



***OWNERSHIP NETWORK STRUCTURE AND DECISION-CONTROL
BEHAVIOUR OF EIGHT MAJOR OIL PALM COMPANIES IN MALAYSIA***

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IPTPH 2019 8



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By

NORFARYANTI KAMARUDDIN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfilment of the Requirements for the Degree of Doctor
Philosophy**

October 2018

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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Chair : Jean-Marc Roda, PhD

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Decisions made by the government-linked companies (GLCs) and family-owned businesses (FOBs) are seen to be fundamentally different. This issue has become more pertinent now that ownership and control structures of major oil palm corporations have become far more complex in the context of growing and intense competition. This study analysed whether the control and decision-making is determined by the type of owner, i.e. the government or a family.

In the palm oil, forestry and biomass sectors, where GLCs and family-owned companies are present as big businesses, there is a major gap in understanding what drives their decision-making. Agribusiness corporations deal with challenging decisions that have economic, social and environmental implications, regardless of their ownership. The global agriculture sector is under the process of more financialisation, precisely through the extension of major agribusiness corporations. Understanding what really drives their decision making, be it their control patterns or other factors is of extreme importance for the sustainability of agricultural sectors worldwide.

The study was designed to analyse how the ownership structure inform decision-making behaviour by the of oil palm corporations owned by the government and family. This is a pioneering study that seeks to quantify and to assess the ownership and control patterns of two very different types of plantation companies. GLCs (Sime Darby, Boustead, IJM Plantations, and Kulim) and FoBs (IOI Corp, KLK, Genting Plantations, and Jaya Tiasa) are compared for their similarities and differences, and finally, analysed their decision-making behaviour.

A network analysis was employed in quantifying and analysing the corporate structures of eight major Malaysian oil palm corporations. The data were obtained from various reputable sources. There are 4,331 companies' shareholding data gathered, covering ten levels of shareholding.

The shareholdings data generated network topology graphs with its network centrality metrics. It explained the characteristic (pyramid levels, average ownership tier, subsidiaries degree, shareholding degree, hierarchy index structural control (betweenness) and decisions load (stress)) of the eight corporate networks structure. Based on the metrics, the research decipher their decision-making control behaviour.

T-test was done to respond to whether GLCs and FOBs are similar or different. Linear regression was run to obtain further insights on the companies' decision-making behaviour pattern. The model was validated to further understand the decision-making behaviour.

Based on the network centrality metrics comparison, the eight companies displayed variations in their designs of ownership structure. Not all GLCs structural control is significantly different from FOBs. The structural control did not appear to have any association with the ownership identity. There is a high similarity pattern of decisions load amongst the eight companies. Within FOBs, the decisions load for all four companies are similar.

Linear regression models showed a linear pattern of increasing decisions load as the structural control increases. Global model presented a better fitted model to understand their decision-making behaviour.

The global model explained that the eight companies were scattered and not inclined to their ownership identity. Three groups had appeared: Boustead was in Group 1; Sime Darby, KLK, IOI Corp, IJM Plantations and Genting Plantations were in Group 2; and Jaya Tiasa and Kulim were in Group 3. The groupings signify their similarity in decision-making behaviour pattern. However, each companies were different in terms of the decisions load given the same subsidiaries' structural control and vice versa. Even though the companies belonged to the same group, followed the same linear pattern of increasing decisions load when structural control increased, their decisions load are all different given the same structural control. There was an emerging behaviour derived from the intercepts of the decisions load and structural control relationship. This research regards the behaviour as structural flexibility. The structural flexibility of the companies was highly dependent on the number of subsidiaries, hierarchy index and pyramid size.

Based on the results, the analysis showed that each company, whether a GLC or a family-owned enterprise, functioned differently. Their decision-making behaviour depended less on ownership type and more on the topology or design of the structure, such as the number of the companies, hierarchy index, and the pyramid size. The different levels of decisions load and control denote a variety of flexibility patterns.

The analyses proved that the ownership structure of a company influenced their decision-making behaviour. This research concluded that their decision-making control behaviour depended less on ownership type and more on the topology or design of the ownership structure. Both of the GLCs and FOBs have similarities and differences in their decision-making behaviour. The results may contradict with some other studies and it opens a new field of research and analysis of corporations, regardless of their ownership type/identity (government-owned or family-owned). This method allows us to evaluate the ownership topology structure quantitatively and qualitatively. Furthermore, these companies can be ranked based on the analysis used in this research.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
Sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**STRUKTUR RANGKAIAN PEMILIKAN DAN TINGKAH LAKU KAWALAN
KEPUTUSAN DI LAPAN SYARIKAT UTAMA MINYAK KELAPA SAWIT DI
MALAYSIA**

Oleh

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Keputusan yang dibuat oleh syarikat berkaitan Kerajaan (GLC) dan perniagaan milik keluarga (FOB) dilihat berbeza. Isu ini menjadi lebih penting apabila struktur pemilikan dan kawalan syarikat minyak kelapa sawit utama menjadi jauh lebih kompleks dalam konteks persaingan yang semakin meningkat dan sengit. Kajian ini menganalisis sama ada kawalan dalam membuat keputusan ditentukan oleh jenis pemilik, iaitu kerajaan atau keluarga, atau struktur pemilikan syarikat.

Di sektor minyak kelapa sawit, perhutanan dan biomas, di mana syarikat-syarikat GLC dan syarikat milik keluarga hadir sebagai perniagaan besar. Terdapat jurang utama dalam memahami apa yang mendorong proses membuat keputusan mereka. Perusahaan perniagaantani menghadapi cabaran yang mencabar apabila pembuatan keputusan mereka merangkumi implikasi ekonomi, sosial, dan alam sekitar, tanpa mengira pemilikan mereka. Sektor pertanian global berada di bawah proses '*financialisation*', melalui syarikat-syarikat perniagaantani utama. Memahami apa yang benar-benar mendorong keputusan mereka, sama ada corak kawalan mereka atau faktor-faktor lain, adalah sangat penting bagi keselamatan sektor pertanian di seluruh dunia.

Kajian ini dirancang untuk menganalisis bagaimana struktur pemilikan memaklumkan tingkah laku pengambilan keputusan oleh syarikat-syarikat kelapa sawit yang dimiliki oleh kerajaan dan keluarga. Ini adalah kajian perintis yang bertujuan untuk mengkuantifikasi dan menilai pola pemilikan dan kawalan dua jenis syarikat perladangan yang sangat berbeza. Kajian ini terdiri daripada dua kumpulan pemilikan syarikat, GLC (Sime Darby, Boustead, IJM Plantations, dan Kulim) dan FoB (IOI Corp, KLK, Genting Plantations, dan Jaya Tiasa). Syarikat di dalam setiap kumpulan dibandingkan, untuk menilai persamaan dan

perbezaan mereka, dan menganalisis kelakuan mereka yang membuat keputusan.

Analisis rangkaian digunakan dalam mengkuantifikasi dan menganalisis struktur korporat lapan syarikat utama kelapa sawit Malaysia. Data diperoleh dari pelbagai sumber yang bereputasi. Terdapat 4,331 data pegangan saham syarikat yang dikumpulkan, meliputi sepuluh peringkat pegangan saham.

Data pemegangan saham menghasilkan graf topologi rangkaian dengan metrik sentraliti. Metrik rangkaian menjelaskan sifat (tahap piramid, peringkat pemilikan purata, darjah anak syarikat, darjah kepemilikan saham, indeks hierarki, kawalan struktur (*Betweenness*) dan beban keputusan (*Stress*)) dari lapan rangkaian struktur korporat. Berdasarkan metrik rangkaian ini, tingkah laku membuat keputusan dinilai.

Ujian-T (*T-test*) telah dilakukan untuk memberi respons kepada sama ada GLC dan FOB adalah sama atau berbeza. Regresi linear dijalankan dengan menggunakan model regresi untuk mendapatkan gambaran lanjut tentang corak tingkah laku pengambilan keputusan syarikat. Model ini telah disahkan untuk terus memahami tingkah laku keputusan.

Berdasarkan perbandingan metrik pusat yang sederhana, lapan syarikat mempamerkan pelbagai reka bentuk struktur pemilikan. Perbandingan metrik rangkaian lanjutan telah dilakukan menggunakan ujian T. Keputusan menunjukkan bahawa kawalan struktur untuk semua syarikat mempunyai persamaan dan perbezaan. Tidak semua kawalan struktur GLC berbeza dengan FOB. Kawalan struktur tidak kelihatan bersekutu dengan identiti pemilikan. Terdapat corak persamaan tinggi keputusan yang diambil di kalangan lapan syarikat. Di dalam FOB, keputusan yang diambil untuk semua empat syarikat adalah serupa.

Dalam analisis selanjutnya, kajian ini menjalankan model regresi linear. Model ini menunjukkan corak linear meningkatkan keputusan beban apabila kawalan struktur meningkat. Model global membentangkan model yang lebih baik untuk memahami tingkah laku mereka dalam membuat keputusan.

