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The Reduction Effect of the Environmental Load by Leasing Personal Computers

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ABSTRACT

In sustainable society, leasing and rental attract attention. The reason is that the used products can be recovered about 100% by leasing or rental, and it may promote recycling and reuse and the environmental load may decrease. However, there are few examples quantitatively evaluated about the reduction effect of the environmental load by leasing personal computers. The aim of this study is evaluating the reduction effect of the environmental load by leasing PC. The LCA method used by this research was Life-cycle Impact assessment Method based on Endpoint modeling (LIME). LIME can compute environmental load as external cost given to society. We evaluated quantitatively about the following three effects. By the increase in the recovery rate of PC, environmental load is reduced about 20%, and the reduction effect of external cost was calculated with about 1 billion yen. By choosing not a desktop PC but a notebook PC, environmental load is reduced about 60%, and the reduction effect of external cost was calculated with about 2.4 billion yen. By leasing PC again, environmental load is reduced about 30%, and the reduction effect of external cost was calculated with about 1.7 billion yen.

Key words: leasing, rental, LCA, LIME, servicizing, Product-service system

1. INTRODUCTION

In sustainable society, leasing and rental attract attention. The reason is that the used products can be recovered about 100% by leasing or rental, and it may promote recycling and reuse and the environmental load may decrease. However, there are few examples quantitatively evaluated about the reduction effect of the environmental load by leasing personal computers. The aim of this study is evaluating the reduction effect of the environmental load by leasing PC.

2. METHOD

The LCA method used by this research was Life-cycle Impact assessment Method based on Endpoint modeling(LIME)[1]. LIME can compute environmental load as external cost given to society. We evaluated quantitatively about the following three effects.

1. The effect of the increase in recovery rate of PC
2. The effect by choosing not desktop PC but notebook PC
3. The effect by leasing PC again

We used the data of eco-leaf environmental label[2] as inventory data.

3. RESULTS AND DISCUSSION

3.1. The reduction effect of the environmental load by the increase in the recovery rate of PC

Fig. 1 is the environmental load and the recycling effect in a copying machine and a personal computer. The recycling effect means the reduction effect of the environmental load obtained by recycling. The recycling effect of a copying machine is larger than that of a personal computer. Becase the copying machine is recovered about 100% and the amount of reused and recycled are large. If the used personal computer has about 100% collected and the quantity of reused or recycled increase, the recycling effect will increase.

In this study, the recycling effect when making the recovery rate of personal computer into 100% was to be one half of the environmental loads in a material manufacture stage like the copying machine. Fig. 2 is comparison of the environmental load in case of 20% of recovery rates of PC and that in the case of 100% of recovery rates of PC. In addition, a part for the recycling effect was subtracted from the environmental load of a material manufacture stage. Consequently, in the desktop personal computer, environmental load was reduced 17% and the reduction effect of external cost was calculated with about 250 yen. In the notebook PC, environmental load was reduced 20% and the reduction effect of external cost was calculated with about 130 yen. Supposing 2.4 millions of desktop PC and 3 millions of notebook PC were leased again leased in a year, the reduction effect of external cost was calculated with about 1 billion yen.

3.2. The reduction effect of the environmental load by choosing notebook PC

Fig. 3 is comparison of the environmental load of a desktop PC and a notebook PC. The external expense of a desktop PC was calculated with about 1400 yen. The external expense of a notebook PC was calculated with about 1400 yen. Therefore, by choosing not a desktop PC but a notebook PC, about 57% of the environmental load reduces, and the reduction effect of external cost was calculated with about 800 yen. Supposing 2.4 millions of desktop PC and 3 millions of notebook PC were leased again leased in a year, the reduction effect of external cost was calculated with about 2.4 billion yen.

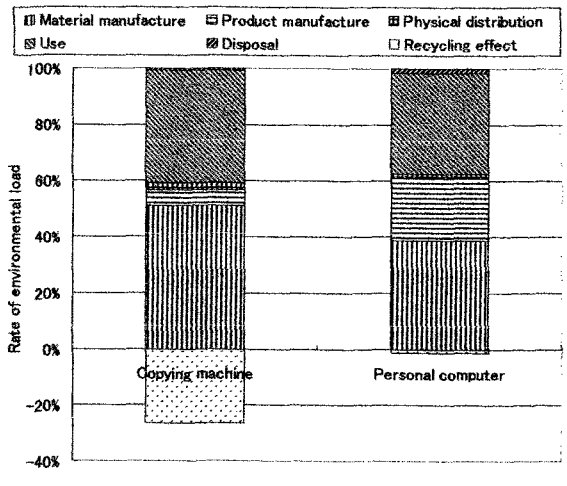

Fig. 1: Comparing of environmental load and recycling effect of Copying machine and Personal computer

