Examining the factors promoting low carbon transportation practices: A case study on the truck fleet industry of Japan

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1. Introduction

in recent years, global environmental concerns, such as climate change, increased society's general consciousness of the effect of business practices on the earth's health (Alperstedt & Bulgacov, 2015). Thus, conventional environmental economics revealed the importance of internalizing the negative externalities into organizations that bought harm to the environment, which ultimately helps to identify the optimal output of businesses (Aruga, 2022). The study belongs to the logistics sector, which is highly dependent on non-renewable natural resources and has great pressure on environmental pollution. Consequently, the green logistics concept was introduced to minimize the negative externalities in society. Accordingly, this study researched the transportation industry, which is still responsible for 24% of direct CO2 emissions from fuel combustion as an economically growing industry. And trucks are responsible for more than 80% of this increase (International Energy Agency, 2020). However, it further says, Japan records the minimum emission level inland freight transportation among the largest economies like the US, China, and the EU. That implies Japan is balancing the environment and economy remarkably but explicit knowledge is not available in this regard. Therefore, exploring the factors promoting low-carbon transportation (LCT) in the fleet industry of Japan is the first study in the academic field and it aims to reveal the most successful factors and most famous green transportation practices in the world. Moreover, academics, government policymakers, and the business community could be identified as the main beneficial parties of the study. Hence the following hypotheses were designed to achieve the above objectives of the study.

H1: Environment management strategy pressure on truck fleets has a positive effect on carrying out low-carbon transportation, **H2**: Mandatory and normative pressure on truck fleets has a positive effect on carrying out low-carbon transportation, **H3**: Key Stakeholders' pressure on truck fleets has a positive effect on carrying out low-carbon transportation

2. Methodology and Data

The theoretical framework was designed based on the study carried out by Zhang el at,2014, and further changes have been made to fit into the research. Institutional theory and corporate environmental management theory (CEM) were consumed to develop hypotheses based on the factors for the study. After a pilot survey, a survey company called Freeasy collected data on behalf of the researcher. A structured auto-fill online questionnaire has been distributed within

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the sample from 2022 Nov 24th to Dec 8th, 2022 and received 169 final responses. The study has employed the ordered probit model for data analysis and the econometric model developed by Aruga (2022) has derived accordingly for the study as follows.

$$LCT = \beta 1 Man.\&Nor. + \beta 2 Env.Mgt + \beta 3 KeyStak. + \sum_{i=4}^{10} \beta i Di$$

3.Results

The ordered probit analysis recorded the environmental management strategy factor as significant, saying that it has a positive effect on promoting low-carbon transportation in the trucking industry of Japan. Also, dummy variables called managing directors of the companies and some employees recorded significant positive effects towards green transportation. In the descriptive analysis, the most popular low-carbon transportation practices in Japan are vehicle classification, choosing the right mode of transportation, and monitoring driving mileage. The top five influential factors are LCT in the company's environmental mission, LCT as a marketing aspect, LCT to obtain tax honors and incentives, LCT for the company's environmental performance, and LCT for the company's public image that comes under the environmental management strategy factor. In-depth analysis, the average marginal effect on LCT was carried out for the significant factor and LCT as a corporate culture and LCT as a company's mission were significant.

LCT	Coef.	Std. Err.	z	P>z
Man.&Nor.	-0.017	0.162	-0.110	0.916
KeyStak.	0.047	0.148	0.320	0.750
Env.mgt	0.617**	0.198	3.130	0.002
CEO	0.045	0.306	0.150	0.883
MD	0.912**	0.466	1.960	0.050
Manager	-0.191	0.198	-0.970	0.334
vehicles ≥100	-0.139	0.209	-0.660	0.507
Business.yrs 11-30	-0.274	0.262	-1.050	0.295
business years ≥30	-0.392	0.282	-1.390	0.164
Income 100-500	0.029	0.213	0.140	0.891
Income 1000-2000	0.296	0.256	1.150	0.248
Male	0.351	0.354	0.990	0.322
Age 20-29	2.180*	1.297	1.680	0.093
Age 30-39	2.178*	1.242	1.750	0.080
Age 50-59	1.670	1.219	1.370	0.171
Age 40-49	1.413	1.218	1.160	0.246
Age 60-69	2.603*	1.265	2.060	0.040
Have children	0.055	0.197	0.280	0.779
No.of observations			169	
Prob > chi2			0.000	
Pseudo R2			0.144	

Note: ** and * denote significance at the 5% and 10% levels, respectively

4. Conclusion

The study revealed the most influential promoting factor for low-carbon transportation in the fleet industry of Japan as the environmental management strategy factor identified as a voluntary approach to internalize the negative externalities in the market. The major reason for the environmental management strategy factor's success is that the low-carbon practices are already embedded in the corporate culture of the company. Therefore, the government rules and regulations were not significant and it use only in the absence of control. Hence, the Japanese logistics industry practices are supporting green logistics through their voluntary approach.

Reference

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