A study on the relationships among *Natami*, city functions and built environment with special reference to Pettah, Sri Lanka

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Abstract

Wholesale and retail trades play a vital role in a city's economy. From the early days of the evolution of cities, a group of labor specialized in loading, unloading and carrying goods emerged to cater to the need of moving goods within the city. During the Colonial era, in order to cater to the demand for economic means of delivering goods within the city in increasing wholesale and retail businesses, the British rulers brought in Indian Coolies to Sri Lanka and to many of their colonies to provide manual labor. Today, they are identified as Natamis and work in wholesale trading areas such as Pettah in Colombo and many other urban areas in Sri Lanka. With the advancement of technology many of the tasks of these goods carriers got replaced by motorized modes such as forklifts, trucks, lorries, cranes etc, but this occupation is not totally disappeared from the wholesale trading areas in Asian cities. It is observed that the character of the built environment and the prevailing city functions, especially the mode of local transactions of goods between traders, support the extended existence of Natami in Pettah; City of Colombo. This research explores the relationships between the Natami community, the city functions and the built environment of the City of Colombo using network analysis. Through the understanding derived from the analysis, this paper calls for the due attention of the policy makers and planners in planning and designing the city environments to identify the hidden but vital role played by these communities in making cities more effective and vibrant.

Keywords: *Good Carriers, City functions, Built environment, Network*

1. Introduction

Vehicular Traffics, greenhouse gas emissionand accidents are some of the frequent topics related to 'Motorized transportation' (MT). Therefore, most of the countries concentrate on 'Non-Motorized transportation' (NMT) modes on their way to sustainable cities. Man power based traditional loading and unloading workers are also one of the NMT modes that expands rapidly in Asian cities.Rather than using motorized modes such as fork lifters/three-wheelers many of the developing countries adopt manpower based traditional loading and unloading modes.

For instance, in Sri Lanka, during the Dutch era, trade and commerce activities were confined to the streets in Pettah. During the British era, with the expansion of the sea port and the associated back yard facilities, the northern parts of Fort and Pettah grew as the high order business district and Colombo attracted people from the other parts of the country. (Munasinghe, 2007) When the Port activities expanded over time, Indian coolies were brought to move the wholesale goods by British as local communities refused to engage in this work. They were called "*Natami*" *(traditional loading and unloading workers in Sri Lanka).*

Although it has passed many years,*Natamis*still in Pettah, (the immediate receiver of the wholesale goods from the port) carrying heavy loads on their bare backs or on their hand-pull carts. Although many alternative modes emerged, still *Natami* are surviving in Pettah. Accordingly, the research is to investigate the relationships among *Natami*, the built environment and the city functions of Pettah in order to explore the reason for the existence of *Natami* over decades in cities.

1.1Research Question

Are the characters of the built environment and the prevailing city functions cause to the existence of *Natami* in Pettah?

1.2 Research Objectives

To identify the relationships among *Natami*, built environment and the city functions of Pettah.

2. Literature review

2.1 History of traditional loading and unloading workers

> *"Call for a sustainable transportation does not reveals the need of new technology for low carbon emission or massive new projects. Instead it is to promote existing traditional NMT."*
>
> *-World Bank (1999)-*

According to Benjamin, "coolies" are the origin of traditional loading and unloadingworkers (Benjamin, 1980).These coolies were engaged in loading and unloading of goods and transporting passengers using carts and rickshaws. Although many of the motorized modes alterthese practices, wholesale markets in countries such asZegyo Market, Mandalay, Khari Baoli Street-Old Delhi and Sampheng Market-Thailand etc. follow this practice.

When it comes to the Sri Lankan context,Indian origin loading and unloading workers were in Pettah ("*Natami"*) since the 1950s. (Rathnaweera, 2014) From the British era Pettah began to expand as the main commerce and trade center. Due to the reluctance of natives to engage in loading and unloading in Pettah, Indian coolies were brought. Meanwhile, theywere engaged in Rickshaw pulling too. In the colonial era,goods were carried by "*watti*" or cart, catering to the transportation need of highly congested areas where access and free movement was not possible for motorized modes of transport. (Marga, 1978)But with the expansion of the trade and commerce activities "*watti*" was replaced by hand pull carts. According to Rathnaweera, in the 1950s only one cart lender lived in Pettah and these carts were imported from abroad. This cart business was initiated by a merchant called P.S. and there were about 150 carts were there. They were rented at Rs.1 per day. Even decades back, most of the transactions happened to be based on "trusting each other". Risseeuw(1988) also mentioned that virtually it is impossible to end this "trust-based loading and unloading network". (RISSEEUW, 1988)

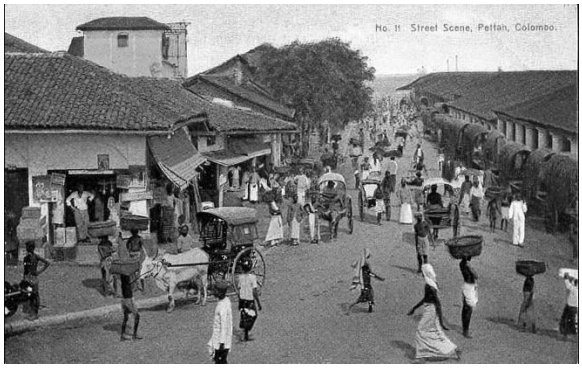


Figure 20- Traditional loading and unloading workers *(Natami)* in Pettah, Sri Lanka

Figure 21-*Natami* at Edinburgh Market-1976

Source: www.lankapura.com

2.2 Natami in the International standard classification of occupation (ISCO)

The International Labor Organization (ILO) represents the labor force in the entire world. The guidelines and goals introduced by the ILO are implemented by the Ministry of Labor of a particular country.

