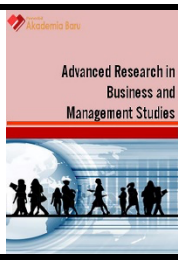
Penerbit Akademia Baru

Journal of Advanced Research in Business and Management Studies

Journal homepage: https://www.akademiabaru.com/submit/index.php/arbms
ISSN: 2462-1935



Big Data Application in Automated Valuation Model for Valuation Process

Penny Goh Pei Nei[1], Siti Uzairiah Mohd Tobi[1,*], Tuti Haryati Jasimin[1]

[1] Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, 54100 Kuala Lumpur, Malaysia

ABSTRACT

This research paper will firstly introduce the function of a property valuation in Malaysia and relating valuations needs to the institutional investors and bank. The valuation standards and bases together with the valuer skill sets were discussed in this paper. Thereafter, this paper will be describing the advance of technology like introduction of data and big data in Valuation, blockchain, artificial intelligence and automated valuation system (AVS), automated valuation models (AVM) and other type of potential advance technology. Furthermore, this paper will describe of the changing client expectations such as sustainability and value, long term value, valuation uncertainty and delivery time. Provided that the Automated Valuation Model have given the added value like the valuation uses in future roles, the valuation process in the future, the valuation standards, valuation approaches and basis of value and the skills of the Licensed Valuer. This research will be covering the Literature Review of different papers, reports, insights, journals and articles. Thereby, introduction of the Automated Valuation Models to the users in the Valuation Sector in the Business industry. The conclusion of the paper will summarize the evolution of the Automated Valuation Models (AVS) from the Traditional Valuation Models.

Keywords: Valuation Process, Big Data, Automated Valuation Models

1. Introduction

The history of Public Valuation Sector known as The Valuation and Property Services Department (JPPH) established by the Ministry of Finance Malaysia had set up a Valuation Division operation in 1st June, 1957, i.e approximately 65 years ago [1]. In year 1999, the National Economic Action Committee (MTEN) in Malaysia has established the National Property Information Centre (NAPIC) to centralize the property monitoring system through a property centre under the NAPIC to monitor the growth of the property market in the country [2].

The Board of Valuers, Appraisers, Estate Agents and Property Managers in Malaysia (BOVAEAP) was established by the Ministry of Finance Malaysia in year 1981 governed by the Valuers, Appraisers, Estate Agents and Property Managers Act 1981 in Malaysia (Act 242) [3]. The function of BOVAEAP is to regulate the professional practices among the professionals held under the Act 242 in order to maintain and control the professional licensing of the professionals practicing in Malaysia. Several frameworks and the standards were provided by the BOVAEAP.

* *Corresponding author.*
E-mail address: uzairiah.kl@utm.my

Besides the Surveyors profession first recognized in the year of 1885, and prior to 1961 there were two professional bodies representing the Surveyors are the Institution of Surveyors Malaysia (ISM) and Institution of Land Surveyors, [4]. Both of these professional bodies appeared to be a supportive non-profitable organization to give supports to the professional practices of Valuation and Property Sectors in Malaysia and strengthen the networking system [4].

The standards, rules and acts that were recommended and introduced by the BOVAEAP are the Valuers, Appraisers, Estate Agents and Property Managers Act 1981 and rules in Malaysia (Act 242), Malaysia Valuation Standards 2019 (Red Book), Estate Agency Standard 2020 and the Property Management Standard [3]. Several continuous profession development courses and seminar were conducted by the Royal Institution of Surveyors Malaysia and books and manual publications were published by the Royal Institutions of Surveyors Malaysia [4].

The Malaysian Valuation Standards (MVS) in Malaysia were revised to 6th Edition effective from 1 January 2019 with the progressive development and inclusive of the Valuations for Submission to the Securities Commission Malaysia and Valuation of Biological Assets. The first issue of the MVS has shown the progressive development in the first edition of the Valuation of assets. The MVS recognizes the valuation principles as enunciated by the International Valuation Standards (IVS) [5]. The MVS and IVS are the standards that promote greater transparency and consistency in the professional practices of the Valuation sectors in the Locally and Internationally for the past 40 years [18]. BOVAEAP Licensed Valuer Registration (LVR) provide the assurance that the independent quality process and assurance to the clients with high levels of standards and professionalism [6].

2. Background of the Automated Valuation Models and Automated Valuation Systems

The Valuation profession is progressively developing and will be the most impactful sector that is affected due to computer technology and changing client expectations. There have been many different types of changes throughout the six decades in the Valuation sectors. The private and the public sectors of Valuation have entered into the evolution of 4th Industry Revolution (IR 4.0) in the country of Malaysia. In a Property Market Report in 2017, stated by the Penang State Government, the 4th Industrial Revolution is a revolution strategy to converge the public, manufacturing and services sector, to gain their benefits and experiences in the 4th Industrial Revolution [7]. The 4th Industrial Revolution is the current trend of automation and data exchange especially in the manufacturing sector to create a “smart factory” using the technology advancement. This manufacturing technology in the current trend of 4th Industrial Revolutions brings the future into the application and usage of Big Data Analytics (BDA), Cloud Computing, Internet of Things (IoT) and e-commerce [7]. In the new and fast changing environment of the advanced technology, the industrial revolutions have also changed client expectations towards the services sector in the Valuation Sectors emerging in the Automated Valuation Models and Automated Valuation System [6].

