EXPLORING APPROPRIATE URBAN FREIGHT TRANSPORT MEASURES IN METRO MANILA

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Abstract: The freight forwarders, freight shippers, government authority and the residents along the designated truck routes characterized the urban freight transport of Metro Manila with different natures of objectives. The study set Metro Manila as its study area primarily because of its status as the center of economic activities of the country. The research aimed to explore the appropriate urban freight transport measures in Metro Manila together with the problems confronting the freight industry.

Keywords: urban freight measures, transport policy, metro manila

1. INTRODUCTION

Goods movement in Metro Manila is an essential part of its economic activities. Such activities seen by the business community as major factor to be considered in their business operations; car users and pedestrians see delivery and service vehicles as nuisance in the city streets and major cause of accidents; homeowners see delivery trucks as something to be banned from the residential streets. One basic problem confronting transport planners and policy makers nowadays is how to properly address these conflicting objectives of the different urban goods movement key players and their preferred measures. The freight carriers aim for cost effectiveness while optimizing the quality of their services, freight shippers, i.e. the suppliers, wholesale and retail firms, want the shortest possible time to the market while minimizing storage levels, resulting in requests for frequent deliveries. Residents demand both ease of access to and within the town and quality of life. Authorities are tasked to design sustainable transport policies that address balanced environmental, economic and social concerns. This is a complex task, which will intrude deeply into social issues. Moreover, solutions will have to be acceptable to all stakeholders with great benefits to overall interest of Metro Manila.

1.1 Brief Profile of the Study Area

The port of Manila is the most important domestic trade port of the country both domestic and international. Approximately 85% of Philippine foreign trade passes through the Port of Manila; 90% of imports enter this Port for distribution to other principal cities via trucks and inter-island vessels. Trucks do the distribution of goods from port to destination and vise versa. The truck ban, which prohibits the trucks to pass EDSA from 6:00 am to 9:00 pm,

makes the delivery of trucks during nighttime resulting to the proliferation used of small trucks that are not covered by the ban. Small trucks having gross weight of less than 4,000 kg does the pick-up and delivery.

2. OBJECTIVES AND METHODOLOGICAL FRAMEWORK

The objective of this research is to explore appropriate urban freight transport measures in Metro Manila. Also included is to determine the problems confronting the freight industry based on the perceptions of the different players considered in the study.

2.1 Hierarchy of Measures

There are three (3) groups of policy objectives in the hierarchy, these are: *efficiency and economy*, *road safety and environment* and *infrastructure and urban structure*. Attributes under efficiency and economy objective are minimize transport cost, improve reliability of delivery time, improve load factor, and create jobs and business opportunity. On the other hand, attributes of safety and environment objective include: minimize air (emission) pollution, minimize accidents, minimize physical hindrance, and minimize noise and vibration. Attributes of infrastructure and urban structure objective are increase infrastructure capacity and encourage decentralization. Level four (4) of the hierarchy showed the lists of potential measures to be considered as urban freight alternatives. These are: freight terminals with cooperative delivery; road links improvement, truck routes; truck parking, loading/unloading facilities; guidance and information system for goods transport; truck regulation (licensing, truck entry restrictions); and road pricing, parking charges. The policy objectives of urban freight transport and the measures considered in this study are further discussed below. (Figure 1)

Efficiency and Economy Objective: Efficiency relates to minimizing or reducing transport operation costs which the shipper, receiver, and transport operator, may incur while simultaneously improving the quality of transport services (access, reliability, travel time, flexibility or security of freight).

Road Safety and Environment Objective: Urban trucks affect the physical, social and safety environment in a number of ways, measurable and non-measurable. The measurable ones include exhaust emissions, noise, vibration, and accidents. The non-measurable impact may be described as truck intrusion, either as a perceived threat to people, or as truck intrusion into residential areas (Castro, 2000).

Infrastructure and Urban Structure Objective: This objective is related to the provision of infrastructure (i.e. roads, ports, terminals) and urban structure planning which have significant effect on freight transport by providing the means to improve efficiency within the freight industry. Reduction of road maintenance cost is an infrastructure objective, while preservation and revitalization of (historic) city centers, and maintaining the levels of service within urban areas belongs to the group of urban structure objectives (Visser *et al.*, 1999).

Goods distribution center (terminal) with cooperation of carriers: This entails provision of a central goods facility that is connected directly to the expressway network to concentrate the usage of heavy vehicles on expressways and prevent them from circulating in urban areas. It also promotes change in the form of urban delivery, from independent private transport to consolidated transport using public carriers. Consolidation of different shipments into concentrated goods flow leads to increases in truckload factors thereby decreasing the frequency of trips (Castro, 2000).

