PROJECT PRESENTATION

Community Structure of ASEAN Corporate Network

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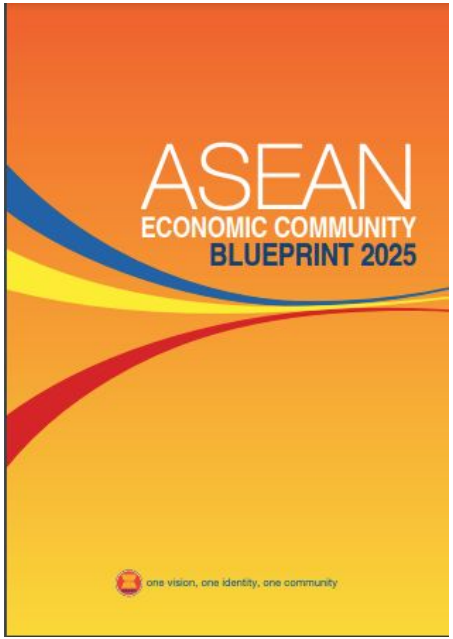
ASEAN Economic Community (AEC) is critical to the regional economic integration agenda in ASEAN, offering opportunities to over 622 Million People

3rd
Largest Economy in Asia

7th
Largest in the world

AEC Blueprint 2025 provided broad directions to leaders from 2016-2025



Trans-ASEAN integration, cohesion, and innovation can be qualified by interlocking directorates in the regional corporate network

Corporate networks **model relationships between firms** based on economic ties, trade, ownership, etc.

Global Board Interlock Network consisting of 400,000 firms and over 1,700,000 board interlocks **from Takes & Heemskerk (2015)**

Interlocking directorates connect top decision-making bodies of the economy in a “social (corporate) network”

An example of Board Interlock (local scene) - M&A and JVCs

Enrique K. Razon (EKR) owns BLOOM, and ITCSI

Enrique K. Razon **acquired** 51% voting rights in Manila Water decreasing Ayala’s economic ownership to ~30%

Ant Financial and Globe entered into a JV to build GCash (under Mynt)

Network Science to examine properties of Corporate Networks

1

Power Concentration and Level of Importance

NODE CENTRALITY is widely considered as an indication of power or advantage (Pfeffer and Salancik, 1978; Stokman et al, 1985)

2

Diffusion of Innovation

Board interlocks facilitate the SPREAD OF GOVERNANCE PRACTICES AND INNOVATION among companies (Burris, 2005)

3

Community Formation in ASEAN Corporate Networks

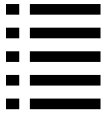
COMMUNITY ANALYSIS allows us discover forming coalitions and market consolidation

Methodology

Web Scraping

- Wall Street Journal Website
- S&P Capital IQ (with help of KRC)
- Annual Reports of Individual Companies and respective Stock Exchange sites

Data updated as of 04/01/21



Data Processing

Extracted information on directors and key executives

Network Analysis

Bipartite graphs where executives are connected to company nodes

We only examined the **Giant Component for each country. Projected to "Company"** instead of "Directors"

Visualization and Interpretation

Centrality Measures
- Degree Centrality

Community Detection
- Louvain Algorithm

Visualization
- Gephi

Key Observations from Top-Level Network Properties of the Giant Component

	ALL	PH	ID	MY	SG	TH	VN	KH	LA	MM
Size/ # of edges	17363.000	1335.000	460.000	8383.000	2572.000	2074.000	1649.000	0.0	0.0	3.000
Order/ # of nodes	3352.000	256.000	286.000	894.000	552.000	672.000	606.000	1.0	1.0	4.000
Mean degree	10.360	10.430	3.217	18.754	9.319	6.173	5.442	0.0	0.0	1.500
Min(degree)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.0	0.0	1.000
Max(degree)	75.000	32.000	12.000	70.000	30.000	29.000	30.000	0.0	0.0	2.000
Mean Clustering	0.430	0.499	0.322	0.569	0.491	0.321	0.364	0.0	0.0	0.000
Characteristic Path Length	5.935	3.244	7.018	3.589	3.710	4.285	4.721	0.0	0.0	1.667
Total # of Companies	3924.000	279.000	663.000	917.000	573.000	750.000	717.000	7.0	11.0	7.000

Will not include Cambodia, Myanmar, and Lao PDR in succeeding analysis. These Stock Exchanges are still new

(1) Indonesia has the most “fragmented” corporate network with its Giant Component constituting only 43% of its total nodes (ASEAN average: 91%)

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Indonesia has a “Board of Commissioners” that supervises the “Board of Directors.” Meanwhile, the Board supervises the “Management Committee”. The presence of BOC prevents *board interlocks* from happening since only one “Commissioner” per company is required by Law

(2) Malaysia has a high clustering coefficient and a short CPL, suggesting an "efficient" network. MY also houses the region's "hubs" with k >= 70

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(3) The Trans-ASEAN network is less efficient than the individual countries, strengthening the call for more integration in the region

