Fair Value measurements in the Big Data environment and the effects of the health crisis COVID-19

Ykhlef Imane*

University Blida 2-Lounici Ali (Algeria)

i.ykhlef@univ-blida2.dz

Received: 14/02/2022 **Accepted: 24/05/2022** **Published: 30/06/2022**

Abstract :

This paper aims to discuss the impact of Big Data on the Fair Value Measurements during the COVID-19 Pandemic, we relied on the inductive method using the description tool, this is by presenting the conceptual framework for both big data and fair value measurement based on previous research and studies, and then we deduced the impacts among them and linking the findings from this emerging relationship to the repercussions of the current health crisis, all of this, is based on the analytical method.

We conclude that Fair Value measurement has become difficult because of uncertain estimates due to the current economic conditions in light of the repercussions of the Corona virus, this leads to thinking about finding the best alternatives for measuring the Fair Value in the current circumstances, which will reduce personal judgments and assumptions. Big data, can exceed the ability of traditional technologies in dealing with the current economic conditions, which are dominated by a state of uncertainty and certainty, where it will work to raise the quality of information and data that the market needs, and this is an advanced manner and somewhat free from assumptions, and responding to various requirements in Real Time.

Keywords: Big Data, Fair Value, COVID-19.

JEL classification codes : M 41; M 49.

*

Introduction:

As fair value is a market-based measurement, not an entity, an estimate of the price on which the transaction is based to sell the asset or transfer the liability between market participants at the measurement date in accordance with current market conditions (selling price); it has become a difficult matter as a result of the current conditions imposed by the Corona Virus on the economy in general, therefore, the entity must take into account all the information reasonably available, to have the opportunity to reach the original market or the most profitable market.

Since the current health crisis has become a source of uncertainty about the future of companies, it is necessary to seek help from modern information and communication technology (Big Data), this is because it is now considered an important source for accounting measurement, due to its characteristics (Volume, Velocity, Variety and Veracity) in the possibility of providing the necessary information to take various decisions in Real-Time.

To prepare this research paper, we presented the conceptual framework for both big data and fair value measurement, and then we deduced the impact of big data on fair value measurement and linking the findings from this emerging relationship to the repercussions of the current health crisis, COVID-19 Pandemic, all of this, is based on our own judgment and perceptions on the subject, based on the analytical method.

Of the above can subtract the following Problem:

What are the effects of big data on fair value measurements in light of the current health crisis COVID 19?

The Hypothesis:

- **First hypothesis**: Big Data can effect fair value measurements in a way that was not possible before.
- **Second hypothesis**: it may be important and necessary to take advantage of what big data provides for fair value measurements affected by COVID 19 outcomes.

The Methodology and the Tools used:

To prepare this research paper, we relied on the inductive method using the description tool, this is by presenting the conceptual framework for both big data and fair value measurement based on previous research and studies, and

then we deduced the impact of big data on fair value measurement and linking the findings from this emerging relationship to the repercussions of the current health crisis, COVID-19 Pandemic (Solutions and Effects), all of this, is based on the analytical and inductive method.

Search axes:

I. Conceptual Framework.
  1. Introduction of the Big Data.
  2. Concept of Fair Value Measurement.
II. Methods and Materials.
  1. Fair value measurement during the COVID-19 Pandemic.
  2. The impact of big data on Fair Value.
  3. Solutions provided using big data in light of the COVID-19.
III. Results and discussion.
IV. Conclusion.

I. Conceptual Framework:

Presenting the conceptual framework for both big data and fair value measurement based on previous research and studies, as follows:

1. Introduction of the Big Data:

In the course of recent years, the growing usage of using web organizing, new improvements, for instance, the possibility of “Internet of Things” (IoT) make huge measure of information that can yield extremely valuable data if fittingly managed (Daniel E. O’Leary, 2013).It is called as" **Big Data**". These datasets portray voluminous measure of composed, semi sorted out and unstructured information. Big Data has created to restrain the value, arrangement and velocity of dataset (Sahar Mahdie Klim, 2017), it is a term to describe vast datasets that could not be capture, stored, managed using traditional databases (Helena Forest et al., 2014), it is large volumes and processed at high velocity (Wendy Arianne Günther et al., 2017), Big Data it means data that is too big, Too fast (it must be processed quickly), and Too hard (Sam Madden, 2012).

