

Mapping Hong Kong-Philippine Domestic Employment Networks

Miguel Ayala
Stanford University
mayala3@stanford.edu

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Abstract

This paper looks at the domestic worker placement industry operating in both the Philippines and Hong Kong. Using original data scraped from government websites and collected from domestic workers, exploratory studies are performed on the Hong Kong and Philippine domestic worker industries. These studies illustrate how the industry features a high level of collaboration and collusion and among players. Initial findings indicate that this might be suspicious activity. International placement collaboration data is then used to link the 2 industries. Centrality measures are employed to find out which agencies have the most influence across these 2 regions. While these results are not groundbreaking, it does provide a way forward. The initial data collection and pre-processing are complete. The information on placement collaboration between HK agencies and PH agencies is lacking, but now there is a pipeline for this type of data. This data is completely new and is ready to be interpreted with the latest cutting edge network analysis techniques.

1 Introduction

1.1 HK Domestic Workers

In Hong Kong, there is high demand for workers who perform menial tasks in domestic households. In 2006, over 8% of households in Hong Kong hired foreign domestic workers [5]. Most of these domestic workers are women who come from countries like the Philippines. Though the work is largely unskilled, the promise of earning a monthly income of 15,000

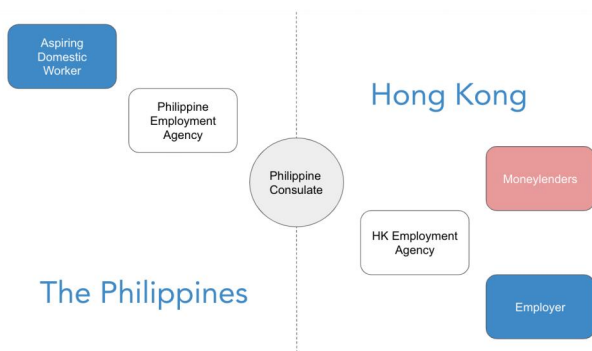


Figure 1: Major Players in the Philippine-HK Domestic Worker Industry

HKD (approximately equal to 2,000 USD) [8] is enough to lure university graduates from their home countries [7].

Unfortunately, many of these workers are subject to terrible working conditions, emotional or physical abuse and civil disenfranchisement. The third is particularly alarming because the agencies that source and place these women are often the cause.

1.2 Employment Agencies

Employment agencies are major actors in this industry (Figure 1).

When an employer from Hong Kong wishes to hire a domestic worker from the Philippines, they contact a HK employment agency. In the meantime, a Philippine employment agency finds a woman who wishes to work in Hong Kong as a domestic helper. Both agencies come to-

gether and match the domestic worker with the potential employer and make the necessary arrangements with the consulate.

Even though legislation in Hong Kong stipulates that employment agencies cannot charge placement fees in excess of 10% of a domestic worker's annual salary, these vulnerable women are often charged far more. And when they cannot pay, they are forced to get loans from moneylenders charging exorbitant rates. Ending up in these dangerous debt cycles can be more harmful than any other form of abuse.

Most efforts to improve the lives of these women focus on the cases of physical and emotional abuse. What has not been tackled is the systemic manipulation of individuals who are unaware of their rights. The main issue is that there is very little structured data about this type of activity.

The domestic worker industry is a complex web of interconnected individuals and organizations in the public and private sectors that operate in both Hong Kong and the domestic worker's home nations. It is believed that over 70% of agencies currently engage in illegal operations [1], however there is not much evidence that can be used to prosecute bad-acting agencies let alone a systematic way of identifying suspicious agencies to investigate further.

2 Related Work

2.1 An Overview

While the lack of information in this area certainly contributes to the lack of effective response, this alone cannot be the sole cause. More harmful is the inability to analyze available material objectively [2]. There is information about the domestic worker employment system that has just not been examined through a scientific lens. One framework that might be applicable to the problem of domestic workers is Social Network Analysis (SNA). This is the scientific, perhaps even 'structuralist', interpretation of complex social systems through the relations of its various actors[6]. Rather than understand a problem from the perspective of the individual, this approach emphasizes the role of the interconnected environment on shaping the individual's behavior [4].