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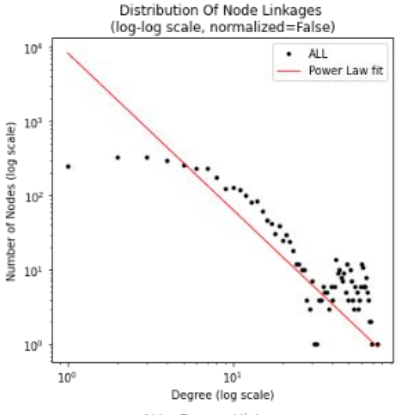
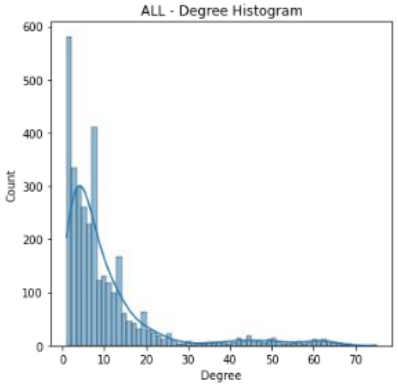
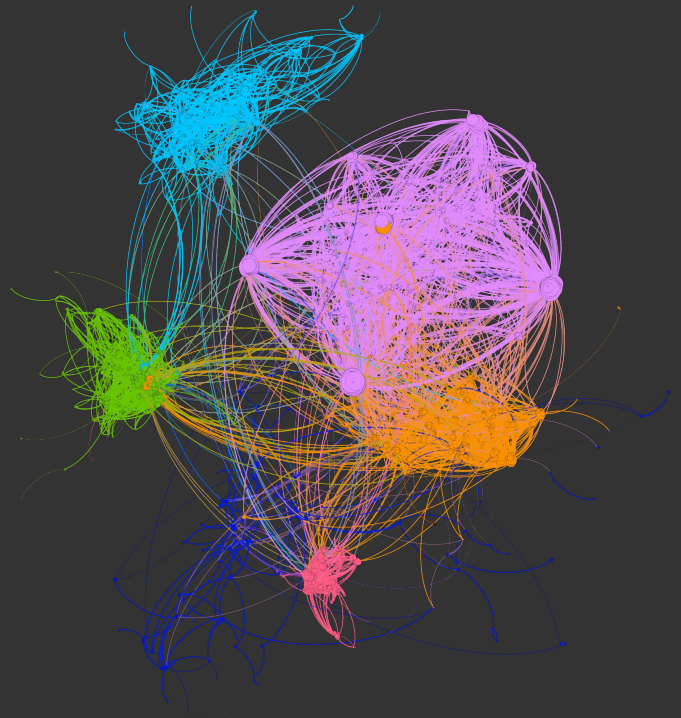
Trans-ASEAN corporate network adheres to Power Law with MY housing the region's hubs



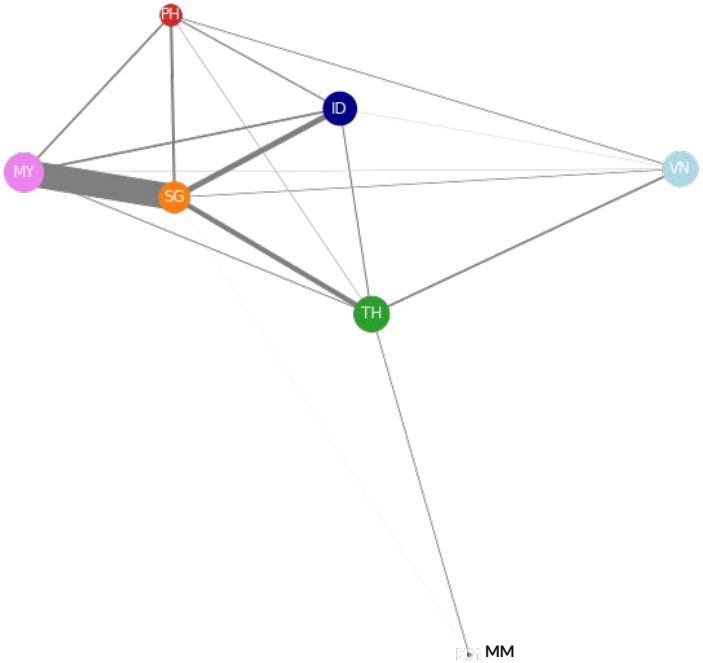


WHOLE OF ASEAN



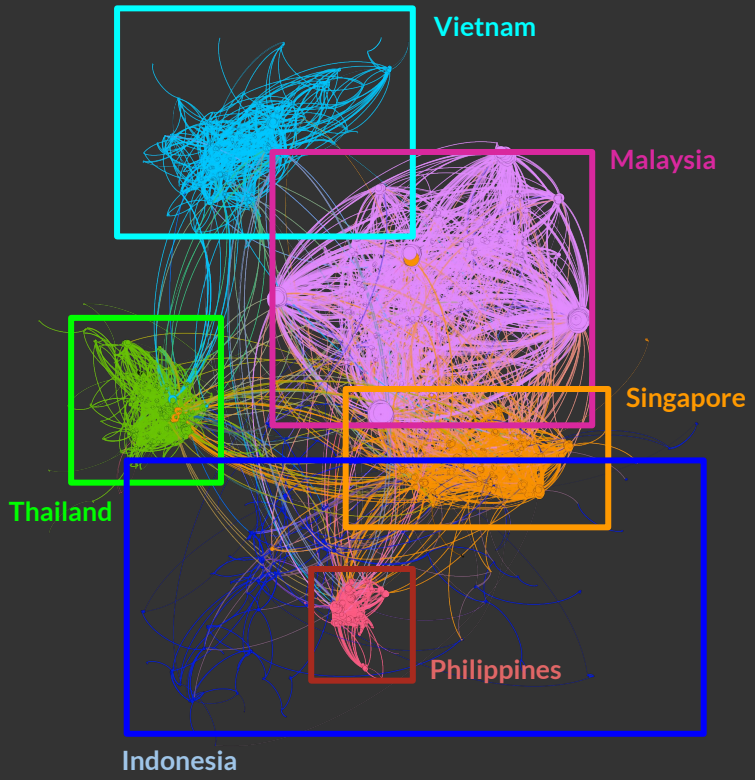
Each Color Represents a Community
Node Sizes represent Degree Centrality

Most of MY's partners are in PH, SG, and ID.