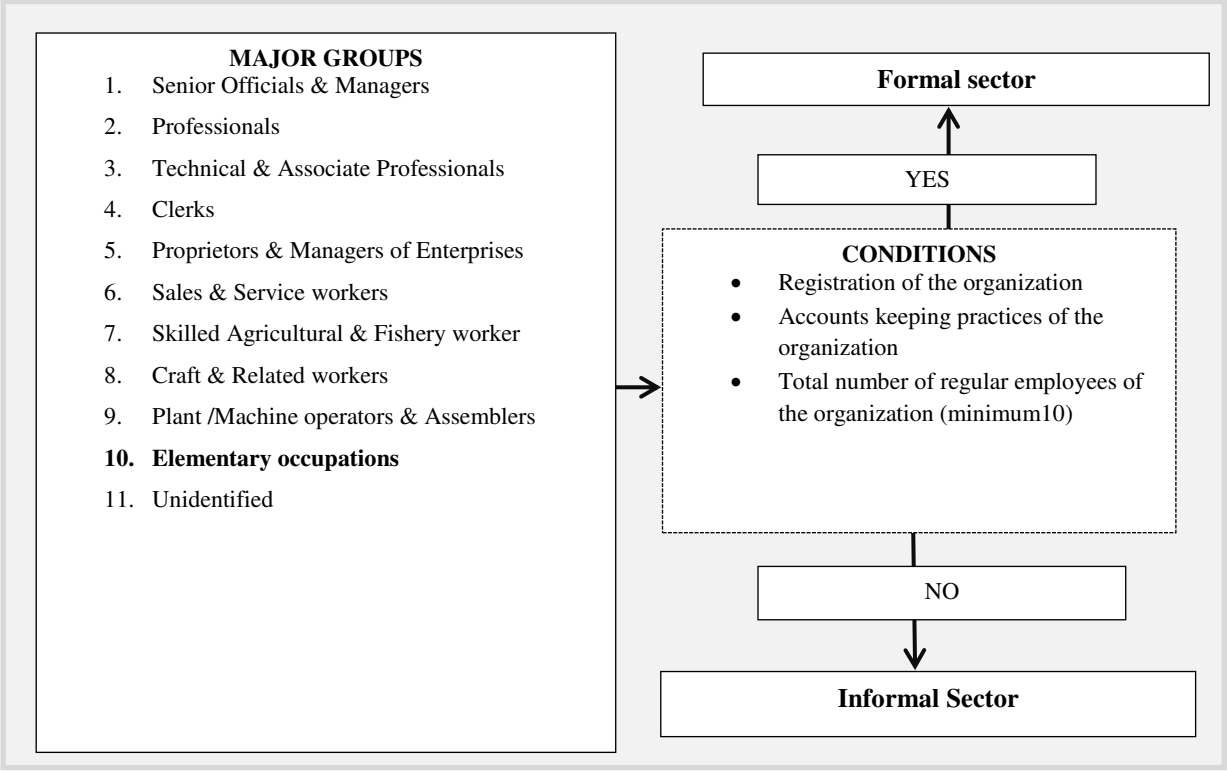


Figure 22- Procedure in identification of formal and informal sectors
Source: International standard Classification of Occupation (ISCO) prepared by ILO, Department of Census and Statistics (2012), *Sri Lanka Labour Force Survey, Annual Report 2012*

According to the above chart there are 11 major groups. Within that 'Elementary **Occupation'**is the 11thmajor group. According to the ILO under the 11th major groupthere is a sub-group called 'Transport labors (933)'. But *Natami* do not satisfy any of the requirements that ILO considered to be a Formal sector labor. Therefore *Natami* as an occupation do not satisfy the above conditions. Thus, *Natami* are within the informal sector in the Sri Lankan labor force.

2.3 Informal Economy

According to an ILO study of the Urban Informal sector, Sethuraman defined the informal sector as follows;

'*Small-scale units engaged in the production and distribution of goods and services with the primary objective of generating employment and incomes to their participants notwithstanding the constraints on capital, both physical and human, and know how.*'

According to the Census and Statistics department, the contribution from the informal sector to the Gross Domestic Product (GDP) is 62.7%. From that 50.9% is contributed from the non-agriculture sector. (Department of Census & Statistics, 2011) The statistics show that as well as the formal economy, informal economy too contributes to the functions of the city. Therefore, it is vital to examine the informal sector of the economy. Informal sector transportation is also a key component in the informal city economy.

According to Cervero(2000),informal transportation includes commercial transactions which distinguish them as transportation services from the provision of free lifts, whether by acquaintances or hand truck drivers all common forms of mobility in many poor, rural areas. (Cervero, 2000) According to the above definition, transportation modes such as pedicabs, cycle rickshaws, horse carts and hand pull carts, for hire-motorcycles, auto rickshaws, and truck passenger transport can be considered as informal transportation modes.

3. Selection of a case study

Pettahwas selected as the case study to carry out the research as *Natami* is a frequent sight in Pettah comparative to the other places in Sri Lanka.Also,the history of Pettah is combined with the movements of *Natami,* as *Natami* is an occupation that originated with the Colombo Port.

The PettahGramaNiladhariDivision (GND) is predominantly a commercial area. According to the Census and Statistics Department, in 2012,Pettah provided accommodation only to 1749 people. But according to PettahGND the commuter population of Pettah is 300,000. Hence, Pettah is the best case study to investigate the role of *Natami*in wholesale and retail trading.

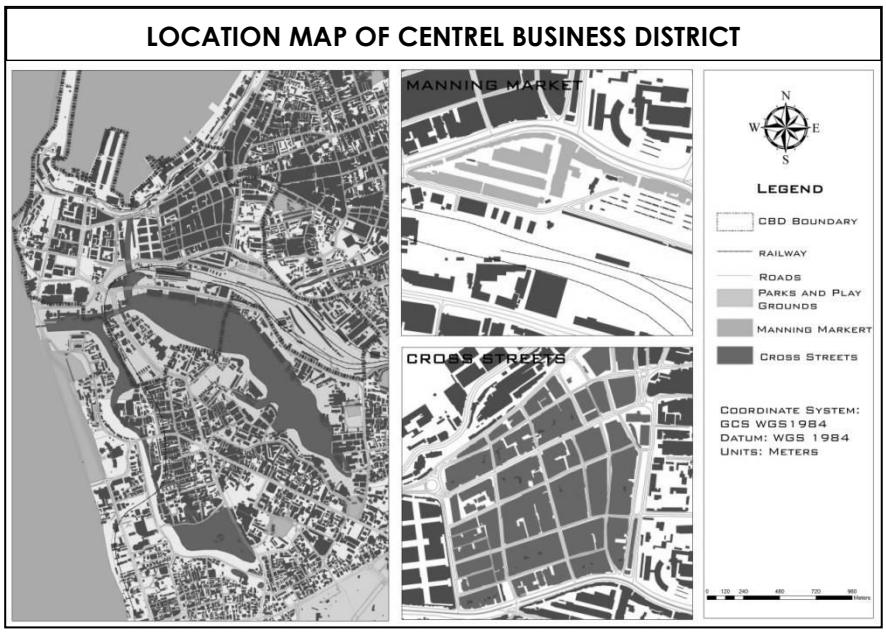


Figure 23- Location map of the acse Study, Pettah, Colombo

In brief,Pettah can be introduced with the quotation of IndiSamarajiva,

'*People work hard in Pettah, selling, transporting, and dealing. As tourists we're just passing through. Amidst the crowds, people drag hand carts full of onions, sprats, or like 20 televisions. It's hot, it's congested and I don't know how they do it*'

(*Source* - Indi Samarajiva*, The Sunday leader,* Thursday, October 02, 2014)

It reveals how *Natami*make Pettah a dynamic place, where people rememberPettah by the movements and activities of *Natami*. Therefore,Pettah GNDivisionwas selected as the case study.