Big Data, it is a huge of data (Helen Brown-Liburd et al., 2015), it is presents opportunities and challenges for companies, and in order to extract value from this data it must be processed and analyzed in a timely manner (EYGM, 2014), the term Big Data means that we can collect and analyze

various data in ways that were previously impossible (more data about anything, with better ability to store and analyze any type of data) (Bernard Marr, 2016), Big data keeps growing day by day (Laika Satish, Norazah Yusof, 2017).

The main **characteristics of big data** is what IBM called the **5Vs**, which can summarized below:

The first **V** is for **Volume**, that is, big data comes in huge storage units, and volume refers to the amount of data worldwide (EMC, 2012). The second **V** is for **Velocity**, Which means that big data is generated continuously and in a fast rate, the challenge is not only to store data streams, but to quickly transform these data streams, fosters innovation and improves decision-making processes(Yotaro Okazaki, 2017), data is being generated extremely fast a process that never stops. The third **V** is for **Variety**, which means data has various formats and types there is structured data like the traditional relational databases that is confined in tables with a specific schema or structure applied to the data at the time of creation, and there is unstructured data like free text, images, audio and video files, and also there is the semi-structured data which is characterized by the lack of an organized structure, like Extensible Markup Language (XML) and Comma Separated Values (CSV) files (Hasanen S. Abdullah, 2016).

In the financial sector, there are two more factors: The Forth V is for **Veracity**_that ism data can be obtained from certain known sources that are ready to meet the needs of their users, and the Fifth V is for **Visibility**, which means that the big data platform provides the ability to discover and search for a wide variety of data sources, in clear and unambiguous manner (Yotaro Okazaki, 2017).

The solutions provided by the big data technology, which are the Big Data is well suited for solving information challenges that do not natively fit within a traditional relational database approach for handling the problem at hand (CHRIS Eaton et al., 2012), Can also be adopted big data technologies, in organizations expect to gain benefits across many domains, such as e-commerce, e-government, science, health, and security (Wendy Arianne Günther et al., 2017).

- We can conclude from the above, that Big Data expresses groups with a large volume of data, which was obtained from different parts, from other data, for a variety of groups, from other sources, which can be obtained, stored. Analyzed and using modern databases. This is in order to influence the various decisions of its users (or bring about positive change), also, data whose size does not exceed the capacity of tools, program's and large databases, cannot be considered Big Data, in addition to overcoming various obstacle and problems that did not have a possible solution, with the presence of traditional analytical programs and tools.

2. Concept of Fair Value Measurement:

IFRS defines "Fair Value" as "the price that would be received to sell assets, or paid to transfer a liability, in orderly transaction between market participants at the measurement date" (FASB, 2011).

The Fair Value measurement assumes that the assets or liability is exchanged in orderly transaction, between market participants, to sell the assets or transfer the liability at the measurement date in accordance with current market conditions (it has become difficult in the current conditions of the economy as a result of the COVID 19).

In addition, the fair value measurement is realized in the original market for the assets or liability, and in the absence of the original market, it realized in the most profitable market (FASB, 2011). The fair value of assets or liability is also measured, using the assumptions of market participants when pricing (they act in their economic best interest) (FASB, 2011).

The inputs to methods of measurements (Fair Value Hierarchy) into three levels: (Veronica Poole, 2015).

a) **Level 1 inputs**: are declared prices (unmodified), quoted price in the active markets for the assets and liabilities that the entity has access at the measurement date;

b) **Level 2 inputs**: are all inputs that are not considered advertised prices, and that are included in the first level, that are observable for the asset or liability, either directly or indirectly ; and

c) **Level 3**: unobservable inputs for the asset or liability.