Number of Links per Country. Edge Thickness refer to the number of 'links' between each country. **Node Size** refer to size of Market (# of public companies)

WHOLE OF ASEAN



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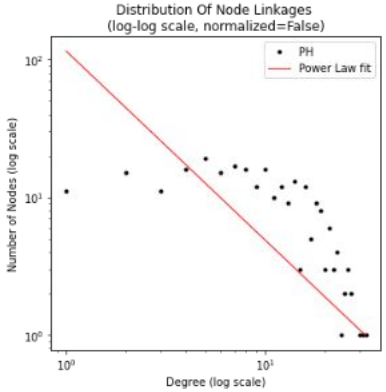
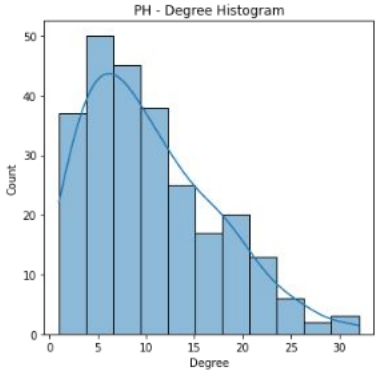
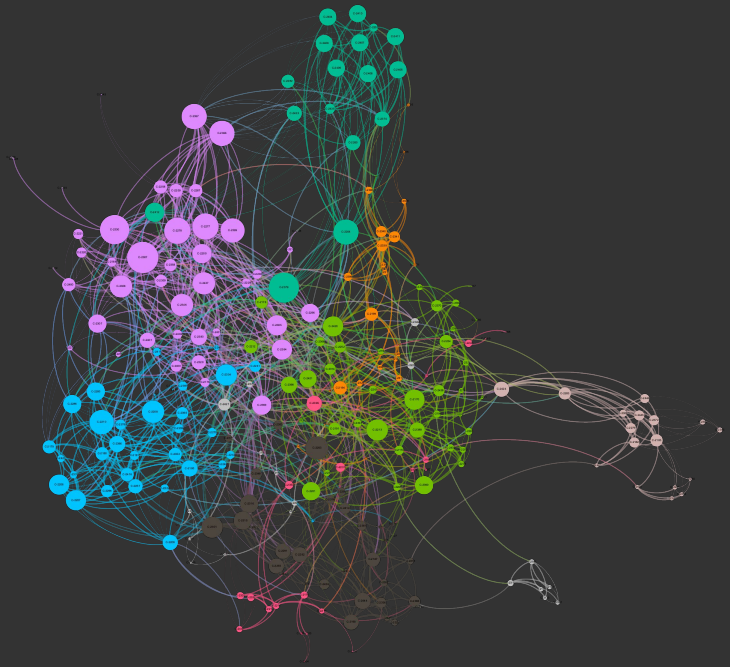
PH corporate sector is dominated by three major players





PHILIPPINES



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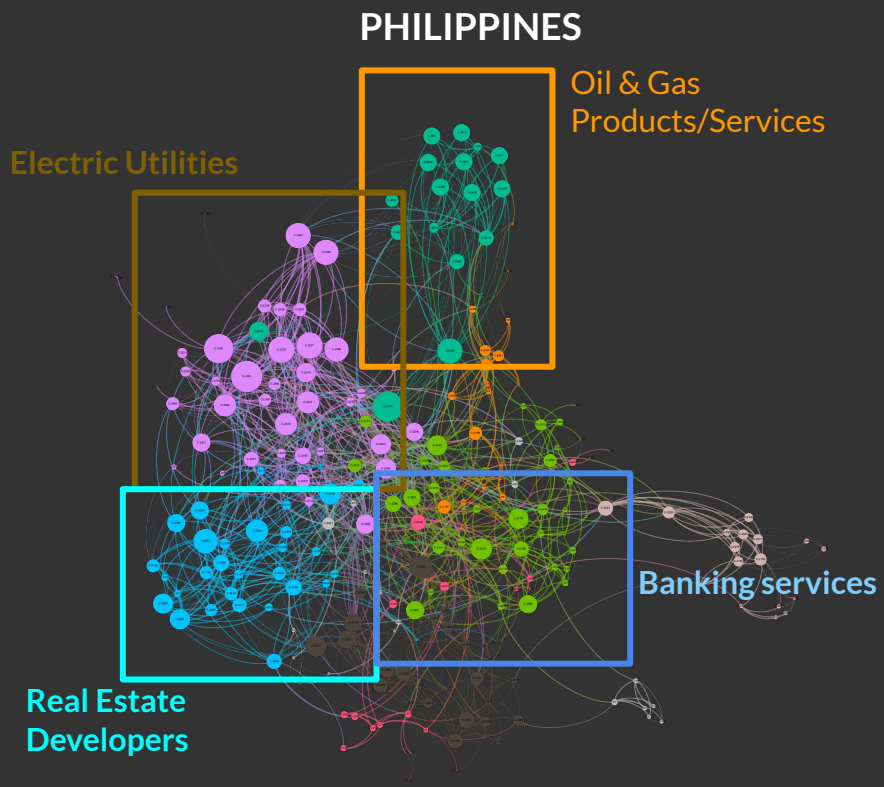
PH corporate sector is dominated by three major players

There are 4 prominent clusters on the network:

1. **Oil & Gas Products/Services** (e.g. San Miguel Corp and Petron Corp)
2. **Electric Utilities** (e.g. Manila Electric, and First Philippine Holdings Corp.)
3. **Real Estate Developers** (e.g. Philippine Realty & Holdings Corp., and MRC Allied Inc.)
4. **Banking Services** (e.g. BPI, PNB, and BDO)