According to the statement quoted from RICS Research Team in the Articles for insights of Future of Valuation, 2017 [6]:

> *“ The valuation profession is likely to face a period of significant change in coming years, in terms of how the valuation process is managed, the role of the valuer as well as the added value to clients.”*

The valuation profession is very important to the property sectors and is very important to have accurate valuation [8]. The public sectors valuations are carried out for taxation and compensation purposes, while Valuation in the private sectors is generally for lending purposes

(retail banking and corporate customers), valuation reports are needed for the security and collateral for the loan provided [8 & 19].

There are two (2) types of challenges and issues in the valuation profession that have been discussed in the insights of Future of Valuation, these includes the technological developments and the changing client expectations. Accordingly, there were six (6) recommendations for valuers to be well equipped in the Automated Valuation Models and Systems including embrace technology, enhance the client experience, ensure independence and objectivity, beware of liability, reduce timescales and update your skill set [6].

Valuation is a skill set of process that required the understanding as both art and the science [15, 18]. First, the valuation is a required understanding and knowledge in the theory of value to gained from the science of economics. Second, the methodologies have been determined through the methods and approaches of Valuation in Malaysia. Third, the teaching of the subject involved the rigorous application of mathematics and statistics. Fourth, the introduction of computers and application of developments in Information and Communication Technologies (ICT) to streamlines the procedures and adopt a more systematic approach to procedures in determination of value. Fifth, more and more research to be carried out in the property market research to preparing a Valuation Report and Financial Appraisals because of the requirement to determine the ownership, use, development, management and ultimate disposal of the asset in a Valuation Reporting process [8 & 15].

In the past, Valuation is considered as an art because of the Valuation report required the preparation of the opinion of market value and must be verify by a Licensed Valuer. All opinion of market value must be supported by relevant information that required to prepare in the Valuation Report to form an opinion of Market Value in accordance to the Malaysian Valuation Standards (MVS) [5 & 8]. Therefore, A valuation is a process to determine the Market Value of the property, tangible and intangible assets [5, 6].

3. Methodologies

This research paper aims to study through the underlying process that could improve the valuation processes in the Valuation sector for consistency and transparency. Two (2) of the research objectives have been determined in this research, the first objective is to give insight of the background of valuation, the processes, the functions, the needs and the importance of property valuation. The second objective is to determine the types of changes that could explore and enhance into the property valuation sectors [6]. The purpose to carry out this research is to identify the issues emerging in the Valuation Sector for the technological developments and client expectations and to relate the Automated Valuation Models and System into the Malaysia context in the Valuation Sectors. The methodologies are carried out through a thorough literature review and the findings determine from the main sources will be discussed in the research paper.

Additionally, the main sources for the reviews were obtained from the Automated Valuation Models standards and guidelines issued by the RICS Research Teams and adopting the ideas of the Valuation Standard, Property Management Standard and Estate Agency Standard published by the Board of Valuers, Appraisers, Estate Agents and Property Managers in Malaysia. The Research methods are through Literature Review analysis, research and records of experiences from the researchers. Nevertheless, other information was obtained from the internet and website of the relevant Government Bodies like the National Institutes of Valuation (NAPIC), Valuation and Services Department (JPPH) and Royal Institution Surveyors Malaysia (RISM) and their official websites.

The primary sources of the Literature Reviews were abstracted from the reports, articles and journal papers in the field of Property Management and Property investment and Finance written by different researchers, including the RICS Research Team [6], Brano and Francois [9,10], Ganeshkumar [12] and Royal Institution Chartered Surveyors (RICS) [15] [6, 9, 10, 12 & 15]. The summary of the Literature Review primary sources and the secondary sources are in Figure 1 below.

The Literature Review Primary Sources and Secondary Sources.

Main five (5) Primary Sources:

1) The Future of Valuations. The relevance of real estate valuations for institutional investors and banks –views from a European expert group [6].
2) Practice Briefing - Automated Valuation Models (AVMs): Their role, their advantages and their limitations [9].
3) Towards A Taxonomy for Real Estate and Land Automated [10].
4) The Implementation of AVM among Valuation Firms in Peninsular Malaysia. Johor Bahru [12].
5) RICS Information Papers, Automated Valuation Models [15].

Five (5) Secondary Sources:

1) National Property Information Centre (NAPIC) and Valuation and Property Services Department (JPPH) recorded publication and statistics.
2) Rules and Regulations of The Board of Valuers, Appraisers, Estate Agents and Property Managers in Malaysia (BOVAEAP) for Professional Practices.
3) Property Surveying division in Institution of Surveyors Malaysia (ISM) for their constant newsletters and publication in the webpage.
4) Valuation Company's Property Market Outlook from CBRE-WTW.
5) Department of Statistics Malaysia (DSM) for their constantly updates of the Malaysia's economic and population statistics.

Fig. 1. Summary of the Literature Review for Primary and Secondary Sources

4. Results and Preliminary Findings

4.1 Purpose of Valuation and the Attributes in A Valuation Report

The results from the Literature Reviews shows that Valuation is a process of determining the value of a property. Valuation is reflecting the past or the current value. The value reported are the fundamental of the reporting and this is for the purpose of business decisions in the accounting purposes, financial reports purposes, tax purposes, conveyancing purposes, sales and purchase decision and support in secured the loan decision [5]. A valuation report follows the Malaysian Valuation Standards (MVS) and the International Valuation Standards (IVS) to the valuation practices to secure the trusts of the client(s). For example, the consistency in valuation approach, consistent in valuation opinions, objective, independent and transparent in the licensed valuer's approach, clarity relating to the terms of engagement like clarity in the appointment letter with clients' terms,

clarity relating to the valuation basis and clarity in reporting and proper disclosure and adequate information [6].