IFRS 13 came using one of the following evaluation method: (FASB, 2011).

a) **Market approach**: Uses prices and other relevant information from market transactions involving assets and liabilities, or a group of identical or comparable (similar) assets and liabilities.

b) **Cost approach**: Reflect the value that will be newly required, to replace the service capacity of the assets, usually referred to as the current replacement cost.

c) **Income approach**: Converts future values (for example, cash flows, or income and expenses) to a single present value (discounted), the fair value measurement reflects current market expectations about future amounts.

These assessment techniques include, for example, the following: (FASB, 2011)

- Current evaluation methods;
- option pricing models, such as the Black-Scholes-Merton formula or a binomial model (i.e. a lattice model), that incorporate present value techniques and reflect both the time value and the intrinsic value of an option; and
- The multi-period surplus profit model used to measure the fair value of some intangible assets.

> ➢ We Can say, that the fair value measurement reflects the economic reality of the company, by evaluate assets and liabilities at fair value, it will express economic income, as market price are taken into account, it is also suitable for making decisions and conducting financial analyzes, and a batter basis for forecasting business result and cash flows. However, this does not make it devoid of some negative aspects, such as overriding the element of personal bias and following varying measurement bases, which makes there difference between the market participants estimates, which loses the confidence and accuracy required for the estimated value, estimation costs may also exceed the expected benefits.

II. Methods and Materials:

To reach the desired results of this research, we have shown the impact of COVID 19 on fair value measurements, some accounting standards were chosen to show the effect, then the impact of big data on it as well, this led us to conclude possible solutions, using big data in fair value measurement to reach accurate, credible and acceptable measurements between the parties, to make various decisions, this appears as follows:

1. Fair value measurement during the COVID-19 Pandemic:

The impact of the COVID 19 on the both financial markets and companies in particular, the prices of basic commodities and the prices of foreign currencies; this led to large fluctuations in the fair value of some investments and other assets.

Undoubtedly, COVID 19 will affect the fair value measurement of some items in the financial statements, when measuring fair value, the facts and circumstances that existed at the measurement date, known by the parties, must be taken into account, management will also need to evaluate the information available at the date of its reporting, relating to COVID 19, in order to assess whether this information will affect the price that was between the willing parties in the transaction.

It is important that adequate disclosure is made about the impact of COVID 19 on fair value measurements, including assumptions, judgments, inputs and model on which the assumptions are based. (MNP, 2020).

We have compiled specific international accounting standards, to show the impact of the COVID 19 on them, and this can be shown through the following table:

Table N°1: Impact of the COVID-19 Pandemic on the Fair value measurement

IAS/IFRS	What to do for Fair value measurement during the COVID-19 Pandemic
IAS 36 **"Impairment of Assets"**	• The outbreak of the COVID 19 has a significant impact on the risk free rate of the company's own risk premiums (funding risk), which are used to determine the appropriate discount rate to discount the appropriate cash flows. • Considering whether there are any indications of depreciation of the company's assets or its cash-producing units. • Considering whether the net assets exceed the market capitalization. • Considering whether the discount rates applied to the valuations have recently been update to reflect the risk environment prevailing at the date of the rapport. • Conceder improving disclosures about assumptions, and uncertainties in fair value estimates. Attention to the evaluation of contracts loaded with obligations.
IFRS 9 **"Financial Instruments"**	• The outbreak of the COVID 19 may need to reduce the likelihood of a hedging transaction occurring, or the ineffectiveness of hedge accounting • If there is an increase in the credit risk of the hedging instrument, the changes in fair value are not offset by changes in the value of the hedged item. • Measure and display expected credit losses, which are high due to COVID 19 (neutral estimate based on best available information). • Adjust expected loss rate. When measuring expected credit losses, must be taken into account the financial collateral (financial assets).

IFRS 7 **"Financial Instruments-** **Disclosures"**	• Disclosure of the material effects of COVID 19, on the risks arising from financial instruments, and how to manager those risks. • Use provisions to determine the disclosures necessary to achieve the company's objectives, and its activities: – Information on the practice of credit risk management. – Recognition and measurement of expected credit losses. – Disclosure of the methods, assumptions and information used to measure expected credit losses. • Communicating the effects of COVID 19.

Source: Prepared by the researcher.

