Application of Environmental Load Analysis to Branch Office Monitoring

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Greenhouse gas emissions in Japan have increased by 9.0% from 1990, which is the base year of the Kyoto Protocol, and those from the commercial and other sectors including office buildings are especially large. In those sectors, greenhouse gas emissions caused by the use of information technology (IT) are large, so reductions require adequate IT solutions. Fujitsu is proposing a branch office monitoring system that provides operation, operator, and space analysis to find problems in branch offices and improve the workflow and IT systems. Furthermore, we provide environmental load analysis developed by Fujitsu Laboratories to assess the environmental-load reduction effect achieved by introducing IT solutions in the field. This paper introduces a case study of environmental load analysis applied to branch office monitoring at a branch of a bank.

1. Introduction

The 34th G8 Summit held in Toyako, Hokkaido, Japan in July 2008 (Toyako Summit) declared the common goal of "achieving at least 50% reduction of global emissions by 2050."[1] Against this background of global efforts to reduce greenhouse gases, greenhouse-gas emissions in Japan totaled 1.374 billion tons (converted to CO_2 equivalent) in fiscal year 2007. This corresponds to a 9% increase since 1990, which is the base year of the Kyoto Protocol.[2] Here, the industrial sector, which is responsible for the most emissions, actually showed a reduction of 2.3%, indicating that energy-saving measures in this area have made progress. On the other hand, the commercial and other sectors including office buildings showed an increase of 43.8%, so the creation of measures for reducing greenhouse gases in those sectors has consequently become urgent. In particular, as the role played by information technology (IT) in the commercial and other sectors is large, the current energy usage and CO_2 emissions amount must be analyzed and measures that lead to improvements must be taken.

At Fujitsu, we have been providing a branch office monitoring system mainly for financial institutions as part of our field-innovation initiative. It is intended to visualize the customer's business operations, find problems in the field, and enable us to propose IT solutions for dealing with those problems. In this paper, we introduce an example of applying environmental load analysis for environmental load visualization to branch office monitoring in a bank having many branch offices and we touch upon future developments.

2. Branch office monitoring

Branch office monitoring is a survey method that uses original technologies and techniques to visualize problems in the field that have gone unnoticed in daily operations. It also reexamines the field from the viewpoint of total optimization

while utilizing IT to make improvements. At Fujitsu, branch office monitoring, which has targeted mostly bank branches up to now, consists of (1) operation analysis, (2) operator analysis, and (3) space analysis.[3] First, operation analysis examines operations and the flow of forms and approval requests. This involves making time and motion measurements, analyzing the circulation of forms and requests, and analyzing the convergence of operations and the IT system. Next, operator analysis examines employee awareness and motivation through interviews and questionnaires. Finally, space analysis examines the actual work space to ascertain whether it has been appropriately designed and arranged. In addition, we propose to customers (4) an environmental load analysis developed and implemented by Fujitsu Laboratories as a technique for analyzing the environmental-load reduction effect of improvements to workflow and systems achieved by introducing IT solutions.

3. Branch office solution: FBC system

In this section, we outline the Financial Business Components (FBC) system that Fujitsu has been providing for bank branches **(Figure 1)**. A key feature of this system is that forms generated at a branch are handled as optical-character-reader (OCR) image data. This enables an operator in reception (customer contact point) to complete most of the form processing without having to get up from his or her seat. Form processing usually requires the approval (signature) of a bank officer, which means that the operator must get up and go over to that person's desk and describe the situation and request approval. In the FBC system, however, transaction data (form data and input data) describing the need for a signature and requesting approval can be forwarded electronically to the officer's desk. In short, the operator can complete the approval processing