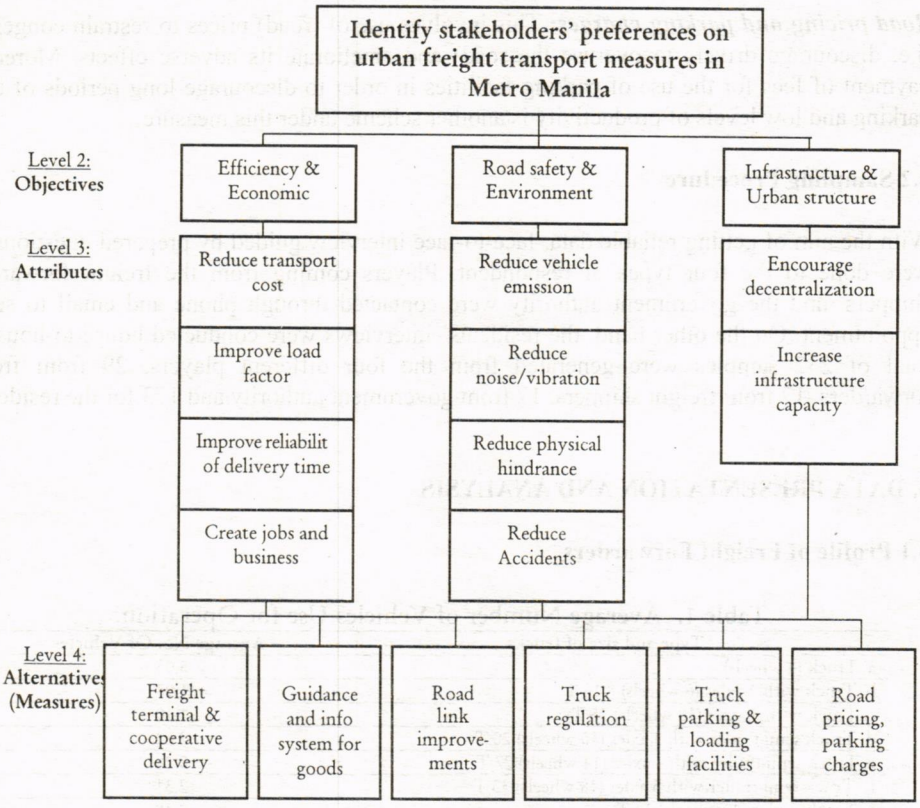

Figure 1. **Hierarchy of Measures (Castro, 2000)**

Road link improvements, Truck routes/networks: This relates to construction and expansion of roads, railway system, etc. in order to accelerate goods transport. It also deals with allocation of truck routes either for the exclusive use of trucks or for the exclusive use of other high-occupancy vehicles.

Truck parking, loading/unloading facilities: This relates to the provision of parking spaces for the loading and unloading of goods and the promotion of parking area improvements as well as effective use of street parking lots to decrease on-street parking of loading and unloading trucks.

Guidance and info system for goods transport: Real-time positioning of trucks, information on cargo, information on road conditions, electronic data interchange, etc. can be utilized to improve freight operations (i.e. cooperative pick-up and delivery) and the urban freight network.

Truck regulation (truck ban, licensing, size, entry restrictions): This entails prohibition of trucks on particular routes on certain hours of the day in order to transfer them to non-congested roads or shift truck movements to a different time period. It also refers to restrictions on operator or vehicle standards, safety measures, pollution, imposition of tax, etc. in order to improve the quality of trucking services.

Road pricing and parking charges: This involves use of (road) prices to restrain congestion (i.e. discourage drivers to overuse the road) and ameliorate its adverse effects. Moreover, payment of fees for the use of parking facilities in order to discourage long periods of truck parking and low levels of productivity is another scheme under this measure.

2.2 Sampling Procedure

With the aim of getting reliable data, face-to-face interview guided by prepared questionnaire were done to the four types of respondent. Players coming from the freight forwarders, shippers, and the government authority were contacted through phone and email to set an appointment. On the other hand, the residents' interviews were conducted house-to-house. A total of 232 samples were generated from the four different players, 29 from freight forwarders, 12 from freight shippers, 17 from government authority and 173 for the residents.

3. DATA PRESENTATION AND ANALYSIS

3.1 Profile of Freight Forwarders

Table 1. Average Number of Vehicles Use for Operation.

Type and size of trucks	Average No. Of Vehicles
a. Truck (4 wheels)	5.03
b. Truck with 2 axles (6 wheels) 8-16 T	1.93
c. Truck with 3 axles (10 wheels) 25 T	1.10
d. Truck semi-trailer with 3 axles (10 wheels) 20 T	2.62
e. Truck semi-trailer with 4 axles (14 wheels) 27 T	0.28
f. Truck semi-trailer with 5 axles (18 wheels) 33 T	2.31
g. Truck-trailer (20 wheels) 34 T	0.48
Average number of trucks per company	**13.75**

There are 29 numbers of truck companies interviewed, having a total of 1,509 numbers of employees. The average number of employees of the sample is 52 per company. On the number of trucks used for operation, table 1 shows that the average number of trucks for each company is about 14. Out of this average truck number, 12 are revealed as owned by the company and 2 are rented. Interestingly, more than half (52%) of the trucks companies reveal that they owned all the trucks they are using for their operation. For the basis of payment, 58% of them express through trip basis. For the frequency of trips, more than half (52%) of the responding companies express 1-2 trips per day.

Table 2. Average Operating Cost for Truck Operation

Variables	Percentage of Share of Operating Cost
Fuel	37
Tire	19
Maintenance & Repair	13
Vehicle Insurance	11
Crew Cost	10
Lubricants	9
Others	1

Table 2 shows how the truck companies allotted the 100 percent operating expenses to the different variables considered as operating expenses. The fuel has the largest share at 37%. On the number of trips taken, more than half says they have 1-2 trips per day. More than half of the interviewed company revealed that they arrive on time while 43% said 'No'. There is a big allowance of time before they were considered late at about 2 to 3 hours. Ironically, despite the late, 90 percent of them say there is no penalty being rendered at all.

3.2 Profile of Freight Shippers

There are twelve (12) companies in Metro Manila interviewed having a total of 13,512 employees. Interviewed company has an averaged of 1,228 employees. It is not surprising to find out those 4 wheel trucks got the highest share (34). This can be due to its advantage, being exempted to the truck ban enforced along the EDSA corridor. For the type of management employed by the shippers for picking and distributing their goods, most of them (68%) reveal that they have a contract to the private carriers while 19 says they use their own vehicles and the remaining 13% rent a vehicles for their operation. More than half at 59% pointed out that the basis for payment for their service is per trip while 33% says per truck basis and the remaining 8%, per ton basis. Having the highest share among the participating company to the study is manufacturing at 45% followed by the warehouse at 20%. It can be remembered that freight forwarders respondent revealed that most of them are having 1-2 trips per day. The shippers expressed similar response, that is, 65 percent revealed that trucks they use for operation are having trips of 1-2 per day.

3.3 Profile of the Residents

Having big number in the survey are students from age range of 20-24 (42), followed by those in the age bracket of below 20 (32%). These two age brackets represent groups of students studying at the schools near the designated truck routes. Around 78 % has no car and most of them fall to 6,000-999 and 10,000-14,999 combined household monthly income. For the occupation, 26% are professionals, followed by housewives and service sector, shop, market worker (17%) and students (12%). For employment sector, 39% marked it "NA", meaning not applicable for them. This group is composed of jobless housewives and students. Those generally involved in economic activities, 18% belongs to commerce while 15% to the service and sector.

The residents were also asked if there are significant volumes of trucks passing along their house/school - 98 percent said 'Yes' while only 2 percent said 'No'. Consequently, they were asked if those trucks using the said streets along their houses/schools negatively affect them. An overwhelming 93 percent said 'Yes' and only 7 percent did not think they are affected.

4. PROBLEMS RELATED TO URBAN FREIGHT TRANSPORT

4.1 Top Five Problems Brought by the Trucks Into the Streets

Table 3 shows the responses of the players with respect to the problems brought by the trucks into the streets.

