論　説

Relationship-Based Costing with Capacity-Estimation:

Post-ABC in the Japanese Banking Industry

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ABSTRUCT

Activity-Based Costing (ABC) has been the standard used in the operation of many Japanese banks for over 10 years. However, in recent years, many banks have been shifting from ABC to Relationship-Based Costing (RBC). RBC is a costing that estimates the capacity of the customer.

The case studies of two Japanese banks that have already transitioned to RBC method were examined and the factors driving this shift in methodology were analyzed. RBC has found that it can contribute to future changes in the banking business and apply to other industries.

Furthermore, RBC was organized into a mathematical model, which was then validated by action research of another bank. Consequently, it was demonstrated that relative to the traditional cost-consumption approach, the capacity-estimation approach to costing is more suitable for resource usage-type enterprises.

Keywords*: Management accounting for banks; Customer profitability; Customer cost accounting; Service costing; ABC (activity-based costing); RBC (Relationship-Based Costing); TDABC (time-driven activity-based costing); RCA (resource consumption accounting); Service-dominant (S-D) logic*

1. INTRODUCTION

Since around 2000, several Japanese banks and credit unions have used activity-based costing (ABC) method for customer cost accounting; this method has been in use for more than 10 years. However, the banks and credit unions have recently started to consider suspension of ABC use, and alternatively review or restructure the method. The following three factors can be considered.

First, the fixed costs have surpassed variable costs due to large-scale IT investments such as FinTech and artificial intelligence (AI). Banks are often called "process industry business," that invest heavily in IT and are impacted greatly by technology.

Second, the use of cloud services has increased, and technology subscriptions have become common among corporations. In other words, various soft and hard technology services are packaged at a fixed price, creating numerous fixed-period expenses (period costs).

Third, subscriptions have increased among services offered to customers. The first and second factors are related to corporate expenditures, while the third factor is related to the consumption of a service offered to customers. In other words, subscriptions enable the provision of assorted services over a fixed period. For instance, Amazon offers a one-year subscription at a fixed fee (Prime membership), which allows unlimited access to music and movies, and same-day delivery of products. The services are charged through a flat fee structure over a fixed period rather than individual service charges.

Due to this increase in fixed costs and subscriptions (fixed cost over set period), there is not a high degree of satisfaction towards the practicality of ABC's calculation method with regards to customer costs and customer profitability. As a result, banks have started to apply relationship-based costing (RBC) instead of ABC.

Therefore, in this study, we review past case studies where banks have applied

RBC instead of ABC considering recent economic conditions. The managers at the two banks have published case studies on this topic; these case studies are objectively examined in this study. For the third case, I analyze and examine sample data drawn from a bank conducting action research on RBC, taking into consideration recent developments. Finally, the implications with respect to the suitability for RBC with future banking business are elucidated.

2. PREVIOUS RESEARCH

The study of bank costing was basically a study of how to allocate fixed overhead costs, most of which are fixed costs. A bank is a complete service industry that does not manufacture any products, and its costs consist of labor costs and fixed overhead costs such as depreciation, maintenance fees, and outsourcing costs related to dynamic real estate and systems (IT). In recent years, IT investment has been increasing, and banks are becoming more and more like an equipment industry. As a result, the cost accounting of fixed overhead costs is becoming even more necessary in bank management accounting.

According to Schlatter and Schlatter (1957: 363), Okamoto (2000: 217), Sakurai (2014: 137), the consumption capacity criterion is appropriate for the allocation of fixed overhead costs.

After the bursting of the bubble economy, bank ABC was applied in Japan, mainly to city banks. Prior studies on the application of bank ABC in Japan and abroad at that time include Kaplan and Cooper (1998), Mabberley (1992, 1999), Takagi (2000), Tanimori (2000), Kocakulah and Diekmann (2001), and Fukuda (2002). In addition, Kaplan and Anderson (2004, 2007), Geri and Ronen (2005), Tanimori (2015a, 2015b, 2019), Matayoshi (2019), and Ueno (2019) are some of the earlier studies that pointed out the problems of bank ABCs and reviewed bank ABCs.