4.2 Two (2) Types of Valuation Process

There are two (2) categories of Valuation process, in the past and in the future namely Traditional Valuation Models and the Automated Valuation Models (AVM)/Automated Valuation Systems (AVS) [9, 10, & 11]. Although, the Traditional Valuation Models have been in practices for more than 40 years, a systematic process was presumed to be required for Valuation reporting. However, the client has expectation in the business to be punctual in submission of the Valuation reports to the Banks and the Financial Institutions. Therefore, Automated Valuation Models (AVMs) and Automated Valuation Systems (AVS) were introduced and emerged into the Property Valuation Sectors because of the weaknesses in the Traditional Valuation Models and to aims to reduce the tedious process that causes delays in the valuation process [12]. The Automated Valuation Systems is a technology that uses the computer system to communicate using the data, big data, blockchain, artificial intelligence and automated valuation, automated valuation models [13, 17].

The Valuation Practice and Processes involved the following types of Valuation activities and duties to be executed in each stage as listed in the Table 1:

Table 1

Description for each Valuation Processes from Stage 1 to Stage 6

Valuation Processes (Stage)	**Description of the Valuation Processes in each Stages**
First Stage: Received Instruction from the Clients	(i) A formal instruction letter is written by the clients or through communication in oral to the Valuer. (ii) The clients include banks, corporation and private company, individual, registered body, insurance companies, Inland Revenue Boards (Jabatan Hasil Dalam Negeri), Housing Loan Mortgager, Land and Mines office, Registry Land Office or Local Authority and Developers.
Second Stage: Preparation of Groundwork / Make a checklist of Responsibility	This is preliminary work that is to be carried out by the Valuer before executing any instruction to complete the Valuation Cases. a. Firstly, the Valuer have to receive the instruction correctly. Then identify the purposes of Valuation through the Valuation Instruction. b. Besides, the Valuer have to ensure the Valuation is for the purposes to value the property that can be derived to the Market Value. c. Thirdly, the Valuers have to contact the customer to ensure the Properties are available and making appointment with the customer. d. Fourth, the Valuers have to identify and list out the information that required before and during the inspection of the property into a checklist. e. Fifth, the Valuers have to ensure the safety during inspection. Therefore, they have to make sure that the instruction received are correct and all the data required for valuation are ready before going to site inspection. f. For example, (i) identifying the location of the Subject Property through location plan (ii) obtained the sale and purchase agreement from the customer or lawyers (iii) Gathering the property data comparison and data evidences (iv) Ensure the title search has been done due diligently by the Valuer g. Collection of Valuation fees / Deposits

Table 1

Continue

Valuation Processes (Stage)	Description of the Valuation Processes in each Stages
Third Stage: Collection of data	(i) Gathering evidences (data comparable) a. The data of the comparables are collected through desktop research or through search in the Jabatan Penilaian dan Perkhidmatan Harta (JPPH) transaction list. b. Usually, a transaction list of the Jabatan Penilaian dan Perkhidmatan Harta (JPPH) is prepared in the excel format c. The data can be obtained through purchase from the JPPH in the database system d. Each transaction must identify the Date of Transaction, Selling Prices, Land Area and the Vendor and Seller e. In order to make a good collection of data comparable, data can be collected in different resources. Such as through the internet, advertisement, newspaper, Bursa Saham Malaysia and gazette publication for Land Acquisition purposes. f. After collection of data comparable has been carried out, the data must be filter and the Valuer have to ensure the data must be reliable and is in arms-length transaction. (ii) Title Searches a. The title search must be carried out after receiving the instruction letter. b. The reason to do title search is for the purpose to identify the ownership of the subject property c. Title search is act as an instrument to ensure that the Valuer can identify the information of the property ownership through the title. d. The title search can be a search through "Carian Persendirian" (Individual Search) or "Carian Rasmi" (Formal Search) to the Land Office. e. The Valuer must ensure that the title searches are conducted at the correct Land and Mines offices or Registry Land Office.

Valuation Processes (Stage)	Description of the Valuation Processes in each Stages
Third Stage: Collection of data (*Cont'd*)	(iii) Site inspection and site survey of the surrounding property a. This is a process that the Valuer have to carry out during the site inspection. They are responsible to do the property surveying through internal and external inspection of the properties. b. Measurement has been taken during the inspection for the subject property because the property built-up area is calculated. c. The gross floor area, main floor area and ancillary floor area is identified in the site inspection. d. Next, the surrounding of the property is inspected because the surrounding area must be inspected before reporting to the Clients the Market Value of the Property. e. Comparable has to be checked and photographs are taken for the Subject Property and the photographs of the surrounding development are taken for the purposes of reporting.
Fourth Stage: Analysis of Data	(i) After gathering the data through inspection. A Valuer must ensure the property is in a good condition before reporting the property Market Value. (ii) Therefore, the analysis of data is conducted in order for the Valuer to identify the best comparable for the research study.

	(iii) For Example, clients have done a renovation for the house which is extension of carporch and kitchen of the two storey terraced house. (iv) Therefore, during the site inspection, the Valuer must gather the data such as renovation approval plan, approval for extension of the carporch and kitchen from the Local Authority (LA) in writing (letter of approval from LA). Measurement of the building have to be conducted. (v) Besides, the existing usage of the property must be in accordance to the category of land use as stated in the National Land Code. (vi) Analysis of data includes analysis of the Property Market Value and selection of the most suitable comparable through the analysis of the suitability of the comparable data. (vii) Data have to be analyse in order to ensure the value reported is reliable and is according to the evidence supported in the Valuation Report.