Model global menjelaskan bahawa lapan syarikat berserakan dan tidak cenderung kepada identiti pemilikan mereka. Tiga kumpulan yang muncul, Boustead berada dalam Kumpulan 1, Sime Darby, KLK, IOI Corp, IJM Plantations, dan Genting Plantations berada dalam Kumpulan 2, dan Jaya Tiasa dan Kulim berada dalam Kumpulan 3. Pengumpulan menunjukkan kesamaan mereka dalam corak tingkah laku membuat keputusan. Walau bagaimanapun, setiap syarikat berbeza dari segi beban keputusan yang diberikan kawalan struktur anak syarikat yang sama dan sebaliknya. Walaupun syarikat itu tergolong dalam kumpulan yang sama, mengikuti corak linear yang sama yang semakin meningkat keputusan apabila kawalan struktur meningkat, beban keputusan mereka semua berbeza dengan kawalan struktur yang sama.

Terdapat tingkah laku yang muncul dari pemintas beban keputusan dan hubungan kawalan struktur. Kajian ini menganggap kelakuan sebagai fleksibiliti struktur. Kelenturan struktur syarikat sangat bergantung kepada bilangan syarikat, indeks hierarki, dan saiz piramid.

Berdasarkan hasilnya, analisis menunjukkan bahawa setiap syarikat, sama ada GLC atau perusahaan milik keluarga, berfungsi secara berbeza. Tingkah laku pengambilan keputusan mereka kurang bergantung pada jenis pemilikan dan lebih banyak pada topologi atau reka bentuk struktur, seperti bilangan syarikat, indeks hierarki, dan saiz piramid. Tahap keputusan dan kawalan yang berbeza menunjukkan pelbagai corak fleksibiliti.

Analisisnya membuktikan bahawa struktur pemilikan syarikat mempengaruhi tingkah laku mereka membuat keputusan. Kajian ini menyimpulkan bahawa tingkah laku mereka membuat keputusan kurang bergantung pada jenis pemilikan dan lebih banyak pada topologi atau reka bentuk struktur pemilikan. Kedua-dua GLC dan FOB mempunyai persamaan dan perbezaan dalam tingkah laku mereka membuat keputusan. Hasilnya mungkin bertentangan dengan beberapa kajian lain dan ia membuka bidang penyelidikan dan analisis baru korporat, tanpa mengira jenis / identiti pemilikan mereka (milik kerajaan atau milik keluarga). Kaedah ini membolehkan kami menilai struktur topologi pemilikan secara kuantitatif dan kualitatif. Selain itu, syarikat-syarikat ini boleh dinilai berdasarkan analisis yang digunakan dalam kajian ini.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank God Almighty for giving me the strength, knowledge, ability and opportunity to undertake this research and to persevere, and complete it satisfactorily. Without his blessings, I would not be able to achieve this to the best of my ability.

Secondly, this journey would not have been possible without the support of my family. Hence, I would like to thank my wonderful parents and parents-in-law, who have continuously supported me; my dearest husband, Kiwi, who has always been there for me and has guided me all the way and my loving children, who have always inspired me to be better. I am grateful for their unconditional love.

Next, I would like to express my sincere gratitude to my advisor, Dr Jean-Marc Roda for his continuous support, patience, motivation, and knowledge during my PhD studies. His guidance has indeed been valuable especially during the time when I did my research and wrote this dissertation. I could not have imagined having a better advisor and mentor for my PhD studies.

Besides Dr Roda, I would like to thank Prof. Dr Terence Gomez for his encouragement, knowledge and experience in the area of political business. It is an honour to work with him during my PhD journey. My sincere thanks also to the rest of my supervisory committee members, Dr Shaufique Fahmi Ahmad Siddique and Prof. Dr Paridah Md. Tahir, for their insightful comments and inspiration, and also for the hard questions which encouraged me to widen my research from various perspectives.

My sincere thanks to the interns, Raphael, Omar, Valentin, Jean-Eudes, and others who worked under the supervision of Dr Roda. I would like to express my deep appreciation to my colleagues in Universiti Malaya, Trishi, Fikri, Sunil, Wai, and others for our stimulating discussions, the hours we spent working together, the constructive reviews of my dissertation, and all the fun we had together. Thank you also to Yagnesh, Uni, and Ivan who have helped me in the reconstruction and editing of my dissertation.

I would also like to thank my colleagues in UPM who have helped me in this research and have provided me the opportunities to learn from them. Lastly, I would like to express my heartfelt gratitude to my best friends who have in their own ways, kept me going on this challenging journey, assisted me to the best of their ability and ensured that our friendship remained strong to this very day.

I certify that a Thesis Examination Committee has met on 8 October 2018 to conduct the final examination of Norfaryanti Binti Kamaruddin on her thesis entitled "Ownership network structure and decision-making behaviour of eight major oil palm companies in Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

ASNB	Amanah Saham Nasional Berhad
Bhd	Berhad
BoD	Board of directors
CCM	Companies Commission of Malaysia
CEB	Corporate-environmental behaviour
CEO	Chief executive officer
COEs	Collectively-owned enterprises
CPKO	Crude palm kernel oil
CPO	Crude palm oil
E&O	Eastern and Oriental Berhad
FFB	Fresh fruit bunch
FOBs	Family-owned businesses
GLCs	Government-linked companies
GLICs	Government-linked investment companies
IGB	IGB Corporation Berhad
IOI Corp	IOI Corporations Berhad
Johor Corp	Johor Corporation Berhad
KLK	Kuala Lumpur Kepong Berhad
KLSE	Kuala Lumpur Stock Exchange
KWAP	Kumpulan Wang Persaraan (Diperbadankan) (Retirement Fund Incorporated)
LTAT	Lembaga Tabung Angkatan Tentera (Armed Forces Savings Fund)
M-form	Multidivisional corporation
MNCs	Multinational corporations



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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

What shapes a company's decision-making? Does it depend on the owner's identity or the company's structure? Why is it important to understand the company's decision-making behaviour? These are the questions that opened the path for this research.

In the literature, the common idea is ownership and control depend on who the owner is. There are three main identities of an owner in a firm: government, family and private. It is believed that decision-making in government-owned companies is determined by political influence. Meanwhile, decisions in family-owned companies rely heavily on aspirations of the founder, while those of private companies are controlled by professionals who make decisions based on facts and figures.

However, while the owner may influence decision-making control of a firm, the ownership structure may have equal or even more influence. The ownership structure of a business involves a multitude of shareholding relations among stakeholders. The stakeholders vary from individuals, government and financial institutions. Among these stakeholders, one will have significant ownership of the business. As the structure of a company grows more complex, the power and control flow from the ultimate shareholder may be concealed and identifying the actual controller of decisions becomes more difficult. Cross-shareholdings and a pyramidal structure play important roles in transferring information when making decisions. An assessment of cross-shareholdings can reveal the amount of control held by a company/individual in a structure, where they own each other but have different amounts of control. For example, company A owns company B by 51%, while company B owns company A by 10%, but these interlocking shareholdings may hide the identity of the actual controller of decisions. The pyramidal structure reflects the hierarchical level of information flow in decision-making. The more pyramidal the company, the bigger the flow of information, a factor that can result in inflexibility in the decision-making process.

Given that the ownership structure of companies involved in diversified business activities vary, it is crucial to analyse them in a greater detail, to gain a better understanding of their decision-making behaviour. Generally, when the behaviour is better understood, the policy intervention is better designed.

The agribusiness and plantations sector is the focus of this research. Agribusiness and plantations are the leading agents in Malaysia's agriculture

industry. The oil palm industry constitutes most of the agribusiness and plantations sector and is the major contributor to the gross domestic product (GDP) in the agriculture sector. In 2016, the oil palm industry contributed 43 percent to the sector, compared to forestry logging and rubber that only contributed 7 percent respectively (Department of Statistics, 2017).

Agribusiness and plantation companies face the dilemma of balancing financial growth and environmental sustainability. They need to achieve financial growth to satisfy shareholders' return on investment, and at the same time, they have to manage trading and investment responsibly to sustain the environment for the future. For government-linked companies (GLCs), there is another dilemma which is to fulfil their social obligations. They have to adhere to the ruling government's visions and aspirations which highly depend on the political agenda. How well they carry out these responsibilities depends on their ability to make responsible decisions. For that reason, it is vital to understand the decision-making behaviour of companies in this sector.

The global agriculture sector is in the process of financialisation, a process in which the role of financial institutions as shareholders is becoming more prevalent. The increasing amount of investment by leading agribusiness corporations is one of the drivers of this process (Anseeuw, Jean-Marc, Antoine, & Norfaryanti, 2016). Financialisation has increased the complexity of the ownership structure of these firms, including those owned by the government, families or private individuals. These companies, regardless of who the owners are, possibly have more complex structures, i.e. interlocking shareholdings and pyramiding. The core questions of this study are: how do complex shareholding structures shape decision-making among government- and family-owned companies in this sector? Is it true, as the current literature suggests, that their decision-making mechanisms are still controlled by their ultimate owners? Are there significant differences in the decision-making processes of government- and family-owned companies?

