

Diffusion of ISO 14001 Environment Management System in the Global Environment

W.M. To, Peter K.C. Lee*

Abstract—This study reports the diffusion of ISO 14001 in the global environment. The official data from The International Organization for Standardization on ISO 14001 adoption were employed in the analysis. The results provide useful implications to environmental management practitioners and The International Organization for Standardization.

Keywords— environmental policy, ISO 14001 environmental management system, management practice diffusion,

I. INTRODUCTION

We summarize the major findings of To and Lee [1] through reporting the diffusion patterns of the ISO 14001 environmental management system worldwide. We use the longitudinal data obtained from the ISO Survey of Certifications on the adoption of ISO 14001 in different countries. More specifically, we attempt to address these two important questions,

Question 1: What are the stages of ISO 14001 diffusion at the global, regional and country-specific levels?

Question 2: How many organizations will adopt ISO 14001 in future?

II. DATA ANALYSIS

THE results show that both global and regional patterns resembled a typical logistic growth curve. The parameters of logistic curves were identified using nonlinear regression estimation, and the total number of ISO 14001 certificates issued was projected. At the country-specific level, correlation analysis was performed and three distinct groups were identified. The three groups resembled the logistic growth curves with different growth rates.

The data analyzed in this study were the official data of The International Organization for Standardization (ISO) [2]. Non-linear regression was applied using the logistic model and the solution was obtained through minimization of the sum of

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Peter K.C. Lee is with Faculty of Business, The Hong Kong Polytechnic University, Hong Kong SAR, The People's Republic of China

W.M. To is with the School of Business, Macao Polytechnic Institute, Macao SAR, The People's Republic of China

errors between the actual data and the fitted data (i.e. the mean error (ME)). The other measures of errors, including the mean absolute error (MAE), the mean percentage error (MPE) and the mean absolute percentage error (MAPE), were also determined to check the overall fit of the logistic model. The results obtained were checked using the nonlinear regression method in the SPSS 17.0 statistical package.

III. RESULT DISCUSSION AND CONCLUSIONS

A. Global Level

According to the data provided by ISO, the total number of ISO 14001 certificates issued in was 1,491. The total number increased to 13,994 in 1999, 49,440 in 2002, 111,163 in 2005, and 223,149 in 2009. Fig. 1 shows the numbers of ISO 14001 certificates issued worldwide from 1996 to 2009.

B. Region Level

The regional numbers of ISO 14001 certificates issued are also shown in Fig. 2. Europe and the Far East have the highest percentages of ISO 14001 adoption. In 2007, the Far East surpassed Europe and has since been the biggest user of ISO 14001 certificates.

C. Country Level

The top 30 countries in terms of ISO 14001 certificates in 2009 are shown in TABLE I. The table shows that the top 5 countries were from the Far East and Europe, namely China, Japan, Spain, Italy and the United Kingdom. There were more than 10 thousand ISO 14001-certified organizations in these countries by the end of 2009. In fact, China, Japan, Spain and Italy export a wide range of consumer products. The total number of certificates issued in the top 30 countries was 204,942, accounting for 91.8% of ISO 14001 certificates issued in 2009.

To obtain insights to explain the statistics, we divided the countries into three groups (see To and Lee (2013) for the figures). In Group 1, most of the six countries (i.e. China, Spain, Italy, Korea, Romania and Czech Republic) have passed their maximum growth recently but still have a relatively high potential to grow in terms of ISO 14001 certificates issued. In fact, Group 1 includes most of the major export-oriented countries in the global market. In Group 2, three developed countries (i.e. Japan, the United Kingdom and France) reached their maximum growth in 2006 or 2008 but their growth of ISO 14001 certificates will sustain in the near

future. The same goes for most other countries in this group, including Switzerland, Hungary, Poland and Austria. In fact, most countries in Group 2 are developed European countries while Poland, Austria and Hungary have focused on heavy industry in recent years. In Group 3, organizations in three developed countries, including Germany, the USA and Sweden, have adopted ISO 14001 widely and their numbers of ISO 14001 certificates have saturated at 5,800, 5,800 and 4,300 respectively. A similar situation happened to most other developed countries in the group, such as the Netherlands, Canada, Finland and Denmark.

the total numbers of ISO 14001 certificates in the top 12 countries, accounting for 81.2% of ISO certificates issued in 2009, were obtained by summing up the contribution from each country (see Fig. 3).

In fact, the total number of ISO 14001 certificates issued in these 12 countries will account for 76% of the total number of ISO 14001 certificates in 2015 based on the projection by the global model. China alone will contribute to 30% in 2015 in comparison with 55,316 certificates issued in 2009, accounting for 25% of the total number, which was 223,149.