Valuation Processes (Stage)	**Description of the Valuation Processes in each Stages**
Fifth Stage: Identifying the Valuation Methods and determine the Market Value	(i) The property value is calculated using the suitable Valuation Methods. For example, A property which is located in Bandar Baru Bangi is value based on comparison method due to there is ample of property transaction, transacted recently in the property market. (ii) The Valuation of a property covers the study and research in forming and opinion of Market Value. Therefore, before the Valuer follow the instruction of the customer. They must identify the type of Valuation Method suitable to be used for the Valuation Purposes. (iii) Three (3) basic valuation approaches to be used to value a property and the best Valuation Approaches are to be selected for the Valuation purposes. i.e. Market/Comparison Approach, Income Approach including Investment Method, Residual Method and The Discounted Cash Flow (DCF) Method and the Profit Method and the Cost Approach [5 & 18].
Sixth Stage: Preparation of Valuation Report	(i) The opinion of Market Value is reported in the Valuation report. (ii) The Valuer must ensure the Valuation Report is prepared according to the Standards 8 as stated in the Malaysia Valuation Standards. (iii) Property which has been inspected must be reported in writing. The Valuation reports must include the Date of Valuation and the Date of Inspection. (iv) A valuer must ensure the report is a 'speaking report' and the Valuation Report can explain by itself without the need to further explain by the Valuer as all information of the Property were reported in the Valuation Report. (v) The Valuation Report must be duly signed by the Registered Valuer and submits to the customer or to the party which have instructed the Valuer to do the Valuation tasks.

The valuation process in Automated Valuation Model and systems are the improvements from the traditional Valuation processes through incorporating the Information and Communication Technology (ICT) in each of the Valuation processes [14, 16 & 17]. The Usage of the Automated Valuation Models and Systems in the Valuation Processes are the innovation of the advanced technology in the Real Estate Industry. Currently, the Automated Valuation Models (AVMs) are actively implemented in the developing Commonwealth Countries like United Kingdom, Japan, Australia, Singapore and Malaysia. The example of AVMs are the smart contracts, drones, the Internet of Things and smart buildings, image streaming/recording and visualising.

In Malaysia, the practical example of the Automated Valuation Models is usage of the big data in the computerised system in the Internet such as Brickz, Valuation Model System (VMS), online databases like Propwall, Property Guru, Iproperty. The usage of the Microsoft software to prepare

Valuation Reports like Microsoft words, Microsoft Excel, Microsoft Power Point and digital drawing like Artificial Intelligent (Adobe AI), Adobe photoshops and corel draw software to draw building layout and building floor plan. There are other types of examples like usage of Geomatic Information Systems (GIS) for mapping purposes, Google Earth and Google Maps in the Internet of Things to determine the land area, shapes of the land and the location of the Building.

The valuation process in the Traditional Valuation Models are listed in the flow chart at Figure 2.