4. Methodology

The methodology was followed by a series of techniques in order to capture more accurate data fromthe busy lives of *Natami*.Preliminary Observation/Eyeballing, Activity audit (On site Documentation), Semi-structured, In-depth Interviews ,Photography survey/Time lap photographs ,Behavior mapping- People centered mapping ,Interviewscarried out from different groups are the key methods followed. Through preliminary observations, the amount of *Natami* in the selected study area was counted as 4000. (*This is anapproximate value calculated by the author refering to the Natami registry of Association of Vegetables and Fruit Merchants Association (AVFMA)) and other sources)*

4.1 Sampling method

Considering the population, the geographic area and the character of the case study, it is difficult to interview the entire population. Therefore,Stratified random sampling method was applied as it ensures greater accuracy. Although the population is large, by using the stratified random sampling method, the population can be reduced into similar strata.

4.1.1 Steps of identification of stratified random samples

Identification of homogeneous Strata

Within Pettah, cross streets and the Manning market are the main wholesale and retail trade magnets. Therefore, the study area was classified into similar strata in terms of dominant trade type.

Table 1- Identification of homogeneous strata in terms of dominant trade type

	Street name	Activity	Dominant Trade type
1	Front Street	Shoes, Bags, Suitcases	Retail
2	**First Cross Street**	**Electrical goods**	**Wholesale**
3	Second Cross Street	Cosmetics and Tailoring (Cloths, shoes, bags)	Retail
4	**Third Cross Street**	**Fabrics,Cloths**	**Wholesale,**
5	**Fourth Cross Street**	**Ayurvedic medicines,Onions**	**Wholesale**
6	**Maliban Street**	**Wedding Items, Stationary**	**Wholesale**
7	**Keyzer Street**	**Bags, Fancy items**	**Wholesale**
8	**Prince Street**	**Hardware, Bags, Leather, Fancy items, Toys**	**Wholesale**
9	Sea Street	Jewellery, Gold and gems	Retail
10	**Manning Market**	**Wholesale and Retail trade**	**Wholesale**
11	**Fifth Cross Street**	**Vegetables, Fruits**	**Wholesale**
12	BodhirajaMawatha	Vegetables, fruit	Retail
13	**Bankshell Street**	**Plastic, Chemicals**	**Wholesale**
14	**Mayuri Lane**	**Old leather, cloths**	**Wholesale**
15	2nd Rohini Lane	Old shoes,Cloths	Retail
16	1st Rohini Lane	Old Shoes , Cloths	Retail,
17	Main Street	Cloths, Leather items,Bags	Wholesale, Retail
18	OlcotteMawatha	Bags, Phones, cloths (many uses)	Retail
19	**China Street**	**Party Intems,glass wear, ceramic,Kitchen utensils**	**Wholesale**
20	**St. John road**	**Cardboard, Sponch**	**Wholesale**

Source: Compiled by the author through the semi structured interviews and target group discussions

Sample selection

According to the above table, there are two homogeneous strata based on the trade type. 'Wholesale trade dominant streets' and 'retail trade dominant streets' are the main identified city functions as the research questionsabout the city function. Therefore,80 *Natami* were selected as the sample from the total population. (2% of the population)
According to the above table, the ratio between wholesale dominant streets and retail dominant streets is 12:8. Therefore 48 *Natami* were interviewed from the wholesale dominating streets and 32 *Natami*were interviewed from the retail dominating streets. In order to identify the relationship between *Natami* and the built environmentKeyzerStreet(representing cross streets) and Manning Market (as it is the dominant vegetable wholesale market in the country) were selected randomly.

5. Analysis

Analysis section contains two main analysis.The first part of the analysis attempts to identify the relationship between *Natami* and the city functions and the second part of the analysis is focused on the relationship between *Natami* and the built environment.

5.1 Identification of the relationship between Natami and the city functions of Pettah

Through data collection 13 nodes were identified within the functioning network of Pettah. They are Wholesale good importers and exporters, *Natami* cart lenders, Wholesale merchants, cart repairers, Security Service Providers, Route Owners, Farmers, Transporters (Lorry Services), Accommodation providers, Street tea shops, Port and consumers. Among them, some are attached to Cross streets and some to the Manning Market. There are some nodes that are common to both cross streets and the Manning Market such as *Natami*, wholesale merchants, Street tea shops and consumers. In Jane Jacob's *Death and Life of Great American Cities,*she mentions that '*An interviewing but different set of relationships must grow up; but these are working relationships among people*.' This character can be seen in Pettah apparently.

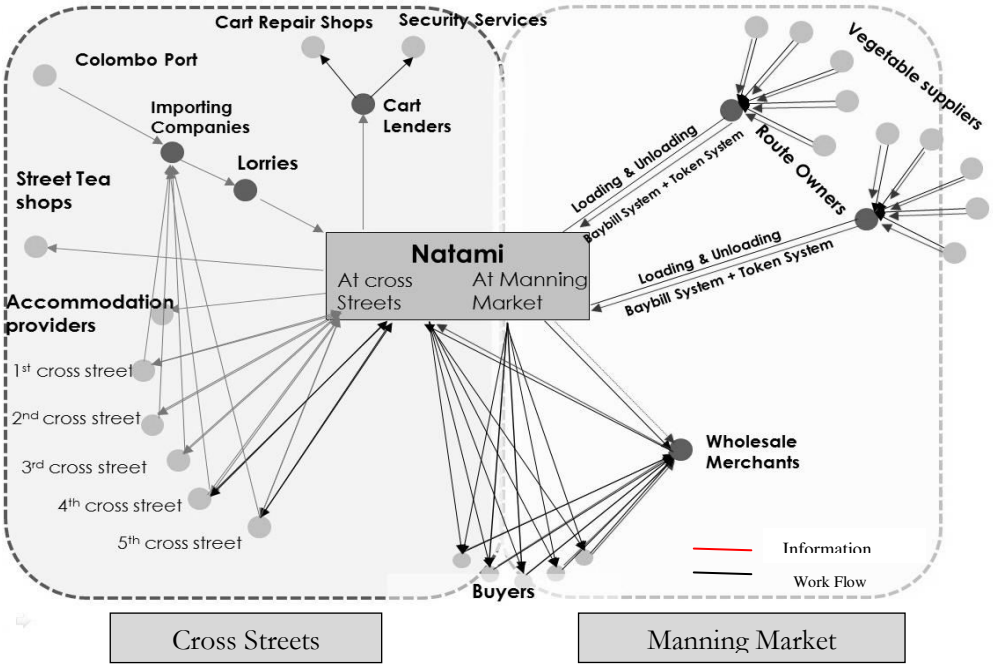


Figure 25- Functioning Network of Pettah

Source: Compiled by the author through the semi structured interviews and target group discussions

In the above diagram, simultaneous to the work flow, information is also flowing. The farmers who are in rural areas sell their vegetables and other goods to the vegetable suppliers. Then, the vegetable suppliers carry the goods via a lorry to Pettah. At the PettahManning Market, vegetable suppliers have to meet the relevant route owners[1]. The vegetable suppliers bring an information bill called 'Waybill'.