This is in direct contrast with current approaches that treat the symptoms rather than the causes of domestic helper abuse. While working on a case to case basis can alleviate some of the symptoms of the issue, they do not attack, or even identify, the root causes. Very little is known about the domestic worker placement industry. SNA can elucidate key features about roles and mechanisms; who is in power and who is dependent.

Similar ecosystems without traditional forms of data have been dissected thoroughly. Many of the most interesting applications of SNA tend to be focused on social structures in illicit areas. With only alternative data streams, SNA has yielded fascinating insights in the realms of drug trafficking rings [13] [12], street gangs [14] and terrorist groups [10].

The approach of three SNA studies seem highly applicable to the issue of domestic workers in Hong Kong.

2.2 Case Study 1: Nigerian Madams

The first study by Mancuso et. al studies a sex-trafficking network operating between Nigeria and Italy [11]. Nigeria and Italy are the two most prominent countries in the West Africa - Europe human trafficking route; Nigeria is the source and Italy is the sink. The main aim of the paper was to analyze the importance of madams in the human trafficking network. Madams are former prostitutes from Nigeria who source more girls to be trafficked. They are widely believed to be the main actors in sex-trafficking groups because they are largely responsible for the recruitment of new victims. The data for this study comes from a 2 year police investigation (2006-2008) in which 67 members of three different crime organizations associated with sex-trafficking were wire tapped. The study aims to measure the centrality and controlling role of madams through their known relationships with other members in the network.

2.3 Case Study 2: Child Sex Trafficking

This paper used SNA to study internal child sex trafficking (ICST) rings in the UK [3]. The data consists of 25 offenders and 36 victims in total, drawn from two major police investigations: Operations X and Y. The data used were typical of police investigations: victim records of video interviews (ROVIs), offender ROVIs, MG5 case

summaries, text messages and video footage from offenders' and victims' mobile telephones, formal charge list (Operation X) and court visits (Operation X).

2.4 Case Study 3: Terrorist Rings

The paper uses SNA to describe how terrorist organisations have evolved since 9/11. Specifically, since 9/11 terrorist networks have changed from a more hierarchical structure to a scale-free "hub-and-spoke" system that is much more resilient to disruption. Further, terrorist organizations have become more self-organized, local and decentralized.

2.5 Case Study Conclusions

These papers were useful for us because there are many parallels in the issues encountered. The first two cases dealt with forms of human trafficking, which to some extent resembles the placement of Filipino domestic workers in Hong Kong. At a glance, it would seem that the domestic worker network is structurally similar to the sex worker trade in Nigeria and Italy with its transnational collaboration.

Secondly, the cases have shown us that even with limited data (i.e. a small network), insightful patterns can be detected by SNA. This is especially exciting given the dearth of data in the domestic worker space.

Because the networks and data constraints seem to be analogous, we believe we can use some of the techniques and algorithms employed by these studies. Specifically, paper 1 had a cross-border analysis of the ego-networks of each Madam, which is definitely a technique we will utilize. Furthermore, we will lean heavily on the measures of centrality explored in all three papers. Moreover, the first paper had interesting individual analysis of ego-networks. This seems to be very interesting in our context.

Nevertheless, these cases also showed us that we may have trouble with our own dataset. Their networks were generally strongly connected. Our data may not be comprehensive enough to create a strongly connected graph, which may mean that we will not be as successful as the studies were.

We do think that we can also build on these papers though. We will be testing their methods on a much bigger network with weighted edges and directionality. It will be

interesting to see if these techniques withstand the change in conditions.

3 Our Study

The primary aim of our study, is to find the agencies that are most central to the network in both the Philippines and Hong Kong. The most central agencies will not necessarily be involved in illegal activity, yet it is still important to understand who drives the industry. They have the most influence and their practices will resonate throughout the network.

