



# FUTURE CITY LOGISTICS IN JAPAN FROM THE SHIPPERS' AND CARRIERS' VIEW

- PROSPECTS AND RECENT MEASURES  
TO DEVELOP THEM -

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# *INTRODUCTION-1*

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- When considering city logistics issues, it is important to take particular note of **the implications for shippers and freight carriers**, and how this will affect their efforts to cope with future changes.
- Shipping companies and freight carriers in Japan are currently facing severe pressure **to reduce the environmental impact of their logistics activities** as well as **to make them more efficient**.



## *INTRODUCTION-2*

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- Recent developments in **logistics management** might make the situation even more complex.
- As more shippers apply the concept of **supply chain management (SCM)** to their logistics operations, carriers and forwarders have begun to develop **more sophisticated logistics services**, with some adopting third party logistics (3PL).
- These developments could lead to **more frequent deliveries** and **even more congestion**, or they might provide **a clue to resolving the trade-off between logistics and the environment**.



# *What we surveyed and analyzed*

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1. Useful information can be gleaned from a survey of shippers and carriers, to determine their perspectives on future prospects for city logistics and the rapidly changing business environment. **Questionnaires were sent to 1,015 members of JILS** (the Japan Institute of Logistics Systems) in April 2001.
  - We constructed **many hypotheses** regarding future trends in logistics, and respondents were asked to indicate which of the hypotheses, in their opinion, would **come true** by around 2010.
  - They were also asked to indicate whether their company would **take measures** to address the situation, if the hypothesis did come true.



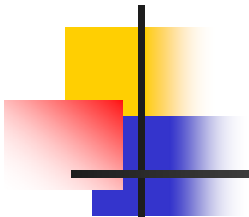
# RESPONDENTS

Table 1. Respondents by industry

<i>Industry</i>	<i>Number</i>	<i>Percent</i>
Shippers	141	46%
(Manufacturers)	(102)	(33%)
Carriers	120	39%
Subtotal	261	84%
Others	48	16%
Total	309	100%

Table 2. Respondents by annual revenue

<i>Revenue (billion yen)</i>	<i>Shippers</i>	<i>Carriers</i>
Less than one	3	10
1 ~ 10	7	52
10~100	32	40
100~1,000	71	13
More than 1,000	24	3
Not answered	4	2
Total	141	120



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2. We also have attempted to **develop a concrete model** of how companies balance the trade-offs between environmental problems and sophisticated logistics activities.

- For this purpose, we have analyzed the **environmental policy papers** published by many companies, and discuss their future logistics plans.
- The JILS survey only asked respondents to offer their general opinions regarding certain hypotheses, and did not generate any concrete examples of future trends in logistics. To make up for this deficiency, we have analyzed many policy papers on the environment that companies have published, to publicise the efforts that they are making to address environmental issues.



*PROSPECTS FOR FUTURE  
CITY LOGISTICS*

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## *Hypotheses and Their Prospects*

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- Based on the background conditions described above, we generated several hypotheses regarding the future conditions **affecting logistics systems and the environment**, as shown in Table 3.
- We asked survey respondents whether they believed these hypotheses would come true, and if so, how they would cope with the changes.
- According to the majority of the respondents, **environmental issues pose a serious challenge**.
- Evaluations of Realization(\*1) The scale used is as follows. Agree =2. Agree somewhat =1. Neutral =0. Disagree somewhat = -1. Disagree = -2.
- Respondents' Directions to Cope with the Hypotheses(\*2) The scale used is as follows. The respondent's company will cope with the hypothesis proactively =2. Cope with unwillingly =1. Neutral =0. Impossible to cope with = -1. No intention to cope with =-2.

