representation in accounting. According to Luce and Suppes (2001), representational measurement takes place if and only if the representation and uniqueness theorems can be proved. If these theorems

cannot be proved under the historical cost basis, it is not possible for historical cost to be a basis of measurement.

6.5.3 The current cost basis of accounting measurement

The formulation of the current cost concept under the IASB's (2006) framework for financial reporting has little regard for the principles of the representational theory of measurement. Current cost is one of the bases of accounting measurement (IASB, 2006). Specified foundations of measurement under the current cost basis of measurement would therefore be expected to be in place.

According to the IASB (2006), current cost represents the amount of cash or other considerations that would be required to obtain the same asset or its equivalent. Current cost thus refers to the amount of monetary units that are assigned to the value of an asset. One would expect there to be a well-defined procedure for assigning monetary units to the value of an asset. Without such a procedure that establishes the equivalence between monetary units and the value of an asset, any such assignment would be arbitrary. The perspective that, under the current cost basis of measurement, assets are recorded at the amount of cash that would have to be paid to acquire the same or equivalent asset (IASB, 2006) reflects that current costs are the value of the measurement function that maps the value of an asset onto the monetary system. The problem with this is that there is no specification of the measurement function that maps the value of an asset onto the monetary system. Ryan *et al.* (2002:118) point out that there is no agreement that relates monetary units to the value of an accounting phenomenon. This indicates that in the accounting discipline there is no agreement on the measurement function that maps value onto the monetary system. It can therefore be concluded that current cost is not a basis of measurement.

Other authors have also noted that current costs are not measures of anything. Willet (1987) notes that there is no property that is measured by the financial statements apart from the numerosity of monetary units, and that it is not known exactly what the numerosity of monetary units represents in accounting. This

highlights the problem of representation in accounting. According to Orbach (1978), measurement theory requires that at least one empirical attribute that induces a non-metrical order on the assets or liabilities such that the order is preserved by the current cost function be specified, whereas no such specification is made by current cost. As in the case of the historical cost basis, the current cost basis presents a representation problem.

Furthermore, the current cost basis of accounting measurement is a measurement basis for an attribute that does not exist. IASB (2006) points out that an item that meets the definition of an element should be recognized in the financial statements if it has a cost or value that can be measured with reliability. This indicates that the attributes that are of use and interest to measure in accounting are cost or value. An individual has a choice of whether to measure: cost or value. It is evident from this that if cost and value were different the accounting literature (IASB, 2006) would not have given such a choice as the measurement of cost would have reflected completely different properties from those of value measurement. If they were different the accounting literature would have specified the conditions under which either cost or value could be measured. Currently, there is no such specification in the accounting literature. It can therefore be inferred that cost and value have identical properties. According to Luce *et al.* (1990), the attribute that is the subject of measurement should be empirically testable. Therefore, if cost and value are the subject of measurement in accounting, they should also be empirically testable. However, authors such as McLean (2006), Tinker (1985) and Willet (1987) have pointed out that value and cost are subjective concepts that cannot be empirically tested. This implies that value and cost do not have an existence that can be empirically tested. Since measurement theory requires that the attribute that is being measured should be given an empirical identity (Luce and Narens, 1994), it can be concluded that current costs are not a measure of value in accounting.

6.5.4-The net realizable value basis of accounting measurement

The concept of a net realizable value basis of accounting measurement hinges on the premise that a market can be obtained for an asset or a liability. In this case the market value is taken to be the measure of the value of an asset or a liability. IASB (2006: Para 100) describes net realizable value as the amount of cash or cash equivalent that would be obtained by selling the asset currently, or that would currently be paid to redeem the liability. The act of measurement (see Abdel-Magid, 1979; Wolk *et al.* 2001), occurs at the time of establishing the amount of monetary units that would be obtained if the assets were to be sold currently or paid if the liability were to be redeemed. However, the amount of cash or cash equivalent that would be obtained by selling the asset currently or that would be paid to redeem the liability currently cannot be considered to be a measure of the value of an asset or a liability. It is not known exactly what the numerosity of monetary units represents in accounting (Willet, 1987). This indicates that the object of measurement is not known: so it is also not known exactly what the numerosity of monetary units represent under the net realizable value basis of accounting.