We also want to see what nodes share resources. If multiple agencies, both dormant and active, share common resources like telephone numbers, addresses and employees, then they are probably more likely to be involved in illicit activity. When unscrupulous firms are closed down by law enforcement agencies, they have been known to re-purpose their existing assets to form new companies that operate in the same way. If we see what nodes share resources and what nodes they interact with, we might be able to have a good idea of who the bad actors are in both the Philippines and Hong Kong.

4 Representation

4.1 Shared Resource Graphs

We want to create a multigraph where edges are based on shared resources (telephone number, fax number, address, etc). Shared resources between agencies is incredibly suspicious and should not exist in an ethical and competitive industry. The relational information we wish to extract can be expressed into a matrix. Matrix S : A weighted adjacency matrix, S , where $S(i, j)$ represents the link between two actors (agency or moneylender). If i is an entity and j is another entity, where $i \neq j$, and c is the number of resources shared by i and j , then $S(i, j) = c$.

4.2 Philippine-HK Graph

We want to create a multigraph where the nodes may be HK agencies or Philippine agencies. There will be an edge between a HK agency and a Philippine agency if there is some domestic worker that was hired by these two

agencies. The relational information we wish to extract can be expressed as a matrix. Matrix T : A weighted adjacency matrix, T , where $T(i, j)$ represents the link between a HK and PH agency. If i is a Philippine agency and j is a HK agency and x is the number of domestic workers who were hired under both i and j , then $T(i, j) = x$.

5 Dataset

5.1 Hong Kong Agencies

The Hong Kong government’s labour department has an online portal that lists every single active employment agency. Using BeautifulSoup4, we scraped the Hong Kong Labour Department Employment Agencies Portal to collect data on employment agencies in Hong Kong. Each digital record has the following information about each operating agency:

- Name, Address, Telephone No., Fax No., Email

After filtering out agencies not involved in the domestic worker industry, we found 1,448 agencies.

5.2 Philippine Agencies

To get information about Philippine Employment Agencies, we scraped the Philippine Overseas Employment Administration website to collect data on all employment agencies in the Philippines. Each digital record has the following information about each agency:

- Name, Address, Telephone No., Email

We found 3,657 agencies.

5.3 Inter-Agency Links

To find links between Hong Kong and Philippine Agencies we have created Google Forms that ask current domestic workers to list their Hong Kong Agency and their Philippine Agency. Using some of our contacts in welfare groups and in the industry, we have found several Facebook groups that facilitate domestic worker placements.

6 Shared Resource Graphs

6.1 HK

Once we pre-processed our Hong Kong agency dataset, we started to explore its network structure.

The first step was to build our shared resource graph, S_{HK} , for HK Agencies. We used geocoding libraries and fuzzy logic to find agencies with very similar addresses, phone numbers, emails and fax numbers. If 2 agencies had a shared resource in common, they would have an edge in S_{HK} . There were 851 edges among the 1,448 agencies. We visualized this graph with graphviz-js.

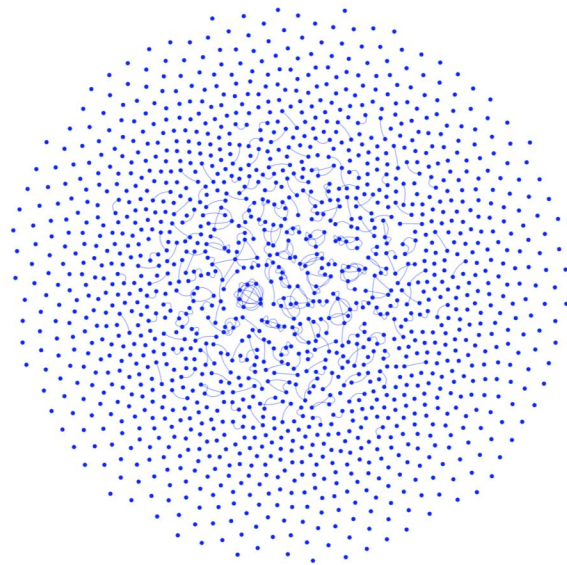


Figure 2: Visualization of HK Agencies. Edges indicate shared resources (Email, Phone and Address)

From **Figure 2**, we can see that the HK Agency network is largely disconnected but there seem to be many large cartels operating in the space. There seem to be a variety of different motif structures present in the graph. What is concerning is that this graph does not merely show a casual relationship between these agencies and moneylenders, but in fact direct collaboration between various entities.