Table 3. Ranking of Problems by Four Major Players

Problems	FORWARDERS			SHIPPERS			GOVERNMENT			RESIDENTS		
	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank
Cause air pollution	71	2.6	2	32	2.9	2	47	1.3	3	385	2.3	1
High risk for accident	37	3.9	6	35	3.2	3	48	3	2	382	2.6	2
Cause traffic congestion	35	1.2	1	16	1.3	1	20	3.1	1	416	2.6	3
Cause noise pollution	91	4.1	7	15	3.8	6	48	4.4	6	511	3.2	4
Cause Vibration	37	3.7	5	8	4	7	0	0	7	406	3.7	5
Obstruction to visibility	46	3.5	4	26	3.7	5	19	3.2	4	194	4	6
Damage the road surface	52	2.9	3	43	3.6	4	58	3.6	5	331	3.9	7

- "Cause traffic congestion" was ranked number one by the freight forwarders, shippers, and the government authority.

- "Cause air (emission) pollution" numbered one from the residents.
- "High risk for accidents" was highly regarded by all players except the freight forwarders.
- "Cause noise pollution" was raised only by the residents as a problem.
- "Obstruction to visibility" and "damage the road surface" were within the top five problems pointed by the players except the residents.

4.2 Top Five Factors Affecting Urban Freight Transport

Table 4. Ranking of Problems Affecting Goods Movement by the Four Major Players

Problems	FORWARDERS			SHIPPERS			GOVERNMENT			RESIDENTS		
	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank	Sum of Scores	Mean	Rank
Truck ban	41	1.5	1	17	1.5	1	18	1.6	2	141	1.8	1
Traffic congestion	56	2.0	2	18	1.6	2	26	1.5	1	290	2.4	2
Overloading	8	2.7	3	0		NA	25	3.6	8	171	3.1	5
No definite routes for trucks	43	3.3	4	8	2.7	3	12	4.0	11	156	3.2	6
Drivers behavior	42	3.8	8	24	3.4	4	39	3.9	10	282	2.6	3
Pedestrian behavior	17	3.4	5	17	4.3	8	13	4.3	12	197	3.3	7
Poorly maintained roads	63	3.9	10	44	4	6	17	3.4	5	226	3.5	11
Narrow roads	39	3.9	9	8	4	6	19	3.8	9	175	3.0	4
Old bridges, limited capacity	9	4.5	12	0		NA	3	3.0	3	95	3.4	9
Inadequate capacity of roads	18	4.5	12	9	4.5	9	34	3.4	5	192	3.4	8
Inadequate traffic control facilities	32	3.6	6	9	4.5	9	6	3.0	3	187	3.4	10
Truck related accidents	15	3.8	7	5	5	9	15	5.0	13	227	3.6	12
Laxity of enforcement	53	4.1	11	21	3.5	5	24	3.4	7	177	4.0	13
Others	0		NA	0		NA	5	5.0	13	0		N/A

The four players in urban freight transport were also requested to rank the top five factors affecting the goods movement. The following were pointed out:

- "Truck ban" was ranked on top by the players except the government authority.
- "Traffic congestion" was ranked second by all players except the government authority, who ranked it number one.
- "Overloading" was with in the top five ranked factors by the freight forwarders and the residents.
- "Pedestrian behavior" as a factor affecting the freight transport was pointed out only by the freight forwarders.
- "Drivers behavior" was highly regarded by both shippers and the residents.
- "Laxity of enforcement" can only be seen within the top five factors ranked by the shippers.

5. DISCUSSION OF POLICY MEASURES

5.1 Measurement of the Stakeholders' Policy Objectives, Objectives' Attributes and Measures Preferences

The data on the players' policy objectives, objectives' attributes and measures preferences at hand are descriptive in nature hence, it need to be assessed quantitatively to obtain a stronger basis of analysis and inferences. With this aim, a simple mathematical measuring technique is being utilized – t-test and p-level.

Process of Scoring in Determining Priorities

After determining the mean score of all variables involved in the hierarchy (level 2 to level 4), the score of each of the variables located in level 3 and level 4 were also calculated in order to know the elements, such as attributes and measures priorities of each player.

The mean score of the objectives in level 2 of the hierarchy were retained serving as its final score since there are no other variables above this level having mean score to serve as a multiplier. Thus, level 2 variables were set as benchmark in measuring the scores or weight of other variables in the succeeding hierarchy. However, for the level 3 variables (attributes), the determination of the priority attributes were done by multiplying the mean score of each attribute to the mean score of its corresponding objective (level 2). The product then serves as the final score of the attributes in level 3. The same process was done in determining the most priority measures in level 4. The mean score of each measure were multiplied to the mean of its corresponding attributes and objectives. The process explained herein is best illustrated by the example below. (Figure 2)

Before the Multiplication

Level 2	Objective	Efficiency & Economy = 1.4 (mean)
Level 3	Attribute	Create jobs/business opportunities = 2 (mean)
Level 4	Measure	Distribution center with cooperation of carriers = 2.4 (mean)

Final Score After the Multiplication of Each Level

Level 2	Objective	Efficiency & Economy = 1.4 (mean)
Level 3	Attribute	Minimize transport cost = (2 * 1.4) = 2.8 (score)
Level 4	Measure	Distribution center with cooperation of carriers = (2.4 * 2 * 1.4) = 6.7 (score)

Figure 2 reveals that the freight forwarders put high priority to "efficiency and economy" objective with a score of 1.4, followed by "road safety and environment" with a score of 2. In terms of attributes and measures, it can be seen in the same figure that "create jobs and business opportunities" and "distribution center" were both given high priority value by the freight forwarders.

Table 5 summarizes the p-level and t-test of the forwarders' revealed priority objectives. The data tests done emphasized that both "Road Safety and Environment" (RSE) and "Infrastructure and Urban Structure" (IUS) are significant as represented by their respective t-test (RSE = -2.83846, IUS = -5.606697) and p-level (RSE = 0.008343, IUS = 0.000005) value. It can be noted that in terms of p-level, IUS is better than that of the RSE's but on the other hand, RSE has a better value of t and mean. This relationship then says that the ranking given by the forwarders on the three policy objectives is strong and stable.