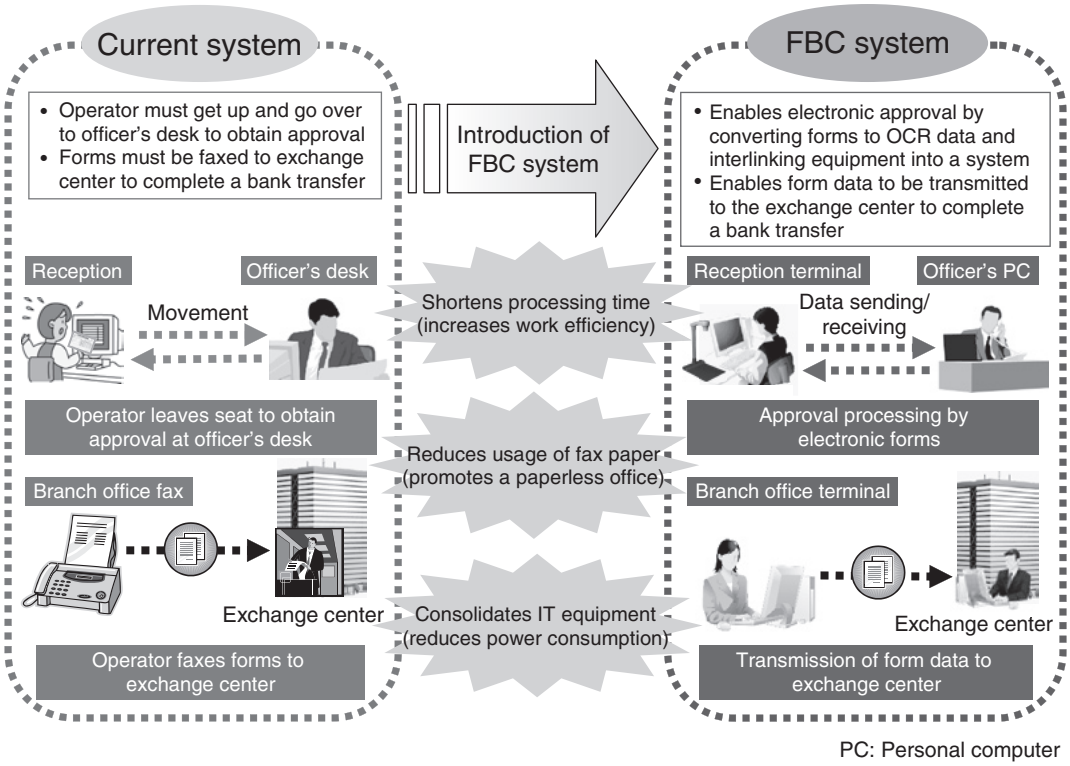

Figure 1
Environmental effect of FBC system introduction at bank branch.

without having to leave his/her seat, resulting in a significant jump in work efficiency. In the case of bank-transfer processing, the conversion of transfer forms to OCR data enables that data to be forwarded electronically to the exchange center. Overall, the interlinking of IT and network equipment used by a bank branch into one system enables the consolidation of servers and branch terminals, which have traditionally been operated separately.

In the above way, the introduction of an FBC system enables the workflow and system shown in Figure 1 to be improved. The customer can expect it to reduce the environmental load by making operator tasks more efficient, reducing the power consumed by IT/network equipment, and reducing the amount of paper used for receiving faxes.

4. Environmental load analysis by branch office monitoring

Next, we introduce a case study of applying environmental load analysis as a branch office monitoring technique to a certain bank branch where the FBC system has been introduced. This branch handles about one million terminal-processing events per year in reception.

4.1 Environmental load analysis procedure

Environmental load analysis in branch office monitoring consists of the following four steps:

1) Performing a monitoring-based survey at the bank branch
2) Collecting data
3) Performing an environmental-load trial calculation
4) Reporting the analysis results

In more detail, these steps involve the following:

1) Visiting the bank branch in person, obtaining a good understanding of the workflow and IT equipment configuration, and extracting data items for which values need to be collected
2) Creating a survey sheet from the data extracted in 1) and surveying and collecting various types of data
3) Using the collected data and a trial-calculation sheet to calculate and analyze the environmental load (amount of CO_2 emissions)
4) Summarizing the analysis results in a report and presenting it to the customer

4.2 Environmental load evaluation method

To make a quantitative evaluation of the environmental-load reduction effect achieved by FBC system introduction at the bank branch in this case study, we performed an analysis using an environmental load evaluation method developed by Fujitsu Laboratories.[4] This method targets the operations stage of the introduced IT solution and performs a before-and-after comparison of CO_2 emissions with a focus on seven environmental impact factors (resource consumption, human movement, goods transportation, office space, warehouse space, power consumption of IT/network equipment, and network data communications). The key feature of this method is its ability to equate greater work efficiencies achieved by IT solution introduction to a CO_2 emissions reduction effect. This is based on the idea that making work more efficient helps to reduce the working time of office workers (man-hours) and thus helps to reduce CO_2 emissions originating from the amount of floor space utilized for work. Here, the greater work efficiencies achieved by introducing an IT solution and the resulting environmental-load reduction effect are assessed using an office-space base unit of 995.6 kg-CO_2 per person-year. This value is arrived at from the amount of CO_2 emissions caused by the use of space and lighting per office building unit area (76.0 kg-CO_2/m^2·year)[5), 6)] and from the work space per office worker (13.1 m^2 per person).[7)]