The viewpoint that it is not known exactly what the amount of monetary units represents implies that there is no specification of the qualitative structure and the attributes of the value of an asset or a liability. Narens (2002) adds that an empirical relational structure and its attributes must be specified for measurement to occur. Therefore, the lack of a specified qualitative structure of value implies that it is not known how monetary units represent value under the net realizable value basis of accounting. Thus, the net realizable value cannot be a basis of accounting measurement.

6.5.5-The present value basis of accounting measurement

The present value concept is also outlined in the accounting literature as one of the bases of accounting measurement. The IASB (2006: Para 100) framework for financial reporting points out that under the present value basis of measurement,

assets are recorded at the present discounted value of the future net cash inflows that the items are expected to generate in the normal course of business. The IASB (2006: Para 100) framework also points out that liabilities are carried at the present discounted value of the future net cash outflows that are expected to be required to settle the liabilities in the normal course of business. It is clear from these points that the expectations of future cash flows are assigned to the attributes of assets and liabilities. According to Orbach (1978:31), expectations have legitimate properties at the present moment which can be measured; they have empirical properties that are testable in the present. This gives the impression that present values are bases of measurement.

However, present values cannot be measures of the attributes of accounting phenomena. For instance, as has been outlined earlier (McLean, 2006), value is a subjective concept that cannot be empirically tested. This implies that value is not measurable. From Luce and Narens' (1994) point of view the representational theory of measurement requires that the attribute that is of use and interest to be measured should be given an empirical identification and the measurement axioms stated in terms of the attribute should be empirically testable. Since value does not have empirical properties that are currently known, it follows that value is not measurable under the representational theory of measurement.

Furthermore, Luce *et al.* (1971) assert that the empirical relational structure and its empirical properties should be treated as invariant. They point out that a set of axioms leading to the representation and uniqueness theorems may be regarded as a set of qualitative empirical laws. If value is an ambiguous concept that is not an intrinsic property of an accounting entity, it cannot be given an empirical identity or be empirically testable. It also follows that statements about the determination of value cannot be considered to be qualitative empirical laws. It can be further inferred from this that if the present value is not empirical its existence cannot be proved. This presents a representation problem. According to Luce and Narens (1994), representational measurement takes place if and only if the representation and uniqueness theorems can be proved. It is not known

exactly what the expectations of future cash flows represent. It should be noted that expectations of future cash flows are genuine measures of the expected inflow of future monetary units, but they are not measures of value. Therefore, from this discussion it can be concluded that the present value basis of accounting measurement is not consistent with the principles of the representational theory of measurement.

6.5.6-The fair value basis of accounting measurement

The fair value concept is currently considered to be one of the bases of measurement in accounting. Fair value is defined as the amount for which an asset could be exchanged in an arms-length transaction (Kirk, 2005:330). In this case, the amount of monetary units paid to acquire a commodity is considered to be a measure of the value of a commodity. However, it should be pointed out that it is only the amount of monetary units that are measured under the fair value, not the value itself. Ryan *et al.* (2002:18) point out that there is no agreement relating the amount of monetary units paid to acquire a commodity and value. This indicates that different amounts of monetary units can be used to represent the same amount of value. It is thus impossible to specify homomorphisms that preserve the empirical relational structure of value on an abstract structure of monetary units.

Added to this, there is no scale of value that relates the amount of monetary units paid to a particular quantity of value. But the principles of measurement require the specification of a scale of measurement (Narens, 2002). The scale of measurement relates the units of value to the monetary units. In the absence of a scale it is not possible to know the extent to which a particular commodity possesses the characteristic of value. It follows that fair value falls short of adherence to the principles of the representational theory of measurement.

6.6-The elements of financial statements

Financial statements are frequently described as portraying measurement information about the financial position, performance and changes in the financial position of an entity. According to the IASB (2006) conceptual framework for financial reporting, financial statements portray the financial effects of transactions and other events by grouping them into broad classes according to their economic classes. Measurement in accounting hinges on the measurement of characteristics of elements of these different economic classes of transactions and events. The elements of financial statements have been outlined by the IASB's (2006) conceptual framework for financial reporting as assets, liabilities, equity, income and expenses.