Reflected in Table 6 are the attributes of the chosen objective "efficiency and economy" by the forwarders. It can be observed that only the variable "improve load factor" is significant as shown by its t and p-level values. This reinforces the forwarders' decision of ranking "create jobs/business opportunities" as the main attribute of "efficiency and economy" objective. Other attributes such as "minimize transport cost" and " improve reliability of delivery time", did not give impressive t-statistics and p-values. These variables are insignificant to strengthen that "create jobs/business opportunities" is indeed the top priority attribute.

Table 5. Level of Significance (P) and T-test of Forwarders' Priority Objectives

Efficiency and Economy	Mean	Std.Dv.	N	T	p
Road Safety and Environment	2.0	0.73	29	-2.83846*	0.008343*
Infrastructure and Urban structure	2.6	0.69	29	-5.606697*	0.000005*

** Significant at p<. 05000*

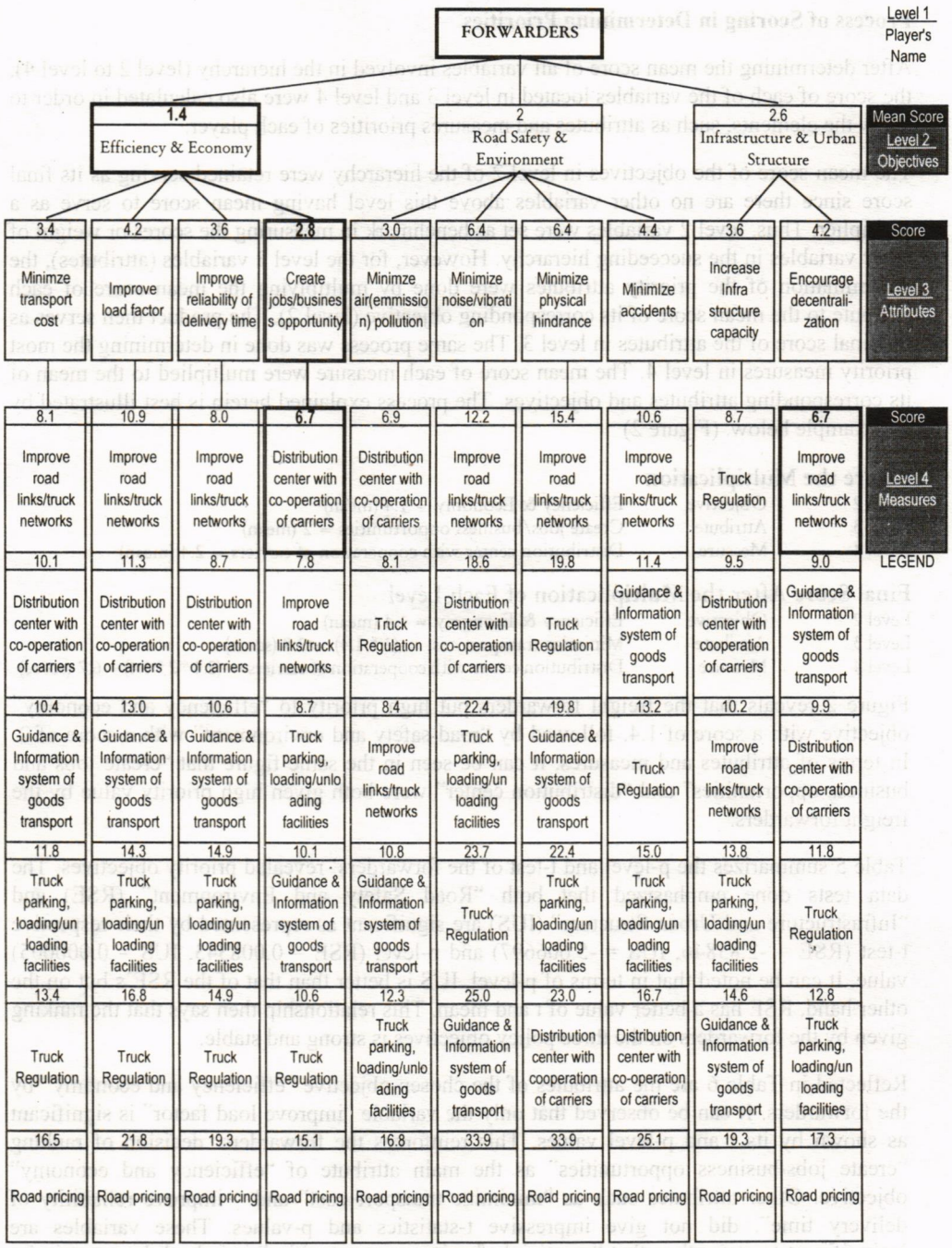

Figure 2. **Hierarchy of Measures of Forwarders' Policy Priority**

Both measures "distribution center with the cooperation of carriers" and " improve road links and truck networks" were chosen by the freight forwarders as priority measures with the common score of 6.7. However, only the former variable was tested using t-stat and p-value given the reason that the latter variable is found in other objective that is not chosen as high priority. (Figure 2)

Table 6. Level of Significance (P) and T-test of Forwarders' Priority Attributes

Create jobs/business opportunities	Mean	Std.Dv.	N	t	P
Minimize transport cost	2.38	1.15	29	-1.026712	0.313344
Improve load factor	3.00	0.85	29	-3.561952*	0.001341*
Improve reliability of delivery time	2.62	1.08	29	-1.650553	0.110004

* *Significant at p<. 05000*

The measures that have significant values when tested using t-test and p-value are "guidance and information system of goods", " truck regulation", and " road pricing". These variables further confirm the chosen high priority measure "distribution center with cooperation of carriers". (Table 7)

Table 7. Level of Significance (P) and T-test of Forwarders' Priority Measures

Distribution Center with cooperation of freight carriers	Mean	Std.Dv.	N	t	p
Improve road links/truck networks	2.8	1.53	29	-1.1536024	0.2584157
Truck Parking, loading/unloading facilities	3.1	1.61	29	-1.8719991	0.0716866
Guidance and information system of goods	3.6	1.55	29	-2.422839*	0.022119*
Truck regulation	3.8	1.40	29	-3.4628651*	0.001736*
Road pricing	5.4	1.18	29	-6.9236578*	0.000000*

* *Significant at p<. 05000*

Other measures such as "improve road links and truck networks", and " truck parking, loading and unloading facilities" showed insignificant values of t and p-level when paired to the chosen top priority measure. It can therefore be inferred that those respondents who chose "distribution center with cooperation of carriers" will most likely choose measures such as "improve road links and truck networks" and "truck parking, loading and unloading facilities" as top priority measure. (Table 7)

Figure 3 shows that the freight shippers chose "efficiency and economy" as the priority objective followed by "road safety and environment". "Infrastructure and urban structure" came as the least priority with a score of 2.1. The same figure shows that attribute "minimize transport cost" and measure "improve road link and truck networks" were chosen as high priority with respect to "efficiency and economy" objective.