1.2 The Research Gap

The relationship between companies' ownership structure and decision-making behaviour among agribusiness corporations has not yet been clarified. The use of network analysis to explore this relationship is also lacking. Therefore, this research fills the gap by analysing quantitatively and qualitatively the oil palm plantation corporations' ownership structure to explore its relationship with decision-making behaviour.

The ownership structure of a company has a crucial bearing on its corporate strategies (Chandler, 1962; Miles, Snow, Meyer, & Coleman, 1978). The ownership structures of large corporations are complex and diverse which informs their decision-making behaviour. Decision-making control by a corporate entity is complex because of the convoluted shareholding structures within the

company. The ownership structures that can be employed include cross-shareholdings and pyramidal structures that can contribute to the complexity of the decision-making process. Such structures could also lead to devious decision-making.

Government-linked companies (GLCs) and family-owned businesses (FOBs) are seen to be fundamentally different in terms of the nature of their ownership which, in turn, determines their decision-making control mechanisms. This issue has become more pertinent now that ownership structures of major corporations have become extremely complex in the context of growing corporation size and intense competition. In the palm oil, forestry and biomass sectors, both GLCs and FOBs are big businesses that have contributed significantly to the development of these sectors.

Control of decision-making in the corporation is vital. It leads to many implications. Excellent control will allow the corporation to prosper; bad control will devalue the corporation. Excellent control includes good governance in the decision-making process where the decisions made are legitimate and with high integrity. Weak control in decision-making encompasses conflicts-of-interest, no integrity, and inappropriate corporate activities.

The board of directors and the management team are key actors in the decision-making structure. They belong to the hierarchical managerial decision-making structure, also regarded as the power structure (Martz & Semple, 1985). Each hierarchy level has a range of control in the decision-making, and it carries a decision's load. For example, a business development department has its hierarchy levels which are responsible for making decisions on future investment of the company. These decisions have a load in the hierarchy. The decisions load in the hierarchy somewhat reflects the decision-making behaviour of the company.

Connections in the structure convey the flow and the concentration of corporate control as well as the flow of information. High concentration of ownership of shares reflects high influence over decision-making.

In the agribusiness and plantation sectors, the decisions of a company are often directly related to environmental sustainability. These important sectors also recorded high volumes of trade and investment in the country and the region. Most of the time, it is difficult to decipher a decision made by a company because many aspects could drive decision-making, from political intervention, oil prices and environmental issues, to international trade and global financial market trends. Understanding the reason for decision-making by a company, be it to reinforce control patterns or other factors, is crucial as this provides insights into issues such as the sustainability of the agricultural sector worldwide. This research is designed to understand and analyse the decision-making patterns by major agribusiness and plantation companies in Malaysia.

GLCs and FOBs are big businesses that have contributed significantly to the development of these sectors but are seen to be fundamentally different regarding how their ownership structure patterns determine decision-making control. As the structure of a company grows more complex, the power and control flows from the ultimate shareholder may be hidden and identifying the actual controller of the decisions becomes more difficult.

1.2.1 Logical Framework

As indicated in the logical framework of this research in Figure 1.1, every structure has properties and a purpose. Structural theories established in the field of science, especially in chemistry, where it was developed stress this point. In the disciplines of business and economics, Chandler (1962) has set the ground for this research. According to him, organisational structure determines corporate strategy. Decision-making is part of corporate strategies. The decision-making is shaped by interactions between actors in the organisation. GLCs and FOBs have diverse actors with various objectives. The interactions among the actors are derived from the design of the ownership and control of the company. The design or the composition of the ownership and control shapes the company structure, reciprocally.

Most of the ownership structures of companies are becoming complex networks. With the advancement of network studies, network analysis is emerging as an important tool to understand the interactions between actors in complex networks. Complex networks are present in a wide range of systems in nature and society, such as in the Internet, movie actor collaborations, cellular networks, ecological networks, citation networks, linguistics networks, power and neural networks, financial networks and many others (Albert & Barabasi, 2002).

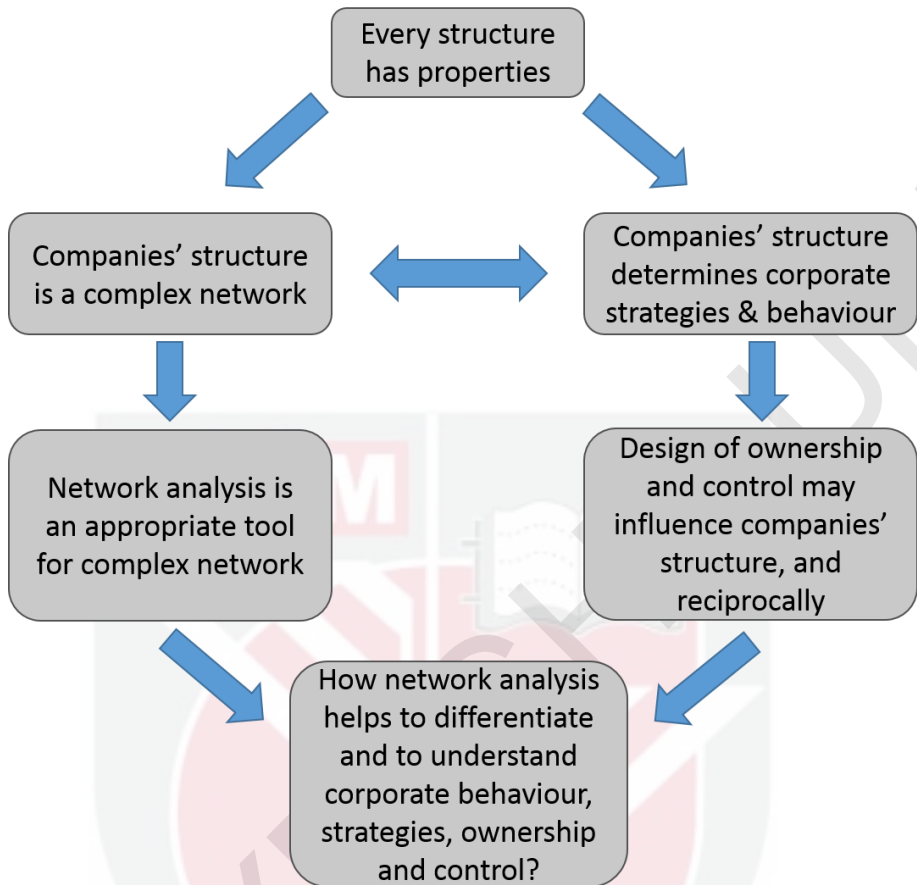


Figure 1.1: Logical framework of the research

A company's structure determines its corporate behaviour and it can emerge as a complex structure, leading to why network analysis serves as a tool to link corporate strategies, ownership and control. This logical framework is the basis for the theoretical framework which will be discussed in the following chapter.

Due to the complex corporate structure which informs decision-making influence, this research is designed to quantify and analyse the decision-making behaviour of each firm based on its corporate structure using network analysis tools. As mentioned, network analysis is emerging as a tool to analyse a complex network such as the shareholding structures of large companies. A decade ago, the tools used to analyse a complex network were limited. Over time, these tools have evolved and network analysis is able to uncover complex cross-shareholdings and pyramidal structures in a quantitative manner.

1.3 Scope of the Research

This research is part of a bigger project under the Consultative Group on International Agricultural Research (CGIAR). Research Programme 6 (CRP6) focused on forests, trees and agroforestry. It is funded by a partnership with various international agroforestry institutions, such as the Center for International Forestry Research (CIFOR), World Agroforestry Centre, International Center for Tropical Agriculture and others. One objective of CRP6 is to study the impact of trade and investment on forests and people, particularly the effects of financialisation on the agriculture sector.

To understand the impact of forest-related trade and investment in Southeast Asia, this research decided to focus on agribusiness and oil palm plantation companies, where most of the trade and investment in forest-related activities were recorded. The leading agribusiness and oil palm plantation companies are part of the financialisation of the global agriculture sector. This research analysed eight companies among the top 12 companies listed in Table 1.1. These eight companies are global players in the industry. As of 2013, there were 44 agribusiness and plantation corporations listed on the Bursa Kuala Lumpur (Table 1.1). Their market capitalisation was then RM172 billion, 10% of the total market capital value of the Bursa Kuala Lumpur which was RM1.7 trillion (Gomez, Padmanabhan, Kamaruddin, Bhalla, & Fisal, 2017).