IV. FUTURE PROJECTION

After determining the growth patterns at the country level,

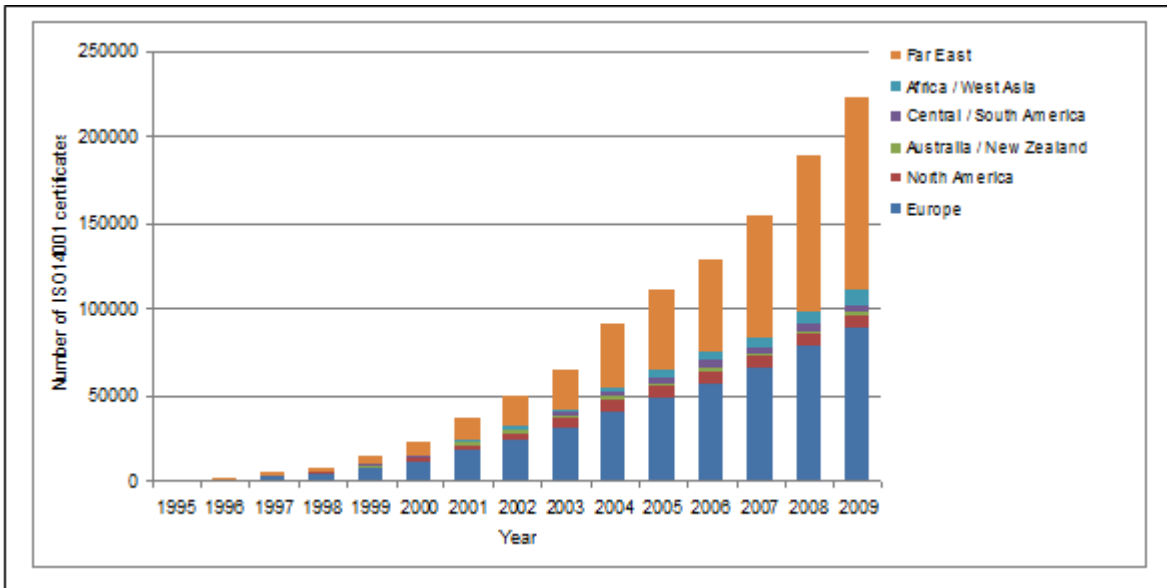


Fig. 1 The numbers of ISO 14001 certificates issued from 1996 to 2009

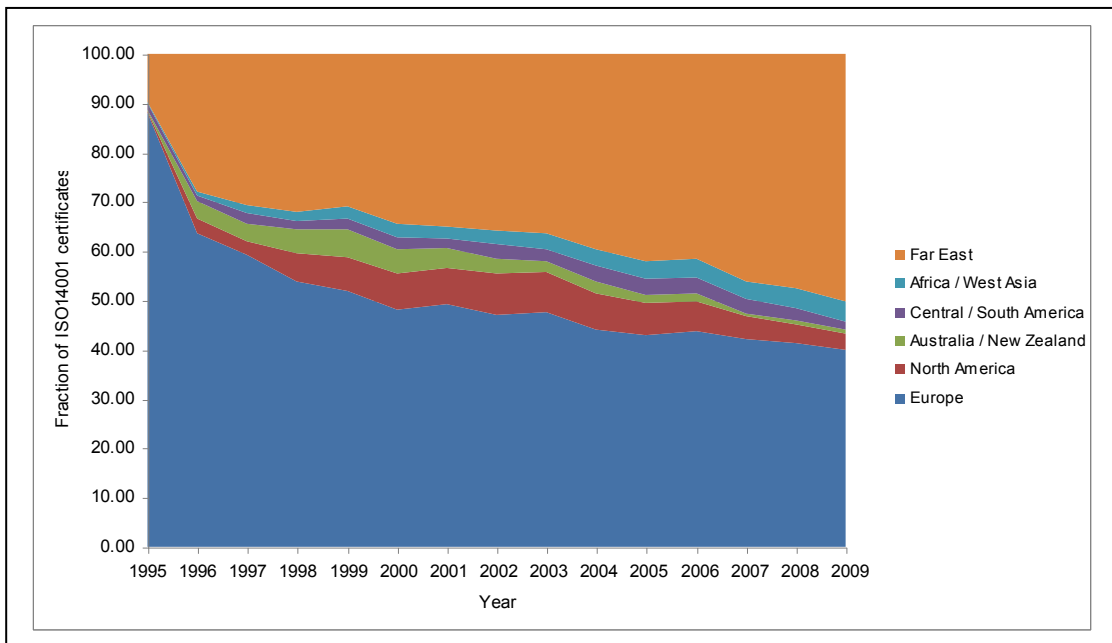


Fig. 2 The percentage of ISO 14001 certificates employed in each region from 1996 to 2009

Top 30 countries in terms of ISO 14001 certificates in 2009.

