# HOUSING MARKET AND FINANCIAL CRISIS: AN ANALYSIS OF BIBLIOMETRIC FROM 1997 TO 2021

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# HOUSING MARKET AND FINANCIAL CRISIS: AN ANALYSIS OF BIBLIOMETRIC FROM 1997 TO 2021

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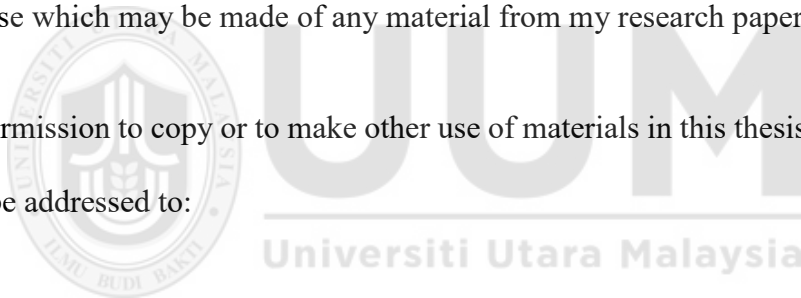
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# ABSTRACT

This study presents a bibliometric analysis of the publications on housing market and financial crisis research from the Scopus database during the period of 1997 to 2021. Based on the keywords used, which are related to housing market and financial crisis in the article title, the study retrieved 1,231 documents for further analysis using various tools. This study used Microsoft Excel to conduct the frequency analysis, VOSviewer for data visualization, and Harzing's Publish or Perish for citation metrics and analysis. This study reports the results using standard bibliometric indicators such as the growth of publications, authorship patterns, collaboration, and prolific authors, country contribution, most active institutions, preferred journals, and top-cited articles. Based from the findings, there is a continuous growth of publications on housing market and financial crisis research for 24 years since 1997. United State was the largest contributor to housing market and financial crisis research, followed by the United Kingdom. The *International Journal of Urban and Regional Research* published the most number of publications related to housing market and financial crisis research. The finding of this study enable government, policy makers and researchers to analyze the research trend on housing market and financial crisis by using bibliometric analysis.

**Keywords**: Bibliometric analysis; Harzing's Publish or Perish; Scopus; Research patterns and tends; Researchers; VOSviewer.

# ABSTRAK

Kajian ini membentangkan analisis bibliometrik penerbitan mengenai pasaran perumahan dan penyelidikan krisis kewangan dari pangkalan data Scopus dari tempoh 1997 sehingga 2021. Berdasarkan kata kunci yang digunakan, iaitu berkaitan dengan pasaran perumahan dan krisis kewangan yang terdapat di dalam tajuk artikel, kajian ini telah mengambil 1,231 dokumen untuk dianalisis dengan lebih lanjut menggunakan pelbagai teknik. Kajian ini menggunakan Microsoft Excel untuk menjalankan analisis frekuensi, VOSviewer untuk visualisasi data dan Harzing's Publish or Perish untuk metrik dan analisis sitasi. Kajian ini melaporkan keputusan menggunakan analisis bibliometrik seperti pertumbuhan penerbitan, corak pengarang, kerjasama, dan pengarang prolifik, sumbangan negara, institusi yang paling aktif, jurnal pilihan, dan artikel teratas. Berdasarkan penemuan kajian, terdapat pertumbuhan berterusan penerbitan mengenai pasaran perumahan dan penyelidikan krisis kewangan selama 24 tahun sejak tahun 1997. Amerika Syarikat merupakan penyumbang terbesar kepada pasaran perumahan dan penyelidikan krisis kewangan, diikuti oleh United Kingdom. "*International Journal of Urban and Regional Research*" menerbitkan bilangan penerbitan yang paling banyak berkaitan dengan pasaran perumahan dan penyelidikan krisis kewangan. Dapatan kajian ini membolehkan kerajaan, pembuat dasar dan penyelidik menganalisis trend penyelidikan mengenai pasaran perumahan dan kisis kewangan dengan menggunakan analisis bibliometrik.

**Kata Kunci**: Analisis bibliometrik; Harzing's Publish or Perish; Scopus; Corak penyelidikan dan cenderung; Penyelidik; VOSviewer.

# ACKNOWLEDGEMENT

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| | |
|---|---|
| IMF | International Monetary Fund |
| GDP | Gross Domestic Product |
| U.S. | The United States |
| U.K. | The United Kingdom |
| RERM | Real Estate Rental Market |
| HPI | House Price Index |
| OLS | Ordinary Least Squares |
| GFC | Global Financial Crisis |
| TP | Total Publication |
| TC | Total Citation |
| NCP | Number of Cited Publication |

# CHAPTER 1

# INTRODUCTION

## 1.0.    Introduction

One of the most important economic shocks in the post-war period was the global financial crisis which was originated from US. Prior to the subprime loan crisis in the United States, the house prices in Australia, Sweden, Spain, Ireland, and the United Kingdom were more than double those prices in the early 1990s (Todd, 2008). Increased of home prices will contribute to the increased of house price's volatility, which is a major determinant of mortgage default and prepayment (Miles, 2008). The Asian financial crisis of 1997 increased the growth in house prices' volatility (Meen, 1998). As an outcome, many researchers consider that significant increases in housing prices could contribute to a housing bubble (Roche, 2000; Hou, 2009).

However, the sub-prime loan crisis in the United States showed how significantly house price fluctuations can negatively impact real-economy stability, particularly in large housing markets such as the United States, the Euro Zone countries, and China (Chen, et al. 2013). Following the bursting of the US housing bubble, the global financial market has become extremely volatile in terms of debt issues in both the US and European countries including Greece, Italy, Portugal, and Ireland (Chen, et al. 2013). Minsky (1986) identified five stages that asset price bubbles and bursts go through: displacement, boom, euphoria, profit taking, and panic. If the housing market is boomed, the increase in house prices will lead to an increase in the house's expected future price (Hayford & Malliaris, 2010). Bubbles are expensive because they will lead a country to bubble bursts and capital reversals (Caballero & Krishnamurthy, 2005). Therefore, if compared to the market crash, the bursting of a housing market bubble can have higher negative impact on the economy. This is due to the high transaction costs, illiquidity and heterogeneity of the housing characteristic (Hayford & Malliaris, 2010).

## 1.1. Background of Study

Developments in the housing market are significant for households, firms, and banks. Housing functions both as a long-term expenditure. Housing accounts for a large share of the wealth of households in U.S, and higher house prices increase the net worth of households (La Cava, 2016). For example, the growth in the housing share reflects a combination of both a higher rate of return (left-side panel in Figure 1.1) and a higher wealth to income ratio (right-side panel in Figure 1.1) are reflects in the national accounts decomposition. Based on the auditor, the growth in the share of housing capital income in the early 1980s seems to be explained by an increased in the rate of return, although the rise in the housing wealth-to-income ratio has been the most important factor since the 1990s. The decomposition by type of housing, however, shows that the rise in the overall housing capital income share is attributed to araise in the wealth-to-income ratio for owner-occupied housing. The wealth-to-income ratio for tenant-occupied housing, on the other hand, has been slowly decreasing since the Great Depression (La Cava, 2016).

**Figure 1.1:** Net Housing Capital Income and Wealth
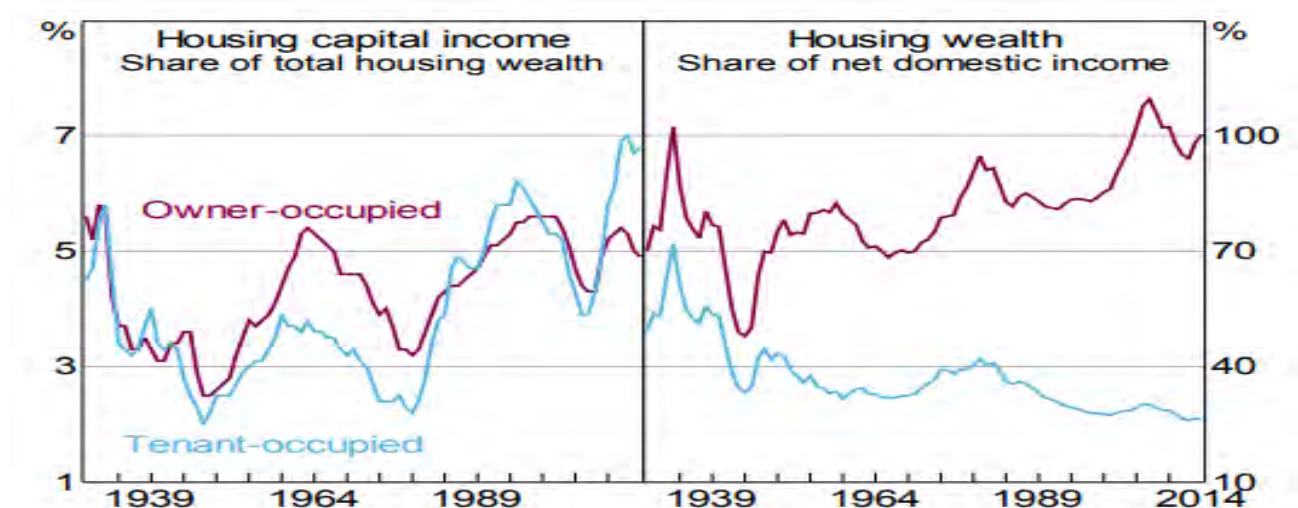


Note: Housing capital income measured as the net operating surplus of the housing sector

Sources: Author's calculations; Bureau of Economic Analysis

The house prices, whether in urban or rural areas, have increased dramatically (Abdul Rahman & Ridzuan, 2020). In Q3 2020, the housing price increases strengthened in various countries in Europe, Asia-Pacific, and Canada and the US. According the published housing statistics, the actual housing prices (i.e., prices adjusted for inflation) rose in 43 out of the 55 world's housing markets. Strong increases in house prices have occurred in Euro countries such as Turkey, the Slovak Republic, Germany, the Netherlands and Austria. With the notable performances by countries such as Vietnam, New Zealand, and Taiwan, the Asia-Pacific region is also getting popular. The U.S. house price rise continues unabated even though being the new epicenter of the corona virus outbreak. In Q3 2020 (inflation-adjusted), the S&P/Case-Shiller seasonally-adjusted national house price index rose by 5.51% which sharply up compared to the previous year's 1.46% growth. The U.S. house price index increased by 6.51% y-o-y in Q3 2020 (inflation-adjusted), up from 3.21% the prior year and the largest y-o-y rise from Q3 2015 which is reported by the Federal Housing Finance Agency's seasonally adjusted purchase-only. The International Monetary Fund (IMF) recently updated in 2020 global economic outlook to a 4.4% downturn, up from a 4.9% fall in June.

## 1.2. Problem Statement

The financial crisis in the housing market triggers bubbles. These bubbles are costly because they will expose a country to bubble bursts and capital reversals (Caballero & Krishnamurthy, 2005). As compared to a financial market collapse, the bursting of a housing market bubble will have a negative impact to the economy, such as the high transaction prices, illiquidity, and heterogeneity of housing characteristics (Helbling & Terrones, 2003). The bursting of a house price bubble leads to a slow adjustment process, as house prices tend to revert to their equilibrium price. As a consequence, inefficient houses prices will prevail in the market for a longer period (Helbling & Terrones, 2003).

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Kallberg (2012) explained that as a real estate market plunges, banks and financial institutions lose billions as a result of overexpansion of the market. This loss quickly spreads to other sectors of the financial field, contributing in a variety of financial issues such as currencies, banking, and stock market crises (Kallberg, et al. 2002). For example, Reinhart and Rogoff (cited in Hayford and Malliaris, 2010) found that the main risks of systematic banking crises is an asset price bubble,which is the reason of the credit over-expansion during the asset boom.

During the current worldwide financial crisis, the volatility of currencies price are linked to foreign exchange and investment mechanisms, which suggests that a burst of housing bubble will decrease the global real economy. Since the middle of 1990s, house prices in the U.S. have increased significantly and the prices continued to increase sharply even during the 2001 recession (McCarthy & Peach, 2004). The low interest rates and poor lending standards are the factors that contributed to the emergence of the US house price bubbles (Krinsman, 2007). The primary factor contributing to the expansion (boom) in the US real estate market is the low interest rate (Unterman, 2009). Therefore, the mortgage financing become cheaper which resulted in more demand for houses (Crouhy, et al. 2008). This rapid growth in housing prices also triggered a huge housing crisis which bursted in 2007. The U.S. Government-sponsored businesses are the Federal National Mortgage Association ("Fannie Mae") and the Federal Home Loan Mortgage Corporation ("Freddie Mac") were the two mortgage companies that went into financial problem. Then other organizations offering mortgage-backed securities (MBS) and collateralized debt obligations (CDOs) were also experienced financial losses (Kim & Kim, 2009). These evident indicate that the volatility of housing market triggered a crisis of bank in the US economy.