Table 1.1: Agribusiness and plantation corporations listed in Bursa Kuala Lumpur in 2013

No.	Plantation corporations	Market capital (RM billion)	Ownership type	Estimated planted area (ha)
1.	Sime Darby Berhad	57.5	Federal GLC	525,000
2.	IOI Corporation	30.0	Family	175,000
3.	Kuala Lumpur Kepong Berhad (KLK)	23.5	Family	193,000
4.	Batu Kawan Berhad	8.518	Family	
5.	Genting Plantations	7.759	Family	117,000
6.	United Plantations	5.707	Family	50,000
7.	Kulim (M) Berhad	4.259	State GLC	50,000
8.	TSH Resources	2.919	Family	50,000

9.	IJM Plantations Berhad	2.882	Federal GLC	55,389
10.	Sarawak Oil Palms Berhad	2.628	Family	63,530
11.	Boustead Holdings Berhad (Boustead)	2.544	Federal GLC	70,338
12.	Jaya Tiasa Holdings	2.064	Family	62,745
13.	Hap Seng Plantations Holdings	2.024	Private	35,697
14.	TH Plantations	1.644	Federal GLC	60,270
15.	MKH Plantations	1.497	Private	14,400
16.	Ta Ann Holdings Berhad	1.464	Private	36,944
17.	United Malacca Berhad	1.456	Family	22,336
18.	TDM Berhad	1.415	State GLC	44,000
19.	Far East Holdings Berhad	1.067	State GLC	20,768
20.	Kretam Holdings	0.95	Private	19,842
21.	Rimbunan Sawit Berhad	0.94	Family	54,659
22.	Chin Tek Plantations Bhd	0.88	Family	10,925
23.	Kim Loong Resources Bhd	0.84	Family	23,512
24.	Tanah Makmur Berhad	0.79	Private	17,969
25.	BLD Plantation	0.78	Private	27,300
26.	Sarawak Plantation Berhad	0.70	Private	31,266
27.	Kwantas Corporation Bhd	0.66	Family	17,051
28.	WTK Holdings Berhad	0.61	Private	9,000
29.	Dutaland Berhad	0.51	Family	10,557
30.	PLS Plantation	0.47	Private	12,140
31.	Negri Sembilan Oil Palms Bhd	0.40	Family	2,653
32.	Inch Kenneth Kajang Rubber PLC	0.36	Private	189
33.	NPC Resources Bhd	0.33	Private	17,316

34.	Cepatwawasan Group Berhad	0.31	Family	11,331
35.	Golden Land Berhad	0.28	Family	9,414
36.	Riverview Rubber Estates Bhd	0.28	Private	2,583
37.	Sungei Bagan Rubber Co (M) Bhd	0.24	Family	2,615
38.	Kluang Rubber Co (M) Bhd	0.23	Family	1,574
39.	Harn Len Corporation Bhd	0.21	Family	12,751
40.	MHC Plantations Berhad	0.21	Family	na
41.	Gopeng Berhad	0.15	Private	1,434
42.	Astral Asia Berhad	0.14	Private	4,019
43.	Malpac Holdings Bhd	0.14	Private	2,023
44.	Pinehill Pacific Berhad	0.06	Private	11,658
	Total	172.325		

Sources: 2013 Companies' Annual Report, 2013 Stock Performance Guide, and www.malaysiastock.biz

Most of the big corporations were founded during the British colonial era. They started as rubber plantation companies and evolved into palm oil businesses between the 1960s and 1970s. As modernisation of the agriculture sector occurred, many of these corporations became involved in a diverse range of business activities, including property development, product manufacturing, heavy machinery and motor production.

Based on Table 1.1, most of the public-listed companies (21 companies) in the plantation sector are family-owned. In the top ten, seven are family-owned businesses. In 2013, total market capital value for family-owned business in the plantation sector was RM90 billion, constituting 52% of the total plantation sector. The rests are either private companies (15) or GLCs (8).

Among GLCs, there are four federal GLCs and three state GLCs. Entities under the federal government which owned plantation companies are Permodalan Nasional Berhad (PNB), Lembaga Tabung Angkatan Tentera (LTAT), and Lembaga Tabung Haji (LTH). State government entities which owned plantation companies are Johor Corporation, Terengganu Incorporated Sdn Bhd, and Lembaga Kemajuan Perusahaan Pertanian Negeri Pahang. The total market capital of GLCs in 2013 was RM71 billion, 41% of the total plantation sector. The

private companies are owned by private limited companies or individuals, which are neither government- nor family-owned.

Out of 44 companies, this research analysed eight companies in the top 12, of which four are GLCs and four are FOBs. The GLCs are Sime Darby Berhad, Boustead Holdings Berhad, IJM Plantations and Kulim Berhad. The FOBs are IOI Corporations Berhad, Kuala Lumpur Kepong Berhad, Genting Plantations Berhad and Jaya Tiasa Berhad. They are major agribusiness and plantation players in Southeast Asia and the world, contributing about 50% of the total plantations market capital and land bank area.

1.3.1 Research Questions

Based on the problem highlighted earlier, several questions are raised to achieve the overall objective of the research. The research questions are:

- i. How to best describe the ownership structure of the corporations and link to decision-control behaviour?
- ii. Are the GLCs and FOBs ownership structures similar or different?
- iii. Is there a general criteria to link to the decision-control behaviour?
- iv. Can decision-control behaviour be represented by a mathematical relationship?

1.3.2 Hypotheses

This research is to test these hypotheses:

1. Ownership structures of government-owned and family-owned companies in agribusiness and plantations are different.
2. The differences or similarities in the ownership structure affect decision-control, involving enterprise development.

1.3.3 Objectives of the Research

The overall objective of this study is to analyse the links between the ownership structure and the corporate decision-making control behaviour. The specific objectives are to:

- i) understand and analyse how the shareholding structure shapes decision-control behaviour of agribusiness corporations owned by the government and families;
- ii) understand and analyse decision-control patterns by GLCs and FOBs; and

- iii) investigate if there is ownership structure criteria to explain decision-control behaviour (model).

1.3.4 Using the Emerging Network Analysis Tool

Due to the complex corporate structure which informs decision-making, this research is designed to quantify and analyse the decision-making behaviour of each firm based on its corporate structure using network analysis tools.

Network analysis is emerging as a tool to analyse complex networks such as the ecological network, financial network, and others. The shareholding structures of large companies are such complex networks. This research employed a network analysis tool which can quantify the decisions load on the corporate structure. Besides, the tool provides insights into the corporate structure which was not discovered in any study previously. A decade ago, the tools used to analyse a complex network were limited. Over time, these tools have evolved, and network analysis can uncover complex cross-shareholdings and pyramidal structures quantitatively.

1.4 Significance of the Study

The study of the ownership and control networks in the agribusiness sector can be a learning paradigm in agribusiness study, as well as to enhance multidisciplinary research. Many studies on decision sciences did not assess decision-making patterns employing the methods used here.

This study's goal is to expand the understanding of what shapes a company's decision-making, using a mixed method approach. The literature is mainly either quantitative or qualitative in its approach. Very few studies employed a mixed method and none focussed on agribusiness and networks, analysing and comparing decision-making behaviour of GLCs and FOBs.

1.5 Thesis Organisation

The first chapter discusses the problems and the scope of this study. It also includes an overview of the agribusiness and plantation sector in Malaysia, as it is the dataset used in this study. The objectives and a logical framework are included in this chapter. These elements framed the research questions and the hypotheses.

Chapter two reviews and analyses the relevant theories and concepts of ownership structure. It also reviews publications related to the topic of corporations' decision-making behaviour and network analysis.

The third chapter explains in detail the methodology used to achieve the objectives of the study. It also discusses the data collection and data analysis. It explains the theory and the application of network analysis in the context of network centralities metrics and statistical method.

The fourth chapter covers the results and discussions of the network analysis. It includes network topology and the network features for each company by ownership identity, i.e. either GLC or FOB.

Chapter five provides the results and discussions of the network centrality metrics. This chapter covers the linear regression analysis.

The sixth chapter concludes the thesis by summarising the findings that are related to the problems identified earlier. It presents the significant findings, limitations of the study as well as the implications of this study at the micro and macro levels.

BIBLIOGRAPHY

- Abdul Rahman, R. (2006). *Effective corporate governance* (1st ed.). Shah Alam, Malaysia: University Publication Centre (UPENA), Universiti Teknologi MARA.
- Albert, R., & Barabasi, A.L. (2002). Statistical mechanics of complex networks. *Reviews of Modern Physics*, 74(1), 47–97. <https://doi.org/10.1103/RevModPhys.74.47>
- Almeida, H., & Wolfenzon, D. (2006). A theory of pyramidal ownership and family business groups. *The Journal of Finance*, 61(6), 2637–2680.
- Almeida, H., Park, S.Y., Subramanyam, M., & Wolfenzon, D. (2008). *Beyond cash flow and voting rights: Valuation and performance of firms in complex ownership structures*. Working paper, University of Illinois at Urbana-Champaign and Stern School of Business at NYU.
- Almeida, H., Park, S.Y., Subramanyam, M., & Wolfenzon, D. (2011). The structure and formation of business groups: Evidence from Korean *chaebols*. *Journal of Financial Economics*, 99(2), 447–475. <http://dx.doi.org/10.1016/j.jfineco.2010.08.017>
- Alwshah, K.A.A.M. (2009). *The impact of corporate governance and ownership structure on performance and financial decisions of firms: Evidence from Jordan* (Doctoral thesis, University of Hull, United Kingdom). Retrieved from <https://hydra.hull.ac.uk/resources/hull:6971>
- Amihud, Y., & Lev, B. (1999). Does corporate ownership structure affect its strategy towards diversification? *Strategic Management Journal*, 20(11), 1063–1069. doi: 10.1002/(SICI)1097-0266(199911)20:11<1063::AID-SMJ69>3.0.CO;2-S
- Anderson, R.C., & Reeb, D.M. (2003). Founding-family ownership and firm performance: Evidence from the S&P 500. *The Journal of Finance*, 58(3), 1301–1328.
- Ang, J.S., & Ding, D.K. (2006). Government ownership and the performance of government-linked companies: The case of Singapore. *Journal of Multinational Financial Management*, 16(1), 64–88. <https://doi.org/10.1016/j.mulfin.2005.04.010>
- Anseeuw, W., Jean-Marc, R., Antoine, D., & Norfaryanti, K. (2016). Strategies globales des firmes et financiarisation de l'agriculture. In B. Estelle, R. Alain, & L. Denis (Eds.), *Developpement durable et filieres tropicales* (pp. 321-337). Paris: Cirad.