Table 8 shows that the variables "road safety and environment" (RSE) and "infrastructure and urban structure" (IUS) are not significant as represented by their respective t-test and p-level values. Since both p-level and t-test are not significant, it cannot be concluded that "efficiency and economy" is indeed the chosen policy objective, as it has no significant weight over the other policy objectives. This also suggests that the shippers' choice decision is unstable most likely due to limited number of samples. Nevertheless, the ranking result gave useful hint on the shippers' policy objective preference. (Table 8)

Table 8. Level of Significance (P) and T-test of Shippers' Priority Objectives

Efficiency and Economy	Mean	Std.Dv.	N	t	P
Road Safety and Environment	2.0	0.85	12	-0.1845419	0.8569466
Infrastructure and Urban Structure	2.1	0.79	12	-0.3936109	0.70139056

* *Significant at p<. 05000*

Variables "improve load factor" and "create jobs and business opportunities" were all seen significant as expressed by their respective t-stat and p-value. These variables expressed their different weights, which further confirm the rank of the top chosen attribute. On the other hand, the variable "improve reliability of delivery time" showed unimpressive t stat and p level value, hence, does not support the rank of the top chosen objective attribute. (Table 9)

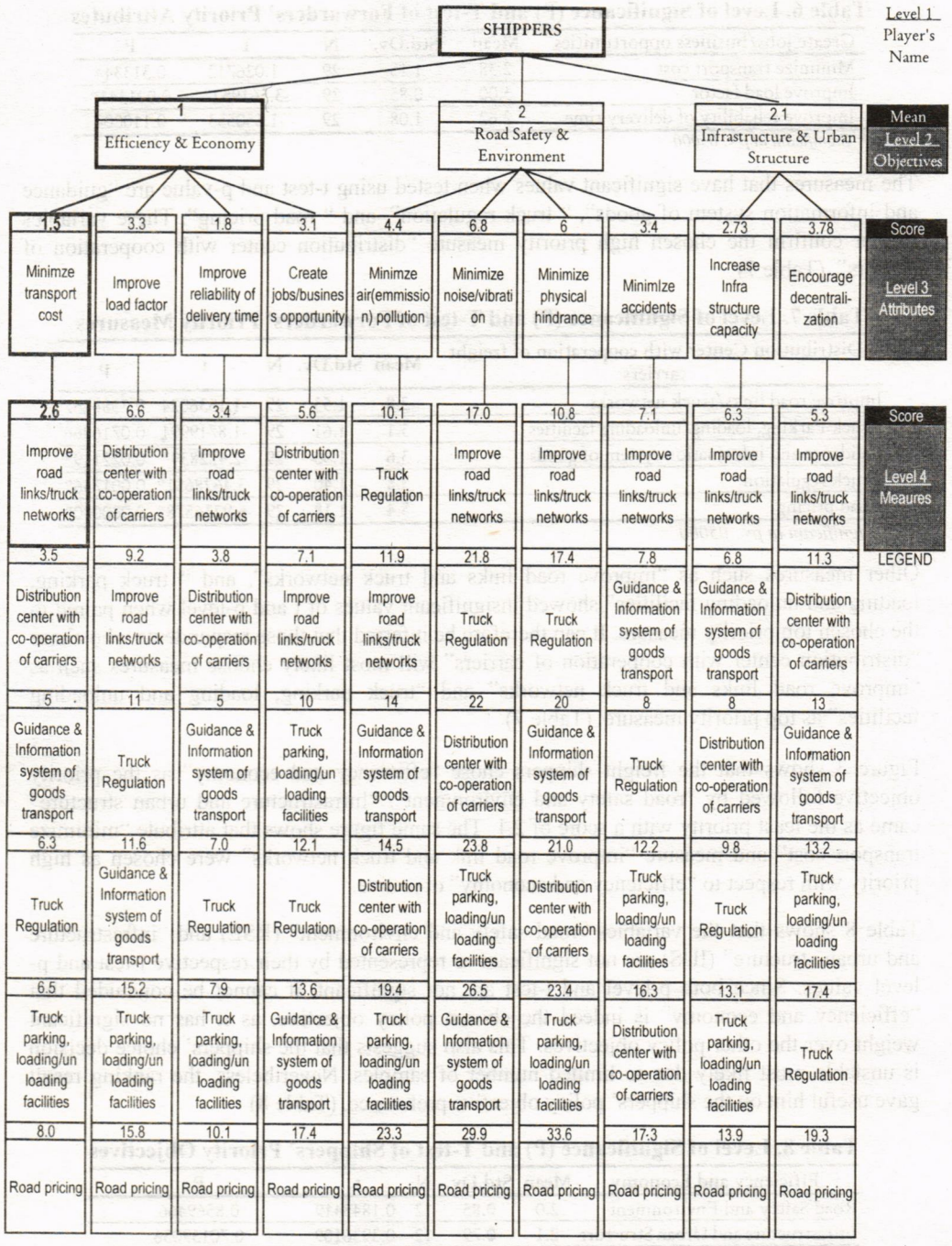

Figure 3. **Hierarchy of Measures of Shippers' Policy Priority**

All the variables tested using t-test and p-level expressed significant values except the variable "distribution center with cooperation of carriers". The variables found significant showed different weights from that of the "improve road links and truck networks" and therefore a strong parameter to support the rank of the top chosen priority measure. (Table 10)

Table 9. Level of Significance (P) and T-test of Shippers' Priority Attributes

Minimize transport cost	Mean	Std.Dv.	N	t	P
Improve load factor	3.33	0.65	12	-8.848396*	0.000002*
Improve reliability of delivery time	1.83	0.72	12	-0.804400	0.438206
Create jobs/business opportunities	3.08	1.08	12	-3.506297*	0.004916*