Figure 26- Waybill

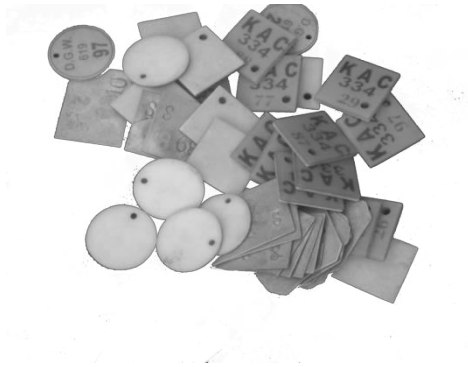


Figure 27 - Tokens

Source: Photographed by the author

These waybills include how many pieces[2], to whom[3]and from whom. All the waybills are collected by the route owners and they immediately pass them to *Natami*. Accordingly,*Natami* read these waybills and engage in unloading. This is the same process that happens in many of the leading courier service providing companies. The only difference is *Natami*do it manually, while many of the courier services do it using barcodes and other computerized systems. Meanwhile, the wholesale merchants get orders from the consumers.Following the same method mentioned above,*Natami* engage in loading activities too. Although OlcotteMawatha separates the connection between Pettah and the Manning Market physically,*Natami*recreate the interaction between Manning Market and the 4th, 5th cross streets of Pettah. Therefore, in

[1] There is an intermediate that represent every part of Sri Lanka. Ex: There is a route owner who represents the southern part of Sri Lanka. So the vegetable suppliers from the southern part have to contact their relevant route owner even to park their lorry within the Manning Market premises.

[2] Manning Market transacts on piece rate. 10kg gunny bag is considered as a piece.

[3] Each wholesale merchants shop has a number. The waybill includes this number.

terms of functions, Manning Market and 4th, 5th cross streets follow the same functions. Even *Natami* in these areas do not prefer to engage in loading and unloading activities in other cross streets. For each completed waybill the relevant wholesale merchant offers the*Natami* with a Token. At the end of the day,*Natami* count them and get the money according to the Tokens collected.

Wholesale merchants in the cross streets keep orders to the international importing agencies about the goods they want to import from the port and send the lorries what are available to carry the goods to Pettah when the ordered goods arrive to the port. Then,*Natami* engage in unloading activities according to the instructions of the wholesale merchant in Pettah. Meanwhile, the merchants receive orders from consumers. Accordingly, the merchants collect all the orders and transfer them to *Natami*.

In order to find out the most influential person in the above network,'Centrality' was calculated.According to Newman (2010), in network analysis, 'centrality' is considered an indicator which identifies the most important pinnacle within a graph. Initially four types of centrality measures were calculated using the software –'SocNet V-1.5'.

Information Centrality (IC)

Information centrality is to investigate 'How much 'X' person removal affect network information efficiency of the network'.

$$IC(i) = \left[\frac{1}{n}\sum_{j}\frac{1}{I_{ij}}\right]^{-1}.$$

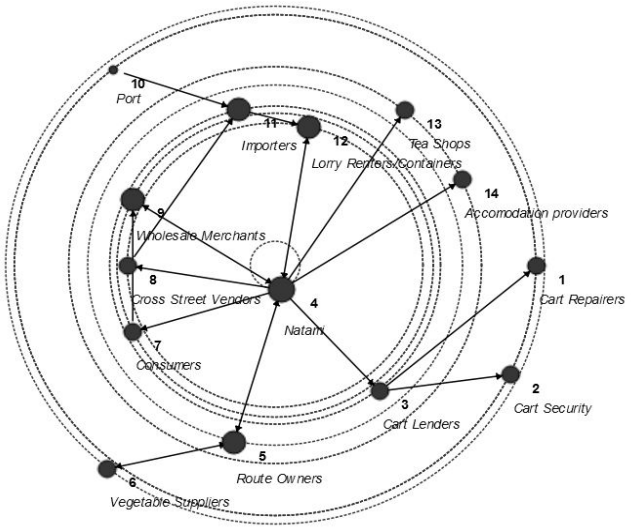
The information measure *Iij*between two nodes is defined as the reciprocal of the topological distance *dij*between the corresponding nodes
N = all nodes in the network

The table below shows the quantitative values of how much each node is centralin the above network in terms of information flow.

Table 13- Information Centrality Values of the nodes

Node	IC' value	%IC
1-Cart Repairers	0.0513	5.13
2- Cart Security Providers	0.0513	5.13
3-Cart Lenders	0.0772	7.72
4-*Natami*	0.166	11.6
5-Route Owners	0.0712	7.12
6-Vegetable Suppliers	0.0486	4.86
7-Consumers	0.0794	7.94
8-Cross Street Vendors	0.0824	5.13
9-Wholesale Merchants	0.0794	7.72
10-Port	0.0513	5.13
11-Importers and Exporters	0.0772	7.72
12-Lorry Renters	0.0824	8.24
13- Tea Shops	0.0661	6.61
14-Accomodation Providers	0.0661	6.61

Figure 28- Graphical interpretation of the Information centrality values of the nodes



It reveals that *Natami*are much more centralized compared to the other nodes in the network diagram. Therefore the removal of *Natami* from this functioning Network of Pettah will highly influence on thenetwork efficiency.

Closeness Centrality(CC)

Closeness Centrality concentrates investigates how close a node is to all other vertices in the network.