- Anthonisse, J.M. (1971) *The rush in a graph* (Technical report). Amsterdam: University of Amsterdam Mathematical Centre.
- Ariffin, B. (2009). Pyramidal ownership structure and agency problem: Theory and evidence. *Integration and Dissemination*, 4(March), 9–18.
- Arrow, K. (1964). Control in large organizations. *Management Science*, 10(3), 397–408.
- Assenov, Y., Ramírez, F., Schelhorn, S.E., Lengauer, T., & Albrecht, M. (2008). Computing topological parameters of biological networks. *Bioinformatics*, 24(2), 282–284. doi: 10.1093/bioinformatics/btm554
- Astrachan, J.H., & Shanker, M.C. (2003). Family businesses' contribution to the U.S. economy: A closer look. *Family Business Review*, 16(3), 211–219. doi: 10.1111/j.1741-6248.2003.tb00015.x
- Basiron, Y. (2007). Palm oil production through sustainable plantations. *European Journal of Lipid Science and Technology*, 109(4), 289–295.
- Bastian, M., Heymann, S., & Jacomy, M. (2009). *Gephi: An open source software for exploring and manipulating networks*. Paper presented at the Third International AAAI Conference on Weblogs and Social Media, San Jose Mc Energy Convention Center, California. Retrieved from <http://www.aaai.org/ocs/index.php/ICWSM/09/paper/view/154%5Cnpapers2://publication/uuid/CCEBC82E-0D18-4FFC-91EC-6E4A7F1A1972>
- Bebchuk, L.A., Kraakman, R., & Triantis, G.G. (2000). Stock pyramids, cross-ownership, and dual class equity: The mechanisms and agency costs of separating control from cash-flow rights. In R. Morck (Ed.), *Concentrated corporate ownership* (pp. 295–315). Chicago, IL: University of Chicago Press.
- Beckhard, R., & Dyer, W.G., Jr. (1983). Managing continuity in the family owned business. *Organizational Dynamics*, 12(1), 5–12. [https://doi.org/10.1016/0090-2616\(83\)90022-0](https://doi.org/10.1016/0090-2616(83)90022-0)
- Berle, A.A. (1968). Corporate decision-making and social control. *The Business Lawyer*, 24(1), 149–157.
- Berle, A.A., & Means, C.G. (1932). *The modern corporation and private property*. New York, NY: Macmillan.
- Bertrand, M., & Mullainathan, S. (2003). Pyramids. *Journal of the European Economic Association*, 1(2–3), 478–483.
- Bhasin, M.L. (2010). Dharma, corporate governance and transparency: An overview of the Asian markets. *International Journal of Business and*

Management, 5(6), 56–73. Retrieved from <http://ccsenet.org/journal/index.php/ijbm/article/view/6228/4922>

- Blair, M.M. (1995). *Ownership and control: Rethinking corporate governance for the twenty-first century*. Washington, DC: Brookings Institution Press.
- Boccaletti, S., Latora, V., Moreno, Y., Chavez, M., & Hwang, D.-U (2006). Complex networks: Structure and dynamics. *Physics Reports*, 424(4–5), 175–308.
- Bohlin, L. (2012). *Network analysis of the share ownership structure on the Swedish stock market* (Master's thesis, Department of Physics, Umeå University, Umeå, Sweden). Retrieved from www.diva-portal.org/smash/get/diva2:536031/FULLTEXT01.pdf
- Bonacich, P. (1972). Factoring and weighting approaches to status scores and clique identification. *Journal of Mathematical Sociology*, 2(1), 113–120. <https://doi.org/10.1080/0022250X.1972.9989806>
- Bonacich, P. (1987). Power and centrality: A family of measures. *American Journal of Sociology*, 92(5), 1170–1182.
- Bonacina, F., D'Errico, M., Moretto, E., Stefani, S., Torriero, A., & Zambruno, G. (2015). A multiple network approach to corporate governance. *Quality & Quantity*, 49(4), 1585–1595. <http://dx.doi.org/10.1007/s11135-014-0075-y>
- Borgatti, S.P., & Everett, M.G. (2006). A Graph-theoretic perspective on centrality. *Social Networks*, 28(4), 466–484. <https://doi.org/10.1016/j.socnet.2005.11.005>
- Boustead Holdings Berhad. (2013). *Annual Report, 2012*. Kuala Lumpur: Author.
- Boutchkova, M.K., & Cueto, D. (2007). *Ownership structure mobility of Canadian business groups*.
- Bunkanwanicha, P., Gupta, J., & Wiwattanakantang, Y. (2016). Pyramidal group structure and bank risk in Thailand. *Journal of Comparative Economics*, 44(2), 272–288. <https://doi.org/10.1016/j.jce.2015.12.002>
- Burkart, M., Panunzi, F., & Shleifer, A. (2003). Family firms. *The Journal of Finance*, 58(5), 2167–2201. doi: 10.1111/1540-6261.00601
- Burt, R.S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Carlsson, B. (1989). Small-scale industry at a crossroads: US machine tools in global perspective (Research program in industrial economics working paper). Cleveland, Ohio: Case Western Reserve University.

- Chandler, A.D. (1962). *Strategy and structure: Chapters in the history of the American industrial enterprise*. New York, NY: Doubleday.
- Chandler, A.D. (1977). *The visible hand: The managerial revolution in American Business*. Cambridge, MA: Harvard University Press.
- Chandler, A.D. (1982). The M-form: Industrial groups, American style. *European Economic Review*, 19(1), 3–23. [https://doi.org/10.1016/0014-2921\(82\)90003-4](https://doi.org/10.1016/0014-2921(82)90003-4)
- Chapelle, A., & Szafarz, A. (2005). Controlling firms through the majority voting rule. *Physica A: Statistical Mechanics and its Applications*, 355(2–4), 509–529.
- Chen, G., Firth, M., & Xu, L. (2009). Does the type of ownership control matter? Evidence from China's listed companies. *Journal of Banking and Finance*, 33, 171-181.
- Chen, L. (2012). *The effect of ownership structure on firm performance: Evidence from non-financial listed companies in Scandinavia* (MSc thesis, Aarhus University, Aarhus, Denmark).
- Child, J. (1972). Organizational structure, environment and performance: The role of strategic choice. *Sociology*, 6(1), 1–22.
- Chu, W. (2009). The influence of family ownership on SME performance: Evidence from public firms in Taiwan. *Small Business Economics*, 33(3), 353-373. <https://doi.org/10.1007/s11187-009-9178-6>
- Chua, J.H., Chrisman, J.J., & Sharma, P. (1999). Defining the family business by behavior. *Entrepreneurship: Theory & Practice*, 23, 19–39.
- Churchill, N.C., & Hatten, K.J. (1987). Non-market-based transfer of wealth and power: A research framework for family businesses. *American Journal of Small Business*, 11(3), 51–64.
- Claessens, S., Djankov, S., & Lang, H.P. (1999). Who controls East Asian corporations—and the implications for legal reform. *Public Policy for the Private Sector*, 1–8.
- Connelly, B.L., Hoskisson, R.E., Tihanyi, L., & Certo, S.T. (2010). Ownership as a form of corporate governance. *Journal of Management Studies*, 47(8), 1561–1589. doi: 10.1111/j.1467-6486.2010.00929.x
- Connelly, J.T., Limpaphayom, P., & Nagarajan, N.J. (2012). Form versus substance: The effect of ownership structure and corporate governance on firm value in Thailand. *Journal of Banking and Finance*, 36(6), 1722–1743. <https://doi.org/10.1016/j.jbankfin.2012.01.017>