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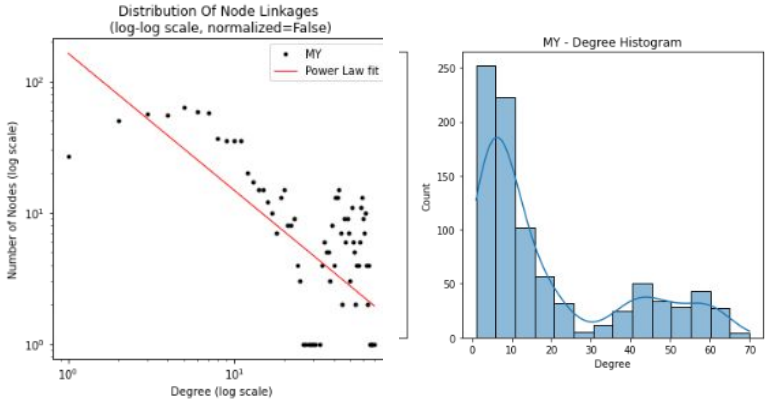
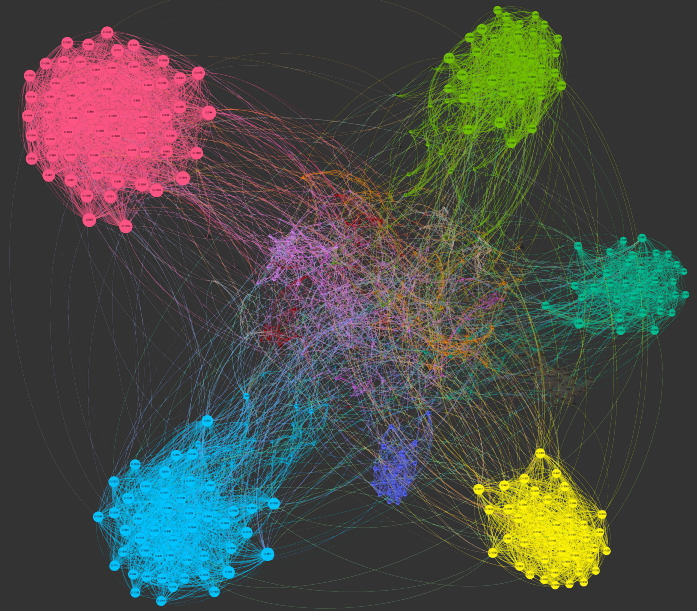
MY exhibits a bimodal degree distribution making it more robust to targeted / random attacks



MALAYSIA



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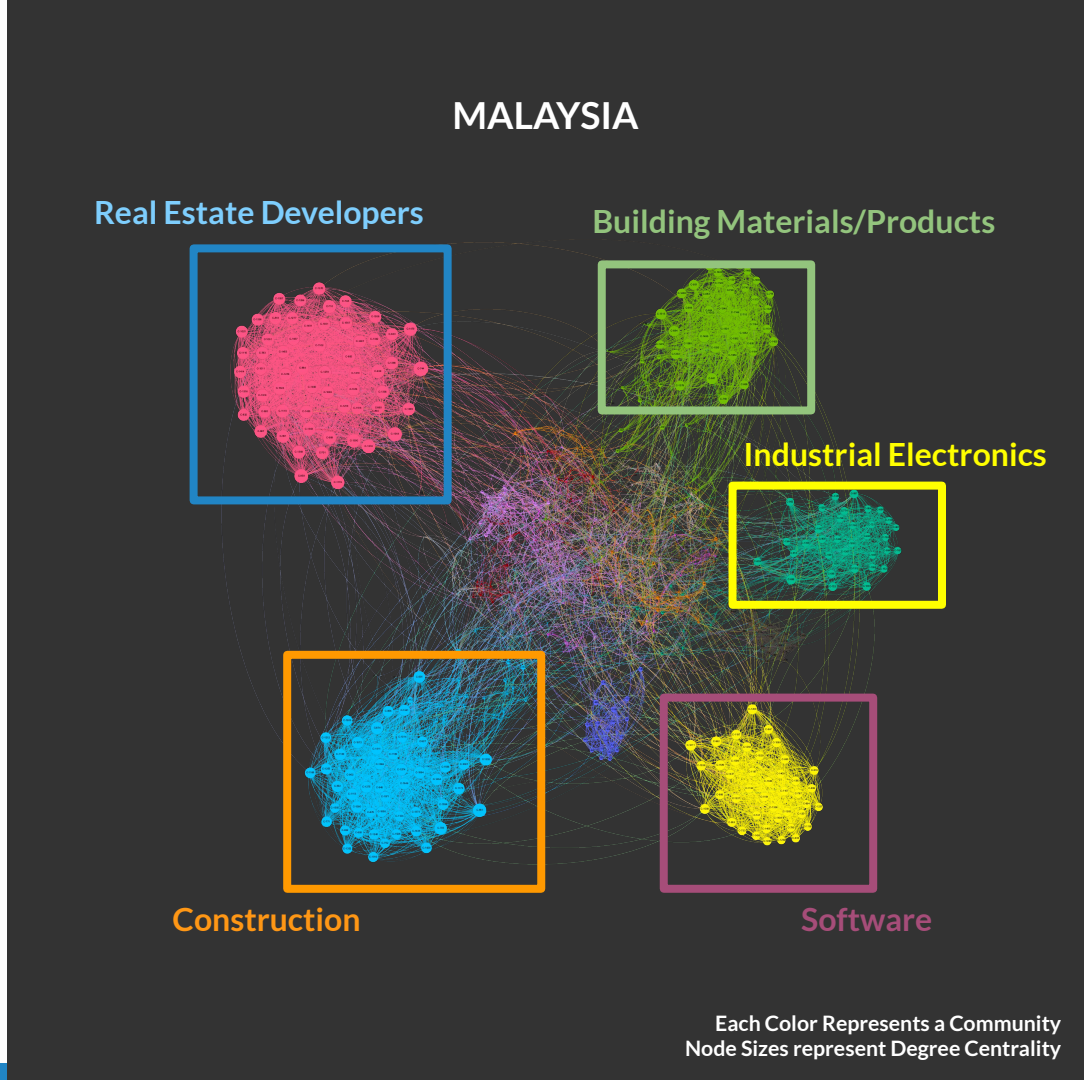
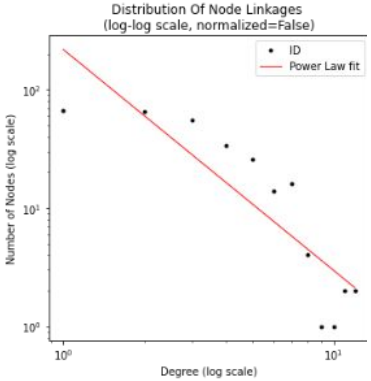
Silos are “risk-averse” regions while the area in the middle serves as “risk-taking” regions