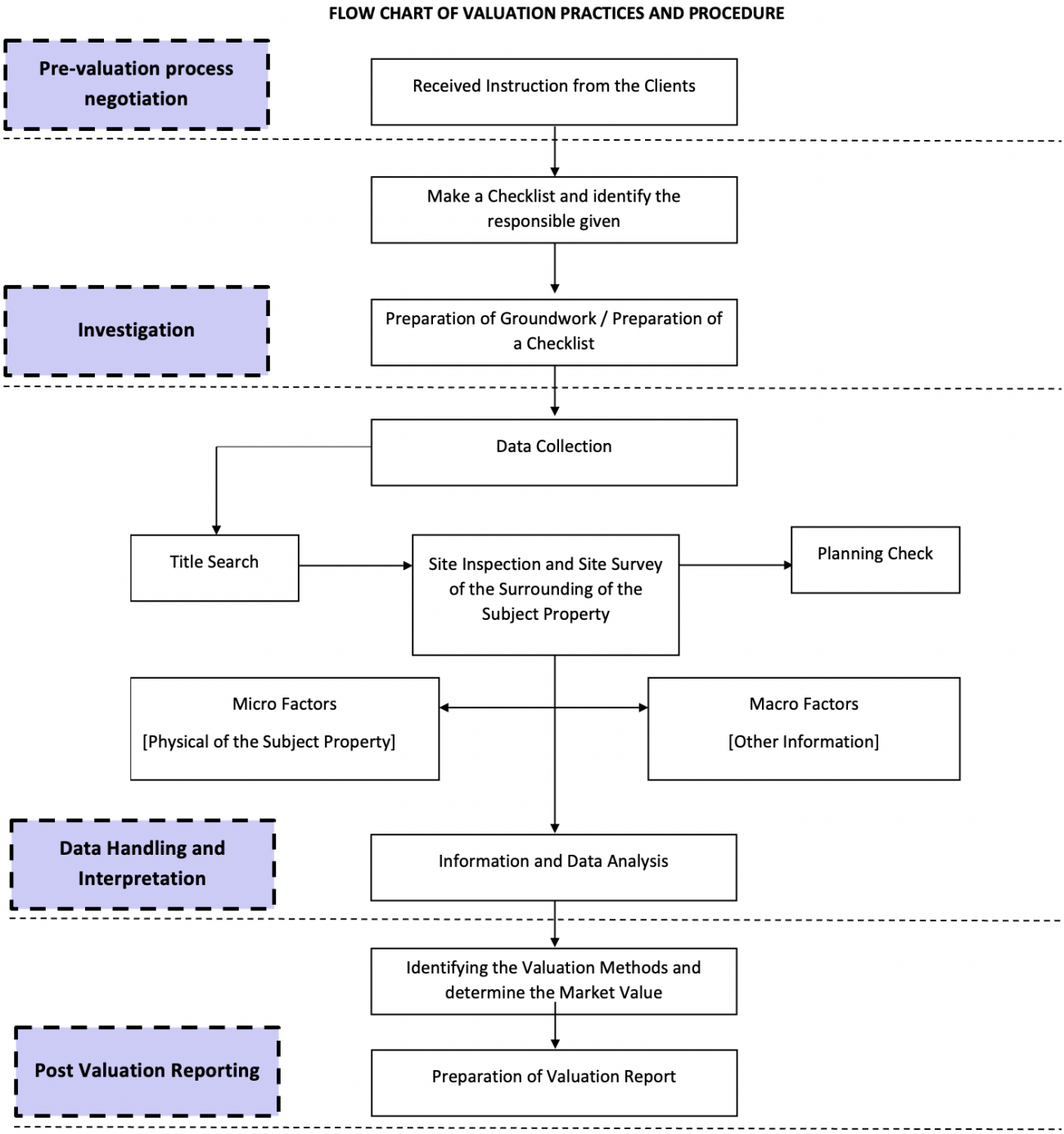


Fig. 2. Summary of Valuation Process in the Local and International Context. **Source:** BOVAEAP (2019) & RICS Research Team (2017) [5 & 6]

The valuation process in the Future Valuation Process incorporating with the Automated Valuation Models and System are listed in the flow chart at Figure 3.

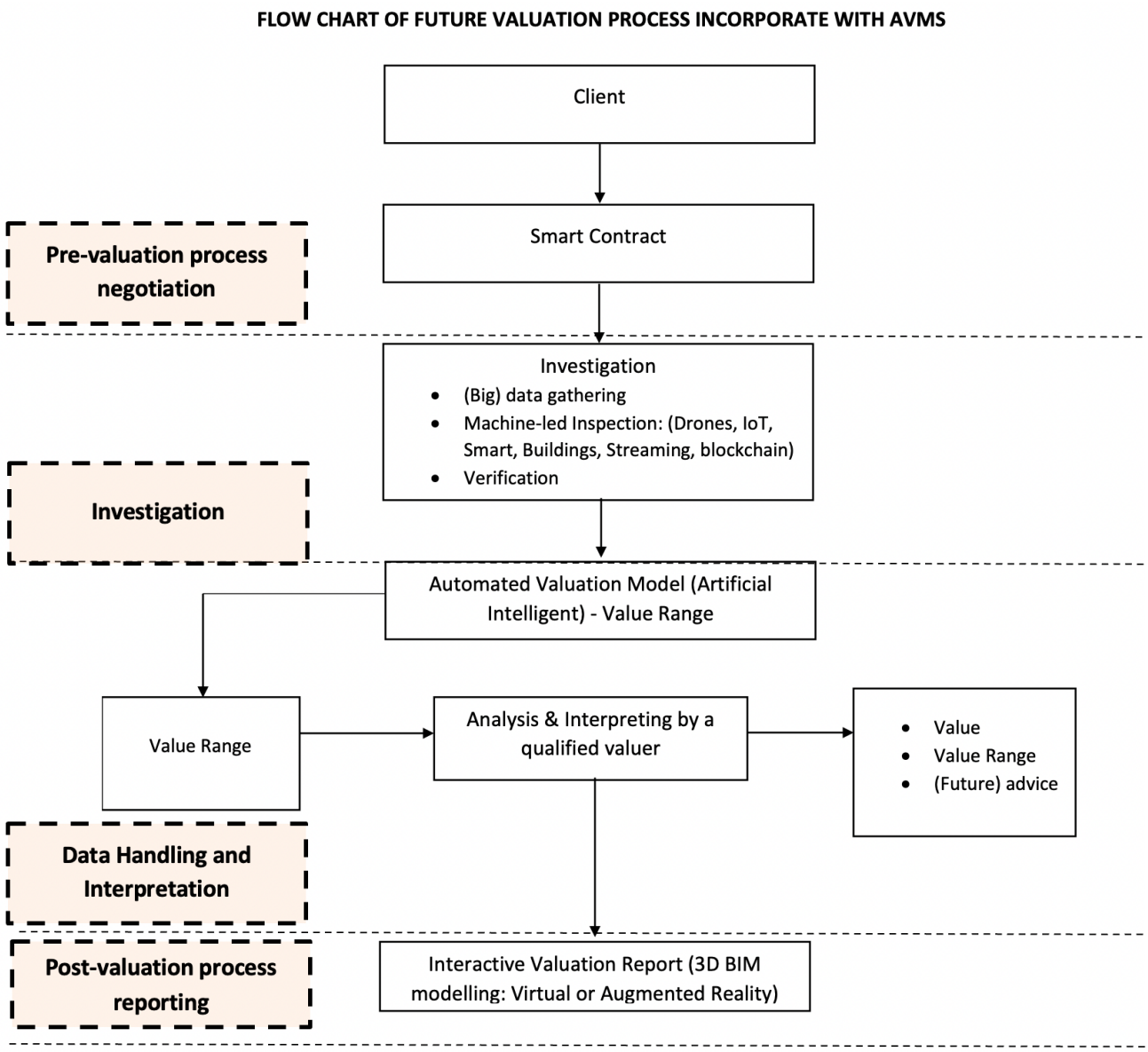


Fig. 3. Summary of Future Valuation Process Incorporating the Automated Valuation Models (AVMs)
Source: BOVAEAP (2019) & RICS Research Team (2017) [5 & 6]

4.3 The Advanced of Technology in AVMs and AVS

According to the World Economic Forum, Deep Shift: Technology Tipping Points and Societal Impact and the PwC and the Urban Land Institute, Emerging Trends in Real Estate – Europe 2017 [6] stated that '*The world is about to experience an exponential rate of change through the rise of software and services*' and '*Our biggest competitor or threat is a company that we do not know yet, which could be two friends working together in a garage*.'