- Cross, R., Liedtka, J., & Weiss, L. (2005). A practical guide to social networks. *Harvard Business Review*, 83(3), 124–132.
- Cull, R., Matesova, J., & Shirley, M. (2001). *Ownership structure and the temptation to loot: Evidence from privatized firms in the Czech Republic* (World Bank Policy Research Working Paper). Washington DC: World Bank. <https://doi.org/10.1596/1813-9450-2568>
- da Costa, L.F., Rodrigues, F.A., Travieso, G., & Villas Boas, P.R. (2007). Characterization of complex networks: A survey of measurements. *Advances in Physics*, 56(1), 167–242. doi: 10.1080/00018730601170527
- Daily, C.M., & Dollinger, M.J. (1992). An empirical examination of ownership structure in family and professionally managed firms. *Family Business Review*, 5(2), 117–136. <https://doi.org/10.1111/j.1741-6248.1992.00117.x>
- Daniels, P.W. (1983). Business service offices in British provincial cities: Location and control. *Environment and Planning A: Economy and Space*, 15(8), 1101–1120. <https://doi.org/10.1068/a151101>
- Davis, J.H., & Goldberg, R.A. (1957). *A concept of agribusiness*. Boston: Division of Research, Graduate School of Business Administration, Harvard University.
- de Masi, G., & Gallegati, M. (2012). Bank-firms topology in Italy. *Empirical Economics*, 43(2), 851–866. <https://doi.org/10.1007/s00181-011-0512-x>
- de Nooy, W., Mrvar, A., & Batagelj, V. (2005). *Exploratory social network analysis with Pajek*. Cambridge: Cambridge University Press.
- Dean, J.W., & Sharfman, M.P. (1996). Does decision process matter? A study of strategic decision-making effectiveness. *The Academy of Management Journal*, 39(2), 368–396.
- Demsetz, H. (1983). The structure of ownership and the theory of the firm. *The Journal of Law & Economics*, 26(2), 375–390.
- Denis, D.J., Denis, D.K., & Sarin, A. (1997). Ownership structure and top executive turnover. *Journal of Financial Economics*, 45(2), 193–221. [https://doi.org/10.1016/S0304-405X\(97\)00016-0](https://doi.org/10.1016/S0304-405X(97)00016-0)
- Department of Statistics Malaysia. (2017). *Selected agricultural indicators, Malaysia, 2017*. Putrajaya: Author.
- Dyer, W.G. (1988). Culture and continuity in family firms. *Family Business Review*, 1(1), 37–50.

- Evans, P. (1999). Transferable lessons? Re-examining the institutional prerequisites of East Asian economic policies. In Y. Akyuz (Ed.), *East Asian development: New perspectives*. London: Frank Cass.
- Faccio, M., & Lang, L.H.P. (2002). The ultimate ownership of Western European corporations. *Journal of Financial Economics*, 65(3), 365–395. [https://doi.org/10.1016/S0304-405X\(02\)00146-0](https://doi.org/10.1016/S0304-405X(02)00146-0)
- Fama, E.F., & Jensen, M.C. (1983). Separation of ownership and control. *The Journal of Law and Economics*, 26(2), 301–325.
- Favero, C.A., Giglio, S.W., Honorati, M., & Panunzi, F. (2006). *The performance of Italian family firms* (ECGI Finance Working Paper No. 127/2006). Brussels: European Corporate Governance Institute.
- Ferreira, D., Ornelas, E., & Turner, J.L. (2007). Unbundling ownership and control (ECGI Finance Working Paper No. 172/2007). Brussels: European Corporate Governance Institute.
- Fligstein, N. (2001). *The architecture of markets: An economic sociology of twenty-first-century capitalist societies*. Princeton, NJ: Princeton University Press.
- Forbes, D.P., & Milliken, F.J. (1999). Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups. *The Academy of Management Review*, 24(3), 489–505.
- Freeman, L.C. (1977). A set of measures of centrality based on betweenness. *Sociometry*, 40(1), 35–41. doi: 10.2307/3033543
- Freeman, L.C. (1978). Centrality in social networks. *Social Networks*, 1(3), 215–239. [https://doi.org/10.1016/0378-8733\(78\)90021-7](https://doi.org/10.1016/0378-8733(78)90021-7)
- Freeman, L.C. (2008). Going the wrong way on a one-way street: Centrality in physics and biology. *Journal of Social Structure*, 9(2), 1–15.
- Friedkin, N.E., & Johnsen, E.C. (1990). Social influence and opinions. *Journal of Mathematical Sociology* 15(3-4), 193–206. doi: 10.1080/0022250X.1990.9990069
- Genting Plantations Berhad. (2013). *Annual report, 2012*. Kuala Lumpur: Author.
- Ghazali, N.A.M. (2007). Ownership structure and corporate social responsibility disclosure: Some Malaysian evidence. *Corporate Governance: The international journal of business in society*, 7(3), 251–266. <https://doi.org/10.1108/14720700710756535>

- Glattfelder, J.B. (2010). *Ownership networks and corporate control: Mapping economic power in a globalized world* (Doctoral thesis, ETH Zurich, Switzerland). <https://doi.org/10.3929/ethz-a-006208696>
- Glattfelder, J.B., & Battiston, S. (2009). Backbone of complex networks of corporations: The flow of control. *Physical Review E - Statistical, Nonlinear, and Soft Matter Physics*, 80(3), 1–12. doi: 10.1103/PhysRevE.80.036104
- Gomez, E.T. (1990). *Politics in business: UMNO's corporate investments*. Kuala Lumpur: Forum.
- Gomez, E.T. (2002). Political business in Malaysia: Party factionalism, corporate development and economic crisis. In Edmund Terence Gomez (Ed.), *Political business in East Asia* (pp. 82–114). London: Routledge.
- Gomez, E.T., & Jomo, K.S. (1997). *Malaysia's political economy: Politics, patronage, profits*. Cambridge: Cambridge University Press.
- Gomez, E.T., Padmanabhan, T., Kamaruddin, N., Bhalla, S., & Faisal, F. (2017). *Minister of Finance Incorporated: Ownership and control of corporate Malaysia*. Kuala Lumpur and Petaling Jaya: Institute for Democracy and Economic Affairs (IDEAS) and Strategic Information and Research Development Centre (SIRD), Petaling Jaya.
- Gomez, E.T., & Saravanamuttu, J. (Eds.). (2013). *The New Economic Policy in Malaysia: Affirmative action, horizontal inequalities and social justice*. Singapore: National University of Singapore Press.
- Gorriç, C.G., & Fumas, V.S. (1996). Ownership structure and firm performance: Some empirical evidence from Spain. *Managerial and Decision Economics*, 17(6), 575–586. doi: 10.1002/(SICI)1099-1468(199611)17:6<575::AID-MDE778>3.0.CO;2-N
- Graham, J.R., Harvey, C.R., & Puri, M. (2013). Managerial attitudes and corporate actions. *Journal of Financial Economics*, 109(1), pp.103–121. <https://doi.org/10.1016/j.jfineco.2013.01.010>
- Granovetter, M. (1995). Coase revisited: Business groups in a modern economy. *Industrial and Corporate Change*, 4(1), 93–130. <https://doi.org/10.1093/icc/4.1.93>
- Gribovskaja, I., Øyvind H. Sr., & Laporte, G. (2007). The bridges of Königsberg—a historical perspective. *Networks*, 49(3), 199–203. doi: 10.1002/net.20159

- Gursoy, G., & Aydogan, K. (2002). Equity ownership, risk taking and performance: An empirical investigation in Turkish listed companies. *Emerging Markets Finance and Trade*, 38(6), 6–25.
- Hanim Adnan. (2017, September 16). IOI Corp and Bunge in win-win deal. *The Star*. Retrieved from <https://www.thestar.com.my/business/business-news/2017/09/16/ioi-corp-and-bunge-in-winwin-deal/>
- Hart, A.G. (1942). Risk, uncertainty and unprofitability of compounding probabilities. In O. Lange, F. McIntyre, & T. Yntema (Eds.), *Studies in mathematical economics and econometrics* (pp. 110-118). Chicago: University of Chicago Press.
- Hart, Albert G. (1965). *Anticipations, uncertainty and dynamic planning*. New York: Kelley.
- Hill, C.W.L. (1988). Corporate control type, strategy, size and financial performance. *Journal of Management Studies*, 25(5), 403–417. doi: 10.1111/j.1467-6486.1988.tb00707.x
- Hill, C.W.L., & Snell, S. (1989). Effects of ownership structure. *The Academy of Management Journal*, 32(1), 25–46.
- Howard, P.H. (2009). Visualizing consolidation in the global seed industry: 1996–2008. *Sustainability*, 1(4), 1266–1287. doi: 10.3390/su1041266
- Hubbell, Charles H. (1965). An input-output approach to clique identification. *Sociometry*, 28(4), 377–399.
- Hunt, E., & Sherman, H. (1972). Value, alienation, and distribution. *Science & Society*, 36(1), 29-48.
- Ibrahim, H., & Samad, F.A. (2011). Corporate governance mechanisms and performance of public-listed family-ownership in Malaysia. *International Journal of Economics and Finance*, 3(1), 105–115.
- IJM Corp. (2015). *Annual report, 2014*. Petaling Jaya, Selangor: Author.
- IJM Plantations Berhad. (2013). *Annual report, 2012*. Sandakan, Sabah: Author.
- IOI Corporations Berhad. (2013). *Annual report, 2012*. Putrajaya: Author.
- Jacob M. Anthonisse. (1971). *The rush in a directed graph*. Technical Report BN 9/71, Stichting Mathematisch Centrum, 2e Boerhaavestraat 49 Amsterdam
- Jasani, N.K. (2002). *Malaysia's family businesses: The family and the Business International Survey Report*. Kuala Lumpur: Shamsir Jasani Grant Thornton & Malaysian Institute of Management.