*Table 3. Hypotheses on environment and results*

<i>Hypotheses about Future (around year 2010)</i>		<i>Evaluations of Realization (*1)</i>		<i>Respondents' Directions to Cope with the Hypotheses (*2)</i>	
		<i>Shippers</i>	<i>Carriers</i>	<i>Shippers</i>	<i>Carriers</i>
1	Harmonizing logistics systems with the environment will become a matter of course for corporate policy.	1.5	1.4	1.8	*
2	Environmentally sensitive logistics will take precedence over quality of logistics service.	0.5	0.3	1.6	1.5
3	ISO14001 certification will become an important criterion for corporate evaluation.	0.5	0.6	1.6	**
4	Consideration of logistics and impact on the environment (easy to carry, compact, etc) will be ubiquitous in the design process.	1.2	1.1	1.7	1.7
5	Packing and wrapping materials will be reduced, reused, and almost completely recycled.	1.0	0.8	1.7	1.6
6	Low-emission trucks will replace diesel trucks.	1.2	1.2	1.7	1.6
7	Trucks will be replaced by multi-modal transport.	0.3	0.3	1.2	1.1
8	Reverse logistics will become a big market.	1.1	1.2	1.6	1.6
9	Regulation on recycling will spread to almost all products.	1.1	1.1	1.6	1.7
10	NOx regulations will spread to all cities in Japan.	1.4	1.3	1.5	1.5
11	Exhaust gas regulations on trucks will be tightened to reduce NOx emissions	1.5	1.6	1.6	1.5
12	Regulations on transport in general will be tightened to reduce CO2 emissions.	1.4	1.3	1.6	1.5
13	Carbon tax will be introduced as one of several environment tax systems.	0.3	0.3	1.1	1.1

(\*3) The number of \* indicates the significance of difference between shippers and carriers by Wilcoxon Scores (rank sums).

\*\*\*\*  $|z| < 0.001$     \*\*  $|z| < 0.01$     \*  $|z| < 0.1$

*Table 4. Hypotheses on government policy and results*

<i>Hypotheses about Future (around year 2010)</i>	<i>Evaluations of Realization (*1)</i>		<i>Respondents' Directions to Cope with the Hypotheses (*2)</i>	
	<i>Shippers</i>	<i>Carriers</i>	<i>Shippers</i>	<i>Carriers</i>
1 Decentralisation-related public works will be reconsidered and elements of infrastructure with higher priority will have been completed	0.3	0.1*	1.4	1.2
2 Highway tolls and port charges will be decreased.	-0.3	-0.4	1.5	1.5
3 Transport demand management (TDM) will become common, as a means of utilising infrastructure more efficiently.	0.3	0.3	1.2	1.4*
4 Private finance initiatives (PFI) will be more common for developing infrastructure.	0.4	0.2*	1.1	0.7*
5 Regulations on entry to logistics market will be abolished.	0.4	0.6	1.2	1.3
6 Regulations on prices and charges in the logistics market will be abolished.	0.4	0.5	1.6	1.4
7 Safety regulations on issues such as overloading and speeding will be tightened.	1.0	1.2	1.6	1.8
8 Regulations on the location of logistics facilities will be tightened in urban area and loosened in other areas.	0.7	0.7	1.3	1.4
9 Traffic control (time, route, and charges) on big trucks and diesel trucks will be tightened.	1.1	1.2	1.3	1.4
10 Road pricing will be introduced in many cities.	0.5	0.6	1.3	1.1

(\*3) The number of \* indicates the significance of difference between shippers and carriers by Wilcoxon Scores (rank sums).

\*\*\*  $|z| < 0.001$  \*\*  $|z| < 0.01$  \*  $|z| < 0.1$

*Table 5. Hypotheses on physical distribution management and results*

<i>Hypotheses about Future (around year 2010)</i>		<i>Evaluations of Realization (*1)</i>		<i>Respondents' Directions to Cope with the Hypotheses (*2)</i>	
		<i>Shippers</i>	<i>Carriers</i>	<i>Shippers</i>	<i>Carriers</i>
1	Level of logistics services will be viewed as an important part of differentiation strategy, and various services will be introduced.	1.4	** 1.7	1.8	* 1.9
2	Shippers will pay more for excellent logistics services even though they only pay attention to cutting costs, now.	0.3	0.3	0.8	*** 1.6
3	Traditional trading customs such as fringe services at no extra charge will disappear.	0.5	*** -0.1	1.4	1.3
4	Physical distribution will be separated from transactions.	1.2	*** 0.5	1.8	1.7
5	Many companies will adopt the concepts and techniques of SCM, and SCM will become common.	1.1	* 0.9	1.7	1.7
6	Retailers will form alliances with manufacturers and the role of wholesalers will decline.	0.6	0.7	1.2	* 1.5
7	Companies will form strategic alliances with others to improve logistics efficiency.	1.4	1.5	1.7	1.8
8	The outsourcing of logistics functions will become popular.	1.2	1.3	1.5	* 1.8
9	Third party logistics will become a big market.	0.7	* 0.9	1.3	* 1.5
10	Reorganization and construction of distribution centres will continue as part of shippers' logistics strategies.	1.6	1.6	1.9	** 1.7
11	Among the functions of physical distribution management, transport will be more important.	0.4	* 0.7	1.4	* 1.5
12	JIT deliveries will be ordinary services for vendors.	0.9	0.9	1.4	1.4
13	The functions of storage warehouses and distribution centres will become shipping oriented from storage oriented.	1.4	1.4	1.8	1.8

(\*3) The number of \* indicates the significance of difference between shippers and carriers by Wilcoxon Scores (rank sums).