House prices have been increased and decreased continuously over the last few decades (Tsai & Peng, 2011). The housing bubble is triggered by speculators and market investors who seek a dramatic rise in the price of houses for their own benefit (Abdul Latif, et al. 2020). The

housing price issues come in different aspects but the main interest is on the housing affordability. As commented by Mints (2008), Russia has seen an unexpected increase in housing prices, making it less affordable to first home buyers. The lower interest rates caused an increased in house prices through the growing lending availability, which boosted household borrowing (Kim & Min, 2011). Housing affordability problems have recently been raised in China, as the issue has turn into a social and economic problem for the country. The rapid economic growth caused house prices to increase, causing it to be unaffordable, especially during the 1997/98 Asian Financial Crisis (Husain, et al. 2011). According to Hashim (2010), the Malaysian residential property market has grown significantly in the last decade, mainly in some states. Suhaida et al. (2011) indicates that strong growth in Kuala Lumpur and Selangor has resulted in a major growth in Malaysia's house prices. Haron and Liew (2013) supported this argument by presenting a case study which showed that similar types of houses in the Klang Valley also have different price levels.

In addition, economic effects such as declining economic growth may also be influenced by a lack of house affordability. If the mortgage loan is too high, the households are required to minimize disposable income, thus lowering buying power and consumption levels. In fact, the households must pay a higher initial housing loan deposit, which would also decrease the amount of their expenditure. This resulted in the increase of house prices which caused a decrease in GDP, thus slowing down economic growth (Pettinger, 2019).

Finally, higher house prices will lead to the lack of labour and have an impact on labour market productivity in national and regional areas. The price of housing in urban cities is considerably higher than in therural areas. When residents in a particular area are unable to pay such higher house prices, they prefer to be transfer and relocate to other locations. The labour migration process would build a gap between jobs and employees. The challenge of recruiting low-paid employees in high-cost global cities would also occur (Judith and Vivienne, 2007).

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As discussed above, the housing market issue is important in the real estate industry. The previous studies have examined real estate industry publications comprehensively. The rent depreciation's calculation techniques introduced in the UK commercial real estate industry were analyzed by Dixon, Crosby, & Law (1999). More than 100 reports on multi-family housing were analyzed by Zietz (2003) which then classified it into five classes. A latent semantic analysis was used by Winson & Evangelopoulos (2013) to analyse the topics of real estate studies from 1973 to 2010. However, the Real Estate Rental Market (RERM) field no research work that analyses publications for the best understanding. An overall review of the RERM literature is also required, as it could encourage decision makers, practitioners, and scholars (Liu, Wang, He, & Dong, 2020).

Angammana & Jayatissa (2016) stated that university libraries spend a huge amount of money annually on the procurement of information sources essential for their specific user. Study projects need to be undertaken to verify the importance and usage of these sources of knowledge and to make an efforts to obtain suitable sources of information to satisfy the needs of the users. In addition, the authors share about the basic rule of 80:20 which may be used to choose details sources in different subject disciplines. The 80% of the overall usage, according to this law, comes from 20% of the total collection. If librarians can understand this 20%, the library can fulfill 80% of user requirements for the most frequently used materials.

It is very important to supply information sources to the users; however university libraries have minimal capacity. Therefore, a method to discard unused and under-used sources of information needs to be developed. Therefore, this study will explore the bibliometric analysis in order to capture which topics of the housing market are being studied by researchers from 1997 to 2021. In addition, it is also the interest of this study to map the interconnection of housing market topic and financial crisis.

### 1.3. Research Objectives

This research goal to achieve the following objectives:

1. To examine the current topics, top researchers, authorship pattern, distribution of citations by subject, country of origin, types of documents and top institutions which publish in Scopus journal from 1997 to 2021 in the main area of housing market and sub-area of financial crisis.

2. To map the subareas and interconnection in housing market and financial crisis

### 1.4. Research Questions

The questions of this research are as follows:

1. What are current topics, top researchers, authorship pattern and top institutions which publish in Scopus journal from 1997 to 2021 in the main area of housing market and sub-area of financial crisis?

2. What are the sub-areas and interconnections in housing market and financial crisis?

### 1.5. Significance of the Study

This study will use bibliometric analysis in order to understand the research areas carry out in housing market and financial crisis. This is significant as it will evaluates the relevant of housing market and financial crisis literature for the objective of identifying potential research gaps, broadening and strengthening its complete knowledge base, investigate the forefront of trends in its development, and exhibiting the boundaries of existing academic work. This study aims to expose housing market collaboration network between different countries, institutions, and individuals.

Science mapping analysis is one of the mainly significant methods in bibliometrics, since it helps scholars interpret research trends deeply and instinctively see the structure and the trend of a research field or a journal (Cobo, et al. 2011). Research conducted using software for

bibliometric analysis and visualization is used to assess the significance of housing market research by means of mapping out the knowledge structure. Additionally, a historical review method is used in this study for a longitudinal review of the literature that allows researchers to track the evolution of the concept of housing market. VoSviewer (Stopar & Bartol, 2019), CiteSpace (Chen C. M., 2006) and CitNetExplorer (Eck & Waltman, 2014) have been popular visualization tools used to analyze science maps up to today. VoSviewer and CiteSpace were select for this study to do an overall and in-depth analysis of the journal.

## 1.6.    Definition of Key Terms

The definitions of each concept involved in the present study are presented as follows:

**Bibliometrics** is a type of research method that utilizes quantitative analysis and statistics to describe patterns of publication within a given field or body of literature (Smith, 1981).

**Citation** is defined as the acknowledgement that one document receives from another (Diodato, 1994).

**Citation analysis** is that area of bibliometrics that deals with the study of the relationship between cited and citing documents (Diodato, 1994).

## 1.7.    Organization of the Study

There are five (5) chapters have been organized for this study. Chapter one (1) is addressing on the whole idea of the research, whereby Chapter two (2) will be discussing on the literature review of housing bubles, housing affordability and bibliometric studies. Chapter three (3) presents the data and methodology of the study and Chapter four (4) discusses the analysis and findings. Chapter five (5) contains a conclusion and recommendation.

# CHAPTER 2

# LITERATURE REVIEW

## 2.0.    Introduction

This chapter discusses about the previous research and selected literatures that are relevant to the housing market in section 2.1 and bibliometrics analysis is explain in section 2.2. The literature of housing market for this study will be focus only on the most significant topics such as housing affordability and housing bubbles.

## 2.1    Housing Market Studies

The housing market research has many sub-topics. It is a very broad topic. Consequently, this study will only be focused on the housing bubbles and housing affordability which are related to the financial crisis.

### 2.1.1    Housing Bubbles

Case and Shiller (2003) define an asset bubble as a price growth that is unrelated to economic fundamentals like inflation, income, and interest rates. As a result, a housing bubble will help an economy's development during a period of growth (Dreger & Zhang, 2010). Nevertheless, if the housing bubble bursts, it will result in panic sales, which will have a severe adverse effect on the real economy (Chen, et al. 2013).

Increases in house prices are driven by both fundamentals of the economy and speculations (Hu, et al. 2006). Several researchers have studied asset price bubbles, including Case and Shiller (1989), Levin and Wright (1997), Muellbauer and Murphy (1997), and Roche (2000), After Minsky published his book on economic instability theory, that demonstrated in 1986 how the asset price bubbles burst. Several researchers have studied asset price bubbles, including Case and Shiller (1989), Levin and Wright (1997), Muellbauer and Murphy (1997), and Roche (2000).

According to Piketty (2014), speculative bubbles in real estate and stock markets have lasted for as long as capital itself. Normally, changes in housing prices must be related to either changing fundamentals or speculative behavior, or a mixture of the two (Coskun, et al. 2017). The speculative bubble problem arises as a result of uncertainties surrounding the 'fundamentals.' (Xiao & Tan, 2007). A bubble's existence can be concluded from (abnormal) correlations between housing prices and market fundamentals (Hui & Yue, 2006). According to Kindleberger and Aliber (2005), noise is defined as fundamental price fluctuation, but a bubble is called an upward price movement over a period of 15 to 40 months, which then implodes.

During the US technology bubble, Brunnermeier and Nagel (2004) identify quick increases and collapses of hedge funds. A housing price bubble is known as a gap between the actual price and the fundamental price, where the fundamental price indicates the discounted value of the flow of expected housing services, which is impacted by supply and demand factors in the housing market, as well as interest rates, which influence the discount rates (Dovman et al., 2012). Once we know the deviation of real house prices from their fundamental value, we can determine whether it is a bubble or not (Hott & Monnin, 2008).

Researchers were interested in whether a home price bubble existed in the US housing market prior to the current global financial crisis in 2007 (see Hastings, 2004; McCarthy & Peach, 2004, 2005; McKnight, 2005; Clithero & Pealer, 2005). For example, the ratio analysis to measure the housing price bubble in the U.S. housing market in 2004 and 2005 were used by McCarthy and Peach (2004, 2005). Nevertheless, the authors failed to identify housing bubble in the US and decided that the quick growth in housing prices are due to rising income and lower interest rates.

The study on housing price bubbles continue in European countries. For instance, the existence of housing price bubbles in London, England was investigated by Levin and Wright (1997). The findings support the concept that speculation is the cause for the volatility in house prices in London and the other parts in UK. Similarly, there is a approximate housing price bubble in Paris, France stated by Roehner (1999). Testing twenty districts in Paris, have resulted in a significant connection among the house price and speculation, mainly in higher priced areas such as the south west part of the region, where the house price elasticity on speculation is larger than 1.3.

The important evidence of bubbles in Asian and East Asian countries such as Japan, Hong Kong, Korea, China and Thailand are documented in some studies. The over-booming and fluctuations of real estate markets in some Southeast and East Asian countries which contributed to the 1997 Asian financial crisis was analyzed by Quigley (2001). For instance, Calhoun (2003), studied house price indices (HPI) in Thailand from 1992 to 2003, from pre-crisis to post-crisis (2000). The important regional differences in housing price inflation rates for both the pre-crisis and post-crisis periods using a hedonic property valuation model was analyzed by Calhoun (2003). The facts of bubble form in the Japanese and Korean housing markets were discovered by Kim and Suh (1993). The authors discovered evidence of both nominal and actual bubbles in the Japanese market by using an equilibrium price equation that included the GDP stock price index and household consumption expenditure. The study unable to reject the null hypothesis, which stated that there were no real estate price bubbles in Korea.

Durlauf and Hall's (1989) signal extraction technique for identifying unobservable model noise and misspecification fault in three Hong Kong property market urban areas used by Chan et al. (2001). Bubble bursts were seen in Hong Kong Island, Kowloon, and New Kowloon from 1990 to 1992 and 1995 to 1997, suggesting that the bubble was triggered by a misspecification error.

In Hong Kong, the similar bubbles in the residential housing market was reported by Wong (2008). The study analyzed the movement of Hong Kong house prices from 1992 to 1998, including the fundamental factors such as population growth, housing stock construction costs, and interest rates.

### 2.1.2 Housing Affordability

Researchers use the term housing affordability to provide approaches, procedures, and contexts, especially in the implementation of housing policy and schemes. Housing affordability is a basic indicator of a household's ability to buy a home (Norazmawati, 2012). Based on Wilcox (2003) study housing affordability is generally indicated by access the rules to mortgage finance, which can pose a problem in housing affordability issues. Furthermore, in terms of customer capacity and desire to buy a home; housing availability is a function of housing service rather than a feature of housing which is concluded by Suhaida et al. (2011). These concepts indicate that there is a correlation between household income and house price and that both of these factors have a significant impact on housing affordability (Chen et al., 2007).

Housing affordability has been a source of argument, and there are a number of factors that must be addressed by both the public and private sectors. Speculation, demand and supply, income, demographics, residential property price, land cost, construction cost, and changing economic growth and human psychology are all factors that influence housing affordability (Yap & Ng, 2018). In an ordinary least squares (OLS) regression, the relationship between direct cash housing subsidies, house prices, housing starts, income, inflation rate, and real GDP growth rates with housing affordability are being examined by Lee and Reed (2014). The housing affordability relationship between the housing prices and direct cash housing subsidies has an important contribution.