** Significant at p<. 05000*

Table 10. Level of Significance (P) and T-test of Shippers' Priority Measures

Improve road links/truck networks	Mean	Std.Dv.	N	t	p
Distribution Center with cooperation of carriers	2.3	1.36	12	-1.0230357	0.328263
Truck parking, loading/unloading facilities	4.3	1.56	12	-5.360475*	0.00023*
Guidance and information system of goods	3.2	1.11	12	-4.779765*	0.000572*
Truck regulation	4.2	1.27	12	-5.527708*	0.000179*
Road pricing	5.3	0.89	12	-10.318915*	0.000001*

** Significant at p<. 05000*

Figure 4 reveals that the government authority chose "efficiency and economy" as priority policy objective (1.3), followed by "road safety and environment" (2.1), and "infrastructure and urban structure" (2.6). "Minimize transport cost" and measure "improve road links and truck networks" were chosen as priority attribute and measure respectively. (Figure 4)

Table 11 shows the p-level and t-test of the government authority's revealed priority objectives. The tests done reveal that the variables "road safety and environment" (RSE) and "infrastructure and urban structure" (IUS) are significant as represented by their respective t-test (RSE = -3.5704296, IUS = -4.5998337) and p-level (RSE = 0.002554, IUS = 0.000296) value. It goes to show that the rank of "efficiency and economy" as the top priority policy objective is strong and stable as shown by the significant t-test and p-values of the variables "road safety and environment" and " infrastructure and urban structure". (Table 11)

In terms of objective attributes, Table 12 shows that there are two variables that have significant t-value and p-level values, *i.e.* "improve load factor" and "create jobs and business opportunities". These variables strengthen the rank of the chosen priority measure, which is "minimize transport cost". (Table 12)

Table 11. Level of Significance (P) and T-test of Government' Priority Objectives

Efficiency and Economy	Mean	Std.Dv.	N	t	p
Road safety and environment	2.1	0.60	17	-3.5704296*	0.002554*
Infrastructure and urban structure	2.6	0.71	17	-4.5998337*	0.000296*

** Significant at p<. 05000*

Table 12. Level of Significance (P) and T-test of Government' Priority Attributes

Minimize transport cost	Mean	Std.Dv.	N	t	p
Improve load factor	3.41	0.87	17	-6.982972*	0.000003*
Improve reliability of delivery time	2.00	0.71	17	-1.645902	0.119282
Create jobs/business opportunities	3.06	1.03	17	-4.190279*	0.000692*

** Significant at p<. 05000*

Attribute "improve road links" was chosen as the top priority measure by the government sector. It can be seen that variables "truck parking, loading and unloading facilities", guidance and information system of goods" and "road pricing" are significant while variables "distribution center with cooperation of carriers", and "truck regulation" expressed insignificant values. This finding argues that such insignificant variables can also be chosen as priority measures. On the other hand, significant variables simply express their different weight compared to the chosen priority measure. (Table 13)

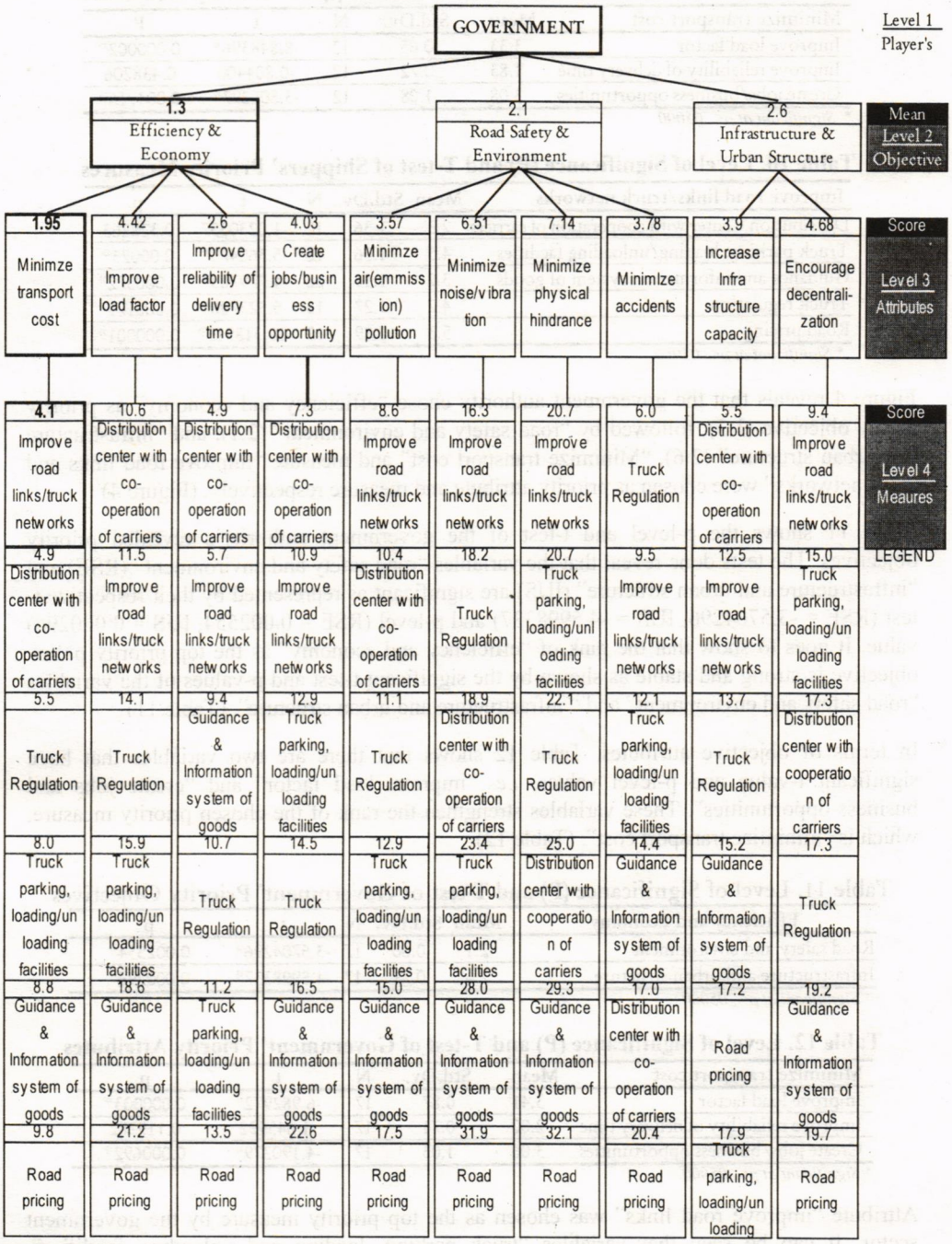

Figure 4. **Hierarchy of Measures of Government's Policy Priority**

It can be observed in Figure 5 that the residents highly prioritize "road safety and environment" policy objective. In level 3 of the same figure shown that "minimize air (emission) pollution" is chosen as the number one priority attribute while in level 4 indicated that "truck regulation" is the top priority measure. (Figure 5)