\*\*\* |z|<0.001    \*\* |z|<0.01    \* |z|<0.1

*RECENT MEASURES TO  
BALANCE ENVIRONMENTAL  
CONCERNS WITH EFFICIENCY*





# *Company policy papers on the environment*

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- We have analyzed many **policy papers on the environment** that companies have published, to publicise the efforts that they are making to address environmental issues.
- Their efforts can be broadly categorized into those that address the issue of **transport**, those related to **logistics centres**, and those that focus on the use of **packing and wrapping materials**.
- We consider **efforts related to transport issues to be most directly related to city logistics**.
- In the discussion below, we focus on **manufacturers, wholesalers and retailers of consumer goods** with sales of more than one hundred billion yen.

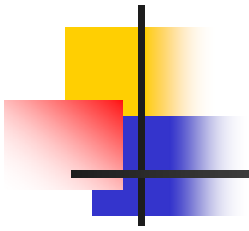
# *How companies of consumer goods tackle with environmental issues*

Table 7. How companies of consumer goods tackle with environmental issues

	<i>Number of Objects</i>	<i>Published policy papers on environment</i>	<i>Stated the environmentally sensitive transport policy further</i>	<i>Stated environmental policies only</i>
Manufacturers	62	42	39	1
Foods	42	29	27	1
Apparels	6	1	0	0
Daily use	14	12	12	0
Wholesalers	20	2	2	2
Retailers	68	26	25	9
Super markets	24	13	12	5
Department stores	12	5	5	1
Convenience Stores	8	8	8	0
Speciality stores	24	0	0	3
Total	150	70	66	12

# Measures to reduce the environmental impact of transport

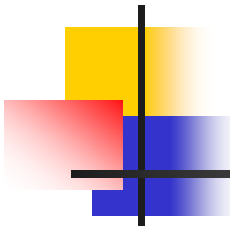
	Manufacturers of foods		Manufacturers of goods for daily use and wholesalers		Retailers		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Reconsidering physical distribution systems	11	40.7%	3	21.4%	6	24.0%	20	30.3%
Environmental transport management	7	25.9%	5	35.7%	7	28.0%	19	28.8%
Utilizing back hauls	3	11.1%	2	14.3%	0	0.0%	5	7.6%
Collective delivery systems	12	44.4%	5	35.7%	25	100.0%	42	63.6%
Direct hauls	3	11.1%	0	0.0%	0	0.0%	3	4.5%
Changes in loading process	7	25.9%	4	28.6%	0	0.0%	11	16.7%
Increasing load capacity with larger trucks	5	18.5%	2	14.3%	2	8.0%	9	13.6%
Using rail and ship transport instead of trucks	7	25.9%	6	42.9%	2	8.0%	15	22.7%
Introduction of cleaner trucks	15	55.6%	7	50.0%	17	68.0%	39	59.1%
Stop idling campaign	13	48.1%	8	57.1%	14	56.0%	35	53.0%
Total	27	100.0%	14	100.0%	25	100.0%	66	100.0%



# *1. Reconsidering physical distribution systems - manufacturers*

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- Twenty companies are **reconsidering their physical distribution systems** with the aim of decreasing transport volume.
- Some manufacturers have **relocated distribution centres, from remote areas to sites adjacent to their factories**, in order to eliminate the need for transport from factory to distribution centre. Others have **consolidated their distribution centres**, to reduce transport volume.
- ➡ For example, a leading manufacturer of toiletries reports that it was able to **reduce transport volume by 30 percent** over five years **by integrating its distribution centres**.