From the previous table, we note that COVID 19 is one of the sources of uncertainty about the future, so it is necessary to make disclosures about its expected effects, even with the inability to estimate the financial effects of this virus, it is considered a source of uncertainty, and fair value measurement will be subject to personal judgment.

Therefore, when estimating the fair value, must be taken into account, the best available information on past events, current conditions and expected economic conditions, the effects of the COVID 19, with an attempt to model the impact of this epidemic, it should also continue to follow the facts and circumstances of COVID 19, to identify any news information that is relevant to the measurement of assets and liabilities, at the date of the report.

2. The impact of big data on Fair Value

Among the most important results provided by information technology and digitization, represented by big data, is the ability to record transactions and provide information in Real-Time, to make various decisions (maintaining up-to date pricing data) (John Peter Krahel and William R. Titera, 2015).

As stated in a study conducted by both researchers John Peter Krahel and William R. Titera, which states that big data can help address discrepancies in fair value valuations; one possible way to facilitate this process is to use internet software agents, their job is to gather information to help value assets that would otherwise be difficult to value, this is done using comprehensive automated search methods on the internet, operating over long periods of time (examination, design and implementation of this information), which expresses programs that collect useful data in various decision making procedures.

Fair value estimates for level 1 and 2 also will be maximized with current and objective market data, agents can work with a standardized process of generating information to make fair value estimates. To expand this idea, data specialize in providing fair value information about assets and liabilities may

appear in the market, similar to the current value companies that provide estimate and valuation services (J. Donald Warren, Jr., and al., 2015).

- The impact of big data on Fair Value are Real-Time Market Data Enable Accurate Present Value.

3. Solutions provided using big data in light of the COVID-19

Big data will help in measuring fair value in light of the COVID-19, as shown in the following table:

Table N°2: Solutions provided using big data in light of the COVID-19 on the fair value measurement

Information available when Fair Value approved	The Impact of COVID-19	Solutions provided using big data in light of the COVID-19	
		Solutions	Effect
1. Specialization, Efficiency, Search and Investigation: · Assumptions of the participants. · Make efforts to acquire information about the asset, liability or transaction. · Determine the original market or the most profitable market in the absence of the original market, by taking all reasonably available information, with having a chance.	· This has become more difficult due to unconfirmed estimates about the economic impacts of the COVID-19. · Take into account whether the evaluation includes the risk premium that may arise from increased uncertainty and other impacts of the COVID-19. · Adopting the most appropriate assessment method in the current environment of the COVID-19.	· Data services companies specializing in providing fair value data. · Creating internet agents to examine, design and implement programs that gather data useful in decision-making. · Social media content. · Internet of Things. · Communications network events. · Collection- Google ‹Yahoo‹ Amazon‹ eBay ‹Oracle‹ IBM - Microsoft ‹Google Analytics‹ Map Reduce Apache Hadoop, Amazon Web Services ‹ Gogrid ,Rockspace . · Storage (mongo DB Hadoop ‹Clustrix, Netezza). · Data Processing and Management (Cloudera Hadoop Greenplum). · Data Analytics- Splunk ‹ Click fox ‹Rainstor ‹ Pervasive ‹Map Reduce‹ Hadoop ‹Progress data direct. · Content creation, testing, classification, conversion, validation, preservation and storage, with the aim of reusing data.	· Provide great support for real-time decision-making. · Reducing personal assumptions in fair value estimates, due to unconfirmed economic estimates about the COVID-19. · Create large data continuously and at a very fast rate (Variety, Veracity, Visibility). · Increase the amount of data available to appropriately feed the analysis (scalability, flexibility) · Enough dynamic. · Improve transparency. · Information quality. · Providing equal chances to information. · Find what is really useful. · Economy in the costs of obtaining information. · Overcoming various obstacles and problems that were not solved by the presence of traditional analytical programs and tools.
2. Procedures for measuring Fair Value: - Quoted Prices (L 01) - Observable inputs (L 02) - Not Observable inputs (L 03)			· Determine the Most Advantages Market by strengthening the three levels (L01-L02-L03) of Fair Value measurements. · Maximize fair value estimates for levels 1 and 2 with current and objective market data. · Maximize the use of observable inputs. · Maximize the use of unobservable inputs as possible.
3. Methods of valuation at Fair Value: - Market approach. - Income approach. - Cost approach.			· Collect-scattered data in one searchable repository automate the daily pricing process for valuations. · Evaluation of assets that are difficult to evaluate. · Develop robust and effective evaluation methodologies while maximizing data value through supervision and quality control. · Reliance on well-analyzed market data-each manner or method used in the evaluation provides an indication of the market value.