We also extended our graph S_{HK} by adding moneylender entities with shared resources. Part of the abuse

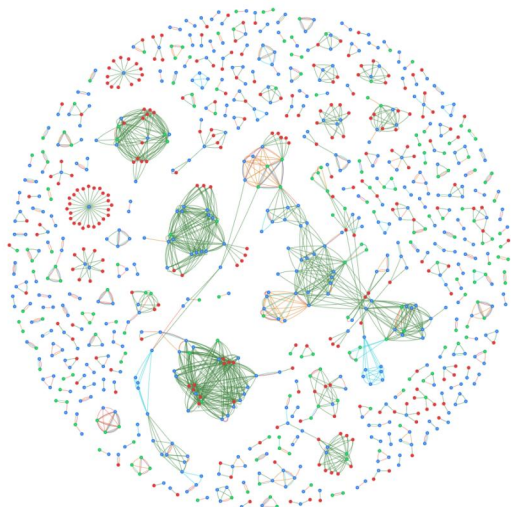
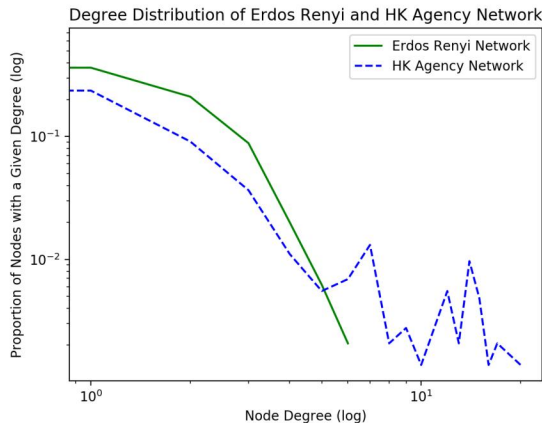


Figure 3: Visualization of Hong Kong Agencies and Money Lenders. Blue nodes are agencies and red nodes are moneylenders. Edges indicate shared resources.

that domestic workers in Hong Kong face is the illegal debt cycles promoted by agencies and suspicious money lenders ¹. The nodes in the graph (**Figure 3**) represent HK agencies (blue) and moneylenders (red), while the edges represent shared information between agencies e.g. shared telephone, fax, email, address and bounding address. The graph shows that there is a close link between employment agencies in Hong Kong. This is tangential to the main issue of agency-agency collaboration, but it is perhaps even more concerning that this type of collaboration exists.

In addition, to this graph visualization, we employed a litany of simple network analysis techniques to glean more insight into the graph structure. We compared our results against an Erdos-Renyi graph with 1,448 nodes and 851 edges. The results of the analysis are presented below:

¹Agencies will overcharge domestic workers who cannot pay. The domestic workers do not usually have the right credit to get traditional loans. The agencies will then refer these domestic workers to money lenders, who will levy exorbitant interest rates



	HK	ER
Clustering Coefficient	0.16348	0.00149
Max Degree	20	6
Diameter	2	59
Triads	1332	1
Max Centrality	0.013822	0.004147

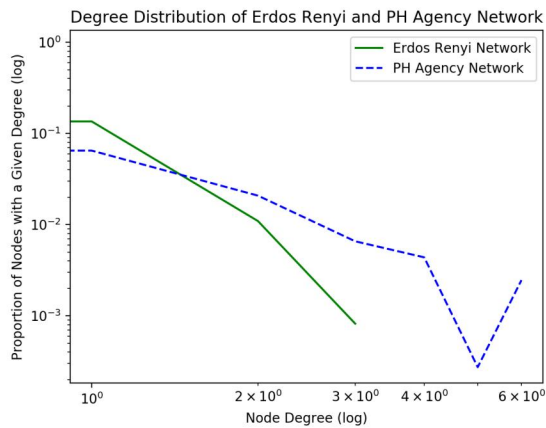
Comparing with the Erdos-Renyi graph, it is clear that our HK Agency Network tends to cluster much more than random. This is not surprising for a real life network however. Also significant is that there seems to be a large concentration of resource sharing among a few nodes. The max degree and max centrality in the HK Agency graph are much higher than those of the Erdos-Renyi graph. It is interesting that the same agency has the highest degree and the highest centrality score. It turns out to be an agency called the Further Creation Employment Centre. Once the links to Philippine Agencies is established, it will be interesting to see if this agency plays a similarly pivotal role.