# *1. Reconsidering physical distribution systems- manufacturers*

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- Manufacturers with many factories tend to transport their goods over longer distances, because each factory produces different goods that are distributed throughout Japan.
  - Some manufacturers are **dividing their businesses into regional sectors, with the factories located in each region satisfying demand in that region.** This helps reduce the distance of the distribution routes from each factory.
- ➡ For example, a beverage manufacturer divides its business operations into five regional sectors, while a liquor manufacturer operates six regional sectors.



# *1. Reconsidering physical distribution systems-Retailers*

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- Retailers also have **integrated distribution centres** which used to be separated by product category into regional centres. However, since this tends to increase the distance from regional distribution centres to stores, some of them have built **local distribution centres** to decrease the total distance.
- ➡ A leading general merchandise retailer has **rebuilt a network of area distribution centres** to serve their stores. As a result it has decreased the total transport distance per year from 440 million km to 254 million km.



## *2. Environmental transport management*

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- Many companies conduct a **thorough review of transport management** with the aim of making their systems environmentally friendly as well as efficient.
- Some companies have introduced **on-board computerized management systems and global positioning systems (GPS)** to manage the real-time status of their trucks. Some are controlling not only their own trucks, but also contracted trucks.
- ➡ A leading beverage manufacturer **reduced the number of trucks in use by 14 percent**, by introducing a system of centralized information control on transport between warehouses.
- ➡ A milk manufacture **reduced total transport distance by 30 percent**, by introducing dispatching systems.



### *3. Utilizing back hauls*

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- Some companies are using **truck-matching systems** that match information on transport demand with information on vacant trucks especially in case of back hauling.
- ➡ For example, a foods manufacturer, increased the load rates of its trucks from about 75 percent **to more than 90 percent** by **introducing truck-matching systems** via the Internet.



## *4. Collective delivery systems*

### *- Manufacturers*

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- Many manufacturers and retailers have introduced **collective delivery systems** to decrease the number of trucks.
- Manufacturers, especially of processed foods, confectionaries, and cosmetics, **not only deliver their own products, but also carry goods produced by other manufacturers** to wholesaler and retailer distribution centres.
- ➡ For example, a leading manufacturer of confectionaries, delivers **43 percent of their products using joint delivery systems.**



## *4. Collective delivery systems*

### *- general merchandise stores*

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- In the case of deliveries to general merchandise stores (GMS), vendors are asked to deliver their goods to distribution centres. **The number of trucks making deliveries to the retail stores is reduced by consolidating loads at the distribution centre**, rather than having each vendor make separate deliveries.
- Some GMS chains try to reduce the number of trucks further, **by collecting goods from vendors on milk-run trucks**.