In April 2015, Royal Institution Chartered Surveyors (RICS) published the Futures report outlining the key drivers of change for the land, real estate and construction sectors [6]. In the reports stated that there will be a shift from transactional to advisory roles, stating that: *'…disintermediation, triggered by access to information and the processing power of technology, is causing parts of agency, brokerage, valuation and cost estimation roles to take on a more services-and advisory-based approach.'*

According to the Research conducted by RICS in Year 2015 [6], the highest probability of the professionals to be at risk due to future computerization are the category from real estate brokers and brokerage clerks. In order to rank from the top to the bottom the affected professionals are real estate brokers and brokerage clerks, surveying technicians, appraisers and assessors of real estate, property and community associate managers, real estate, building inspectors, surveyors and cost estimators, urban planners, construction managers and Arbitrators and mediators. This research and surveys have been conducted by RICS among approximately 704 participants in the research projects of the AVMs.

The RICS research team have reported their understanding that the Valuation field is the most likely sector in the Real Estate to be affected in the future. There is an issue highlighted in the reports that Automated Valuation Models and Systems are introduced and invent in the market due to the advanced technology. This AVMs and AVS are whether able to give an accurate and efficient valuation results, or completely or partially replacing the role of the valuer. All this advancement technology is interrelated and the subject cannot be study as single subject and the understanding of the AVM must be overall through study specifically on the data (including big data), blockchain, artificial intelligence and automated valuation models.

4.4 The Data including Big Data

The data and valuation are divided into three (3) categories including the quality, sources and processing [6]. The quality is the assurance of the data to give accurate, available, reliable and security data to the end users. Then the sources are the sources from the data must be according to the client terms of engagement, obtained from the inspection, property analysis and market analysis that could give a structured information to the user to insert in the data input and the public are playing a main role to provide the data to the professionals to process the information to write a report. Meanwhile, the processing is to making sure all data collection from the sources are verify, qualify, classify, calculate and analyse by the professionals and the researchers in order to make this analysis using the data and valuation that have been obtain were clearly stated and informed to the clients. The summary of the data and valuation in the smart Diagram are in the Figure 4.

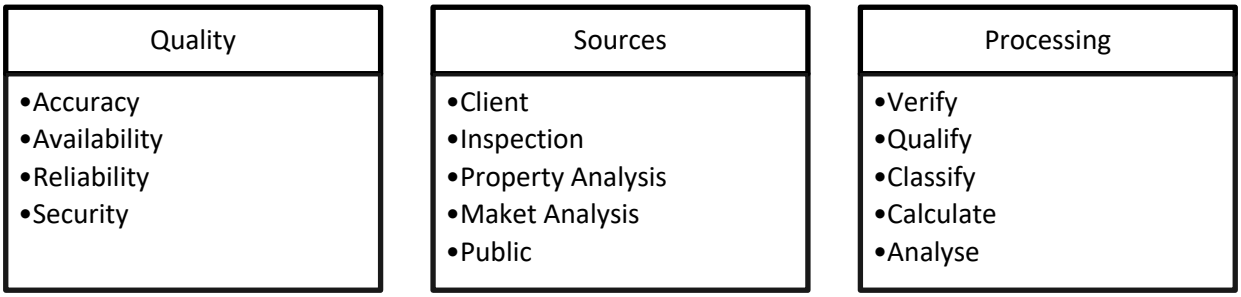


Fig. 4. Data and Valuation, Source: RICS Research Team (2017) [6]

The Data plays a major role in the real estate sector and the valuation process because the data are the most important information needed to make a decision for businesses and contracts. The Data are comprising of three categories and the data have to be very accurate and reliable unless the data cannot be obtained by any resources then the data have to be considered nulled and void.

4.4.1 Quality

The data quality will give an impact to the valuation accuracy and this must be from a reliable resource and cannot simply quotes in the market because this will affect the quality of the products and the services. A valuer must be able to review the data and be transparent because the data is a piece of information that could provide the sufficient understanding and accuracy in the value reported in the valuation report.

4.4.2 Sources

Besides, the sources are classified to primary sources and secondary sources and this information must be verify through the property analysis, a complete and details market analysis and obtaining public sources. Sometimes the information is quite challenging to obtain from the clients due to the first-hand information are not make known and available to the Valuer or the Valuer have overlook the important steps to obtain the clarification of information from the clients.

4.4.3 Processing

For the processing of data, the data must be verified, qualified, classified, calculated and analysed by the Valuer. This data is important to provides quality and accurate value in the valuation reporting process. The reason is the data obtained sometimes have uncertainty in the accuracy and reliability and this will give an outcome to the valuation of having a higher risk just like 'garbage in, garbage out'.

4.5 Big Data

The RICS glossary have defined the big data as a big data set that are so large and complex that a traditional data processing application are inadequately for the process. The big data has been defined as the seven 7 Vs of the big data in accordance to the Automated Valuation Models recognized by RICS known as volume, velocity, variety, variability, veracity, visualisation and value.