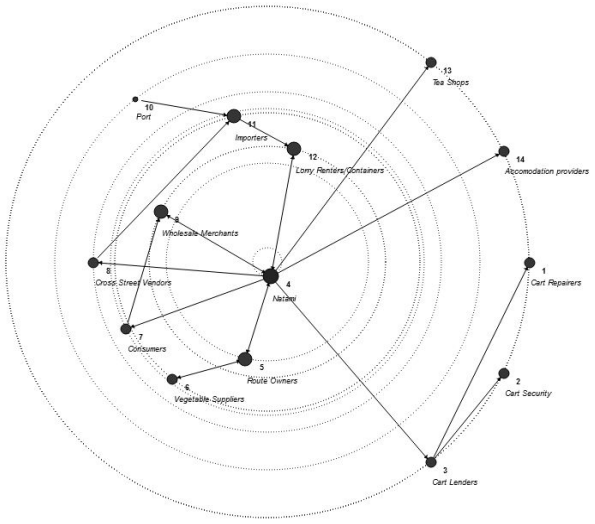
$$\mathbf{CC_i = (N-1)/\sum_{j=1}^{k} L_{ij}}$$

Where: CCi = Closeness centrality of node i
Lij = Cumulative impediment between nodes i and j, with j∈N and i≠j
N = all nodes in the network

Table 14 – Closeness Centrality Values of the nodes

Node	CC' value	%CC
1-Cart Repairers	0	0
2- Cart Security Providers	0	0
3-Cart Lenders	0	0
4-*Natami*	0.566	56.6
5-Route Owners	0.367	36.7
6-Vegetable Suppliers	0.249	24.9
7-Consumers	0.24	24
8-Cross Street Vendors	0.201	20.1
9-Wholesale Merchants	0.328	32.8
10-Port	0.112	11.2
11-Importers and Exporters	0.249	24.9
12-Lorry Renters	0.328	32.8
13- Tea Shops	0	0
14-Accomodation Providers	0	0

Figure 29-Graphical interpretation of the closeness Centrality values



The above table reveals that *Natami* have the highest closeness centrality throughout the network. If Freeman's (1979), definition for Closeness Centrality related to this context (CC measures 'To what extent a node is close to all the other nodes along the shortest paths of the network?') the answer to that question is '*Natami*are 56.6% close to all the other nodes along the shortest paths of the network'**.** In terms of Closeness centrality*Natami*are a critical node that contributes to the network efficiency of Pettah.

Degree Centrality (DC)

Degree Centrality provides the answer to the question of 'How many people interact with a node in the network?

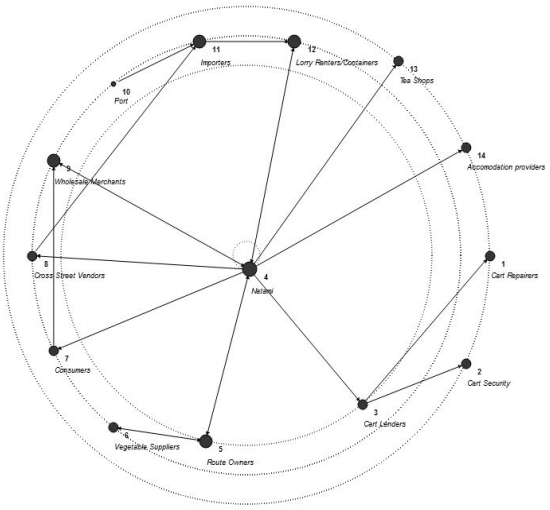
$$CD_i = \frac{\Sigma A_{ij}}{(N-1)}$$

CDi = Degree centrality of node i
Aij = Direct (transfer-free) link between nodes i and j, with j∈N and i≠j
N = all nodes in the network

Table 15 – Degree Centrality Values of the nodes

Node	CCvalue	%CC
1-Cart Repairers	0	0
2- Cart Security Providers	0	0
3-Cart Lenders	0	0
4-*Natami*	0.566	56.6
5-Route Owners	0.367	36.7
6-Vegetable Suppliers	0.249	24.9
7-Consumers	0.24	24
8-Cross Street Vendors	0.201	20.1
9-Wholesale Merchants	0.328	32.8
10-Port	0.112	11.2
11-Importers and Exporters	0.249	24.9
12-Lorry Renters	0.328	32.8
13- Tea Shops	0	0
14-Accomodation Providers	0	0

Figure 30- Graphical interpretation of the Degree Centrality values of the nodes



This reveals that *Natami*have the highest degree centrality while route owners own the second. The above analysis shows that ***Natami* have the highest amount of nodes directly connected, proportionate to the other nodes in the network**.

BetweenessCentrality (BC)

Betweeness Centrality addresses the question of 'To how many people a node act as a BRIDGE' in a network. The diagrams below and results provide the answer in the case of functioning network of Pettah.

$$CB_k = \sum P_{ij}(k)/(N-1)(N-2)$$

CB_k = Betweenness centrality for route segment k

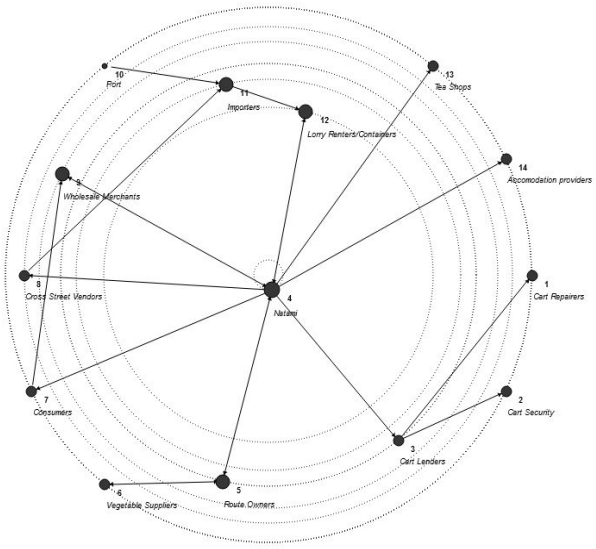
$P_{ij}(k)$ = paths between nodes i and j that pass through segment k, for all i,j∈N and i≠j

N = all nodes in the network

Table 16 Betweeness Centrality Values of the nodes

Node	BC value	%BC
1-Cart Repairers	0	0
2- Cart Security Providers	0	0
3-Cart Lenders	0.115	11.5
4-*Natami*	0.519	51.9
5-Route Owners	0.115	11.5
6-Vegetable Suppliers	0	0
7-Consumers	0	0
8-Cross Street Vendors	0.0385	3.85
9-Wholesale Merchants	0.0705	7.05
10-Port	0	0
11-Importers and Exporters	0.147	14.7
12-Lorry Renters	0.205	20.5
13- Tea Shops	0	0
14-Accomodation Providers	0	0