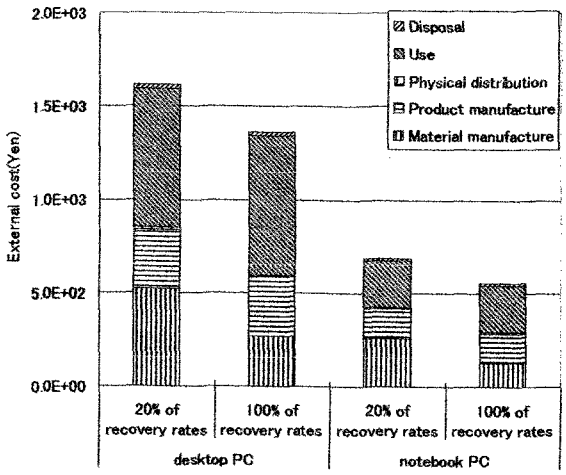

Fig. 2: The reduction effect of the environmental load by the increase in the recovery rate of PC

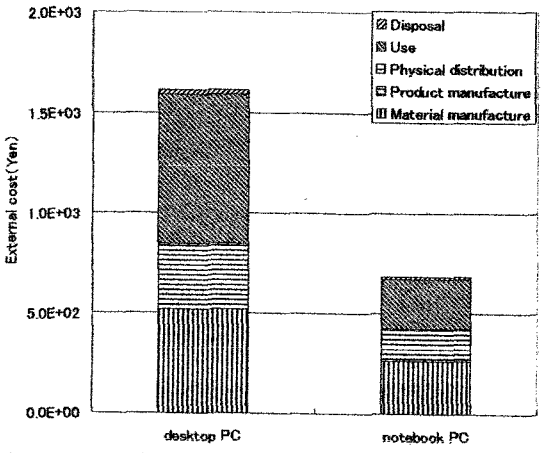

Fig. 3: Comparison of environmental influence integrated evaluation of the desktop PC and notebook PC

3.3. The reduction effect of the environmental load in the case of leasing PC again

The personal computer which lease and the rental ended may be rented and leased again. By being leased and rented again, the life of a product becomes long and it leads to environmental load reduction. Here, it evaluated about this effect.

The environmental load in case of not leasing and renting PC again was defined twice the environmental load of 1 life cycle of a personal computer. The scenario in the case of leasing and renting again was defined as material manufacture, product manufacture, a physical distribution, use, a physical distribution, use, and disposal. The environmental load of material manufacture, product manufacture, and disposal stage was defined as the environmental load of one life cycle. The environmental load of a physical distribution and a use stage were defined as the twice of the environmental load of one life cycle. Fig. 4 is comparison of the environmental load in the case of not leasing PC again with that in the case of leasing PC again. In the case of the desktop personal computer, when leased and rented again, environmental load was reduced about 30% and the reduction effect of external cost was calculated with about 900 yen. In the case of the notebook PC, when leased and rented again, environmental load was reduced about 33% and the reduction effect of external cost was calculated with about 400 yen. Supposing 1.5 millions of desktops PC and 1.2 millions of notebook PC were leased again leased in a year,
the reduction effect of external cost was calculated with about 1.7 billion yen.

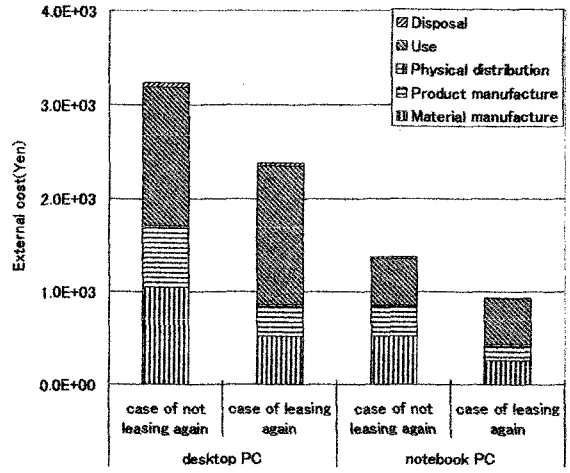

Fig. 4: The reduction effect of the environmental load by leasing PC again

4. CONCLUSION

In this research, we evaluated quantitatively the reduction effect of the environmental load by leasing personal computer. Consequently, the following thing became clear.

- By the increase in the recovery rate of PC, environmental load is reduced about 20%, and the reduction effect of external cost was calculated with about 1 billion yen.
- By choosing not a desktop PC but a notebook PC, environmental load is reduced about 60%, and the

reduction effect of external cost was calculated with about 2.4 billion yen.

• By leasing PC again, environmental load is reduced about 30%, and the reduction effect of external cost was calculated with about 1.7 billion yen.

5. ACKNOWLEDGEMENT

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6. References

[1]METI (2003). Technical report on National Life Cycle Assessment Project. Ministry of Economy, Trade and Industry. Japan. (Japanese version)

[2]JEMAI (2003). Eco-leaf. Japan Environmental Management Association for Industry. Japan.

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