6.2 PH

The shared resource graph of Philippine Agencies, S_{PH} has also been built. The resources that we compared were address, email and telephone number. In total, we found 292 pairs of agencies with shared resources. Very simple analysis has been performed on this:

	PH	ER
Clustering Coefficient	0.028338	0.003127
Max Degree	6	5
Diameter	1	0
Triads	110	0
Max Centrality	0.001641	0.000821

Once again, we see that the shared resource network in the Philippines has many more nodes that have high degree than does an Erdos Renyi graph with the same dimensions. This graph is far less connected than the HK graph, but it still seems to be more clustered than random.



The visualization, **Figure 4**, confirms this. While there are a few triads and clusters, most of the nodes are disconnected from the rest.

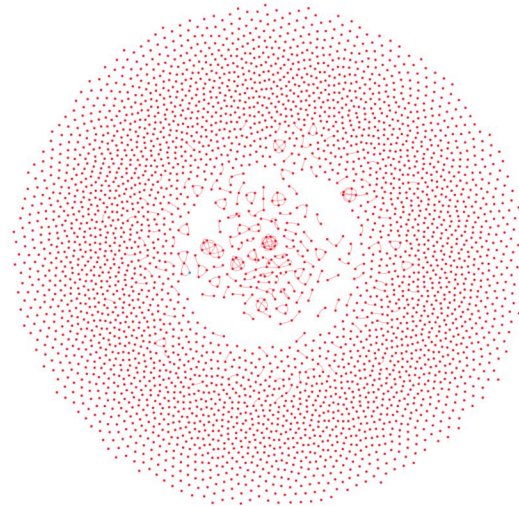


Figure 4: Visualization of Philippine Agencies. Edges indicate shared resources (Email, Phone and Address)

7 Philippine-HK Graph

A Google form was sent out in late October to several Facebook groups composed of Filipino domestic workers in Hong Kong. It had 2 very simple questions: 1. 'What is the name of your Hong Kong Agency' and 2. 'What is the name of your Philippine Agency'. Initially, respondents were able to type their responses. This was a key mistake. Many responses were malformed. Answers did not match up with the existing agencies. This may indicate the activity of illegal agencies. The more likely answer is that the respondents did not clearly remember their agencies. Some respondents also left certain fields blank or left answers like "I don't remember". Concerning answers like "I do not have an employment agency in HK" were also present. Using fuzzy logic as a first pass and manual checking for the remainder, we ended up with only 205 actionable data points from our top funnel of 600+ responses. We eventually created a drop-down survey but this was only released late October. Not many responses were collected partially due to fatigue and timing.

With the well-formed relational data from our survey we created our Philippine-HK Graph. The 205 data points

revolved around 153 agencies from Hong Kong and the Philippines. This graph was not very interesting, so we decided to reconcile our 3 graphs into 1. Edges between Hong Kong agencies indicate shared resources. Similarly, edges between Philippine agencies indicate shared resources. Edges between Philippine and Hong Kong agencies indicate placement collaboration. Disconnected nodes were removed from this graph. In the end, the graph has 906 nodes and 782 edges. This graph is shown in Figure 5.