Figure 31- Graphical interpretation of the Betweeness Centrality values of the nodes



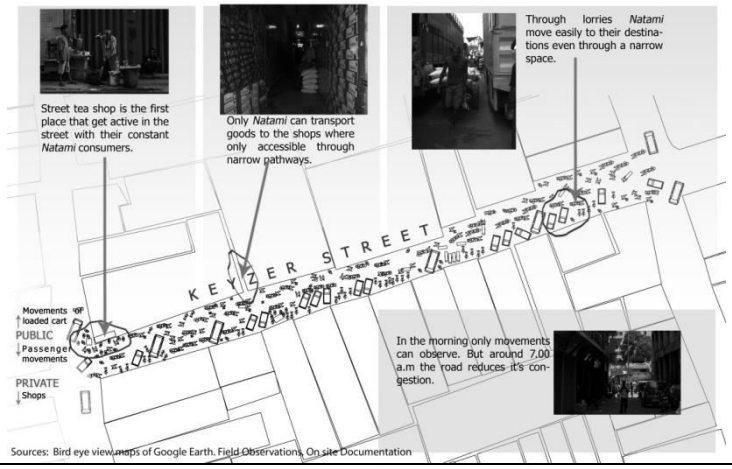
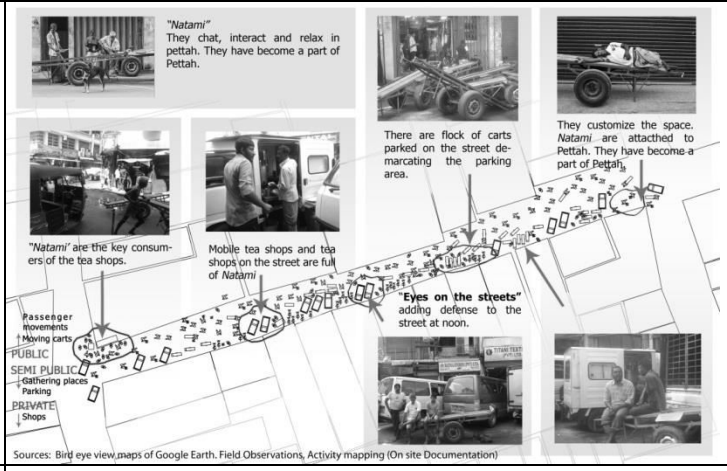
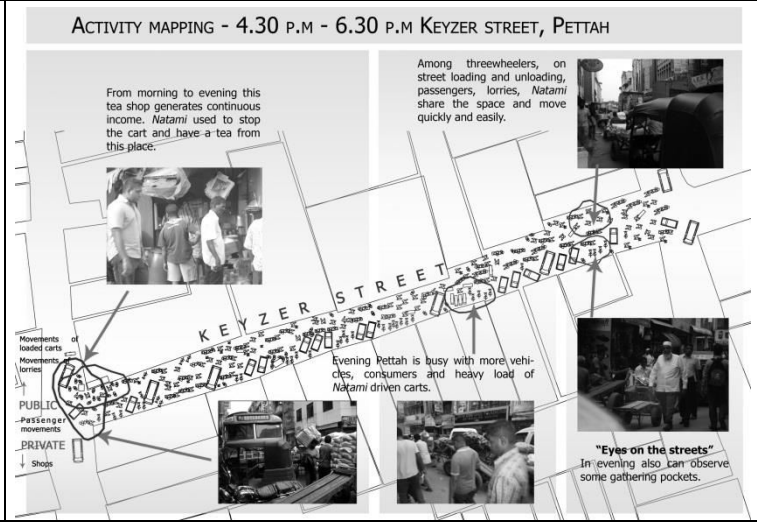
According to the above outputs *Natami* act as a bridge to the other nodes in 51.9% in the network. It is the highest node which has the highest BC.

According to the above centrality calculations of the functioning network of Pettah, it is revealed that *Natami*are the most influential people within the functioning network of Pettah.

Activity mapping

Although the above analysis reveals that *Natami*are a significant character of the functioning network of Pettah, the research paper also attempts to examine how *Natami*organize their space at different time periods of the day; considering the two cases of KeyzerStreet and the Manning Market.

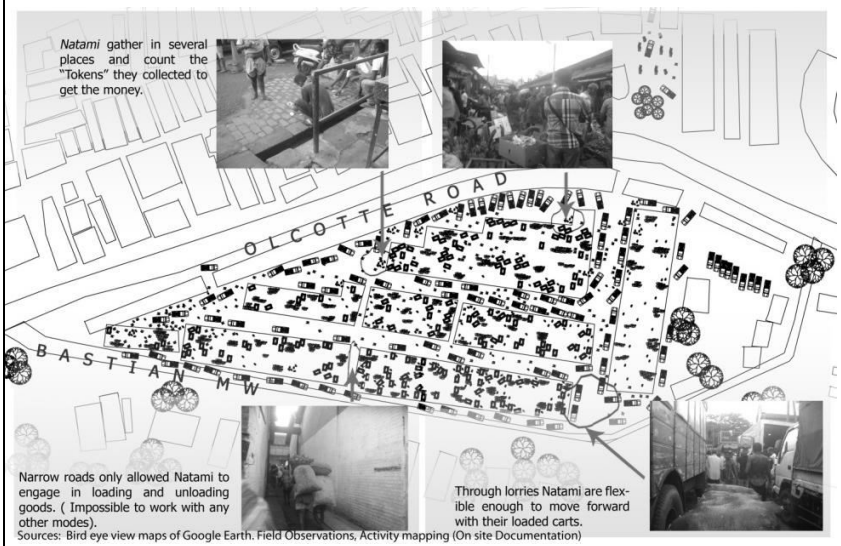
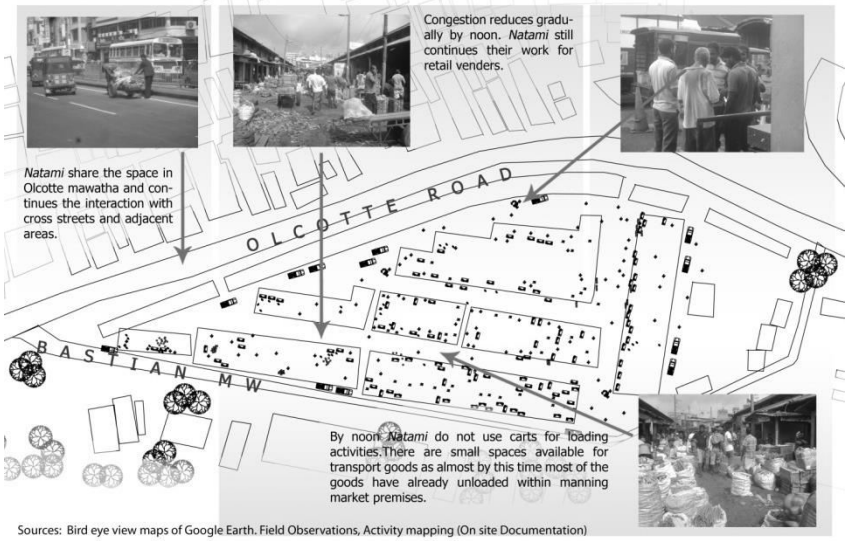
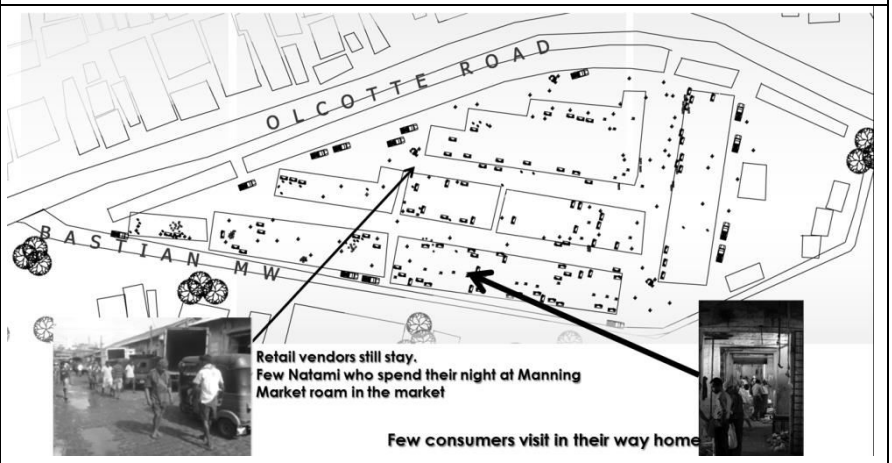
Table 6- Activity Mapping-Keyzer Street