Affordability indicators tend to shift in perfect agreement with the housing market's cyclist (McCord, et al. 2011). According to Maclennan (2008), affordability and house price volatility are closely connected. There is a common belief that housing market booms lead to a significant decrease in housing affordability as well as a widening of affordability differences across regions (Gan & Hill, 2009). Furthermore, the fall of the sub-prime mortgage market in the United States and the subsequent contraction of global mortgage liquidity have shown that the supply of mortgage finance, though in a different way, heightens affordability problems (McCord, et al. 2011).

Previous boom-bust cycles in the UK real estate market have been seen to be asymmetric across income groups, with lower-pay households being all the more contrarily affected by economic conditions, resulting in repayment difficulties and a decreased opportunity to access the market at a sensible price (Pryce & Sprigings, 2009).

The global factor of the housing affordability crisis caught more attentions from researchers lately. Wetzstein, (2017), Florida & Schneider, (2018), Rifkinn (2014), Miller & Wei (2018), and Kallergis et al. (2018) provide evidence for the worldwide environment of the affordability crisis, with both developed and growing countries facing issues with affordable housing. Miller and Wei (2018) evaluate normal housing expenses with net month to month pay in over one hundred cities around the world, finding that monthly housing expenses are greater than twice the average income in 15 of cities. At last, Kallergis et al. (2018) use an expert study of approximately 200 cities worldwide to argue that differences in housing affordability can be explained in part by restrictions in land supply.

With the exception of the period immediately after the Global Financial Crisis (GFC), these trends in housing affordability have been addressed mainly as an intergenerational problem in Europe and elsewhere as a result of rapidly rising house prices in the 2000s (Haffner & Hulse,

2019). A growing literature on 'generation rent' has reported on how first-time entrants into the housing market were unable to obtain homeownership and have ended up in the rental sector, where they are likely to remain for long periods of time (Arundel & Ronald, 2016; Eaqub & Eaqub, 2015; Lennartz, Arundel, & Ronald, 2015; McKee, 2012; McKee, Moore, Soaita, & Crawford, 2017).

Mapping by Li (2014) shows that the number of publications on the subject of 'housing affordability' in 26 selected journals has increased, especially since the GFC. Ezennia and Hoskara (2019) recently published an updated analysis of the English-language literature on housing affordability evaluation published between 2000 and 2018. According to these reviews, there is scholarly discussion of housing affordability in the advanced economies (North America, Europe, and Australasia) in the fields of housing/urban studies, economics, and social sciences.

## 2.2    Bibliometric Studies

According to Agyeman and Bilson (2015), Bibliometrics, also known as scientometrics is a research technique in library and information science that applies quantitative analysis and statistics to describe publication patterns in any field of knowledge. Reuters (2008) also defines bibliometrics as the application of quantitative analysis and statistics to publications. It is used in research performance evaluation especially in university and government laboratories and also by policymakers, research directors and administrators, information specialists and librarians, and researchers themselves.

According to Lopez-Salido (2011), the usability of rental housing could reduce the risk of a housing price bubble. Furthermore, Rubaszek and Rubio (2020) argue that a higher rental portion reduces business cycle fluctuations. Cuerpo et al. (2014) and Czerniak and Rubaszek

(2018) discovered that a mature real estate rental market diminishes the disturbances from both economic and demographic factors on the housing market.

The bibliometric analysis is an effective method to quantitatively analyze academic publications using statistical techniques, consists of citation analysis and content analysis (Zhong et al., 2016). The citation network analysis implies the linkages between citing and cited publications as well as researchers' interactions, thus helps to visualize the sub-fields and corresponding intellectual interconnections (Peris et al., 2018).

Nowadays, bibliometric analysis has been quickly developed and applied to several areas of study, as it's an efficient method to determine the merits of a particular subject area or publication (Shang, et al. 2015). The purpose of bibliometrics is a field in which philology; information technology, mathematics and statistics are thoroughly intersected and merged in a subject area (He, et al. 2017). Because of its potential advantages, bibliometrics has a large variety of uses in various fields, such as business and economics (Merigo, et al. 2016), fuzzy decision-making (Liu & Liao, 2016), sustainable energy (Hache & Palle, 2019) and renewable energy supply chain (Azevedo, et al. 2019). In addition, based on bibliometric analysis can explored the publications' structure and the growth trend of a journal and in recent years, academics have tended to systematically study papers.

## 2.3    Conclusion

Chapter two reviews the literature on housing market and bibliometric analysis. It discusses the literatures on the housing buble in the U.S., European countries (such as UK and France) and Asian countries (for instant China, Japan, Korea and Hong Kong). The discussion of identifying housing affordability problems led to two important factors to consider. Firstly, the structural pathways in housing policy and schemes have disappointed buyers because of the difficulties to complete in the open housing market and the gap of affordable housing is yet to be filled by the state. Secondly, the capability of buyer in doing things and not their intention in doing it is influenced by the formal structure. Additionally, there are many reaserch studies that highlight the housing affordability problems in the international perspectives. Finally, chapter two also discussed about the literatures on the bibliometric analysis in various fields.

# CHAPTER 3

# RESEARCH METHODOLOGY

## 3.0. Introduction

This chapter elaborate about research methodology used in this study. Section 3.1 explains about the research method and tool employed while section 3.2 discusses on the research design. The data collection procedures are described in section 3.3. Section 3.4 clarifies about the data analysis technique.

## 3.1. Research Method and Tool

Bibliometrics is a scientific research area, and it has attracted more and more attention by the scientific community (Alvarez-Betancourt & Garcia-Silvente, 2014). Bibliometrics is a type of researchused in different subject areas by scholars. This techniques are used for a variety of purposes such as the determination of various scientific indicators, the evaluation of scientific output, the selection of journals for libraries and even the forecasting of potential Nobel Laurates (Zafrunnisha, 2012).

This concept originated initially as a statistical bibliography and then established into a significant field, which is now commonly accepted as bibliometric studies. It is used in this area for analyzing text and results. Bibliometrics is quantitative in nature and can be used widely for the study of literature in the area of Library and Information Science. It is known that this method of analysis is used mostly in the field of Library and Information Science to evaluate literature trends (Angammana & Jayatissa, 2016). Bibliometric studies are especially useful for the analysis of library facilities, allocation of resources, improvement of decision making and collection, sharing of resources and weeding. Bibliometric analysis has become a well-established part of information research (Zafrunnisha, 2012). The researchers used bibliometric analysis effectively to define user requirements.

VOSviewer is a software tool designed for constructing and visualizing bibliometric networks, with journals, researchers, or individual publications as actors, and based on co-citation, bibliographic coupling, or co-authorship relations (Van Eck & Waltman, 2010). It also provides text mining functionality for creating co-occurrence networks of important terms extracted from a corpus of scientific literature. It was created by Leiden University's Centre for Science and Technology Studies (CWTS) (The Netherlands). From bibliographic data, it can extract bibliographic networks (co-authorship, co-occurrence, and citation-based).This data was collected from WoS, Scopus, Dimensions, PubMed, and RIS files.

Moreover, the API of Crossref, Europe PMC and MA can be queried interactively in VOSviewer; if we have a set of DOIs, the data can be obtained from the APIs of Semantic Scholar, Open Citations, and WikiData. VOSviewer constructs the map based on a co-occurrence matrix in three steps (Van Eck & Waltman, 2010): i) Similarity matrix, to apply the VOS mapping technique (Van Eck et al., 2010); using the association strength (Van Eck & Waltman, 2007); ii) VOS mapping technique, to construct a map reflecting the similarity measure between items; and iii) Translation, rotation, and reflection, to correct the optimization problem described in the literature (O'Connell et al., 1999).

About visualization capabilities, this software provides three visualization options: i) network, ii) overlay and iii) density. It is remarkable that the zoom and scroll functionality and smart labeling algorithm to prevent labels overlapping. VOSviewer provides a zoom and scroll function to enable for an in examination of the generated map. Finally, all of the generated visualizations can be saved in a variety of graphical file formats, including bitmaps or vectors. This option enables the analysis output to be used in any format, digital or printed. VOSviewer can also be started directly from the web page.

## 3.2.    Research Design

The methodological framework for this process is based on Zhao and Strotmann's (2015) book Analysis and Visualization of Citation Networks. The process was slightly different, despite the fact that the general ideas were the same. More precisely, it focuses on the use of one database whereas Zhao and Strotmann (2015) use only one, and the recourse to VOSviewer, which was not mentioned by both, authors either.

This study also has a co-citation analysis after doing conventional bibliometric analysis, which is essentially a frequency analysis on the properties of the bibliographic data. Co-citation analysis is a more dynamic type of research since it is a bibliometric method that shows the number of documents that cite two or more objects at the same time. (Zhao & Strotmann, 2015). This method examines the documents that were published at times which may fall outside of the study period of analysis (i.e., 2010 - 2017), such as in 1978, for example. Consequently, seminal papers in the field that were not in our dataset for various explanations (e.g., not in the timeframe, not available in the databases, not specifically related to the collaborative economy) (Persson, 1994).

## 3.3.    Data Collection Procedures

The model for data collection is an important aspect, which involves gathering and collecting data. This study follows a four step method to acquire the data.

**Figure 3.1:**PRISMA Flow Chart
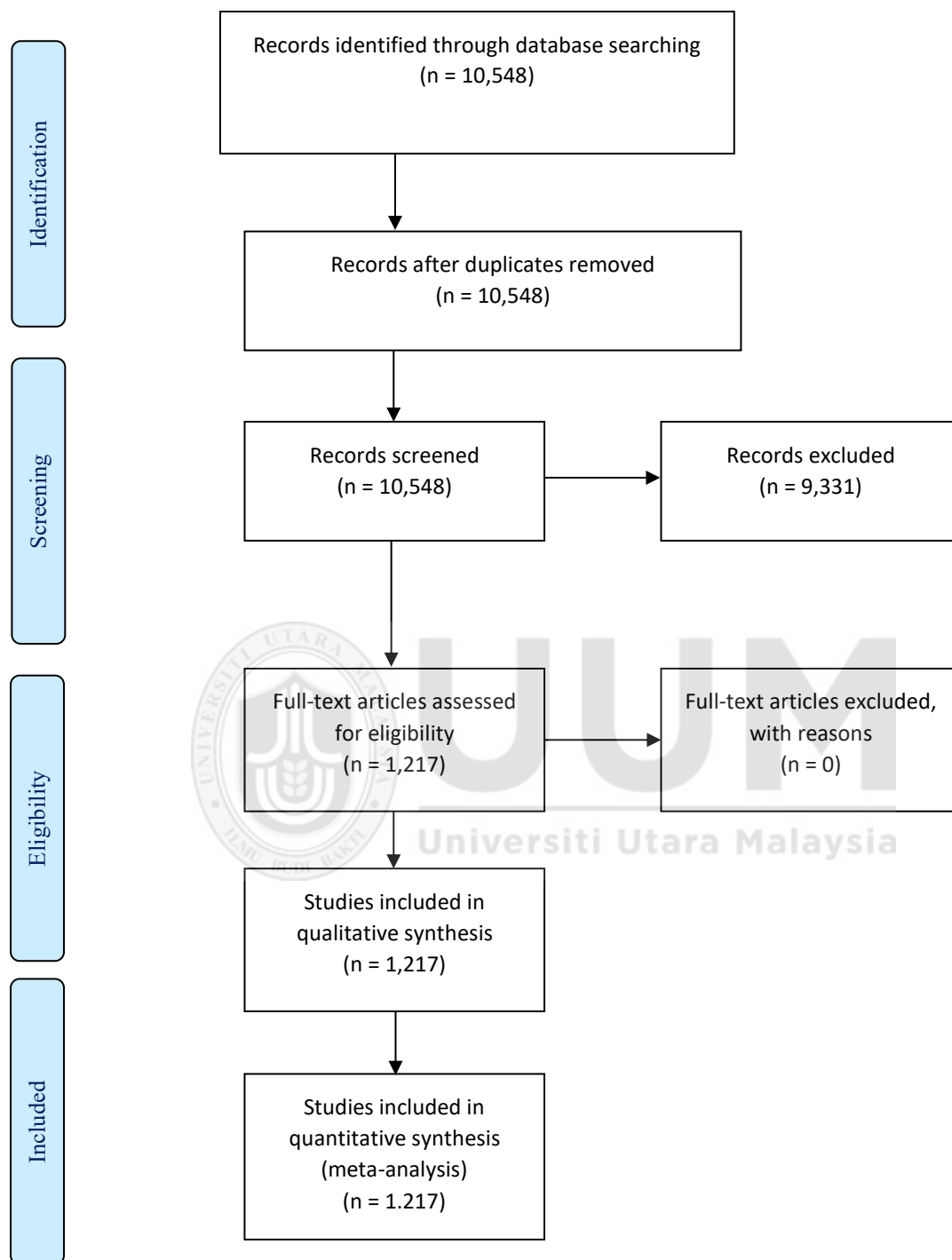


Source: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med 6*(7): e1000097. doi:10.1371/journal.pmed1000097

First step is to identify and limit the study's research field. The field of study can be wide (e.g., housing market) and focused on a specific (e.g., financial crisis). This study search field was the housing market and sub area in financial crisis. The search field was thus restricted in a timeframe which in this study, the timeframe was between 1997 and 2021. Finally, the documents type can be selected at this stage (e.g., journal articles, books, etc.). It's important to determine which language(s) should be retrieved. I managed to maintain documentation in English only while the majority of influential publications were published in this language. However, we believe that after the initial searches are conducted, it will be easier to focus on the actual of this matter. This way, we will see what is possible and, as a result, change our search requirements.