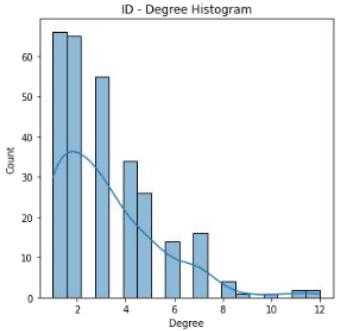
There are 5 prominent clusters on the network:

1. Real Estate Developers
2. Construction
3. Building Materials/Products
4. Industrial Electronics
5. Software

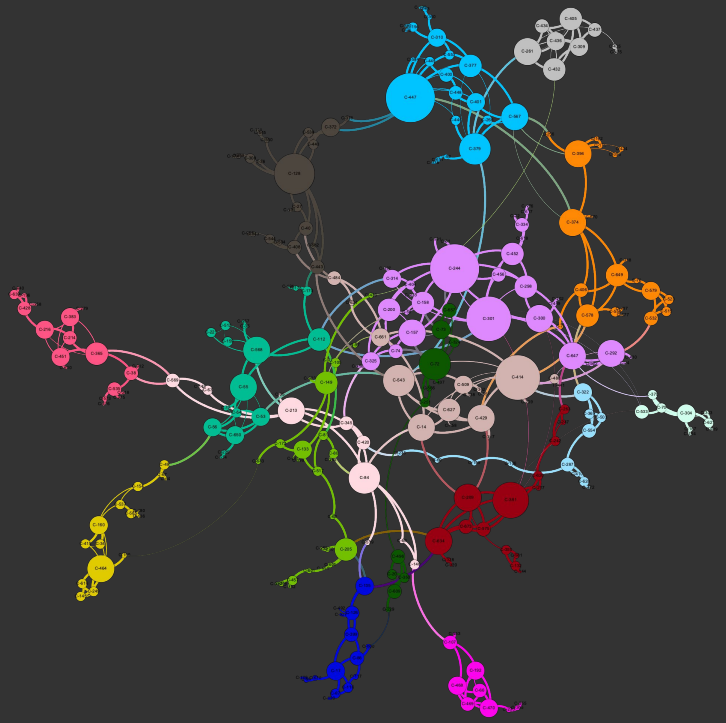


ID is characterized by long characteristic path lengths and highly fragmented sector





INDONESIA



Each Color Represents a Community
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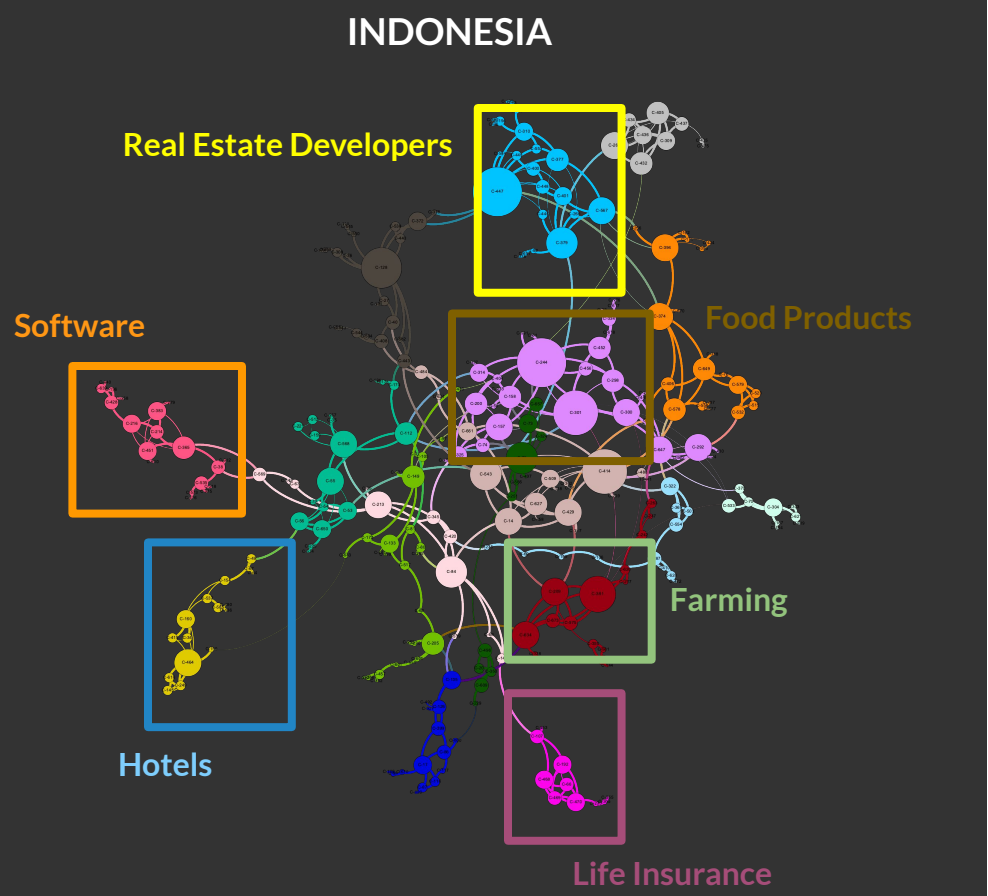
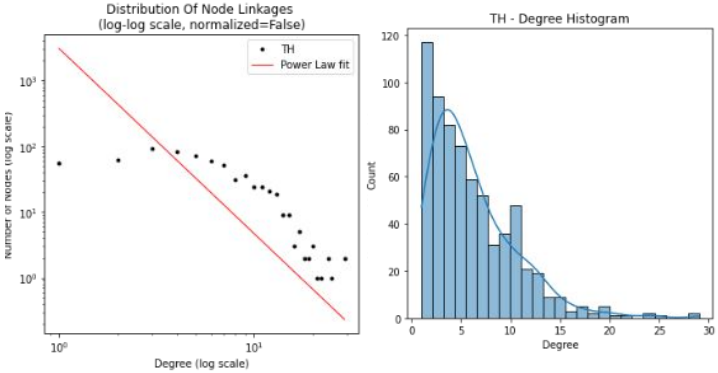
ID is characterized by long characteristic path lengths and highly fragmented sector