Table 13. Level of Significance (P) and T-test of Governments' Priority Measures

Improve road links/truck networks	Mean	Std.Dv.	N	T	p
Distribution Center with cooperation of carriers	2.5	1.66	17	-0.77520	0.449526
Truck parking, loading/unloading facilities	4.1	0.70	17	-6.54177*	0.000007*
Guidance and information system of goods	4.5	1.66	17	-4.967417*	0.000140*
Truck regulation	2.8	1.51	17	-1.921975	0.072601
Road pricing	5.0	1.32	17	-7.235746*	1.988998*

* *Significant at p<. 05000*

The p-level and t-test of the residents' revealed priority objectives were shown in Table 14. The test shows that both variables "Efficiency and Economy" (EE) and "Infrastructure and Urban Structure" (IUS) are significant as expressed by their respective t-test (EE = -- 6.3853322, IUS = -12.914059) and p-level (EE = 0.000000, IUS = 0.000000) values. This significance confirms that the variables weights of EE and IUS are different from "Road Safety and Environment" (RSE). These variables support the residents' decision to have ranked "road safety and environment" objective on top. (Table 14)

All the objectives' attributes were significant when paired to the prioritized attribute, i.e. "minimize air (emission) pollution". This further strengthens the findings in the hierarchy diagram based on ranking that attribute "minimize air (emission) pollution" is the top priority attribute by the residents. (Table 15)

Table 16 shows that only the measure "guidance and information system of goods" is found insignificant when paired to "truck regulation", which is the priority measure of the residents. All the remaining measures expressed significant values through their respective t and p values. These variables support the residents' given rank on "truck regulation". (Table 16)

Table 14. Level of Significance (P) and T-test of Residents' Priority Objectives

Road Safety and Economy	Mean	Std.Dv.	N	t	P
Efficiency and Economy	2.0	0.59	173	-6.3853322*	0.000000*
Infrastructure and urban structure	2.6	0.65	173	-12.914059*	0.000000*

* *Significant at p<. 05000*

Table 15. Level of Significance (P) and T-test of Residents' Priority Attributes

Minimize air (emission) pollution	Mean	Std.Dv.	N	t	P
Minimize noise/vibration	2.89	0.85	173	-14.355937*	0.000000*
Minimize physical hindrance	3.26	0.93	173	-13.430670*	0.000000*
Minimize accidents	2.13	1.11	173	-3.130160*	0.002053*

* *Significant at p<. 05000*

Table 16. Level of Significance (P) and T-test of Residents' Priority Measures

Truck regulation	Mean	Std.Dv.	N	T	P
Distribution Center with cooperation of carriers	3.6	1.50	173	-5.332091*	0.000000*
Improve road links/truck networks	3.1	1.38	173	-3.185146*	0.001718*
Truck parking, loading/unloading facilities	3.9	1.39	173	-7.075628*	0.000000*
Guidance and information system of goods	2.7	1.53	173	-0.7082861	0.4797263
Road pricing	5.2	1.25	173	-16.440617*	0.000000*