- Jaya Tiasa Holdings Berhad. (2013). *Annual report 2012*. Sibul, Sarawak: Author.
- Jensen, M.C., & Meckling, W.H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- Jensen, M.C., & Meckling, W.H. (1992). *Specific and general knowledge and organizational structure* (SSRN research paper). Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=6658
- Kirchoff, B.A., & Kirchoff, J.J. (1987). Family contributions to productivity and profitability in small business. *Journal of Small Business Management*, 25(4), 25–31.
- Kogut, B. (1985). Designing global strategies: Profiting from operational flexibility. *Sloan Management Review*, 27(1), 27–38.
- Koschützki, D., Lehmann, K.A., Peeters, L., Richter, S., Tenfelde-Podehl, D., & Zlotowski, O. (2005). Centrality indices. In U. Brandes, & T. Erlebach (Eds.), *Network analysis: Methodological foundations (Volume 3418 of Lecture Notes in Computer Science Tutorial)* (pp. 16–61). Berlin: Springer.
- Kuala Lumpur-Kepong Berhad. (2013). *Annual Report 2012*. Ipoh, Perak: Author
- Kulim Berhad. (2013). *Annual Report 2012*. Johor Bahru, Johor: Author.
- La Porta, R., Lopez-De-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. *The Journal of Finance*, 54(2), 471–517. doi: 10.1111/0022-1082.00115
- Laeven, L., & Levine, R. (2008). Complex ownership structures and corporate valuations. *The Review of Financial Studies*, 21(2), 579–604. <https://doi.org/10.1093/rfs/hhm068>
- Lane, P.J., Cannella, A.A., & Lubatkin, M.H. (1998). Agency problems as antecedents to unrelated mergers and diversification: Amihud and Lev reconsidered. *Strategic Management Journal*, 19(6), 555–578. doi: 10.1002/(SICI)1097-0266(199806)19:6<555::AID-SMJ955>3.0.CO;2-Y
- Lansberg, I.S., Perrow, E.L., & Rogolsky, S. (1988). Family business as an emerging field. *Family Business Review*, 1(1), 1–8. <https://doi.org/10.1111/j.1741-6248.1988.00001.x>
- Lee, C.H. (1990). Corporate behaviour in theory and history: I. The evolution of theory. *Business History*, 32(1), 17–31. <https://doi.org/10.1080/00076799000000000>

- Lee, J. (n.d.). *Changes in the ownership structure of Asian corporations post-Asian financial crisis*. GREThA - UMR CNRS 5113. Bordeaux, France: Montesquieu University - Bordeaux IV.
- Leech, D., & Leahy, J. (1991). Ownership structure, control type classifications and the performance of large British companies. *Economic Journal*, 101(409), 1418–1437.
- Leff, N.H. (1978). Industrial organization and entrepreneurship in the developing countries: The economic groups. *Economic Development and Cultural Change*, 26(4): 661–675. <https://doi.org/10.1086/451052>
- Levy, M. (2009). Control in pyramidal structures. *Corporate Governance: An International Review*, 17(1), 77–89. doi: 10.1111/j.1467-8683.2008.00719.x
- Li, Z., & Wu, S. (2010). An empirical research on ownership structure, board governance and corporate growth. In *Proceedings of 2010 International Conference on Management and Service Science*. Wuhan, China: MASS 2010.
- Lim, M.H. (1981). *Ownership and control of the one hundred largest corporations in Malaysia*. Kuala Lumpur: Oxford University Press.
- Lim, S.H. (2012). *Ownership structure and concentration and the timeliness of corporate earnings: Malaysian evidence* (Masters thesis, Queensland University of Technology, Brisbane, Australia).
- Lindblom, C. (1977). *Politics and markets: The world's political- economic systems*. New York: Basic Books.
- Lu, Y., & Yao, J. (2006). Impact of state ownership and control mechanisms on the performance of group affiliated companies in China. *Asia Pacific Journal of Management*, 23(4), 485–503. doi: 10.1007/s10490-006-9017-0
- Mansor, N., Che-Ahmad, A., Ahmad-Zaluki, N.A., & Osman, A.H. (2013). Corporate governance and earnings management: A study on the Malaysian family and non-family owned PLCs. *Procedia Economics and Finance*, 7, 221–229. [https://doi.org/10.1016/S2212-5671\(13\)00238-4](https://doi.org/10.1016/S2212-5671(13)00238-4)
- Martz, D.J.F., & Semple, R.K. (1985). Hierarchical corporate decision-making structure within the Canadian urban system: The case of banking. *Urban Geography*, 6(4), 316–330. <https://doi.org/10.2747/0272-3638.6.4.316>
- Miles, R.E., Snow, C.C., Meyer, A.D., & Coleman, H.J. (1978). Organizational strategy, structure, and process. *Academy of Management Review*, 3(3), 546–562. doi: 10.5465/AMR.1978.4305755

- Miles, R.H. (1982). *Coffin nails and corporate strategies*. Englewood Cliffs, NJ: Prentice-Hall.
- Miller, D., & LeBreton-Miller, I. (2005). *Managing for the long run: Lessons in competitive advantage from great family businesses*. Boston, MA: Harvard Business School Publishing.
- Miller, E.J., & Rice, A.K. (1967). *Systems of organizations: The control of task and sentient boundaries*. London: Tavistock Publications.
- Mishra, C.S., Randoy, T., & Jenssen, J.I. (2001). The effect of founding family influence on firm value and corporate governance. *Journal of International Financial Management & Accounting*, 12(3), 235-259. doi: 10.1111/1467-646X.00073
- Moebert, J., & Tydecks, P. (2007). *Power and ownership structures among German companies: A network analysis of financial linkages* (Darmstadt Discussion Papers in Economics 179). Darmstadt, Germany: Darmstadt University of Technology.
- Morck, R., & Yeung, B. (2004). Family control and the rent-seeking society. *Entrepreneurship Theory and Practice*, 28(4), 391–409. doi: 10.1111/j.1540-6520.2004.00053.x
- Murtha, T.P., & Lenway, S.A. (1994). Country capabilities and the strategic state: How national political institutions affect multinational corporations' strategies. *Strategic Management Journal*, 15(Supplement S2), 113–129. doi: 10.1002/smj.4250151008
- Newman, M.E.J. (2001). Scientific collaboration networks. II. Shortest paths, weighted networks, and centrality. *Physical Review E*, 64(1), 016132-1–016132-7. <https://doi.org/10.1103/PhysRevE.64.016132>
- Newman, M.E.J. (2010). *Networks: An introduction*. New York: Oxford University Press.
- Newman, M.E.J., & Park, J. (2003). Why social networks are different from other types of networks. *Physical Review E*, 68(3), 036122-1–036122-9. <https://doi.org/10.1103/PhysRevE.68.036122>
- Newman, M.E.J., Watts, D.J., & Strogatz, S.H. (2002). Random graph models of social networks. *Pnas*, 99(Suppl 1), 2566–2572. doi: 10.1073/pnas.012582999
- Obata, S. (2003). *Pyramid business groups in East Asia: Insurance or tunneling?* (CEI Working Paper Series, No. 2002-13). Tokyo, Japan: Institute of Economic Research, Hitotsubashi University.

- OECD. (2013). *Malaysia – OECD investment policy review*. Paris, France: Author.
- Owen-Smith, J., Cotton-Nessler, N.C., & Buhr, H. (2015). Network effects on organizational decision-making: Blended social mechanisms and IPO withdrawal. *Social Networks*, 41(May), 1–17. <http://dx.doi.org/10.1016/j.socnet.2014.11.004>
- Prowse, S.D. (1992). The structure of corporate ownership in Japan. *The Journal of Finance*, 47(3), 1121–1140. doi: 10.2307/2328979
- Puthuchery, J.J. (1960). *Ownership and control in the Malayan economy*. Singapore: Eastern Universities Press.
- Ramanujam, V., Venkatraman, N., & Camillus, J. (1986). Multi-objective assessment of effectiveness of strategic planning: A discriminate analysis approach. *Academy of Management Review*, 29(2), 347–372.
- Robinson, R.B., & Pearce, J.A. (1983). The impact of formalized strategic planning on financial performance in small organizations. *Strategic Management Journal* 4(3), 197–207. doi: 10.1002/smj.4250040302
- Roda, J.M., Kamaruddin, N., & Tobias, R.P. (2015). Deciphering corporate governance and environmental commitments among Southeast Asian transnationals: Uptake of sustainability certification. *Forests*, 6(5), 1454–1475. doi: 10.3390/f6051454
- Roe, M.J. (1993). Some differences in corporate structure in Germany, Japan, and the United States. *The Yale Law Journal*, 102(8), 1927–2003. doi: 10.2307/796856
- Salvaj, E., & Lluch, A. (2011). *Corporate networks in turbulent environments: A comparative study of interlocking directorates of Argentina and Chile (1970)*. Paper presented at the 15th Annual Conference of the European Business History Association (pp. 24–26), Athens, Greece.
- Sarkar, R. (2008). Public policy and corporate environmental behaviour: A broader view. *Corporate Social Responsibility and Environmental Management*, 15(5), 281–297. doi: 10.1002/csr.167
- Scardoni, G., & Laudanna, C. (2012). Centralities based analysis of complex networks. In Yagang Zhang (Ed.), *New frontiers in Graph Theory* (pp. 323–348). London: INTECH. <http://dx.doi.org/10.5772/35846>
- Schweitzer, F., Fagiolo, G., Sornette, D., Vega-Redondo, F., Vespignani, A., & White, D.R. (2009). Economic networks: The new challenges. *Science*, 325(5939), 422–425. doi: 10.1126/science.1173644