There are at least 6 prominent clusters on the network:

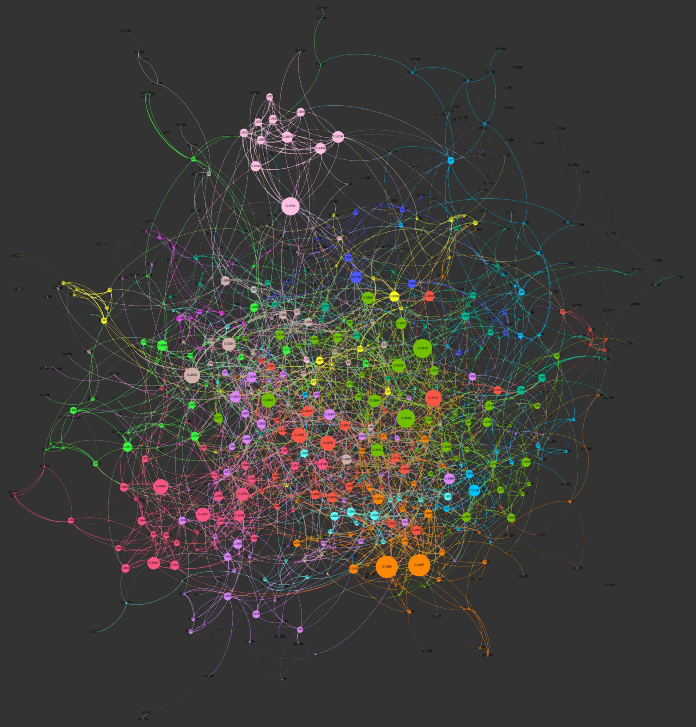
1. Real Estate Developers .
2. Software
3. Hotels
4. Food Products
5. Farming
6. Life Insurance



Highly Intertwined communities reveal a lot of partnerships; some players are trying to consolidate



THAILAND



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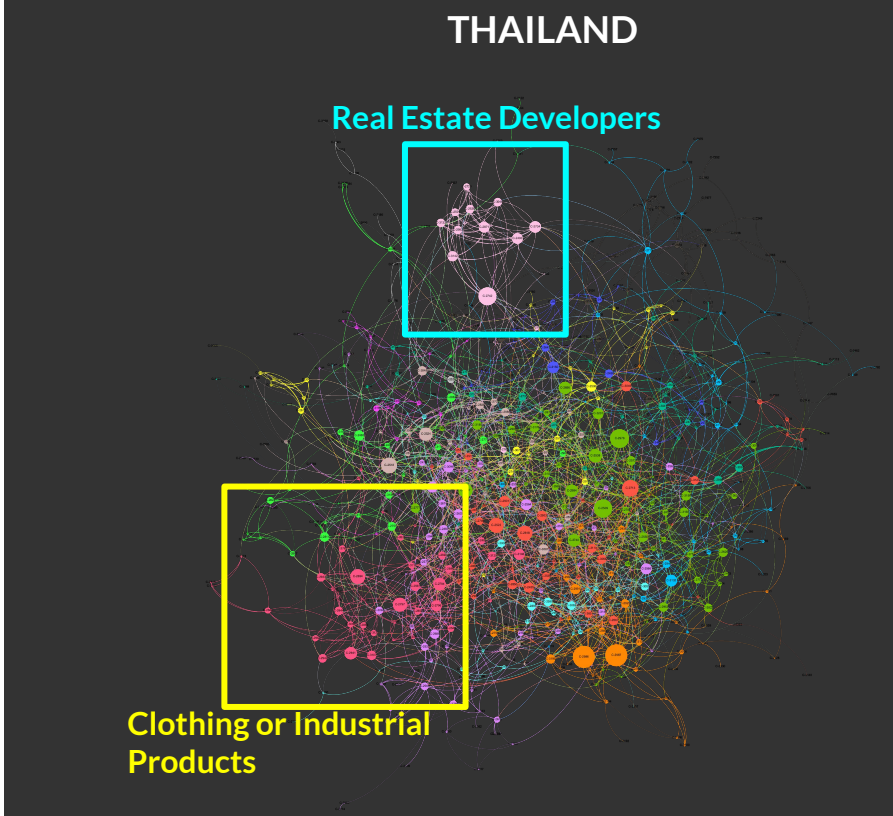
Highly Intertwined communities reveal a lot of partnerships; some players are trying to consolidate