The second step is the collection of databases, keywords, and search criteria which decided to be include from Scopus database. The scope of both databases changes have shown in latest studies by Mongeonand Paul-Hus (2016). As a consequence, bibliometric analyses can yield different results depending on usage of the database. Following Zhao and Strotmann (2015), a good approach might be to supplement results retrieved from a citation database with additional publications (which are then indexed by researchers in the same format as the downloaded records) in order to reach the desired level of completeness for the study at hand. Scopus was selected because they provide citation metadata, which is required for a co-citation analysis. Keywords used were "housing market," and "financial crisis." The search criteria were the title, abstract, keywords search for Scopus and the topic search for Web of Science.

The third step is the data were extracted in plain text from Scopus. This research can provides a representative sample of the documentations published in the field of study.The dataset went from 10,548 to 1,217 entries after duplicates and non-relevant entries were removed. Then, we formatted the data from Scopus in the style of Web of Science for facilitating the analysis.

The final step is the co-citation method works in groups of two. If two data of the same type (e.g., authors, article titles, journals) are cited inside the similar document, they each earn a mention and become related. For instance, if A quotes B and C, B and C become joined. When analyzing a citation network, this is the most common method. It is, however, quite hard to set up and necessarily needs the use of computer programs to automate the process. When pairing with another document, for instance, where an article has more than one author, each author must be mentioned. On a scale of a few hundred documents, author combinations can be very puzzling. This is the reason for the use of VOSviewer to import the standardized data.

VOSViewer can program can do both co-citation analysis and visualization at the same time. Furthermore, network analysis through co-citation analysis requires the use of data mapping techniques that are either distance-based or graph-based (Perianes-Rodriguez, et al. 2016). In distance-based maps, smaller distance between two items reflects the strength of the relation between the items (Van Eck, et al. 2010). In graph-based maps, the difference between two items need not reflect the strength of the association between the two items (Fahimnia, et al. 2015). Items distribute uniformly, with one of the most connected nodes moving to the network's center and the more isolated nodes moving to the network's borders (Van Eck et al. 2010). Both approaches have pros and cons. However, according to Van Eck et al. (2010), it is more difficult to see the strength of a relationship between two items by using graph-based mapping, and clusters of related items can be difficult to detect.

## 3.4. Data Analysis Technique

Past research showed that the visualization of similarities (VOS) mapping technique shows superior performance than other distance-based algorithms (e.g., multidimensional scaling, VsOrd, Kopcsa-Schiebel) (Van Eck et al., 2010). VOSviewer is based on Van Eck, et al. (2005) VOS. It is a clustering technique that is used to provide a low-dimensional visualization in

which objects are located in such a way that the distance between any pair of objects reflects their similarity as accurately as possible (Van Eck &Waltman, 2007, p. 299).

The weighted sum of the squared Euclidean distances with all pairs of objects is minimized with VOS and the similarity between two objects will affect positively the weight for their squared distance. In the line of Van Eck and Waltman (2007, p. 2), if there are n objects (i.e., citations), denoted by 1, n and an n × n similarity matrix S, then element Sij of S denotes the similarity between the objects i and j. Then if there is an n × m matrix X, where m denotes the number of dimensions of the space that is used, contains the coordinates of the objects 1, …, n, the vector $x_i$ ($x_{i1}$, … , $x_{im}$) $\in R^m$ denotes the ith row of X and contains the coordinates of object i. The objective function to be minimized in VOS is expressed as follows:

$$E(X;S) = \sum_{i<j} s_{ij} \| x_i - x_j \|^2$$

where ‖.‖ denotes the Euclidean norm. The objective function is minimized in accordance to the constraint shown in (2), in which the distances $\| x_i - x_j \|$ in the constraint are not squared.

$$\sum_{i<j} \| x_i - x_j \| = 1$$

The VOS mapping technique is fully integrated in the VOSviewer software. Thus, no additional computer program (e.g., Pajek) is needed for constructing VOS maps (Van Eck et al., 2010).

# CHAPTER 4

## RESULT AND FINDINGS

### 4.0    Introduction

This study used the data obtained from the Elsevier Scopus database as at 18th March 2021. Section 4.1 describes about the documents profiles which include types and sources of the documents, types of language used in the publication and subject areas of publication using the keywords of "housing market" and "financial crisis".  Section 4.2 describes the research trend in the housing market and financial crisis. Section 4.3 explains the citation analysis while section 4.4 reports about visualization in the housing market and financial crisis. Section 4.5 conclude the results and findings.

### 4.1    Documents Profiles

The documents obtained were firstly analyze based on several features such as documents types, source types, languages and subject areas publish using keywords "housing market" and "financial crisis".

### 4.1.1   Documents Types and Source Type

The data sets' published documents have also been evaluated based on their type of document and type of source. Document types refer to the types of document based on the originality of the documents such as conference proceedings, journal article, or book series, while source type is the type of the source documents weather it is journal, conference paper, book chapter, book or trade publication (Sweileh et al., 2017). The conference papers that emerged under document type were different from those that appeared under source type (Sweileh et al., 2017). The conference paper has been presented in a conference but it perhaps was published as a journal article. Even though the type of document originated from the conference paper, several conference papers were published either as conference proceedings or book chapter under type

of source. In this research found eight documents type that have been published on housing market and financial crisis including article, book chapter, conference paper, review, book, editorial and note. The Scopus have two of the undefined publications. As per Table 4.1, the more publications were from article (83.35%), followed by book chapter (6.66%). The total publications from the other type of documents are less than 4%.

**Table 4.1:** Document Type

| Document Type | Total Publications (TP) | Percentage | Cumulative Percentage |
|---|---|---|---|
| Article | 1,026 | 83.35% | 83.35% |
| Book Chapter | 82 | 6.66% | 90.01% |
| Conference Paper | 42 | 3.41% | 93.42% |
| Review | 40 | 3.25% | 96.67% |
| Book | 30 | 2.44% | 99.11% |
| Editorial | 8 | 0.65% | 99.76% |
| Note | 1 | 0.08% | 99.84% |
| Undefined | 2 | 0.16% | 100.00% |
| **Total** | **1,231** | **100.00%** | |

Meanwhile, Table 4.2 presents five source types of documents with the keywords of housing market and financial crisis. The highest type is journals (88.06%), followed by books with 8.37%. The lowest sources of publication using the keywords were from book series, conference proceedings and trade journals.

**Table 4.2:** Source Type

| Source Type | Total Publications (TP) | Percentage | Cumulative Percentage |
|---|---|---|---|
| Journal | 1,084 | 88.06% | 88.06% |
| Book | 103 | 8.37% | 96.43% |
| Book Series | 24 | 1.95% | 98.38% |
| Conference Proceeding | 18 | 1.46% | 99.84% |
| Trade Journal | 2 | 0.16% | 100.00% |
| **Total** | **1,231** | **100.00%** | |

## 4.1.2   Types of Languages in Publications

According to Table 4.3, English was most generally used language, accounting 97.57% of the 1,237 publications on housing market and financial crisis. Other documents were published in eight other languages, including Spanish, French, Chinese, Portuguese, German, Italian, Czech and Lithuanian, but these accounted for less than 1.0% of the total.

**Table 4. 3:** Languages

| Language | Total Publications (TP) | Percentage | Cumulative Percentage |
|---|---|---|---|
| English | 1,207 | 97.57% | 97.57% |
| Spanish | 8 | 0.65% | 98.22% |
| French | 6 | 0.49% | 98.71% |
| Chinese | 5 | 0.40% | 99.11% |
| Portuguese | 5 | 0.40% | 99.51% |
| German | 2 | 0.16% | 99.68% |
| Italian | 2 | 0.16% | 99.84% |
| Czech | 1 | 0.08% | 99.92% |
| Lithuanian | 1 | 0.08% | 100.00% |
| **Total** | **1,237** | **100.00%** | |

### 4.1.3   Subject Area of Publications

As summarized in Table 4.4, this finding categorizes the publications based on the subject area. The distribution of study on housing market and financial crisis emerges mainly from social sciences (34.84%) and economics, econometrics and finance (30.16%). Other significant contributing subject areas include business, management and accounting (11.67%) and environmental sciences (11.56%). Nevertheless, other subject areas, including engineering, mathematics, earth and planetary sciences, computer science, and energy, have also published articles on the housing market and financial crisis, as shown in Table 4.4.

**Table 4.4:** Subject area publish using "housing market " and " financial crisis"

| Subject Area | Total Publications (TP) | Percentage | Cumulative Percentage |
|---|---|---|---|
| Social Sciences | 684 | 34.84% | 34.84% |
| Economics, Econometrics and Finance | 592 | 30.16% | 65.00% |
| Business, Management and Accounting | 229 | 11.67% | 76.67% |
| Environmental Science | 227 | 11.56% | 88.23% |
| Engineering | 41 | 2.09% | 90.32% |
| Mathematics | 37 | 1.88% | 92.21% |
| Earth and Planetary Sciences | 32 | 1.63% | 93.84% |
| Computer Science | 21 | 1.07% | 94.91% |
| Energy | 21 | 1.07% | 95.98% |
| Arts and Humanities | 18 | 0.92% | 96.89% |
| Agricultural and Biological Sciences | 14 | 0.71% | 97.61% |
| Decision Sciences | 11 | 0.56% | 98.17% |
| Psychology | 11 | 0.56% | 98.73% |
| Multidisciplinary | 6 | 0.31% | 99.03% |
| Physics and Astronomy | 6 | 0.31% | 99.34% |
| Medicine | 5 | 0.25% | 99.59% |
| Biochemistry, Genetics and Molecular Biology | 3 | 0.15% | 99.75% |
| Chemical Engineering | 2 | 0.10% | 99.85% |
| Materials Science | 2 | 0.10% | 99.95% |
| Nursing | 1 | 0.05% | 100.00% |
| Total | 1,963 | 100.00% | |

## 4.2    Research Trend

Table 4.5 shows the statistics on annual publications of housing market and financial crisis study from the year 1997 to 2021. The total number of publications shows a trend of rising. First research on housing market and financial crisis was published in 1997 by Brain Bloch with a title, *"Volatility in the residential housing market: An international perspective*". The housing market and financial crisis topics are not so much development in the publication and there are few years the publication not even exist until the term become famous in 2008. After that,there were extremely increased in the publications number from year by year. The maximum total number of publication on housing market and financial crisis was recorded in 2020 as shown in Table 4.5 and Figure 4.1, indicating the total of 153 publications. It's expected that the number will increase in 2021 as the topic, although this study was conducted in March 2021.