* *Significant at p<. 05000*

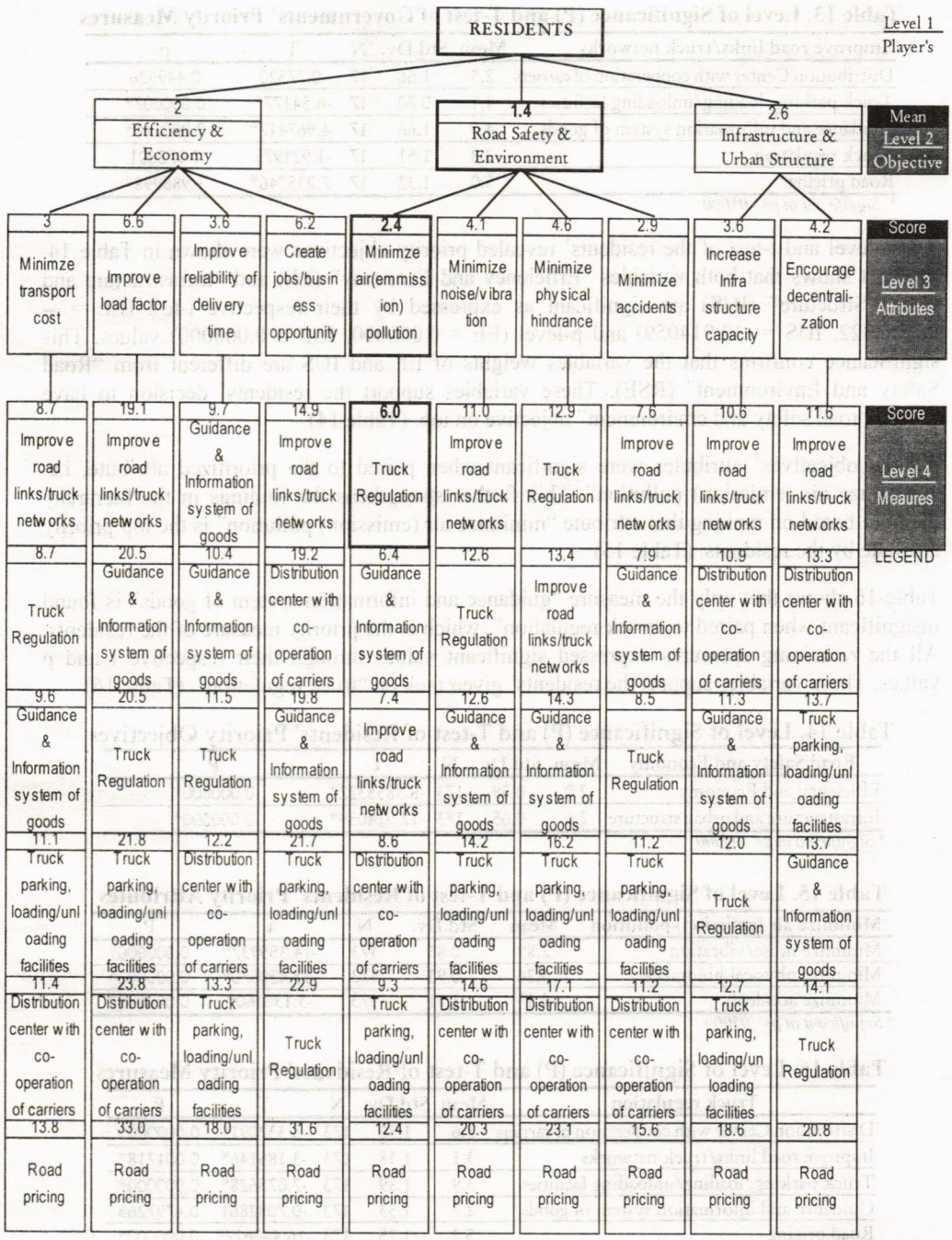

Figure 5. **Hierarchy of Measures of Residents' Policy Priority**

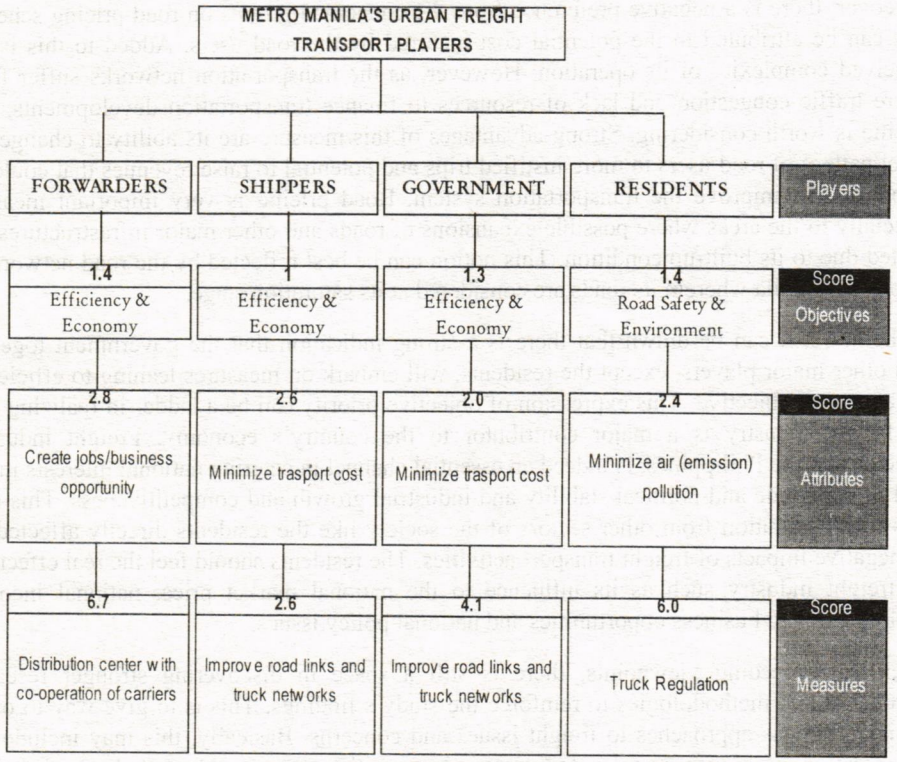

Figure 6. **Summary of Stakeholders' Preferences for Policy Measures**

Figure 6 summarizes the stakeholders' preferred objectives, objectives' attributes and policy measures. It can be noted that the stakeholders differ in terms of choice of policy objectives. The government sector together with the two business oriented groups such as "forwarders" and "shippers" expressed their positive inclination to "efficiency and economy" while the "residents" chose "road safety and environment". The diversity of objective preference in the diagram is basically influenced by the stakeholders' nature of interests and concerns.

6. SUMMARY OF FINDINGS AND CONCLUDING REMARKS

Generally, the study presented the current situations of urban freight transport in Metro Manila from the perspective of the different players involved. The problems confronting the freight industry were discussed together with the policy objective priorities of the four major players in urban freight transport. It was found out that the four concerned players in urban freight transport have different priority policy objectives, attributes and measures. These differences in urban freight transport priority policy objectives can be attributed to the differences in the characteristics of each player and their perceptions regarding the most appropriate urban freight measures.

The analyses revealed that the freight forwarders strongly support the provision of public freight terminals or distribution centers. This strategy can be seen helpful in addressing the ever-growing number of trips of freight trucks greatly contributing to the deteriorating traffic problems of Metro Manila. Tradionally, this tool changes the form of urban delivery from independent private transport to consolidated transport which could result to high load factors thereby reducing the frequency of trips.

Moreover, there is a negative preference from the concerned groups on road pricing scheme. This can be attributed to the potential cost incurred by the road users. Added to this is the perceived complexity of its operation. However, as the transportation networks suffer from severe traffic congestion and lack of resources to finance transportation developments, this scheme is worth considering. Strong advantages of this measure are its ability to change the travel pattern of road users to more justified trips and potential to raise revenues that could be re-invested to improve the transportation system. Road pricing is very important measure especially to the areas where possible expansions of roads and other major infrastructures are limited due to its built-up condition. This notion can be best reflected by the road network of the city of Manila wherein its roads are considered at its saturation stage.

Furthermore, it can be drawn that there is a strong indication that the government together with other major players, except the residents, will embark on measures leaning to efficiency and economy objective. This expression of objective priority can be a ladder in realizing that the freight industry is a major contributor to the country's economy. Freight industry, especially in the Philippines, is indeed an essential channel in catering national interests in the field of economic and political stability and industrial growth and competitiveness. This also calls for cooperation from other sectors of the society like the residents directly affected by the negative impacts of freight transport activities. The residents should feel the real effects of the freight industry such as its influence to the national market price, national income, employment and business opportunities and national policy issues.

Given the preceding viewpoints, there is still a space in discovering stronger research approaches and methodologies to reinforce the study's findings. This is to give way to other possible analysis approaches to freight issues and concerns. Basically, this may include the consideration of bigger samples for more representative outputs. Nevertheless, given the study's samples limitations, it is believed that it laid down substantial inputs to improve the country's freight industry, not to mention its significant contribution to the planning sectors of the society.

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