There are only two prominent clusters on the network:

1. **Real Estate Developers**
2. **Clothing or Industrial Products**



Each Color Represents a Community
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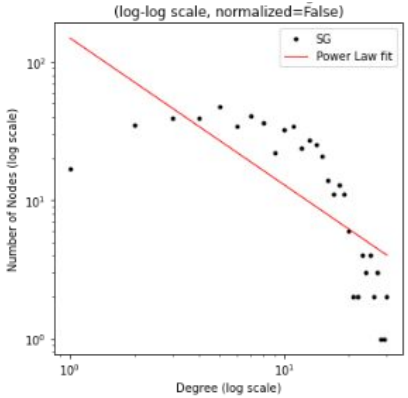
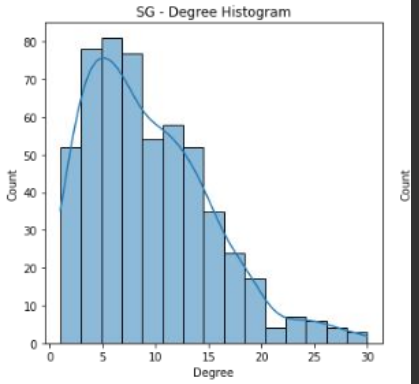
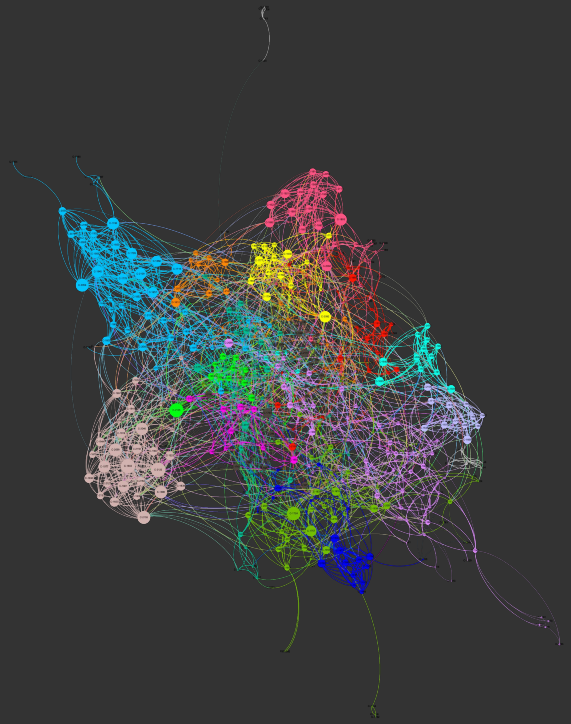
SG shows strong consolidation in several industries





SINGAPORE



Each Color Represents a Community
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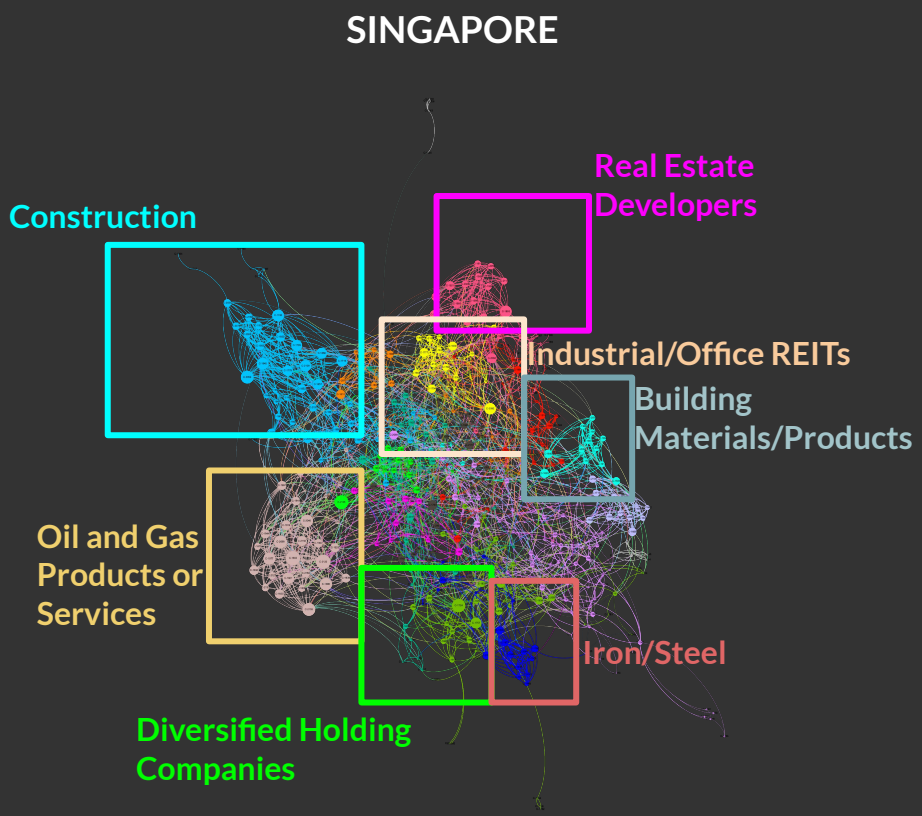
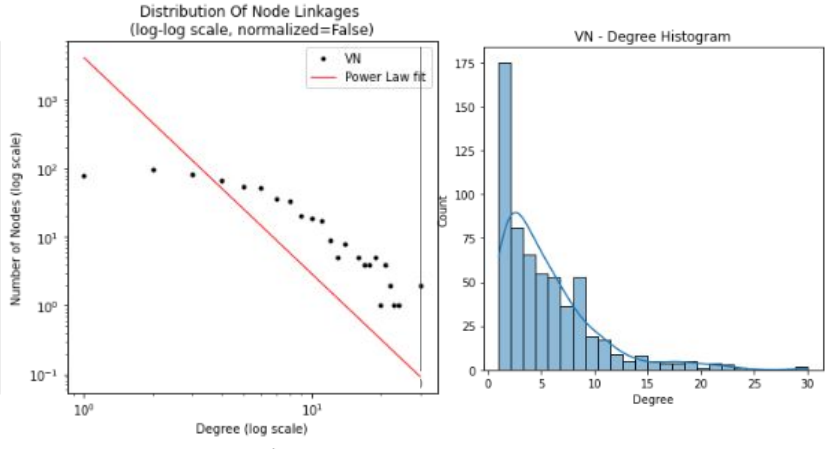
SG shows strong consolidation in several industries