Source: Prepared by the researcher.

III. Results and discussion

From our research, we reached several important results, which can be summarized as follows:

From the theoretical side of the research, we concluded that big data occupies an important place in the world of information technology, and both speed, modernity and size are essential to it, thus, it is important delivering information to stakeholders in real time, and this creates great value. The importance of big data stems from the effective role it adds in overcoming various obstacles and problems, which were not feasible with the presence of traditional analytical programs and tools.

In addition, speaking of economic value, we refer to the Fair Value, which expresses its economic income; the fair value measurement takes into account changes in the purchasing power of the monetary unit. The fair value is determined through its price in a regular market, and it may difficult to determine it, because the market is otherwise, this does not prevent it from suffering evaluations according to personal judgments and assumptions and following undifferentiated bases, this was evident from the developments in the effects of COVID 19 on the economic.

As for the applied side of the research, which came to support its theoretical side, its results are as follows:

- Big data Provide great support for real-time decision-making.

- Big data is Increasing the amount of data available about COVID 19, to appropriately feed the analysis (scalability, flexibility), and Providing equal chances to information, in addition, Maximize the use of observed inputs.

- When estimating the fair value, taken into account, the best available information on past events, current conditions and expected economic conditions, the effects of the COVID 19, with an attempt to model the impact of this epidemic.

- The impact of big data on Fair Value are Real-Time Market Data Enable Accurate Present Value.

- Adopting the most appropriate assailment method in the current environment of the COVID 19.

- Take into account whether the evaluation includes the risk premium that may arise from increased uncertainty and other impacts of the COVID 19.

- The need to clarify the disclosures about COVID 19.

One of the area that big data may effect is fair value measurement, where big data related to the fair value of assets and liabilities can reduce assumptions and personal e3stimates in estimating their value.

For example, in the current economic conditions as a result of the COVID 19 outbreak, big data helps provide market data for evaluation by collecting

dispersed financial data on the effects of the virus outbreak, and collecting them in one searchable repository, which can automate the daily pricing processes for evaluations.

Thus, the relationship that our research concluded, will be useful in solving the problems facing decision-making, especially in the current economic conditions imposed by the health crisis, for example, automated algorithms can be used for big data, so that the analysis is highly sophisticated and supports decision-making, minimizing possible risks when adopting fair value measurements, it creates economic value.

Therefore, we attach great importance to this topic from an academic point of view, in developing methods and mechanisms for fair value measurement, using the technologies presented by big data, and benefiting from them as much as possible, it facilitate the realization of the value and benefit of the information that is the focus of decision-making, this is to raise the level and performance of academic education, by providing everything that supports this approach, to overcome obstacle to evaluation at fair value using traditional programs and tools, and finding solutions to every problem facing professionals and academics, accountants and auditors, and modernization of accounting education and its link to the current economic developments.

IV. Conclusion

From the theoretical side of the topic that relates to providing the conceptual framework for both big data and fair value measurement, and the analytical aspect through which we have shown and analyzed each of the impact of COVID 19 on the fair value Measurement, and impact of big data on fair value measurement, we connected the three elements into one relationship that, Fair Value measurement has become difficult because of uncertain estimates due to the current economic conditions in light of the repercussions of the Corona virus, this leads to thinking about finding the best alternatives for measuring the Fair Value in the current circumstances, which will reduce personal judgments and assumptions, through big data that works to responding to various requirements in Real Time.

Recommendations

- The necessity of having an up-to-date database of big data for fair value measurement, which collects, analyze and stores data sets, it is available in way that enables it to bring about a change or a positive impact on decision-making.
- It is necessary to pay attention to developing the relationship between fair value accounting and big data solutions.