Country	Number of ISO 14001 certificates (2009)	Region	Exports US billion in 2009 (ranking)	Country	Number of ISO 14001 certificates (2009)	Region	Exports US billion in 2009 (ranking)
China	55,316	Far East	1202 (1)	Taiwan	2204	Far East	204 (17)
Japan	39,556	Far East	581 (4)	Thailand	1864	Far East	152 (25)
Spain	16,527	Europe	219 (16)	Hungary	1659	Europe	84 (35)
Italy	14,542	Europe	406 (7)	Russia	1503	Europe	303 (13)
United Kingdom	10,912	Europe	352 (10)	Poland	1500	Europe	134 (27)
Korea	7843	Far East	364 (9)	Australia	1432	Australia	154 (23)
Romania	6863	Europe	41 (50)	Brazil	1327	South Am	153 (24)
Germany	5865	Europe	1126 (2)	Netherlands	1326	Europe	496 (5)
USA	5225	North Am	1056 (3)	Malaysia	1281	Far East	157 (22)
Czech Republic	4684	Europe	113 (32)	Canada	1221	North Am	317 (12)
France	4678	Europe	4785 (6)	Iran	1118	West Asia	78 (36)
Sweden	4193	Europe	131 (28)	Finland	1107	Europe	63 (37)
India	3799	West Asia	163 (21)	Denmark	947	Europe	93 (34)
Turkey	2337	Europe	102 (33)	Austria	919	Europe	138 (26)
Switzerland	2324	Europe	173 (20)	Mexico	870	North Am	230 (15)

TABLE I
TOP 30 COUNTRIES IN TERMS OF ISO 14001 CERTIFICATES IN 2009

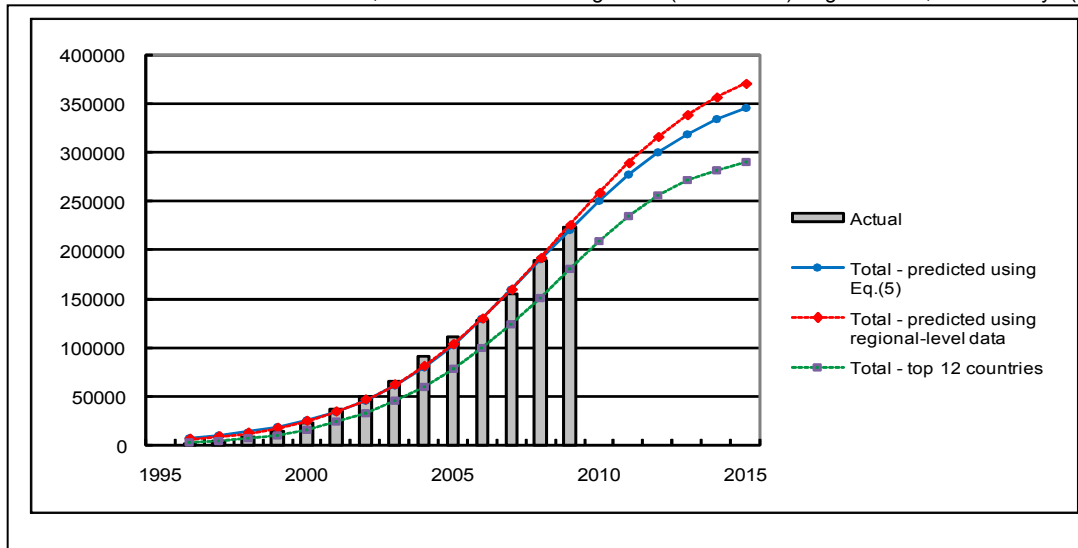


Fig. 3 The numbers of ISO 14001 certificates of top 12 countries – actual vs. predicted – at both global and regional levels

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REFERENCES

- [1] To, W. M., Lee, P. K. C. (2014). Diffusion of ISO 14001 environmental management system: global, regional and country-level analyses. *Journal of Cleaner Production*, 66, PP. 489-498. <http://dx.doi.org/10.1016/j.jclepro.2013.11.076>
- [2] ISO (2011). *The ISO Survey of Certifications – 2009*. The International Organization for Standardization.