**Table 4.5:** Year of Publication

| Year | TP | NCP | TC | C/P | C/CP | *H* | *g* |
|------|-----|------|-----|-------|-------|------|------|
| 1997 | 1 | 1 | 8 | 8.00 | 8.00 | 1 | 1 |
| 1999 | 2 | 2 | 18 | 9.00 | 9.00 | 2 | 2 |
| 2000 | 1 | 1 | 22 | 22.00 | 22.00 | 1 | 1 |
| 2001 | 1 | 1 | 9 | 9.00 | 9.00 | 1 | 1 |
| 2002 | 4 | 4 | 126 | 31.50 | 31.50 | 4 | 4 |
| 2003 | 1 | 1 | 32 | 32.00 | 32.00 | 1 | 1 |
| 2004 | 3 | 3 | 206 | 68.67 | 68.67 | 3 | 3 |
| 2005 | 4 | 4 | 35 | 8.75 | 8.75 | 4 | 4 |
| 2006 | 2 | 2 | 40 | 20.00 | 20.00 | 2 | 2 |
| 2007 | 4 | 1 | 15 | 3.75 | 15.00 | 1 | 3 |
| 2008 | 9 | 6 | 201 | 22.33 | 33.50 | 5 | 9 |

| | | | | | | | |
|------|-------|-----|-------|-------|-------|----|----|
| 2009 | 45 | 36 | 1,253 | 27.84 | 34.81 | 16 | 35 |
| 2010 | 66 | 55 | 1,321 | 20.02 | 24.02 | 17 | 34 |
| 2011 | 72 | 58 | 1,780 | 24.72 | 30.69 | 21 | 41 |
| 2012 | 65 | 53 | 684 | 10.52 | 12.91 | 13 | 24 |
| 2013 | 70 | 58 | 718 | 10.26 | 12.38 | 15 | 24 |
| 2014 | 92 | 76 | 1,250 | 13.59 | 16.45 | 19 | 32 |
| 2015 | 109 | 98 | 1,636 | 15.01 | 16.69 | 21 | 37 |
| 2016 | 100 | 93 | 1,391 | 13.91 | 14.96 | 18 | 33 |
| 2017 | 122 | 106 | 1,136 | 9.31 | 10.72 | 16 | 27 |
| 2018 | 139 | 121 | 947 | 6.81 | 7.83 | 15 | 22 |
| 2019 | 121 | 95 | 537 | 4.44 | 5.65 | 12 | 16 |
| 2020 | 153 | 77 | 300 | 1.96 | 3.90 | 10 | 11 |
| 2021 | 45 | 6 | 13 | 0.29 | 2.17 | 2 | 3 |
| **Total** | **1,231** | | | | | | |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; *h*=*h*-index; and *g*=*g*-index.

**Figure 4.1:** Documents by year
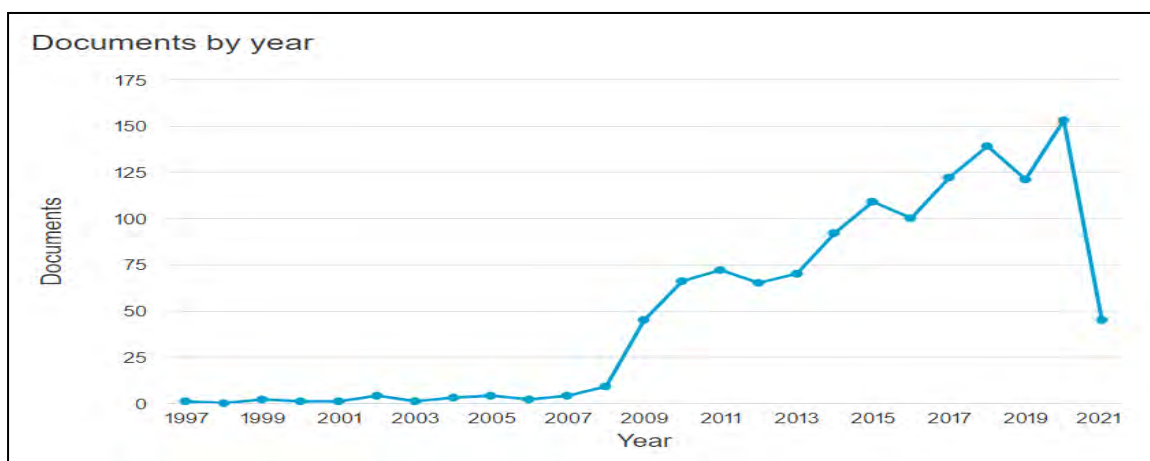
The researchers contributed to the publication of the retrieved documentsfrom 69 different countries. Table 4.6 shows the top 10 countries contributed to the publications in housing market and financial crisis. The published document which in first rank is United States (347) followed by the United Kingdom (229), China (85) and Australia (74). In terms of the number of total citation by country, United States was first rank with a total of 5,090 citations and followed by United Kingdom (3,812).

**Table 4.6:** Top 10 countries contributed to the publications

| COUNTRY | TP | NCP | TC | C/P | C/CP | *h* | *g* |
|---|---|---|---|---|---|---|---|
| United States | 347 | 283 | 5,090 | 14.67 | 17.99 | 35 | 61 |
| United Kingdom | 229 | 196 | 3,812 | 16.65 | 19.45 | 32 | 52 |
| China | 85 | 62 | 890 | 10.47 | 14.35 | 13 | 28 |
| Australia | 74 | 63 | 719 | 9.72 | 11.41 | 14 | 22 |
| Netherlands | 71 | 67 | 986 | 13.89 | 14.72 | 17 | 28 |
| Germany | 54 | 42 | 600 | 11.11 | 14.29 | 12 | 23 |
| South Korea | 54 | 39 | 400 | 7.41 | 10.26 | 12 | 18 |
| Italy | 51 | 38 | 527 | 10.33 | 13.87 | 12 | 22 |
| Hong Kong | 44 | 37 | 494 | 11.23 | 13.35 | 12 | 21 |
| Spain | 42 | 38 | 436 | 10.38 | 11.47 | 11 | 19 |
| Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; *h*=*h*-index; and *g*=*g*-index. | | | | | | | |

In this paper, the contribution of the institutions in the research about the housing market and financial crisis also has been counted, i.e. based on a least of fourteen publications. Table 4.7 indicates that the highest number of publications on housing market and crisis was Universiteit van Amsterdam. The second highest was Delft University of Technology and followed by London School of Economics and Political Science. In terms of the number of total citation by influential institutions, the first ranked to National Bureau of Economic Research with a total of 612 citations and followed by Universiteit van Amsterdam (551).

**Table 4.7:** Most influential institutions with minimum of fourteen publications

| Affiliation | Country | TP | NCP | TC | C/P | C/CP | *H* | *G* |
|---|---|---|---|---|---|---|---|---|
| Universiteit van Amsterdam | Netherlands | 32 | 31 | 551 | 17.22 | 17.77 | 14 | 23 |
| Delft University of Technology | Netherlands | 26 | 25 | 395 | 15.19 | 15.80 | 11 | 19 |
| London School of Economics and Political Science | United Kingdom | 20 | 19 | 251 | 12.55 | 13.21 | 7 | 15 |
| University of Cambridge | United Kingdom | 19 | 17 | 407 | 21.42 | 23.94 | 9 | 19 |
| The University of Sheffield | United Kingdom | 18 | 17 | 420 | 23.33 | 24.71 | 9 | 18 |
| OTB - Onderzoekvoor de GebouwdeOmgeving, TU Delft | Netherlands | 18 | 18 | 267 | 14.83 | 14.83 | 10 | 16 |
| City University of Hong Kong | Hong Kong | 17 | 16 | 204 | 12.00 | 12.75 | 9 | 14 |
| RMIT University | Australia | 15 | 12 | 205 | 13.67 | 17.08 | 7 | 14 |
| National Bureau of Economic Research | United States | 15 | 14 | 612 | 40.80 | 43.71 | 11 | 15 |
| National University of Singapore | Singapore | 14 | 10 | 369 | 26.36 | 36.90 | 6 | 14 |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; *h*=*h*-index; and *g*=*g*-index.

This analysis also provides the top 10 productive authors that published the documents on housing market and financial crisis. Based from the table, Ronald, R., Tsai, I.C. and Aalbers, M.B. are among the top 10 productive authors in this field of research who publish more than 10 publications on housing market and financial crisis. In terms, the number of total citation by productive authors, the highest ranked was Aalbers, M.B. with the total of 493 citations and followed by Ronald, R. (302). The lowest number of total citation author was Huang, M.C. which is 19 citations.

**Table 4.8:** Top 10 Productive Authors

| Author's Name | Affiliation | Country | TP | NCP | TC | C/P | C/CP | *h* | *G* |
|---|---|---|---|---|---|---|---|---|---|
| Ronald, R. | The Open University of Hong Kong | China | 15 | 14 | 302 | 20.13 | 21.57 | 8 | 15 |
| Tsai, I.C. | National University of Kaohsiung | Taiwan | 11 | 8 | 69 | 6.27 | 8.63 | 5 | 8 |
| Aalbers, M.B. | KU Leuven | Belgium | 10 | 10 | 493 | 49.30 | 49.30 | 8 | 10 |
| Gupta, R. | Universiteit van Pretoria | South Africa | 9 | 6 | 93 | 10.33 | 15.50 | 4 | 9 |
| Forrest, R. | Lingnan University | Hong Kong | 8 | 8 | 158 | 19.75 | 19.75 | 6 | 8 |
| Arundel, R. | Universiteit van Amsterdam | Netherlands | 7 | 7 | 144 | 20.57 | 20.57 | 4 | 7 |
| Huang, M.C. | National Taipei University | Taiwan | 7 | 6 | 19 | 2.71 | 3.17 | 3 | 4 |
| Leung, C.K.Y. | City University of Hong Kong | Hong Kong | 7 | 7 | 72 | 10.29 | 10.29 | 5 | 7 |
| Hulse, K. | Swinburne University of Technology | Australia | 6 | 6 | 133 | 22.17 | 22.17 | 6 | 6 |
| Immergluck, D. | Georgia State University | United States | 6 | 6 | 156 | 26.00 | 26.00 | 6 | 6 |

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; *h*=*h*-index; and *g*=*g*-index.

The housing market studies also were published in various journal, book and book series. Based on the least number of 18 publications formed by each source title, the top 10 active source title that the articles on housing market and financial crisis have been published can refers in Table 4.9. The housing studies host the highest paper on housing market and financial crisis topic which can refer from the table. The highest number of citation recorded by International Journal of Urban and Regional Research (1,068) and followed by housing studies (984).

**Table 4.9:** Top 10 Active Source Title

| Source Title | TP | TC | Publisher | Cite Score | SJR 2019 | SNIP 2019 |
|---|---|---|---|---|---|---|
| Housing Studies | 60 | 984 | Taylor & Francis | 3.3 | 1.067 | 1.812 |
| International Journal Of Housing Policy | 44 | 565 | Taylor & Francis | 4.1 | 0.987 | 1.778 |
| International Journal Of Housing Markets And Analysis | 42 | 203 | Emerald | 1.3 | 0.340 | 1.003 |
| Journal Of Housing And The Built Environment | 40 | 444 | Springer Nature | 2.6 | 0.555 | 1.106 |
| Urban Studies | 26 | 450 | Sage | 5.8 | 1.618 | 2.221 |
| Applied Economics | 21 | 50 | Taylor & Francis | 1.9 | 0.468 | 0.939 |
| Journal Of Housing Economics | 21 | 497 | Elsevier | 2.5 | 0.852 | 1.551 |
| Journal Of Real Estate Finance And Economics | 21 | 154 | Springer Nature | 2.0 | 0.634 | 1.481 |
| International Journal Of Urban And Regional Research | 18 | 1,068 | Wiley-Blackwell | 5.8 | 2.645 | 2.870 |
| Regional Science And Urban Economics | 18 | 329 | Elsevier | 3.4 | 1.235 | 1.707 |
| Notes: TP=total number of publications; TC=total citations. | | | | | | |

## 4.3    Citation Analysis

Harzing's Publish or Perish software used in this study to retrieve the citation metrics data. The data obtained from Scopus database has been imported in RIS formatted file and then this file will open in this software to produce the citation metric as well as the total citation for each document based on Google Scholar citations. Table 4.10 shows that retrieved the citation metrics documents as at 18ᵗʰ March 2021. As presented in the table, there were 13,678 citations recorded in 24 years (1997 – 2021) for 1,231 articles and the average of citations per year was 570.