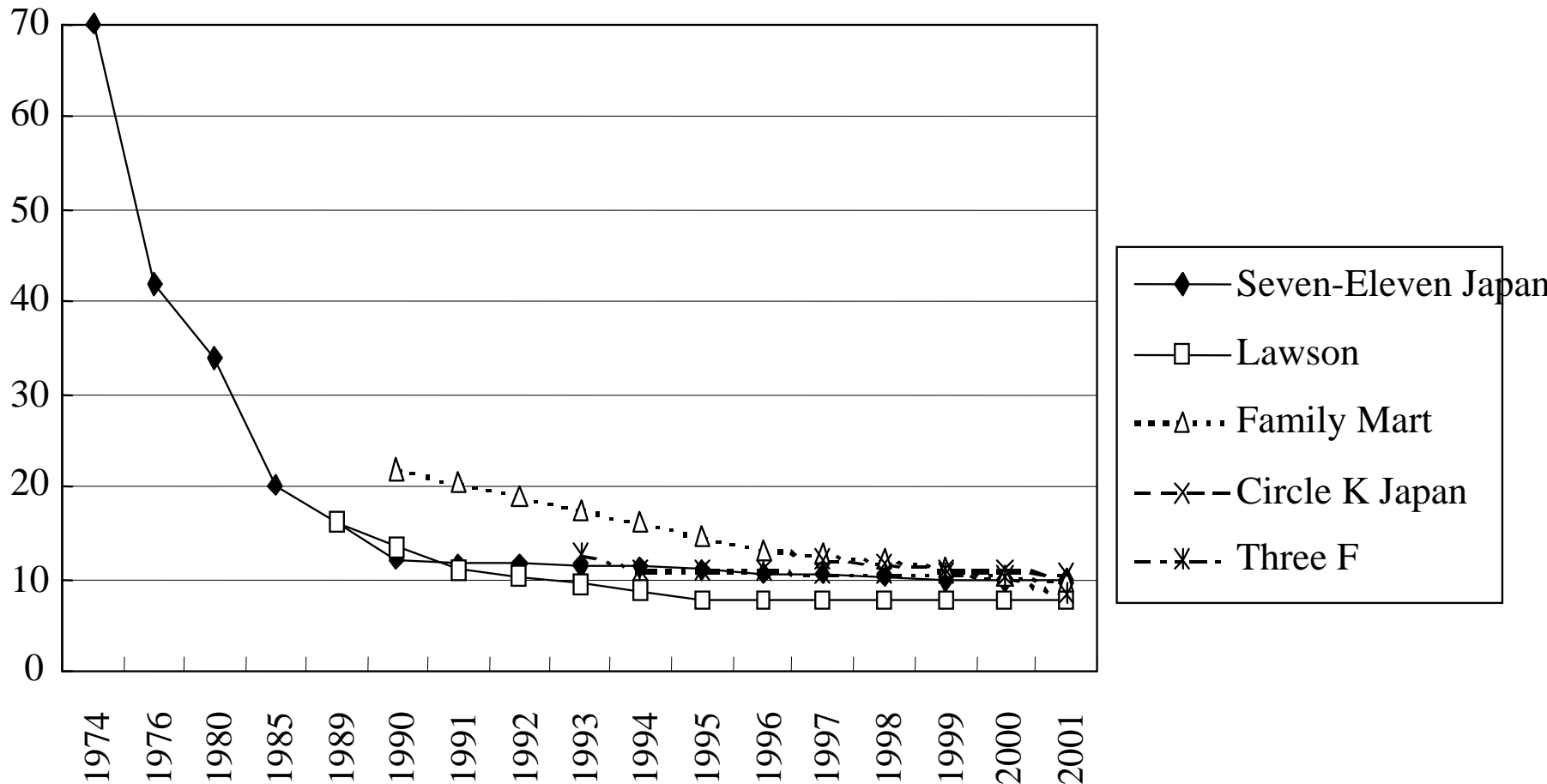


## *4. Collective delivery systems -convenience stores*

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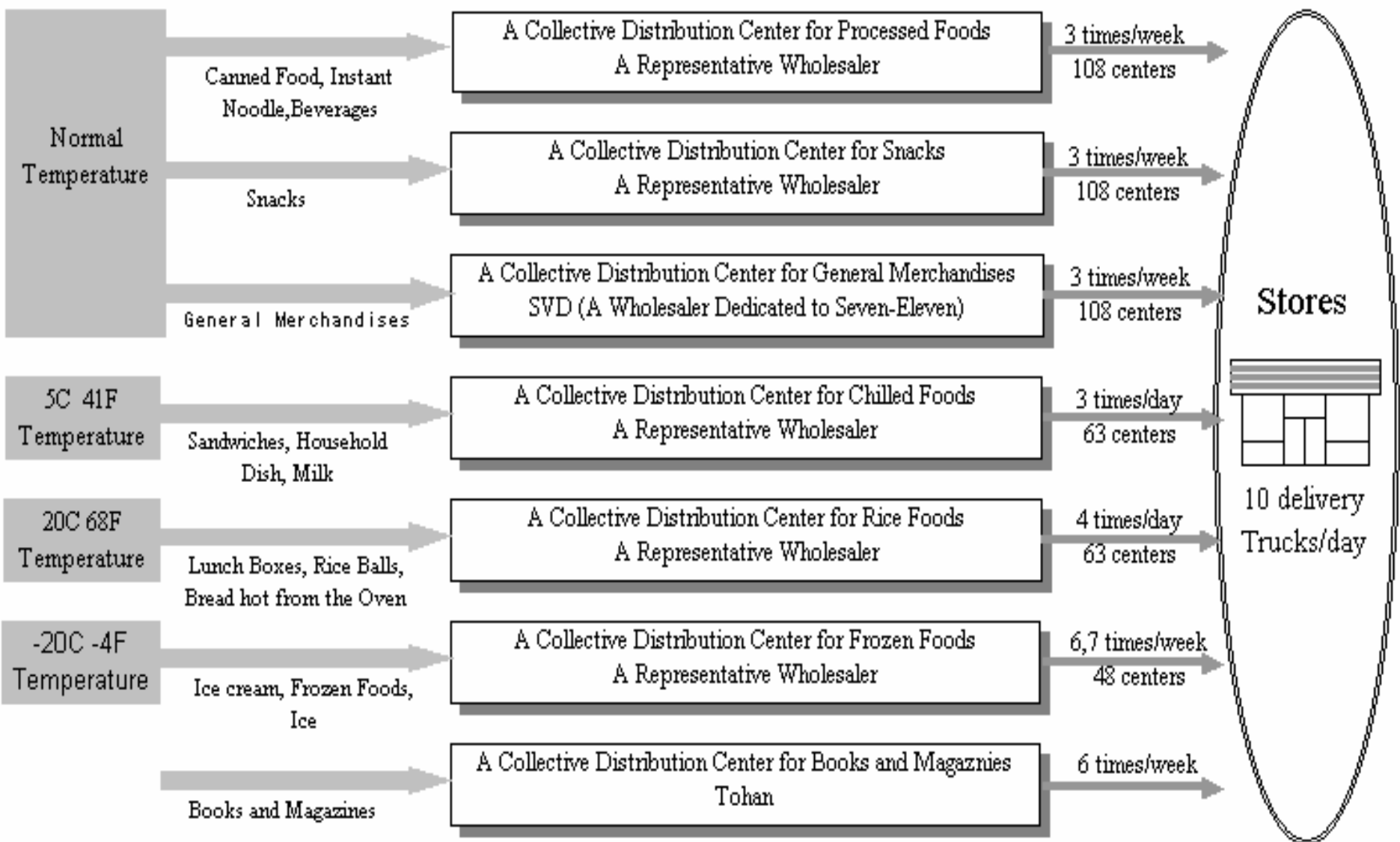
- In the case of convenience stores, one important issue is to reduce the number of trucks making deliveries to each store. One example of the measures used to tackle this issue is the use of **temperature-controlled collective delivery systems**.
- ➡ Seven-Eleven Japan introduced collective delivery systems using four bands of temperature-controlled vehicle. This helped to reduce the number of trucks making deliveries to each store **from 70 in 1974 to 10 in 2001** mainly by the effect of better load planning. Other convenience stores have introduced similar delivery systems (Fig. 1).

*Fig. 1 Number of trucks making deliveries to convenience stores, per day*



Source: Policy papers on environment published by each company

# Collective delivery systems - Seven-Eleven Japan





## *4. Collective delivery systems*

### *- Department stores*

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- Department stores have built distribution centres to concentrate shipments.
- However, many goods are **still directly delivered to each store**, especially in case of foods and major brand-name products.
- These direct deliveries are not only inefficient but also invite **traffic jams** on roads around stores.



## *4. Collective delivery systems*

### *- Department stores*

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- One good example is a department store at Ikebukuro. It covers an area of 63,470 square meters and generates 272,610 million yen in sales. The number of trucks making deliveries to this one store – one of the biggest in Japan -- was about **900 per day** in fiscal year 1997.
- By introducing **delivery agency systems**, the company decreased this number to about **580 per day** in fiscal 2001. About 75 percent of vendors utilize these systems, and the volume of direct delivery has decreased.
- Companies are also introducing collective delivery systems for home delivery from department stores.



## *5. Direct hauls from factories*

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- **Direct hauls from factories** instead of from warehouses to wholesalers and retailers reduces the volume of transport by eliminating excessive loading and unloading.
- In particular, manufacturers of beverages and beer have tackled the issue with direct hauls.
- ➡ **A leading brewery hauls 86.6 percent of its products directly from factories** to wholesalers and retailers, as a result it has reduced the number of trucks.



## *6. Changes in loading*

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- **Changes in the packing and wrapping materials used** can reduce the volume of goods and increase the load rates as well as decreasing waste.
- In particular, manufacturers of foods and daily use goods are trying to adopt more environmentally sensitive methods. Some transport their goods by tank lorry instead of in paper bags, or have changed the method of stacking corrugated cartons to increase their load rates.
- ➡ A leading food manufacturer **increased the number of noodle soup items** loaded on a truck with a ten tone capacity from **16,800 to 25,200**.