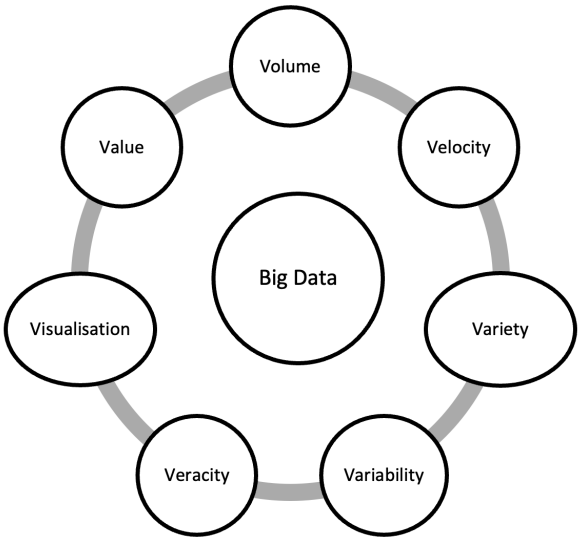


Fig. 5. The 7vs of Big Data, Source: RICS Research Team (2017) [6]

The description of each of the 7 Vs of big data are stated in the Table 2 below:-

Table 2
The 7 Vs of big data

7 Types of Vs	Description of the each of the Big Data criteria
Volume	Size is certainly an important aspect of what makes big data big – (mobile) internet, the Internet-of-Things and smart buildings are just a few examples that have added to data volume.
Velocity	The increasing speed at which data is created, processed, stored and analysed has been a game changer. The greatest potential advantage in relation to valuation is perhaps the potential to obtain data in real-time.
Variety	Much of today's data is 'unstructured' and cannot be neatly slotted into a table and analysed. For example, the use of visual data (photos posted on social media) or comments on Twitter about neighbourhoods, could have an immediate impact on the value of a property.
Variability	The meaning of apparently similar data can be different. This specifically regards language use. For example, in two sentences, two very different sentiments can be expressed: 'what a great neighbourhood to live in' or 'another bike stolen in our neighbourhood. Great, now I have to walk to work'. Software programs need to be able to identify these nuances.
Veracity	Whether traditional data or big data, the challenge of quality remains. Programs can only be as good as the data they work with. As big data makes use of many different sources at high speed, accuracy remains crucial.
Visualisation	Once processed, data needs to be presented in such a way that can be understood by the client. Currently, valuation reports remain predominantly paper-based, which does not always invite a full review of all the information. Different presentation could change the interaction between valuer and client, and make the valuer's work more useful to the client.
Value	The increased efficiency created by the other six Vs creates significant cost-saving potential. Looked at another way, the cost of poor data is potentially huge, as it can lead to incorrect decision making.

Source: RICS Research Team (2017) [6]

The advantages of Big Data and Real Estate are improving the decision-making process through a greatest forecasts and accuracy are reliable. Thereafter, the information used are correctly written and enhance the market transparency. The big data are able to provide faster performance and comprehensive analysis. One of the challenges of the Big Data is the security of the data because ethically the valuer that collecting the data must ensure that the data are privately kept and recorded and obtaining the consent from the originate of the source providers for any disclosure. The data protection laws served to provide security to the valuer to conduct the research and to do the Valuation reports [6, 10].

One of the service providers for Big Data in the country like United Kingdom is CycloMedia. The company is specializing in providing the service to capture photographs in 360-degree panorama view are stored in the online databases. a large-scale and systematic visualization of environments based on 360-degree panoramic photographs, which are stored in an online database. This product offers the possibility to view and inspect a property online from street view and street level by assessing the condition of real estate objects without visiting the property by themselves. The databases in the system can allows measurement of the external floor area and create images for reports. This system did not provide service to look inside of the building.

4.6 Blockchain and Valuations

The blockchain is an algorithm-based public ledger to records and confirm like the smart contract in the future Valuation process. This is a decentralised asset database connecting the people across network regardless of the sites, geographical areas and institutions which would not require

third party to involved. All parties have the distributed ledger and changes for the identical copy of the ledger will quickly reflects in the master files and shows full transparency like google classrooms and google excels. This is beyond that ability to editing a customer profiles and customer contracts through the blockchain where it is there forever. The blockchain system allows anyone to check the contracts and acceptance of the contract any time. The system is similar to the banks instruction for loan application and loan approvals processes, eg. online application and online approval for housing loan borrower from the financial institutions.

The blockchains system is originally an analogue wavelength system then this system moved to the digital era that allows the transaction recorded to be transfer in a secure and transparent mode. According to the RICS Land Journal [6], the effect of the internet and email as compared to the post office are quoted as below:

> *"Before email, you needed envelopes, stamps, trucks, sorting facilities and postal workers to organize and distribute the mail if you wanted to send a letter. Once people can easily verify property records themselves and transfer a title digitally, brokers, escrow companies, title insurance companies, country recorders and notaries will go the way of the post office."*

Therefore, the blockchain and valuation is a revolution of industry of 4.0 that the transaction and corresponding of the digital address that contains occupancy, financial account, legal documents details, building performance and physical characteristics and data will be conveys in a perpetual manner and all historical transactions will be maintaining in the form of digital communication.

Blockchain will indirectly affects the real estate professionals because of the transparency of the data and quick ability of the data to the users. The potentials impact of the blockchain to the valuers and valuations are less severe because of the blockchain can potentially increase the delivery processes like transparency and trust and portability of valuations.

4.7 Artificial Intelligent

The historical event for Artificial Intelligent (AI) and begin in 1997 with the using of computing power. Subsequently, the AI developed together with other technology developments like neural networks and reinforcement learning. The AI have more far-reaching implications throughout the developments and in this paper will only elaborate of the AI in current usage. Currently, AI were used in everywhere that have disrupted the predominantly routine and manual labour through advancement in the technology in the mass and busy world. The example of the AI are self-driving cars and this could help to make a lot changes in the technology world and the taxi and truck drivers may be at risk in the near future.

The AI accepts feedback and the monitor processes are hundreds of times in the algorithm to achieve the results and the correct answer in the computerize calculation of the accepted valuations. At the same time, the algorithm reading in the computer software can generate more than a property or assets value for an unknown valuation.