Time Duration	Activity Mapping- Keyzer Street
6.30 a.m to 8.30 a.m	
11.30 a.m to 1.30 p.m	
4.30 p.m to 6.30 p.m	

The above activity maps were drawn through the observations derivedfrom field observations and activity mappings carried out in the morning, noon and evening. They interpret different perspectives ofthe relationship of *Natami* and the city functions. Desmond Morris,in his book 'Human Zoo', interprets cities as'*city is not a concrete jungle. But it is a human zoo'*. This definition is reflected inPettah. Pettahdoes not sleep even at night. Narrow streets do not give a sense of security to the people who travel. Therefore,at night,Pettah seems to be a concrete jungle. They are the people who wake Pettahand they turned the concrete jungle into a human zoo. From 4.30 am to 6.00 am there are only loaded carts moving fastly. They do not have time to stay. They drag their carts rapidly. But the opening and closing times of

the tea shops and mobile tea shops (kinetic commercial spaces) harmonize with the working hours of *Natami*. According to Jacobs(1961*), fluidity of opportunities is an asset, not a detriment for encouraging city – neighborhood stability*. Therefore *Natami* are identified as an opportunity generating magnet in Pettah.

Table 7-Activity Mapping-Manning Market

Time Duration	Activity Mapping- Manning Market
6.30 a.m-8.30 a.m	
11.30 a.m – 1.30 p.m	
4.30 a.m – 6.30 p.m	

Most of the food stands open from the morning (around 5.00 a.m to 5.30 a.m) and only the movements can be observed of *Natami*. Their rush and speed give energy to the entire environs. There are two reasons for their continuous speedy movement in the morning. They transport goods in wholesale. Their slightest delay may cause a massive impact on the price determination of the goods. The goods in their carts are to be delivered to different areas of the country. They know their responsibility although many of the policy makers forget their contribution.

By noon, they are relaxed. They sleep, they chat or they gather at certain points to gossip. Their eyes are always on the street. Those streets are their homes. They are the people whodemarcate the parking area of the street for that day. They defend the street. Jacobs too emphasized that each additional pair of eyes, and every increase in their range, is good for dull grey areas.

By evening, the situation changes.*Natami* become busier again, as in the morning. But the streets get a face of chaos as there are many customers unlike in the morning. Among vehicles and people, *Natami* do not feel difficult to find their way to carry the heavy loads. Then, the rapid movements decline gradually over time.

Within one day,Pettah streets get different characters with the activities of *Natami*. *Natami* are the key role players of Pettah. Therefore, activity mapping and field observations illustrate that *Natami* is a key character who makes activities happen in Pettah.

Around 5.30 a.m all the lorriespark within or adjacent to the Manning market. In cross streets,*Natami*are more or less independent. They are individually responsible for the work they do. In the Manning Market, there are certain organizations that exercise influence on *Natami*. So, they are told to unload all the goods by 6.30 am. Morning is the climax of the day as most of the activities start and finish in the morning. *Natami* have to cross OlcotteMawatha with their carts or heavy load on their bare backs to distribute in 4th and 5th cross streets. Although *Natami*carry heavy bags they haltnear the traffic lights until the green light appears. They share the space smoothly with other modes. In the morning,Pettah is full of movements. *Natami* bring goods such as onions and other from cross streetsto the Manning Market and they also carry vegetables and other goods from the Manning Market to cross streets

These activities only take place in the morning. By around 9.00 am, all the large scale transactions are completed. All the vegetables and other food types are almost unloaded by this time and there are few spaces available for more. With these spaces *Natami* find easy ways to transport the goods. Around 11.00 a.m to 12.00 noon all the transactions are finished. According to Hector KobbekaduwaAgrarian Research and Training Institute, there are about 150 tons of vegetables transacted in the Manning Market. *Natami*are the group of people that move these vegetables. Within a short time period, Manning Market goes through different stages of activity. In such circumstances,the absence of *Natami* will stop each and every activity of the Manning Market as they are the activity generators of the Manning Market.

In the evening, the Manning Market does not have many functions and the Colombo Municipal Council (CMC) officially closes the Manning Market. But still, there are some *Natami* roaming in the area and they stay their night in Manning market.

5.2 Identification the relationship between Natami and the Built environment

Literature review reveals that *Natami*were in Pettah over decades. Although many of the NMT modes have been replaced by Motorized modes within the last few decades,*Natami*still exist in Pettah. In order to identifywhether there is a relationship between*Natami* and the built environment,the analysis below was followed. In order to identify the relationship between *Natami* and the built environment, a streetscape study was done in Keyzer Street.