Research in accounting (e.g., Chambers, 1997; Ijiri, 1975; Ryan *et al*., 2002; Staubus, 1985; Staubus, 2004) indicates that the attributes that are of use and interest to measure in the accounting discipline are not clearly stated in the accounting literature. The measurable dimensions and qualities of the different economic classes of the elements of financial statements are not known. This casts doubt on the belief that the elements of financial statements have measurable attributes. Furthermore, there is consensus (e.g. Ijiri, 1975,1967; Gilman, 1939; Littleton, 1953; Paton and Littleton, 1940; Staubus, 1985; Sterling, 1966) that the accounting discipline has not succeeded in creating a theory of accounting measurement from the observation of practices of measurement in accounting. This suggests that accounting is a measurement discipline that does not have a theory of measurement. However, every process of measurement must have such a theory (Ryan *et al.*, 2002). It is clear then that it is doubtful whether, currently, the elements of financial statements have measurable attributes. The lack of success of accounting researchers in creating a theory of accounting measurement suggests that the dimensions and qualities of the elements of financial statements might not be consistent with the principles of representational measurement.

6.6.1 The dimensions and qualities of assets

The dimensions and qualities of an asset can be inferred from its existing definition. The existing IASB (2006, Para 49) framework's definition of an asset is as follows:

> An asset is a resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity.

This definition indicates that an asset is a resource that is controlled by an entity in the present. The resource and the right to control it exist on the date of the financial statement. From the representational measurement perspective (Luce et al., 1971) the attributes of the resource and the right to control it exist currently and therefore they are measurable. In measuring these attributes, they must be identified and an empirical identity assigned to them. Currently, accounting research (e.g., Chambers, 1997; Staubus, 2004; Vollmer, 2006) indicates that such attributes are not specified in the literature. If attributes of an asset are to be measurable they have to be specified. It is also clear from the definition above that the concept of an asset also depends on the future benefit theory. This theory indicates that an asset can only exist if future economic benefits are expected to flow to an entity from the asset. Consequently, in order for one to prove the existence of an asset one must focus on the identification of a future inflow of economic benefits. Sterling (1968) also points out that the notion of future benefits gives accounting a forward-looking direction. If this is the case it can be inferred that the firm has to exist in the future in order to receive the benefits.

It should be pointed out that the future attributes of future economic benefits are not measurable in the present: the attributes of future economic benefits cannot be empirically tested in the present. On the other hand, expectations of future economic benefits are measurable. Orbach (1978:31) makes the point that expectations can be measurements because they have legitimate properties at the present moment, which can be measured. Nevertheless, it should be

highlighted that an expectation is different from the real attribute that is in the future and therefore, although the expectation can be measured, the future attribute cannot be measured in the present. As a result, future phenomena are not measurable.

The principles of recognizing the elements of financial statements in the financial statements bring another dimension to the measurement of the attributes of an asset. According to IASB (2006), an item that meets the definition of an element of the financial statement should be recognized in the statement if it is probable that any future economic benefits associated with the item will flow to or from the entity, and if the item has a cost or value that can be measured with reliability. It follows that for an asset to be recognized in the financial statement its cost or value must be capable of being measured with reliability.

Evidence in the accounting literature suggests, however, that the value of an asset cannot currently be measured. For example, Ryan *et al.,* (2002:118) point out that there is no agreement relating the concept of value to the amount of monetary units used to represent it in accounting. Yet, according to the principles of representational measurement (Luce and Narens, 1994), measurement takes place if and only if the representation and the uniqueness theorems can be proved. In chapter 2 it was noted that the existence theorem focuses on proving whether the attributes and the relations specified by an empirical relational structure actually exist, and whether the associated numerical relational structure onto which the specified relations can be mapped actually exists. The uniqueness theorem is proved by the specification of the type of transformations under which a scale is invariant. Consequently, if the relationship between the amount of monetary units assigned to represent the value of an asset and the value itself cannot be specified, it is impossible to prove the representation and uniqueness theorems of the representational theory of measurement. In chapter 2 it was also noted that the representation theorem of the representational theory of measurement is proved once the scale of measurement is specified. But if the relationship between monetary units and value is not known, it is not possible to

specify the scale used in measuring value. Again in chapter 2 it was noted that the uniqueness theorem of the representational theory of measurement is proved once the unit in the scale of measurement is specified. But, if the relationship between monetary units and value is not known, it is not possible to specify the scale used to measure value and consequently it is impossible to specify the unit in the scale used to measure value.