**Table 4.10:** Citations Metrics

| Metrics | Data |
|---|---|
| Papers | 1,231 |
| Citations | 13,678 |
| Years | 24 |
| Cites_Year | 569.92 |
| Cites_Paper | 11.11 |
| Cites_Author | 8,069.56 |
| Papers_Author | 741.18 |
| Authors_Paper | 2.14 |
| *h*_index | 51 |
| *g*_index | 81 |

Meanwhile, Table 4.11 refers the top 20 highly cited articles (based on the number of times being cited) according the Scopus database. The document entitled "*Racial segregation and the American foreclosure crisis*" by J.S. Rugh and D.S. Massey has obtained the maximum number of citations (401 citations / an average of 36.45 citations per year).

**Table 4.11:** Top 20 Highly cited articles

| No. | Authors | Title | Year | Cites | Cites Per Year |
|---|---|---|---|---|---|
| 1 | J.S. Rugh, D.S. Massey | Racial segregation and the American foreclosure crisis | 2010 | 401 | 36.45 |
| 2 | T. Sobotka, V. Skirbekk, D. Philipov | Economic recession and fertility in the developed world | 2011 | 289 | 28.90 |
| 3 | K.F. Gotham | Creating liquidity out of spatial fixity: The secondary circuit of capital and the subprime mortgage crisis | 2009 | 238 | 19.83 |
| 4 | R. Martin | The local geographies of the financial crisis: From the housing bubble to economic recession and beyond | 2011 | 222 | 22.20 |

| 5 | J. Wu, J. Gyourko, Y. Deng | Evaluating conditions in major Chinese housing markets | 2012 | 188 | 20.89 |
|---|---|---|---|---|---|
| 6 | R.J. Shiller | Irrational exuberance: Revised and expanded third edition | 2015 | 186 | 31.00 |
| 7 | E. Wyly, M. Moos, D. Hammel, E. Kabahizi | Cartographies of race and class: Mapping the class-monopoly rents of American subprime mortgage capital | 2009 | 180 | 15.00 |
| 8 | C. Leung | Macroeconomics and housing: A review of the literature | 2004 | 167 | 9.82 |
| 9 | M.B. Aalbers, B. Christophers | Centring Housing in Political Economy | 2014 | 154 | 22.00 |
| 10 | L. Agnello, L. Schuknecht | Booms and busts in housing markets: Determinants and implications | 2011 | 138 | 13.80 |
| 11 | J. Muellbauer, A. Murphy | Housing markets and the economy: The assessment | 2008 | 126 | 9.69 |
| 12 | D. Fields, S. Uffer | The financialisation of rental housing: A comparative analysis of New York City and Berlin | 2016 | 123 | 24.60 |
| 13 | J.V. Duca, J. Muellbauer, A. Murphy | Housing markets and the financial crisis of 2007-2009: Lessons for the future | 2010 | 113 | 10.27 |
| 14 | S. Claessens, M.A. Kose, M.E. Terrones | What happens during recessions, crunches and busts? | 2009 | 113 | 9.42 |
| 15 | M. GarcÃƒÂa-Lamarca, M. Kaika | Ã¢â‚¬ËœMortgagedlivesÃ¢â‚¬â„¢: the biopolitics of debt and housing financialisation | 2016 | 99 | 19.80 |
| 16 | M.B. Aalbers | The Variegated Financialization of Housing | 2017 | 96 | 24.00 |
| 17 | T. Wainwright | Laying the foundations for a crisis: Mapping the historico-geographical construction of Residential Mortgage Backed Securitization in the UK | 2009 | 96 | 8.00 |
| 18 | J. Beswick, G. Alexandri, M. Byrne, S. Vives-MirÃƒÂ³, D. Fields, S. Hodkinson, M. Janoschka | Speculating on London's housing future: The rise of global corporate landlords in Ã¢â‚¬Ëœpost-crisisÃ¢â‚¬â„¢ urban landscapes | 2016 | 93 | 18.60 |

| 19 | J.V. Duca, J. Muellbauer, A. Murphy | House Prices and Credit Constraints: Making Sense of the US Experience | 2011 | 92 | 9.20 |
| 20 | J. Favilukis, S.C. Ludvigson, S. Van Nieuwerburgh | The macroeconomic effects of housing wealth, housing finance, and limited risk sharing in general equilibrium | 2017 | 90 | 22.50 |

## 4.4 Visualization Map

The author keywords also have been mapped with VOSviewer software. Figure 4.2 describes the relationship with other keywords by used the author keywords network visualization in which colour, circle size, font size, and thickness of connecting lines (Sweileh et al., 2017). According to this study, the author keywords have developed with the seven clusters in housing market and financial crisis research. The red colour is first cluster, which is related to housing, austerity, evictions, finance, foreclosure and property. The second cluster in green colour which includes the keywords of housing market, housing bubble, economic crisis, real estate and stock market.
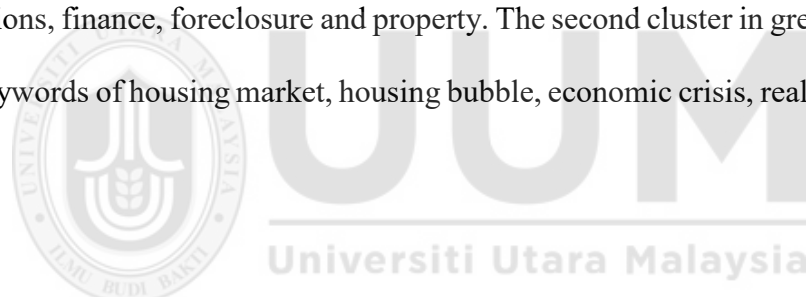
**Figure 4.2:** Network visualization map of the author keywords

**Figure 4.3:** VOSviewer visualization of a term co-occurrence network based on title and abstract fields (Binary Counting)



**Figure 4.4:** VOSviewer visualisation of a term co-occurrence network based on title and abstract fields (Full Counting)
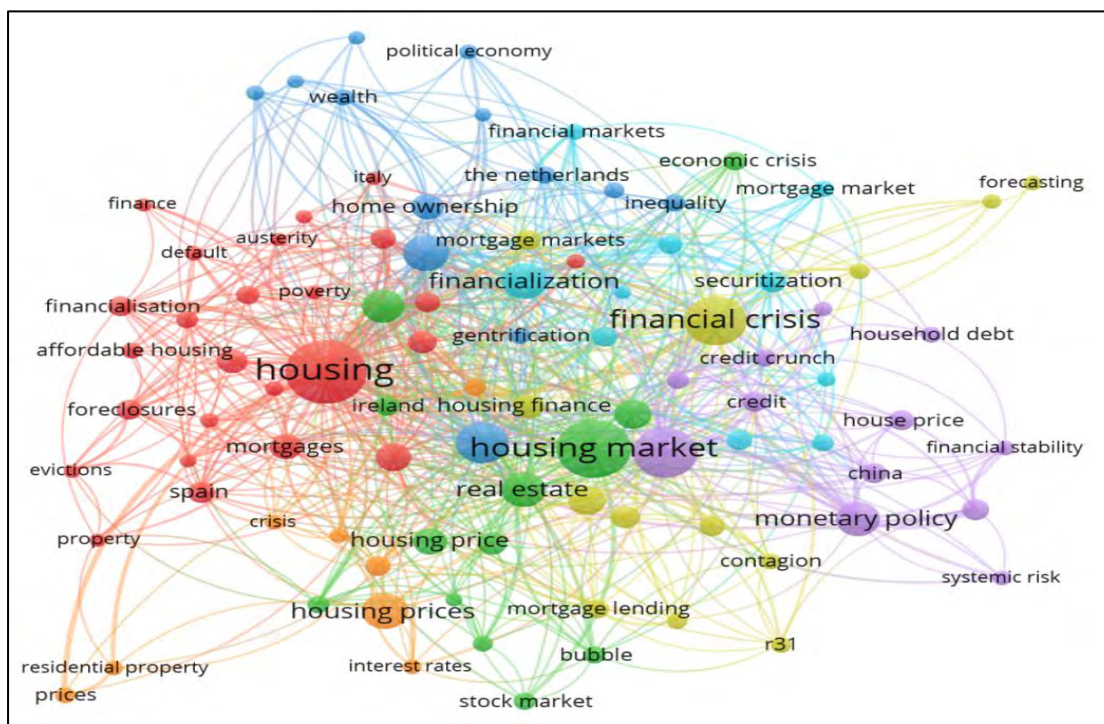
Figure 4.5 describes the visualization of a term co-occurrence network based on title fields with a least of 10 occurrences of a term. "The number of times a noun phrase appeared in a publication's title had no impact if we used a binary counting method" (van Eck &Waltman, 2014). "A noun phrases that occurs only once in the title of a publication is treated in the same way as a noun phrases that occurs, for instance, 10 times" (van Eck &Waltman, 2014). Figure 4.5 shows that the different perspectives of research in housing market and financial crisis, specifically in the figure where this particular study is grouped with. There are five clusters, and the VOSviewer developed 26 items based on the ten-minimum number of occurrences. The Cluster 1 contains bust, determinant, great recession, housing crisis, lesson, recession and role. Cluster 2 consists of china, effect, hongkong, housing price and korea. Cluster 3 and cluster 4 have five items. Cluster 5 has three items, i.e. economic crisis, housing bubble and monetary policy.

**Figure 4.5:** VOSviewer visualisation of a term co-occurrence network based on title fields (Binary Counting)
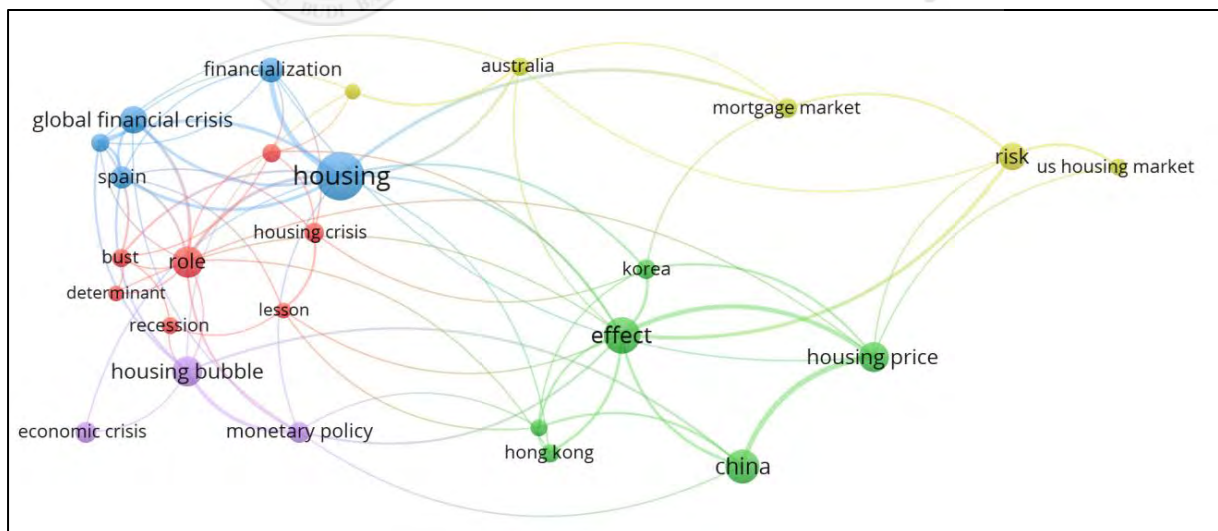
Figure 4.6 explains the network visualization map of the citation based on the countries. In this analysis, the only countries with greater than five articles and greater than ten citations were considered. China plays a very prominent role in collaborating with other countries showed according on the fractional counting approach. China has worked strongly with Taiwan, Singapore, Japan and Hong Kong, while Germany seems collaborates with Poland, Turkey and Italy.