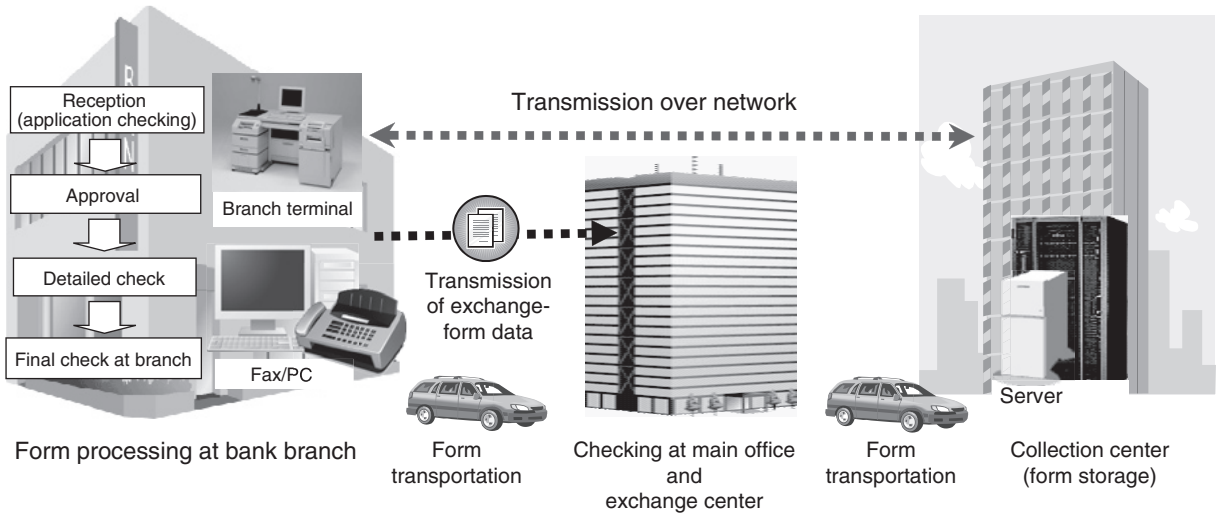

Figure 2
Scope of environmental load analysis.

Table 1
Reduction rates for survey items among environmental impact factors.

Environmental impact factors	Survey item	Reduction rate (%)
Resource consumption	Number of forms/faxes	2.4
Human movement	Out of scope	–
Goods transportation	Form transportation distance	0.0
Office space	Work time	9.2
	Stored documents	100
	IT/network equipment	30.0
Warehouse space	Stored forms	0.0
Power consumption of IT/network equipment	Amount of power consumed	34.5
Network data communication	Amount of data transmitted	35.1

4.3 Environmental load analysis results

Environmental load analysis was performed for the following work and assessment scope.

1) Targeted work

Work involving settlement processing and bank-transfer processing over one year (coverage rate with respect to all processes: about 50%).

2) Assessment scope

The scope of analysis ranged from form processing at the bank branch to form transportation by car and form checking/storage in a collection center at the main office **(Figure 2)**.

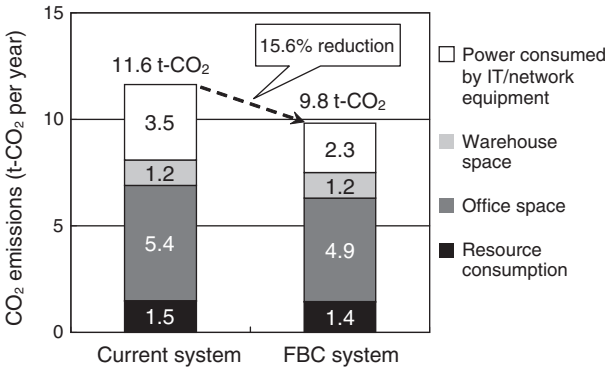

Figure 3
CO_2 emissions reduction effect of FBC system introduction.

The reduction rates for survey items corresponding to various environmental impact factors as a result of FBC system introduction are listed in **Table 1**. Compared with the current system, reductions of 2.4%, 9.2%, and 34.5% were achieved in the use of forms and faxes, work time, and power consumed by IT/network equipment, respectively.

The data obtained for these survey items was then used as a basis for calculating CO_2 emissions before and after FBC system introduction using a CO_2-emissions base unit.[8] Results are shown in **Figure 3**. They suggest that a 15.6% reduction

effect in CO_2 emissions (1.8 t-CO_2 per year) can be obtained by introducing the FBC system at a bank branch. In particular, reductions of 1.2 and 0.5 t-CO_2 per year should be achievable in the IT/network equipment and office space categories, respectively, for which CO_2 emissions are especially high in the current system. Thus, this environmental load analysis demonstrated that the introduction of the FBC system at a bank branch could also be effective from the environmental viewpoint.

5. Conclusion

In this paper, we described problems in current workflows and IT systems (environment load sources) by applying environmental load analysis to branch office monitoring and showed that the environmental load could be effectively reduced by introducing appropriate IT solutions in response to those problems.

Looking forward, we plan to expand the application of environmental load analysis beyond financial institutions to a wide variety of fields and to support the visualization of environmental-load reduction effects achieved by introducing IT solutions. We also plan to study the development and provision of simplified analysis tools to promote the widespread use of environmental load analysis.

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