6.6.2 The dimensions and qualities of liabilities

The dimensions and qualities of a liability can also be inferred from its existing definition. The IASB's (2006 Para 49) framework for financial reporting defines a liability as follows:

A liability is a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits.

This definition reveals that a liability has qualities that have existed in the past, and that are in the present and that will exist in the future. The use of the phrase "present obligation" in this definition implies that the economic burden and the obligation exist on the date of the financial statement. From the perspective of the representational theory of measurement (Luce *et al.*, 1971), the attributes of the economic burden and the obligation that exist are measurable as long as the process of measurement complies with the principles of the representational theory of measurement. One of the necessary steps in the measurement of these attributes is their identification and the assignment of an empirical identity to them. Currently, accounting research (Chambers, 1997) indicates that such attributes are not specified in the accounting literature.

It is also clear from the definition above that the existence of a liability hinges on the future benefit theory. This definition indicates that a liability can only exist if there is an expected outflow of economic resources from the entity. Expectations have legitimate properties in the present (Orbach, 1978). In other words,

expectations have properties that are empirically testable in the present. It follows that expectations have properties that are identifiable in the present. Luce *et al.* (1971) points out that it is only empirical phenomena that are measurable. Therefore, the properties of expectations are measurable in the present. But the actual attributes that will exist in the future and which do not exist now are not measurable. As noted in chapter 2, it is only empirical phenomena that are measurable. Thus, it can be concluded that expectations of liabilities are measurable.

The principles for recognizing the elements of financial statements also bring another dimension to the measurement of liabilities. According to the IASB (2006), an item that meets the definition of an element of a financial statement should be recognized in the financial statement if it is probable that any future economic benefits associated with it will flow to or from the entity, and if it has a cost or value that can be measured with reliability. However, accounting value is not currently measurable. According to Ryan *et al.* (2002:118), there is no agreement relating the concept of value to the amount of monetary units used to represent value in accounting. Yet the principles of representational measurement require the specification of the relationship between the empirical relational structure and the abstract structure. This suggests that the value of a liability is currently not measurable in accounting. It is therefore necessary to specify the relationship between monetary units and the value they are intending to measure.

6.6.3 The dimensions and qualities of income

The concept of income depends on both the going concern concept and the liquidation concept. IASB (2006, Para 70) defines income as “increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in the increases in equity, other than those relating to contributions from equity participants”.

This definition ties the attributes of income to those of assets and liabilities. It is clear that income is defined as a variation in the attributes of assets and liabilities

that bring a positive change to the assets and liabilities of a business. Therefore, if income is taken to represent increases in economic benefits during an accounting period, other than increases in assets or decreases in liabilities, it may be argued that the increase in economic benefits represents something that has happened. Since measurement is the assignment of numbers to empirical phenomena according to rules (Stevens, 1951), it looks as though it is possible to measure the attributes of the increase in economic benefits during an accounting period once the rules of representational measurement have been complied with. However, the applicability of the representational theory of measurement to the measurement of income is constrained by the viewpoint that income is ambiguous and not an intrinsic property of an accounting entity (Stamp, 1981:23) This makes income a hypothetical phenomenon that is not backed by reality. It follows that income is dependent on the opinion and assumptions of an individual or accountant. As a result, there can be no consensus among accountants on the nature of the qualitative structure of income or its measurability.