**Figure 4.6:** Network visualisation map of the citation by countries
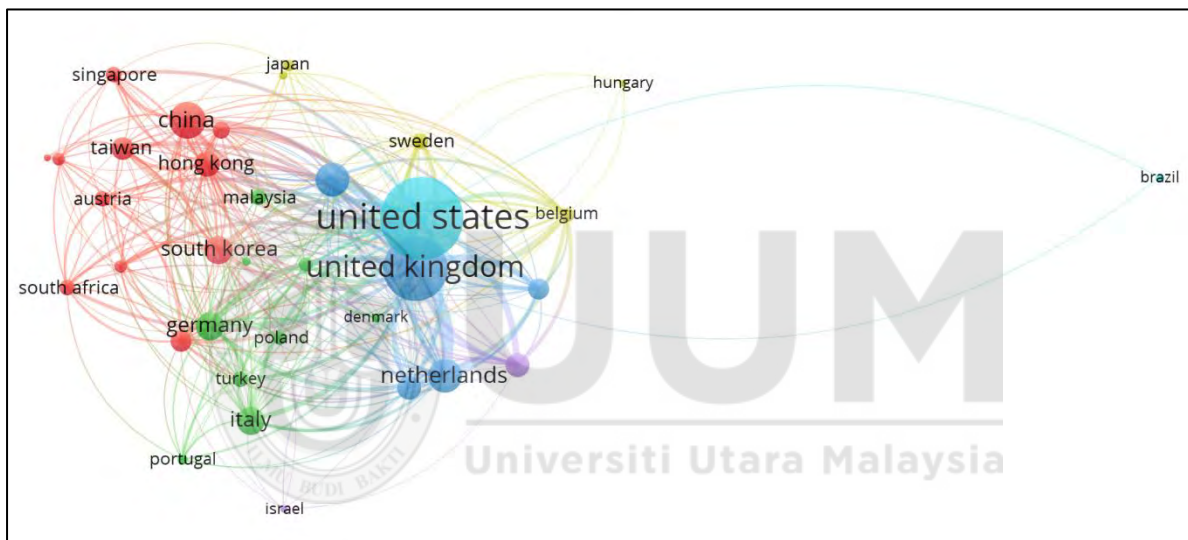


Note: Minimum number of documents of an author = 5; Minimum number of citations of an author = 10

Figure 4.7 describes the citationsmapping for documents with atleast of 5 citations. It demonstrates the field's key authors and how their concepts were presented in relation to each other. According to this study, there are twenty six clusters in housing market and financial crisis research has been developed based on the citations for documents. While, Figure 4.8 shows the citations mapping for documents with at least of 10 citations and it have twenty two clusters.

**Figure 4.7:** Network visualisation map of the citation by documents (Minimum number of citations of a document = 5)
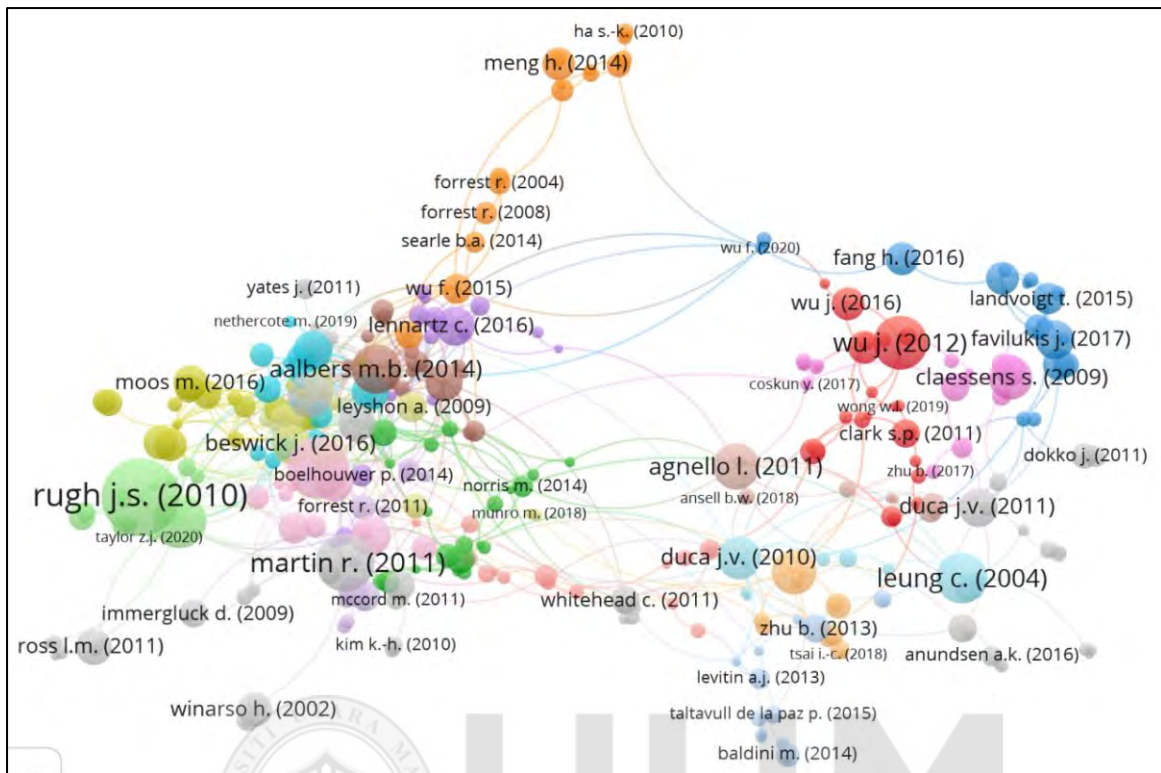


**Figure 4.8:** Network visualisation map of the citation by documents (Minimum number of citations of a document = 10)
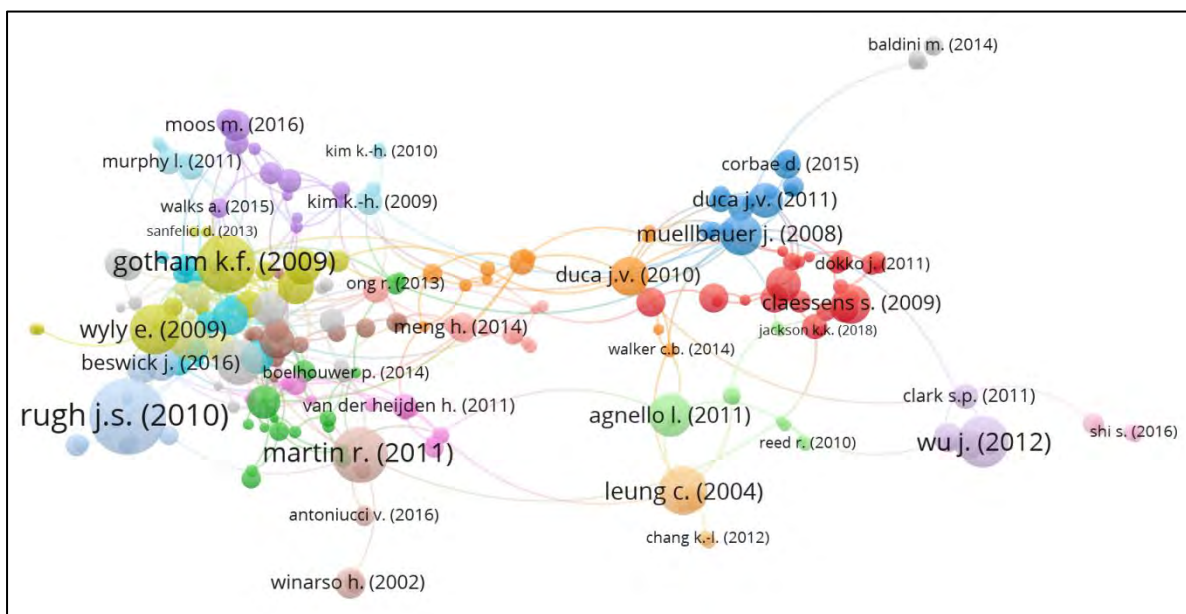
Figure 4.9 explains that the network visualization map of the co-authorship based on the authors' affiliated countries. In this study only countries with at least 5 documents and at least 10 citations were considered. It was understandable that authors from the United Kingdom have played a important role in working with authors from other countries in terms of housing market and financial crisis research according to the fractional calculation approach. Authors from The United Kingdom have worked strongly with colleagues from (i) Malaysia, (ii) Portugal, (iii) Australia, (iv) New Zealand, and (v) Hong Kong. Some affiliation efforts with associate in other countries have also been recognized by authors from United State, Italy, Germany, France, Canada and the Netherlands. Meanwhile in this study, Figure 10 shows that the countries with minimum ten documents and minimum fifteen citations were considered. The outcome was same as Figure 4.9 but the clusters were reduce to six.

**Figure 4.9:** Network visualisation map of the co-authorship by countries (Minimum number of documents of a country = 5 & Minimum number of citations of a country = 10)
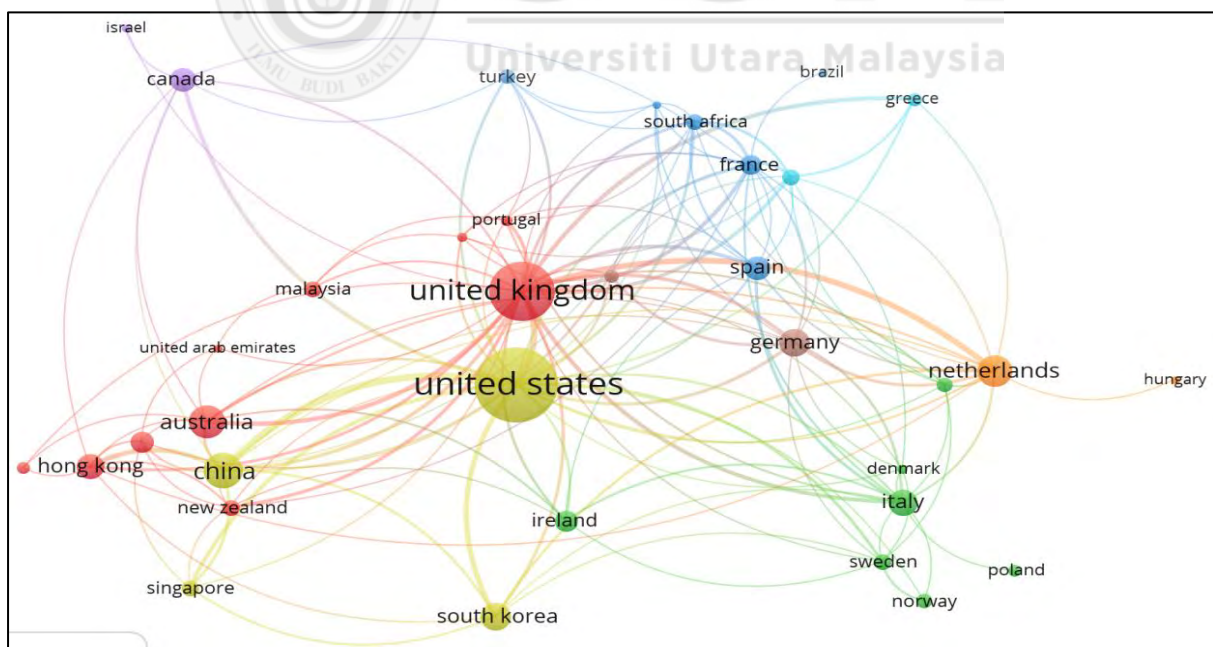