4.8 The advantages and challenges of AVMs & AVS

The advantages of AVMs and AVS are the technology usage saves times because the function of technology is easily accessible and easily communicate. This data is an insight to us that in Valuation the AVMs have all the linkages of communication. Moreover, blockchain provides us reliable and trustworthy database to keep the transaction and the smart contracts. The AVMS helps

to keep the workspace clean and tidy, organize and systematics to retrieve the files and information. This could help valuer to manage resources more efficiently because ICT is accessible by users when need to retrieve information from the AVMs [19]. The AVMS has also reduce the human contact and manpower because the computerized system has made the information easily to be communicate through technology. However, the risk of fraudulent activity can be at higher risks because of the transparent of the information and data in the online system [19]. The challenger of AVMs and AVS are refers to the monetary costs and execution time of creating the data bases and software for Automated Valuation Models. There are more expensive and costly than operation using the traditional valuation models [20]. Therefore, there is pros and cons in the AVMs and AVS technology usage. The technology in AVM will improves the delivery system in the Valuation processes.

5. Conclusion

The impact of Covid-19 has resulted in most of activities in countries worldwide to be conducted online, thus the Information and Communication Technology (ICT) cannot be separated from the technology world especially in the workplace [17]. The future of the Valuation process in the Valuation Automated Models and the Automated Valuation Systems will indirectly reduce the time required to prepare and deliver a Valuation report through the systematic management of the Automated Valuation Systems [19]. There are many types of technology advancement that can be used for the enhancement of the Valuation processes such as in the terms of engagement like using smart contracts, inspection using the drones and smart buildings, image streaming and recording and visualizing the valuation reports.

References

[1] JPPH. (2022). Official Portal Valuation and Property Services Department (JPPH). Retrieved August 5, 2022, from https://www.jpph.gov.my/v3/en/department-profile/background/

[2] NAPIC. (2022). National Property Information Centre (NAPIC), Valuation and Property Services Department. Retrieved August 5, 2022, from https://napic.jpph.gov.my/portal/web/guest/about-napic

[3] LPPEH. (2022). Welcome to The Board of Valuers, Appraisers, Estate Agents and Property Managers. Retrieved August 5th, 2022, from https://lppeh.gov.my/WP2016/

[4] RISM. (2022). Royal Institutions Surveyors Malaysia. Retrieved August 5th, 2022, from https://rism.org.my/about-us/

[5] BOVAEAP. (2019). Malaysian Valuation Standards (Sixth Edition ed.). Kuala Lumpur: Board of Valuers, Appraisers, Estate Agents and Property Managers.

[6] RICS Research Team. (2017). The Future of Valuations. The relevance of real estate valuations for institutional investors and banks –views from a European expert group (First Edition ed.). London: The Royal Institution of Chartered Surveyors (RICS).

[7] CBRE-WTW. (2017). Market Outlook Report 2017. Kuala Lumpur: C H WILLIAMS TALHAR & WONG MALAYSIA.

[8] Mani Usilappan. (2006). Challenges, Insights and Issues in Property Valuation and Investment. In M. Usilappan, Real Estate in Malaysia Challenges, Insights and Issues (pp. 3-10). Kuala Lumpur: UM Press.

[9] Glumac, Brano, and François Des Rosiers. "Practice briefing–Automated valuation models (AVMs): their role, their advantages and their limitations." *Journal of Property Investment & Finance* 39, no. 5 (2021): 481-491.

[10] Glumac, Brano, and François Des Rosiers. "Towards a taxonomy for real estate and land automated valuation systems." *Journal of Property Investment & Finance* 39, no. 5 (2021): 450-463.

[11] French, Nick, and Laura Gabrielli. "Pricing to market: Property valuation revisited: The hierarchy of valuation approaches, methods and models." *Journal of Property Investment & Finance* (2018).

[12] Ganeshkumar. (2017). The Implementation of AVM among Valuation Firms in Peninsular Malaysia. Johor Bahru: Faculty of Geoinformation and Real Estate, University of Technology Malaysia.

[13] Tajani, Francesco, Pierluigi Morano, and Klimis Ntalianis. "Automated valuation models for real estate portfolios: a method for the value updates of the property assets." *Journal of Property Investment & Finance* (2018).

[14] Filippova, Olga, Jeremy Gabe, and Michael Rehm. "Pricing office rents in Sydney CBD: testing the water on automated rent reviews." *Property Management* 40, no. 2 (2022): 230-246.

[15] RICS (2013). RICS Information Papers, Automated Valuation Models, 1st Edition. London: Royal Institution of Chartered Surveyors (RICS).
[16] Hasniyati, H. & Yasmin, M. (2020). Smart Cities Conceptualisation and Implementation. Kuala Lumpur: University of Malaya Press.
[17] Faishal Ibrahim, Muhammad, Fook Jam Cheng, and Kheng How Eng. "Automated valuation model: an application to the public housing resale market in Singapore." *Property Management* 23, no. 5 (2005): 357-373.
[18] Nick and Laura (2018). Property Valuation Revisited: The Hierarchy of Valuation Approaches, Methods and Models. Journal of Property Investment and Finance, Emerald Publishing Limited. Vol 36, No. 4, 2018, pp. 391-396
[19] Nigel S. and Andrew K. (2021). Automated Valuation Models Roadmap for RICS Members and Stakeholders. Royal Institution Chartered Surveyors (RICS).
[20] Krause, Felix, Marc-Andre Bewernik, and Gilbert Fridgen. "Valuation of manual and automated process redesign from a business perspective." *Business Process Management Journal*(2013).