There are at least **seven prominent clusters** on the network:

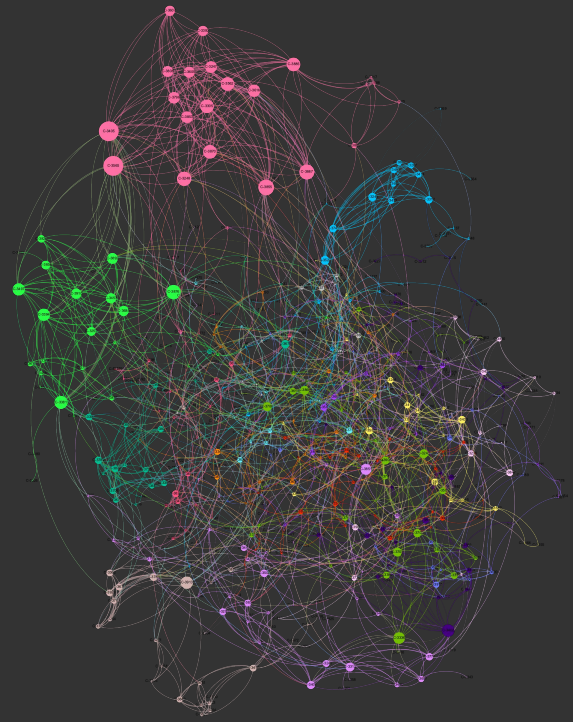
1. **Construction**
2. **Oil and Gas Products or Services**
3. **Diversified Holding Companies**
4. **Iron/Steel**
5. **Building Materials/Products**
6. **Industrial/Office REITs**
7. **Real Estate Developers**



VN shows show consolidation but majority remains to be scattered



VIETNAM



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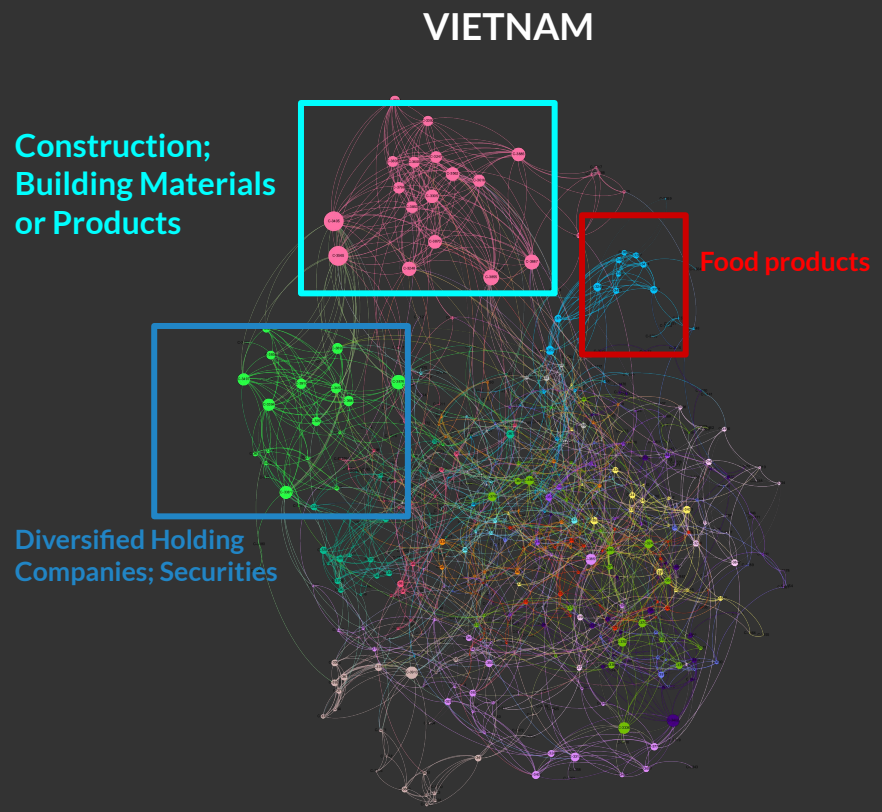
VN shows show consolidation but majority remains to be scattered

There are **three prominent clusters** on the network:

1. **Construction; Building Materials/Products**
2. **Food products**
3. **Diversified Holding Companies; Securities**



Conclusions

1

MY is critical in the Trans-ASEAN network (hubs). Its bimodal degree distribution exhibit robustness to targeted attacks

2

Indonesia remain to be one of the most fragmented sectors with high CPLs and low clustering

3

Size aside, the Philippine business scene closely mimic that of Singapore's

Recommendations

1

Simulate an Influence Diffusion in the Network

2

Explore directed graphs so we know whether partnership is outward or inward

PROJECT PRESENTATION

Thank You!

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