- Scott, J. (1997). *Corporate business and capitalist classes*. London: Oxford University Press.
- Serrat, O. (2009). Social network analysis. In Olivier Serrat, *Knowledge Solutions: Tools, Methods, and Approaches to Drive Organizational Performance* (pp. 39–43). Singapore: Springer. <https://doi.org/10.1007/978-981-10-0983-9>
- Sexton, D., & van Aucken, P. (1982). Prevalence of strategic planning in small business. *Journal of Small Business Management*, 20(1), 20–26.
- Sharifi, N. (2014). *The ownership structure and control mechanisms in Sweden: Case study of leading pyramidal corporations* (Master's thesis, Eastern Mediterranean University). Retrieved from <http://hdl.handle.net/11129/1436>
- Sharma, P., Chrisman, J.J., & Chua, J.H. (1997). Strategic management of the family business: Past research and future challenges. *Family Business Review*, 10(1), 1–35. doi: 10.1111/j.1741-6248.1997.00001.x
- Shimbel, A. (1953). Structural parameters of communication networks. *Bulletin of Mathematical Biophysics*, 15(4), 501–507. <https://doi.org/10.1007/BF02476438>
- Shleifer, A. (1998). State versus Private Ownership. *Journal of Economic Perspectives*, 12(4), 133–150. doi: 10.1257/jep.12.4.133
- Shleifer, A., & Vishny, R.W. (1986). Large shareholders and corporate control. *Journal of Political Economy*, 94(3), 461–488.
- Sieh, L.M.L. (1982). *Ownership and control of Malaysian manufacturing corporations*. Kuala Lumpur: University of Malaya Cooperative Bookshop Publication.
- Sime Darby Berhad. (2013). *Annual Report 2012*. Kuala Lumpur: Author.
- Simon, H.A. (1959). Theories of decision-making in economics and behavioral science. *The American Economic Review*, 49(3), 253–283.
- Smoot, M.E., Ono, K., Ruschinski, K., Wang, P.L., & Idekar, T. (2011). Cytoscape 2.8: New features for data integration and network visualization. *Bioinformatics*, 27(3), 431–432. doi: 10.1093/bioinformatics/btq675
- Sonquist, J.A., & Koenig, T. (1975). Interlocking directorates in the top U.S. corporations: A graph theory approach. *Critical Sociology*, 5(3), 196–229.

- Sprenger, C. (2007). *Ownership and firm behavior* (Doctoral thesis, Universitat Pompeu Fabra, Barcelona, Spain). Retrieved from <http://www.tdx.cat/handle/10803/7350>
- Sraer, D., & Thesmar, D. (2006). *Performance and behavior of family firms: Evidence from the French stock market* (ECGI Working Paper No. 130/2006). Brussels: European Corporate Governance Institute.
- Stigler, G. (1939). Production and distribution in the short run. *Journal of Political Economy*, 47(3), 305–327.
- Su, L.D. (2010). Ownership structure, corporate diversification and capital structure: Evidence from China's publicly listed firms. *Management Decision*, 48(2), 314–339. <https://doi.org/10.1108/00251741011022644>
- Thomson, S., & Pedersen, T. (2000). Ownership structure and economic performance in the largest European companies. *Strategic Management Journal*, 21(6), 689–705. doi: 10.1002/(SICI)1097-0266(200006)21:6<689::AID-SMJ115>3.0.CO;2-Y
- Tiffen, M., & Mortimore, M. (1990). *Theory and practice in plantation agriculture: An economic review*. London: Overseas Development Institute.
- Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *The Academy of Management Review*, 11(4), 801–814.
- Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics*, 80(2), 385–417. <https://doi.org/10.1016/j.jfineco.2004.12.005>
- Vitali, S., Glattfelder, J.B., & Battiston, S. (2011). The network of global corporate control. *PLoS ONE*, 6(10), 1–6. <https://doi.org/10.1371/journal.pone.0025995>
- Walsh, J.P., & Seward, J.K. (1990). On the Efficiency of Internal and External Corporate Control Mechanisms. *The Academy of Management Review*, 15(3), 421–458.
- Williamson, O. (1975). *Markets and hierarchies: Analysis and antitrust implications*. New York: Free Press.
- World Bank. (2012). *Report on the observance of standards and codes (ROSC): Corporate governance country assessment – Malaysia*. Washington, DC: Author.

- Yeh, Y.H., Lee, T.S., & Woidtke, T. (2001). Family control and corporate governance: Evidence from Taiwan. *International Review of Finance*, 2(1-2), 21–48.
- Zahra, S.A., Hayton, J.C., & Salvato, C. (2004). Entrepreneurship in family vs. non-family firms: A resource-based analysis of the effect of organizational culture. *Entrepreneurship Theory and Practice*, 28(4), 363–381. doi: 10.1111/j.1540-6520.2004.00051.x
- Zhao, J. (2010). Ownership structure and corporate diversification strategies of Chinese business groups. *Management Research Review*, 33(12), 1101–1112. <https://doi.org/10.1108/01409171011092167>
- Zheng, Y., & Chen, M. (2009). China's state-owned enterprise reform and its discontents. *Problems of Post-Communism*, 56(2), 36–42.
- Buckley, N. and van Alstyne, M.(2004) “Does email make white collar workers more productive?” Technical report, University of Michigan, USA.
- Cisic, D., Kesic, B. and Jakomin, L. (2000). “Research of the power in the supply chain *International Trade*”, Economics Working Paper Archive EconWPA, April, 2000.
- Coffman, T., Greenblatt, S. and Marcus, S. “Graph-based technologies for intelligence analysis”, *Communications of the ACM*, Vol. 47, No. 3, pages 45–47, 2004.
- Guimer`a, R., Mossa, S., Turtleschi, A. and Amaral, L., “The worldwide air transportation network: Anomalous centrality, community structure, and cities' global roles”, *Proceedings of the National Academy of Sciences USA*, Vol. 102, No. 22, pages 7794–7799, 2005.
- Krebs, V., “Mapping networks of terrorist cells”, *Connections*, Vol. 24, No. 3, pages, 43–52, 2002.
- Rajasingh, I., Rajan, B., & Isido, F. (2009). Betweenness-Centrality of grid networks. *International Conference on Computer Technology and Development 2009*, pp, 407-410.
- Marks, J., Barnett, L. M., Foulkes, C., Hawe, P., & Allender, S.(2013). Using social network analysis to identify key child care center staff for obesity prevention intervention: A Pilot study. *Journal of Obesity*, p. 1-10.
- Badar, K., Hite, J. M., and Badir, Y. F. (2013). Examining the relationship of co-authorship network centrality and gender on academic research performance: the case of chemistry researchers in Pakistan. *Scientometrics*, Vol (94): 755-775.

Yan, E., & Ding, Y. (2009). Applying centrality measures to impact analysis: A coauthorship network analysis. *Journal of the American Society for Information Science and Technology*, 60(10), 2107–2118.

Centiserver http://www.centiserver.org/?q1=centrality&q2=Stress_Centrality
19/11/18

Brandes, U. (2008). On variants of shortest-path betweenness centrality and their generic computation. *Social Networks*, Vol (30): pp. 136-145.

Paul Shannon, Andrew Markiel, Owen Ozier, Nitin S. Baliga, Jonathan T. Wang, Daniel Ramage, Nada Amin, Benno Schwikowski, T.I., 2003. Cytoscape: A software environment for integrated models of biomolecular interaction networks. *Genome Resource*, 13, pp.2498–2504. Available at: <http://www.genome.org/cgi/doi/10.1101/gr.1239303>.

Brandes, U., and Erlebach, T. (2005). *Network Analysis: Methodological Foundations*. Springer. Germany.

Mones, E., Vicsek, L. & Vicsek, T., 2012. Hierarchy measure for complex networks. *PLoS ONE*, 7(3), pp.1–10.

Hanneman, R. A., and Riddle, M. (2005). *Introduction to social network methods*. University of California, Riverside, USA. Retrieved from http://faculty.ucr.edu/~hanneman/nettext/Introduction_to_Social_Network_Methods.pdf

Krackhardt, D. (1994). Graph theoretical dimensions of informal organizations. In K. M. Carley & M. J. Prietula (Eds.), *Computational organization theory* (pp. 89-111). Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.