Note: Counting method = Fractional counting

**Figure 4.10:** Network visualisation map of the co-authorship by countries (Minimum number of documents of a country = 10 & Minimum number of citations of a country = 15)
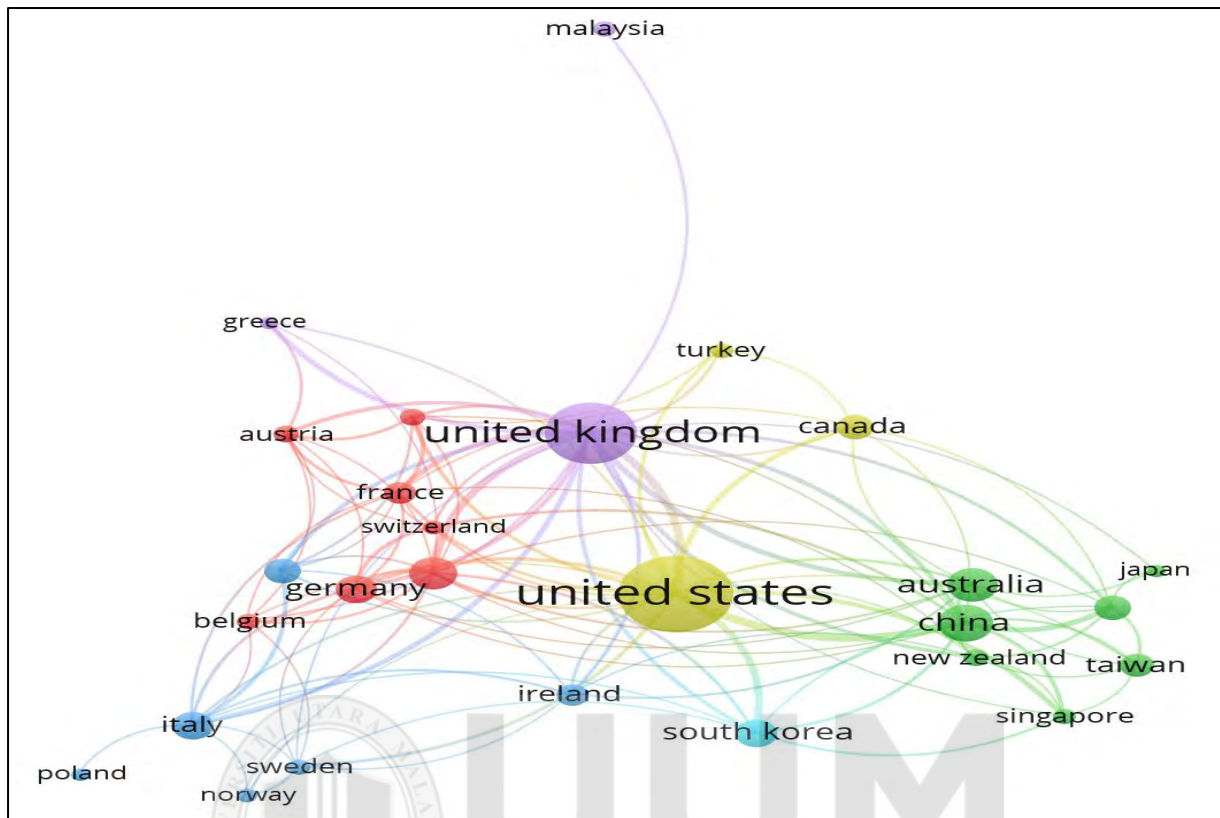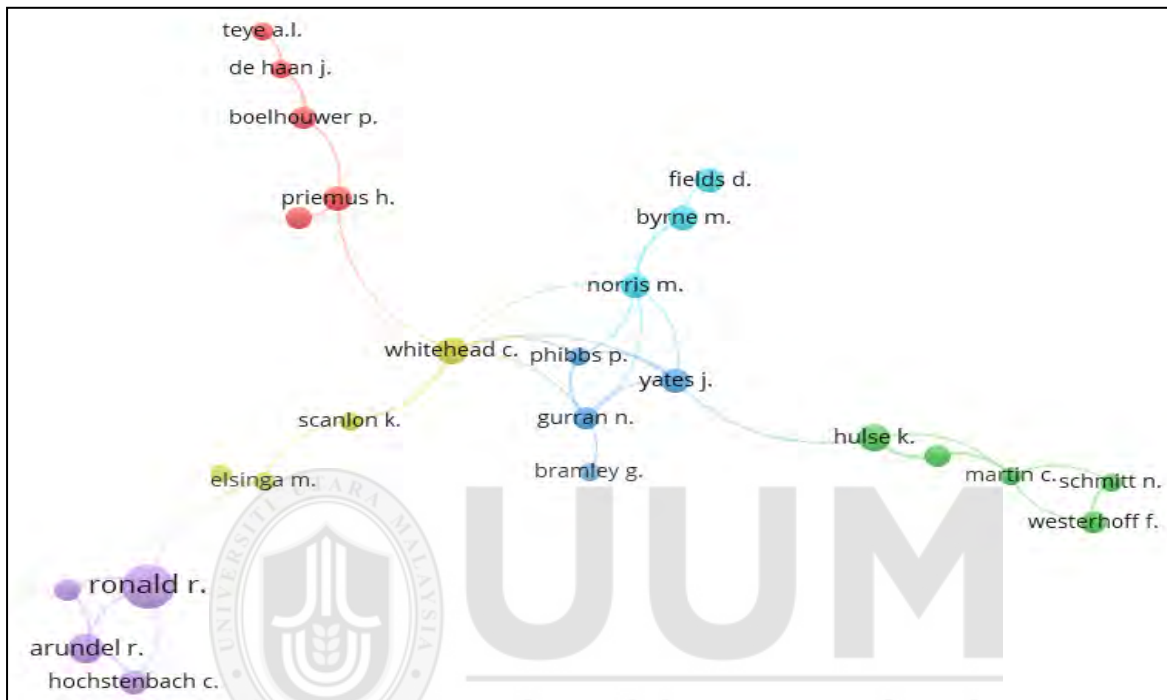


Note: Counting method = Full counting

VOSviewer software was used to present organization visualization (see Figure 4.11) of the mapping of coauthorship surrounded different authors. This study used the fractional counting approach for mapping and was based on data of those authors who had at least three documents on housing market and financial crisis and at least three citations. The color, circle size, font size, and thickness of connecting lines show the strength of the relationship among the authors. The same color is the indication of related authors, which are commonly listed together. For instance, the map suggests that Ronald, R., Arundel, R and Hochstenbach, C., who are all from the alike institution in United State, have collaborated closely. In this study, all authors seem to have had ainfluential collaboration with authors from separate parts of the globe including U.S., U.K., France, China, Italy and South Korea.Figure 4.12 explains the fractional counting

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approach for mapping and was based on data of those authors who had at least one documents

on housing market and financial crisis and at least 5 citations.

**Figure 4.11:** Network visualisation map of the co-authorship by authors (Minimum number of documents of an author = 3 & Minimum number of citations of an author = 3)



Note: Counting method = Fractional counting

**Figure 4.12:** Network visualisation map of the co-authorship by authors (Minimum number of documents of an author = 1 & Minimum number of citations of an author = 5)
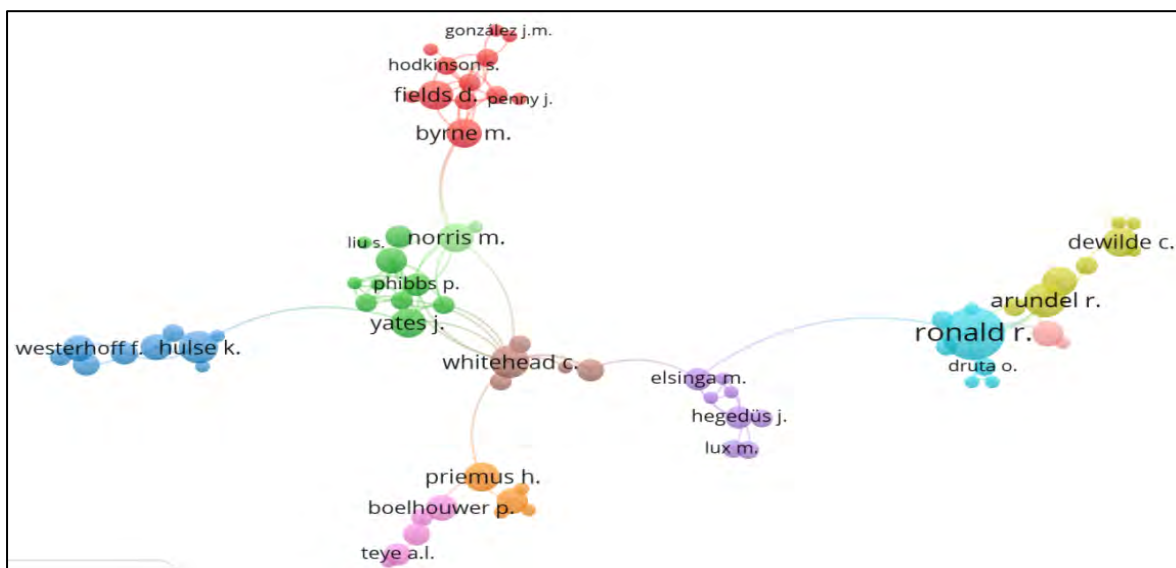


Note: Counting method = Fractional counting

**4.5    Conclusion**

This research analyzes the bibliometric features such as publication by year, document types and source types, the language of the document, subject area, keywords analysis, country productivity, authorship, active institution and citation analysis according to the data retrieved from the Scopus database. Most of the results are provided as frequency and percentage. The author keywords co-occurrence is mapped by using VOSviewer, and describes citation analysis as citation metrics and disclosed the top 10 most cited articles in housing market and financial crisis.

# CHAPTER 5

## CONCLUSION AND RECOMMENDATIONS

### 5.0    Introduction

This chapter presents a summary of the thesis findings which under the Section 5.1. Section 5.2 discusses the research limitation and Section 5.3 describes the suggestions for future research on bibliometrics.

### 5.1    Summary of the Findings

The main objective of this study is to analyze the research trend on housing market and financial crisis by using bibliometric analysis. It can analyse the productivity of research by accepting this bibliometric analysis (Moed et al., 2002) publications in the particular research domain. The information provided from the bibliometric data can be used to analysis the performance of specific research domain and beneficial for research-related organization to control some of the policies pertaining to the allocation of funding and differentiate the scientific input and output Gu (2014). Moreover, the results of the bibliometric analysis can define factors that bear the contribution of studies in a research area and helps scholars towards producing impactful studies (Akhavan, et al. 2016).

This study focuses on the publications on housing market and financial crisis collected from the Scopus database. The result of data collection from Scopus are 1,231 documents to be use in the specific search queryof "housing market" and "financial crisis". The research on housing market and financial crisis was introduced by Bloch (1997) with the title "Volatility in the residential housing market: an international perspective" whereby at the same time has received the lowest numbers of citations. While in 2009, the publications number on housing market and financial crisis has increased from year to year until 2020.

The documents above 80% were published as articles compared with other types of documents. Most of publications were printed in English and came from 69 countries. The top countries contributed to the publication of housing market and financial crisis are United States and United Kingdom. The research on housing market and financial crisis is regularly published in under social sciences and economics, econometrics and finance subject area. The research on housing market and financial crisis focus more on the social science area of research such as housing price, housing bubble, globalization, mortgage, financial market and rental market. Using the keywords analysis and title and abstract analysis from VOSViewer, the housing price, housing bubble and mortgage keywords are the usual keywords found in the collected documents.

This paper disclosed the effect of publications on housing market and financial crisis seen from the citation metric. There are 1,231 documents have been published with a total of 13,678 citations according to the 24 years of publications (1997 - 2021). There are 569.92 citations per year, while 11.11 citations per paper and 2.14 authors per paper for documents collected from the Scopus database on housing market and financial crisis.

## 5.2    Limitations of the Study

Regardless the specific nature of the bibliometric analysis, the research has restriction that addressed in order to provide clear acknowlegdement to the readers of the articles and to guide for better future study. First of all, the results only appear from the specific keyword, i.e. housing market and financial crisis based on the title of the document. Thus, the finding of the search query on the other fields like in abstract and keyword have not been included in this analysis. Many researchers mainly focus on the specific area where they will update on their title of the documents. A few of the researchers provide term related to the search query in the abstract or the keyword field; but their focus of research are most likely was not exactly related to what the researcher are looking for.

Hence, a lot of filtering and cleaning data has to done before the analysis could be conducted. Future research most likely can also be extended into this issue. It is also worth to noted that there is no search query, which is 100% perfect; thus, false positive and negative results should be anticipated (Sweileh, et al., 2017). Thirdly, the main source of the documents in this research is only focused on the Scopus database. Although Scopus is among the most broad databases that index all scholarly works (Sweileh, et al., 2017; Ahmi&Mohamad, 2019), it does not effortlessly cover all available information.

## 5.3    Suggestions for Future Reserach

There are few available databases which could probably be included in the future research such as Web of Science, Google Scholar and Dimensions. Combining all of these databases will also provide more important and valuable results. Regardless of these limitations, this research provides better understanding of the trends in housing market and financial crisis study and publications. In this field of research, each of the measures points towards growth which may offer more opportunities for bettering current economic systems and housing prices. This research develops and complements past findings on housing market and financial crisis literature by using bibliometric methods. For now, the analysis produces few exciting observations that highly highlight the rising importance of housing prices in the economic environment around the world and require more research involving cooperation among numerous regions.

In addition, this research helped to identify the gaps in the literature in the area of housing market and financial crisis. These issues can be further addressed and examined in future studies. For stakeholders, researchers, governments and funding agencies, this thesis may serve as the basis for further analysis of the area of houaing market and financial crisis, developing and improving research policy in this area and calling for necessary actions to accelerate the closure of the gaps identified in this research.

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