## *7. Increasing load capacity with larger trucks*

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- **Increasing load capacity with larger trucks decreases the number of trucks**, assuming that the amount of goods delivered is equal.
- Manufacturers have introduced larger trucks to transport goods to the distribution centres of wholesalers and retailers.
- Some food manufacturers have introduced trucks with capacity of 13 or 14 tonnes, instead of 10 tonne trucks.



## *8. Using rail and ship transport instead of trucks*

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- In the case of long-distance transport, for more than 500 km, some companies are trying to **shift from trucks to rail and ship transport**, which is more environmentally friendly. In particular, manufacturers are adopting this solution in the case of large-lot cargoes delivered from factories to warehouses.
- ➡ A manufacturer of food products, now transports 16.5 percent of all goods by rail container. As a result, it reduced the amount of CO2 exhaust by 28,000 tonnes a year.
- ➡ A manufacturer of office supplies, transports many of its products such as tables and partitions by rail.
- ➡ A GMS chain, transports fresh vegetables such as lettuce from growing districts to distribution centres using temperature-controlled rail containers. The company transported 850 tonnes of vegetables in 170 container cars, from Hokkaido to Tokyo, and 1,150 tonnes of vegetables in 230 containers from Hokkaido to Osaka.



## *9. Introducing cleaner trucks*

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- 39 companies have **introduced cleaner trucks** to their fleets, including models that satisfy the latest regulations on emissions, **compressed natural gas (CNG)** trucks, and **liquefied natural gas (LNG)** trucks.
- However, few companies have asked their contracted carriers to introduce cleaner trucks.



## *10. Stop idling campaign*

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- Many companies have introduced campaigns to discourage their drivers from **idling at stops, sudden braking, and sudden starts**, to reduce the impact on the environment.
- Some companies have made a thorough effort to eliminate such practices, and monitor the actual situation.
- ➡ Convenience stores **utilize on-board computerized management systems and GPS to monitor each truck**, and determine whether they are idling, or making sudden stops and starts. Dispatchers can give advice to each driver individually, according to the monitors. It reported that it **increased fuel mileage** for its trucks to 6.18 km per litre from 5.88 km per litre.



## *Changes in amount of CO2 exhaust produced by transport at each company*

<i>Category</i>	<i>2001/2000</i>	<i>Category</i>	<i>2001/2000</i>
Cigarette manufacture	0.96	Supermarkets	0.99
Brewer	0.85	Supermarkets	0.79
Manufacturer of beer and beverages	0.98	Supermarkets	1.22
Brewer	1.23	Supermarkets	0.84
Brewer	0.98	Supermarkets	1.05
Distiller	0.98	Supermarkets	1.01
Manufacturer of foods	1.07	Department store	0.96
Manufacturer of film	0.99	Convenience store	0.95
		Convenience store	0.93



# *Conclusion*

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## *CONCLUDING REMARKS-1*

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- We have examined **the views of shippers and carriers regarding the future prospects and likely direction of city logistics in Japan**, based on the JILS survey. We also offered **some concrete examples of how companies are making logistics systems both efficient and environmentally sensitive**, based on their policy papers.
- The respondents believe that it is a matter of course that companies try to **harmonise their logistics systems with the environment, and cope with environmental problems**.
- They also **expect the government to tighten control over logistics activities, to protect the environment**. On the other hand, they think that **the level of logistics services is still increasing** and concepts such as SCM and 3PL will be introduced more widely.



## *CONCLUDING REMARKS-2*

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- These opinions may be **incompatible**, and the respondents themselves are **not convinced** that **the environmental impact of logistics will take precedence over the quality of logistics service**.
- Environment-friendly logistics often **entails higher costs**, such as replacing diesel trucks with clean trucks, using rail transport instead of trucks, and so on. Furthermore, it can reduce the level of service in distribution.
- Therefore, one of the key challenges for city logistics will be **the effort to maintain a balance between the environment and logistics service**.



## *CONCLUDING REMARKS-3*

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- Based on the policy papers on the environment published by many companies, there are some **concrete examples to show the way**. In the past, most companies aimed to make distribution systems more efficient, but now, they are trying **to make them environmentally sensitive**, as well.
- Companies have introduced measures such as **a review of distribution systems, precise transport management, use of backhauling, and so on**. However, the impact of measures taken by single company is limited. Thus, some companies are also trying to introduce **joint measures, such as collective delivery systems**.
- When evaluating city logistics, **it is important to understand the prospects of shippers and carriers, and the measures they will take to prepare for future challenges**.