Figure 32- Streetscape Study of Keyzer Street

Figure 33-Cross Section-Keyzer Street

The maps above show that the store rooms of the shops in Keyzer Street are mostly on the upper floors of the building. Although the shop owners hire other modes such as three wheels to transport the goods, they have to hire a *Natami* to carry the goods to the upper floors. Accordingly,*Natami* is an occupation that emerges from this built environment. This built environment facilitates the existence of *Natami* in this environment.

Figure 34- Cross Section-Manning Market

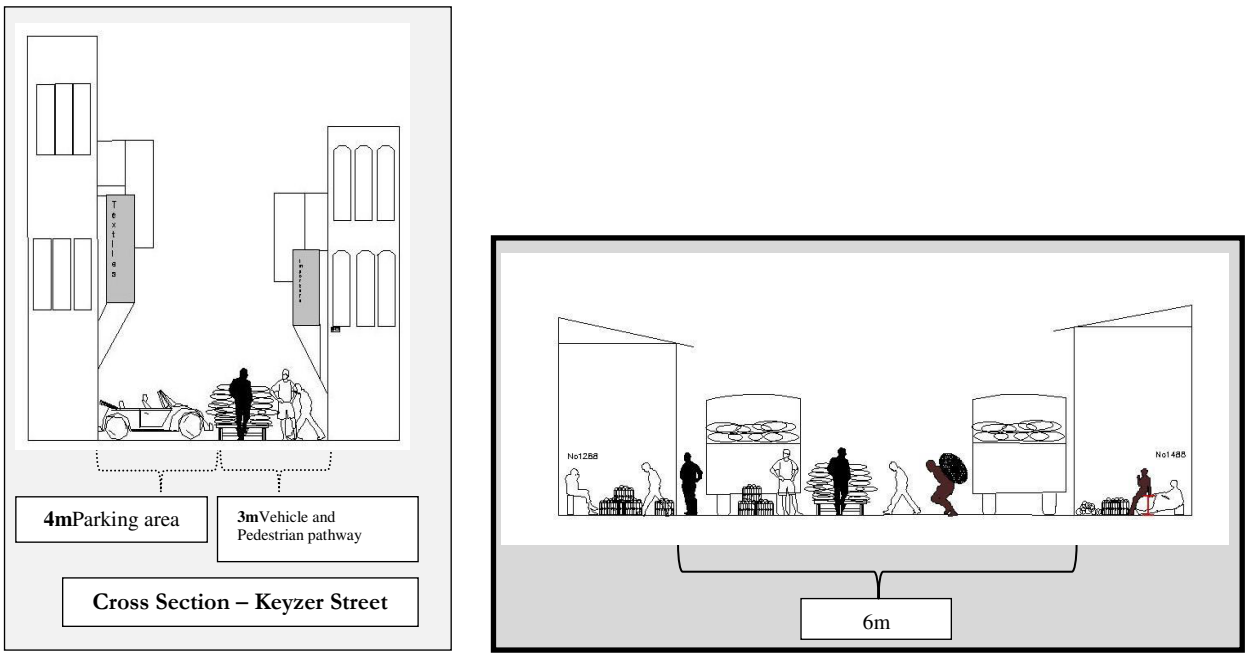


Figure 35- Narrow Streets and spaces in Manning Market

The above cross-section reveals that this built environment supports the existence of *Natami*. Thus, the survival of*Natami* is combined with this built environment.

According to the above details and cross-sections, it reveals that, within this context, it is impossible to use another mode of transportation to engage in loading and unloading activities. Accordingly, in Manning Market also can find a relationship between*Natami* and the built environment just as Keyzer Street. Therefore, it is possible to conclude that the existing built environment prevents any other loading and unloading mode entering the Manning Market while *Natami* play a vital role in contributing to the efficiency of the prevailing networks.

As well as the relationship between *Natami* and the city functions, there is a positive relationship between *Natami* and the built environment too. The above analysis reveals that the existence of*Natami* depends upon the prevailing built environment. If these narrow streets widen there is a possibility to experience a modal shift from *Natami*to motorized modes. At present,BodhirajaMawatha and 5th cross streets are experiencing the arrival of motorized modes. When consider the other streets, although they hire a three-wheeler they have to hire a *Natami* to transport the load to the upper floors, where their wholesale stocks are stored. Therefore, this built environment only facilitates *Natami*who were in Pettah for decades.

When consider the above facts and figures*Natami* play a vital role in making the city networks/functions efficient and dynamic. Therefore *Natami*, the built environment and the city functions are three knots in one rope.

5. Conclusion

When considering the analysis,it reveal that *Natami* are highly attached to the functioning network and the built environment of Pettah.The built environment of Pettahreveals the existence of *Natami*. In Pettah, throughout the busy streets, they create livable places where they stop, talk and share their tea. They are within the interwoven network of Pettah. The analysis reveals that *Natami* is the focal point of this network where most of the ties intersect. Their carts create safe environment for elders, children, and the handicapped. *Natami* engage inon-street loading and unloading, but their work does not disturb the pedestrians who use it. *Natami*share the road with them mutually.

The built environment of Pettah, with its narrow streets and vertical rhythmic buildings, encourage the existence of *Natami*. At the sametime,*Natami* contribute to the functioning wholesale and retail networks of the city to support the smooth flow of the city functions of Pettah. Therefore, it is an interdependent flow where the built environment encourages the existence of *Natami* and *Natami*contribute to the functions of Pettah. Ultimately,Pettah attracts many people while creating diverse surroundings that many scholars such as Gorden Cullen, Christopher Alexander, Jane Jacobs, Donald Appleyard (Humanistic approaches to Urban Design) have emphasized.

The network analysis reveals that the network to which *Natami* are attached to, is very complex and interwoven. This is the reason behind the efficiency of Pettah. According to Jacobs (1961) '*superficial architectural variety may look like diversity, but only a genuine content of economic and social diversity resulting in people with different schedules which it gives meaning to the place'*.Therefore, it is true enough that Pettah has a superficial architecture but the economic and social diversity enforced by the centrality of *Natami* only enhance the efficiency of Pettah. Therefore, the above analysis identifies*Natami* as a part of Pettah.

Hence, the research study reveals that there is a positive relationship between*Natami* and the built environment, where the built environment supports the existence of *Natami* and *Natami* contribute to the city functions of Pettah. If one node of this cycle were disturbed or damaged, the entire system will be disturbed or will collapse. Thus, in the future, when making decisions related to Pettah, it is a crucial consideration to align the decisions with these relationships as they are not visible at once. If not, the entire system will collapse.

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