- Frame the skills of big data analysis, in order to turn it into meaningful decision-making processes.
- Working in training workshops for accountants, auditors and academics, to raise their skills in using big data analytics, to make their estimates and evaluating at fair value, with an increase in empirical research.
- Accounting education should develop faculty, teachers and students in big data issue and analytics, and utilize them in accounting work.
- Companies should give great importance to adopting this type of data.

As for the latest developments in the impact of the COVID 19 on the economic situation, it is necessary to constantly monitor the effects, facts, and scenarios of this epidemic, to identify any new information that is relevant to assessing the situation, and take advantage of big data technologies to create a unified database among decision makers, in which all information on the epidemic is up-to-date, in addition to planning in advance and applying early communication strategies, taking into account the uncertainties that cast more doubts about fair value measurement in the current circumstances, and trying to model the impact of the epidemic.

Research suggestions:

- The role of big data in maximizing fair value estimates.
- The importance of using automated algorithm for big data to support decision-making.
- Modelling the COVID 19 impact using big data algorithm.
- The impact of credit risk on the continuity of the company in light of COVID19.
- Financial sustainability and the principle of continuity in light of COVID 19.
- Accounting disclosure in light of COVID 19.
- The impact of COVID 19 on the preparation of financial statements.

V. Bibliography List

- Bernard Marr, (2016), Big Data in Practice, Wiley, UK;
- CHRIS Eaton et al., (2012), Understanding Big Data –Analytics for Enterprise Class Hadoop and Streaming Data, McGraw-Hill books;
- Daniel E. O'Leary, (2013), 'Big Data', the 'Internet of Things' and the 'Internet of Signs', Intelligent Systems in Accounting, Finance and

Management Intell. Sys. Acc. Fin. Mgmt. 20, published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/isaf.1336;

- EMC(2012),ttps://www.emc.com/about/news/press/2012/20121211-01. (Last visited 30/07/2019) ;
- EYGM, (2014), Big data - Changing the way businesses compete and operate;
- Hasanen S. Abdullah, (2016), Proposed Business Intelligence System through Big Data, Eng. & Tech. Journal, Vol. 34, Part B. No 4;
- Helen Brown-Liburd et al., (2015), Behavioral Implications of Big Data's Impact on Audit Judgment and Decision Making and Future Research Directions, American Accounting Association, Accounting Horizons, Vol. 29, No. 2;
- Helena Forest et al., (2014), Big Data How it can become a differentiator, Deutsche Bank-Global Transaction Banking;
- J. Donald Warren et al., (2015), How Big Data Will Change Accounting, Accounting Horizons, Vol. 29, No. 2.
- John Peter Krahel and William R. Titera, (2015), Consequences of Big Data and Formalization on Accounting and Auditing Standards, Accounting Horizons, Vol. 29, No. 2;
- Laika Satish, Norazah Yusof, Areview, (2017), Big Data Analytics for enhanced customer experiences with crowd sourcing, 2nd International Conference on Computer Science and Computational Intelligence 2017, ICCSCI 2017, Bali, Indonesia, 13-14 October 2017;
- MNP leading national accounting, tax and business consulting, (2020), Accounting Considerations Related to the COVID-19 Outbreak,Canada;
- Sahar Mahdie Klim, (2017), Big Data Management using Mao Reduce: Case Study, EEG Images` Data, Al-Khwarizmi Engineering Journal,Vol. 13, No 1, BAGDAD;
- Sam Madden, (2012), From Databases to Big Data, the IEEE Computer Society;
- The IASB defines fair value similarly;
- The IASB defines fair value similarly;
- Veronica Poole, (2015), IFRS in your pocket, Deloitte edition;
- Wendy Arianne Günther et al., (2017), debating big data: A literature review on realizing value from big data, Journal of Strategic Information Systems, Volume 26;

- Wendy Arianne Günther et al., (2017), debating big data: A literature review on realizing value from big data, Journal of Strategic Information Systems, Volume 26;
- Yotaro Okazaki, (2017), Implications of Big Data for Customs - How It Can Support Risk Management Capabilities, WCO Research Paper No. 39;