Furthermore, Kam (1990:69) remarks, “income is based more on accounting constructs than on economic reality”. A construct is an idea or a belief that is based on various pieces of evidence which are not always true (Hornby, 2005: 312). This means that income is not real even at liquidation. Gouws and van der Poll (2004) also suggest that when income is determined under accrual accounting, personal judgements regarding deferrals, allocations and valuations are taken into account. If this happens in the determination of income it means that income is a subjective phenomenon. This suggests that the attributes of income are not empirically testable.

The qualities of income mentioned above have serious, negative implications for the measurement of income. If income is a subjective concept that is based on constructs rather than on reality, it is a creation of the mind. The axioms about the measurement of income cannot be empirically tested and the attributes of income cannot be given an empirical identity. The principles of the representational theory of measurement (Luce and Narens, 1994) require that axioms about the

measurement of a phenomenon should be empirically testable and that attributes of the phenomenon be given an empirical identity. Furthermore, it is not possible to prove the representation and uniqueness theorems from the perspective of the representational theory of measurement. In chapter 2 it was pointed out that representational measurement occurs if and only if the representation and uniqueness theorems are proved. It is thus quite clear that the attributes of income cannot be considered measurable.

6.6.4 The dimensions and qualities of an expense

The nature of the concept of an expense is such that it asserts the view that representational measurement is not part of the traditional accounting methodology. IASB (2006) defines expenses as “decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or the incurrence of liabilities that result in decreases in equity, other than those relating to distributions to equity participants”.

This defines expenses in terms of a change in the attributes of assets or liabilities. If expenses are defined as depletions of assets or incurrence of liabilities, then it may be inferred that they are bound by the measurement rules governing assets and liabilities. The use of the term “future economic benefit” in defining assets and liabilities clearly indicates that what is of interest to an asset or a liability is the future, and therefore expenses are also future oriented.

The future implies uncertainty and this leads to the use of probability theory (Hampton and Bishop, 1998). However, there is no probability version of a measurement theory. The uncertainty of future events implies that they cannot be known with absolute certainty. Yet, according to Decoene *et al.* (1995), measurement magnitudes are historically and theoretically determined reflections of quantitative aspects of objectively existing entities and not merely the outcome of metricization or measuring procedures. This makes it clear that measurement pertains to objectively existing phenomena that can be empirically tested: it

follows that the attributes of future events are not measurable. Decoene *et al.* (1995) argue that choosing an appropriate qualitative axiom system depends entirely on a deep understanding of the part of reality that one is studying. This means that it is not possible to have a deep understanding of future events in the present. It was mentioned in chapter 2 that the existence and uniqueness theorems could only be proved on the empirical relational structures of phenomena that actually exist. The existence and uniqueness theorems can clearly not be proved on the empirical relational structure of an expense.

The concept of an expense may be broader than the future benefit theory. For example, the Committee on Terminology (1957:3) explain it as follows: “Expense in the broadest sense includes all expired costs which are deductible from revenues.”

This definition represents the traditional revenue expense orientation. The deduction of expenses from revenues implies that identical attributes of revenues and expenses are measured. However, there is no specification in the accounting literature of the attributes of expenses and revenues that are the subject of measurement for the purposes of matching. As a result, these attributes are not empirically testable. Vickrey (1970) comes to the conclusion that there is no property that is measured in accounting apart from the numerosity of monetary units. Exactly what the numerosity of monetary units represents is unknown, however. This violates the representation and uniqueness theorems (see chapter 2) of the representational theory of measurement. Given this, it follows that revenues and expenses cannot be meaningfully added or subtracted.

In addition to the above, accountants arbitrarily allocate costs to products (Hampton and Bishop, 1998). In other words, the allocation process is not based on an identifiable attribute. A measurement process is arbitrary when another numeral could have been assigned instead. Furthermore, no conclusive argument is invoked to defend the numeral that was actually chosen. Allocation is not measurement because it is not empirically testable (Sterling, 1979). As a result,

models for allocating expenses to products do not correspond to any real life phenomena. These allocation models are not theoretical because they do not help to explain observations or empirical phenomena. In chapter 2 it was underlined that all processes of measurement must have an underlying theory of measurement. Allocations do not qualify as processes of measurement as they do not have an underlying theory to support them.