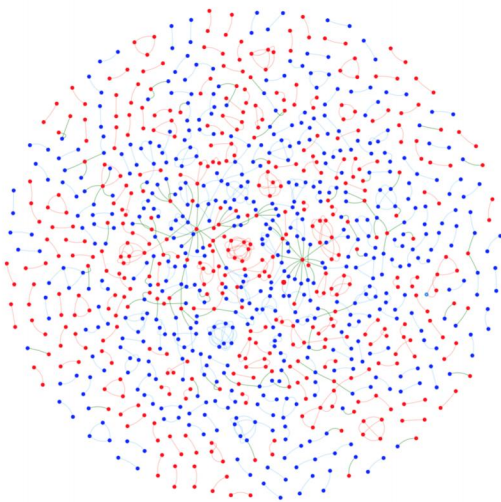


Figure 5: Visualization of Philippine (blue) and Hong Kong (red) Agencies. Green edges represent links between HK and PH agencies while other edges are shared resource edges.

At first glance, the graph seems to suggest that nodes with a lot of international collaboration seem to have a lot of domestic collaboration as well. Logically, however, a more comprehensive dataset of international agency links will make this graph far more connected. These HK agencies could only exist if they are doing business with PH agencies. Nevertheless, the graph in its current state does allow for some interesting analysis.

3 different measures of centrality were used to determine which agencies seem to be at the center of the network. High centrality among the shared resource and placement collaboration edges may indicate high influ-

ence in the industry. Below is each metric and the 5 most central agencies according to that metric.

Degree centrality is simply the fraction of nodes that it is connected to. There are a lot of repeated scores because these nodes probably belong to the same clique.

Degree Centrality

- Angelex Allied Agency: 0.0124869927159
- Filscan Shipping Incorporated: 0.00624349635796
- Jebsens Maritime Inc: 0.00624349635796
- Leader Employment Company Limited: 0.00624349635796
- Baguio Benguet International Recruitment Agency: 0.00624349635796

Betweenness centrality is the sum of the fraction of the shortest paths that pass through a given node over all pairs of nodes in a graph:

Betweenness Degree Centrality

- Angelex Allied Agency: 0.000663371488033
- Sunlight Employment Agency: 0.000550641692681
- Light Hope Overseas Employment Agency: 0.000446583420049
- Baguio Benguet International Recruitment Agency: 0.000381546999653
- Lakas Tao Contract Services: 0.000238466874783

Eigenvector centrality uses the eigenvector of the graph's adjacency matrix to determine a measure of a node's centrality by 'looking' at the node's neighbors' centralities.

Eigenvector Centrality

- New Wish Employment Agency: 0.705781660805
- Luzern International Manpower Services: 0.60700337755
- Gerdin International Manpower: 0.352175309491
- New Forsee Employment Agency: 0.0867147682215
- Professional Employment Agency: 0.0432694727446

There does not seem to be any one agency that dominates these rankings outright. Angelex Allied Agency seems to be pretty central according to the first two rankings. However, with such limited data, it is unclear how significant this is. One interesting trend is that most of

these very central agencies are PH agencies. Maybe this is just an anomaly resulting from a small sample. It could be something worth exploring, though. PH agencies may have more influence because the laws in that country are more flexible and may allow agencies more room to operate.

8 Next

Betweenness centrality used here is the standard algorithm that searches for the shortest path among all pairs of nodes. What would be more compelling in this problem space is an algorithm that only examines shortest paths between agencies from different countries. Then, the centrality metric would be a measure of how key an agency is in connecting the 2 regions. This would not be a huge modification to the algorithm and it would yield very topical results.

In the same vein, bridge analysis would be very exciting to perform on this merged network. It would be interesting to rank nodes or edges in terms of priority to remove. This is a vital measure because it is unrealistic to assume that law enforcement can remove all cut-points in the network (as paper 1 suggested). Law enforcement's time is better spent focusing on apprehending one linchpin entity that effectively destroys the network.

While these results are not groundbreaking, it does provide a way forward. The initial data collection and preprocessing are complete. The information on placement collaboration between HK agencies and PH agencies is lacking, but now there is a pipeline for this type of data. This data is completely new. It did not exist before the study. New algorithms do not necessarily have to be invented. All the data can be parsed with the cutting edge of network analysis. It is very exciting to imagine what can be done on this data in the future.

9 Acknowledgements

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10 Github

<https://github.com/mayala3/ph-hk-agency>

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