6.6-5 The dimensions and qualities of equity

The dimensions and qualities of equity can also be inferred from the existing definition. The IASB's (2006 Para 49) framework for financial reporting defines equity as follows:

> Equity is the residual interest in the assets of the entity after deducting all its liabilities.

This definition indicates that liabilities are subtracted from assets to produce equity. This subtraction suggests that the attributes of liabilities and the attributes of assets that are subtracted are identical and are measured on the same scale. However, accounting research (e.g., Chambers, 1997; Ijiri, 1975; Staubus, 1985; Walker and Jones, 2003) indicates that the attributes of the elements of financial statements that are of use and interest to measure are not specified. If this is the case, it will be impossible to verify whether the attributes of assets and liabilities that are being measured are identical. These attributes might be structurally different and as a result the operation of subtraction cannot be applied between them. Furthermore, Ryan *et al.* (2002:118) points out that there is no agreement relating the concept of value to the amount of monetary units used to represent it in accounting. It is clear from this that the rules that were employed in assigning monetary units to value are not known. It is thus impossible to know whether the rules employed in determining the amount of monetary units assigned to the value of an asset are the same as those applied in assigning the amount of monetary units to the value of liabilities. This would seem to make equity immeasurable.

6.7-Summary and conclusions

The concept of value is fundamental to the accounting discipline. Accountants believe that value can be measured. However, it has been shown that attempts by researchers in accounting to create a theory of accounting measurement from the observation of the so-called accounting measurement practices have not succeeded. But every measurement system must have a theory of measurement which includes the objectives of a measurement process. This lack of success in creating a theory of accounting measurement suggests that accountants are currently not measuring the value of accounting phenomena.

This chapter comes to the conclusion that the amount of monetary units paid to acquire a commodity is not a measure of value. It has been established in this study that the theory of measurement that is applicable to the accounting discipline is the representational theory. This chapter underlines that the nature of value is such that the domain of the measurement functions that should map the empirical relational structure of value cannot be specified, which is not consistent with the principles of the representational theory of measurement that requires the specification of the domain of the measurement function.

Foundations of measurement are fundamental to every measurement discipline. One of the main concerns in analysing the foundations of measurement in a measurement discipline is formalization. This involves the choice of an empirical relational structure as an abstraction from the available data, the choice of an appropriate numerical relational structure, the discovery of suitable axioms and the construction of numerical homomorphisms (Luce *et al.*, 1971). Consequently, every measurement discipline must have formalized foundations of measurement.

Currently, accounting is regarded as a measurement discipline. Accounting literature reveals that there are no formalized foundations of accounting measurement. An analysis of the bases of accounting measurement reveals that they do not contain any foundations of measurement. This suggests that they are

not in fact bases of measurement. Furthermore, it has been established in this chapter that the existence and the uniqueness theorems of the representational theory of measurement cannot be proved on the bases of accounting measurement.

A summary of some of the main points follows:

- The current cost basis, the historical cost basis, the net realizable value basis, the present value basis and the fair value basis of accounting measurement are not bases of measurement. They are not compatible with the principles of the representational theory of measurement.

- Present values are probabilistic in nature because of their future orientation. But there is no probabilistic version of measurement theory or the related statistical methods for evaluating whether or not a data set supports or refutes specific measurement axioms. Furthermore, there is no specification of the attribute that is the subject of measurement under present value.
- Before it can be considered measurable, an empirical relational structure has to satisfy certain preconditions under the representational theory of measurement. These include the specification of the attributes, subsets and relations among the attributes of the empirical relational structure. Accounting literature (e.g., IASB, 2006; Wolk *et al.*, 2001) refers to the measurement of the elements of financial statements. In this study it has been found that the dimensions and qualities of the elements of financial statements are not measurable. Attempts to prove the representation and uniqueness theorems on some examples of accounting measurement, particularly the relationship between monetary units and value, have not been successful. This suggests that the dimensions and qualities of the elements of financial statements are currently not being measured.

The discussion in this chapter revealed that value is not measurable, and that there are no foundations of accounting measurement. It was also shown that elements of financial statements currently do not have measurable attributes. Therefore, it can be concluded from this chapter that there are no foundations for accounting measurement.