Kaplan and Anderson (2004, 2007) studied the ABC of a bank with a few 70,000

employees and a 100few branches, and concluded that it is necessary to review the ABC because “the burden of maintaining the ABC model is high, the ABC system is updated only rarely, and the ABC remains outdated. They conclude that ABC needs to be reviewed because “the burden of maintaining the ABC model is high, the ABC system is updated only infrequently, and ABC remains outdated. In addition, a case study is given on how TDABC（Time-Driven ABC）revitalized an otherwise inapplicable ABC model in an investment bank.

Geri and Ronen（2005）summarize the case of an ABC review of a 10billion-USD financial group, and argue that after the ABC review, the framework of recovering costs with revenues should be applied based on the concept of throughput accounting. In Tanimori（2015b, 2019）, the suitability of bank ABC for management is studied from theoretical and practical perspectives based on actual bank cases, such as pointing out problems in the suitability of bank ABC and operational load issues. Matayoshi（2019）summarizes the ABC review of the Bank of Okinawa, and Ueno（2019）summarizes the case of the ABC review of Ehime Bank.

3. CURRENT APPLICATION OF ABC IN BANKS

In this section, the application of customer cost accounting in the banking sector is summarized. Table1 depicts the results obtained in Tanimori（2019）. The research targets were top banks, roughly a dozen including mega banks and major regional banks that cover over 90 percent of the funds held by domestic banks. Although many in this list were banks with large funds, the study not only selected based on size but also included banks with superior operations as well as credit unions in the analysis.

The ratios displayed in the 2000s is based on survey results conducted by the FISC Research Department（2006: 52）. In Table1, “frozen ABC” signifies ABC methods that were essentially inactive due to lack of revision of the unit price and model over many years.

Table1. Cost accounting methods at Japanese banks by decade

	～1990s	2000s	2010s
Traditional Costing	100%	48%	12%
ABC	0%	52%	2%
Frozen ABC	0%	0%	37%
Post-ABC	0%	0%	49%

(Source) Data based on Tanimori (2019: 97) with slight revisions.

As Table1 indicates, over half of the surveyed banks used the ABC method in the 2000s. In the 2010s, other than a few exceptions, banks had discontinued ABC use (frozen ABC) or migrated to an alternative costing method (RBC).

In ABC, the activity types and unit prices should be reviewed each accounting period. "Frozen ABC" is a state in which the benchmarks have not been revised in several years. Therefore, calculations made using frozen ABC are not reasonable.

According to Tanimori (2015a, 2016, 2018b), RBC is a cost accounting method that estimates required capacity for each customer. It is a costing method from an asset utilization perspective, that is, it aims at asset allocation rather than an allocation and aggregation of costs (Tanimori 2015b, 2017, 2018b).

In the 2010s, the most recent decade, the ratio of banks using the RBC method has approached the ratio of banks applying ABC in the 2000s. In the following section, an objective examination after reviewing the case study of a bank that switched from ABC to RBC is performed.

4. CASE STUDY AND EXAMINATION OF RBC USED IN BANKS

The overview of case studies of the two banks that replaced ABC with RBC is presented and the principles and characteristics of RBC are further elucidated.

For Ehime Bank and the Bank of Okinawa the case studies published in 2019 by the banks' cost accounting managers were referenced (Ueno 2019, Matayoshi 2019).

Furthermore, during the review of this paper, direct interviews with the managers of both banks were conducted between December 2018 to May 2019 to verify the case study details and supplementary information.

4.1　Case Study 1 : RBC at Ehime Bank

At Ehime Bank, ABC was discontinued in 2015 in favor of RBC. According to Mr. Ueno, the Deputy General Manager of the Planning and Public Relations Department and management accounting supervisor, “The rebuilding of management accounting started in January 2015… Japan’s FSA instructed the regional financial institutions to adequately assess their revenue conditions. Against this landscape, banks migrated from ABC to RBC” (Ueno 2019: 210).

In addition to the Ehime Bank case study (Ueno 2019), a biweekly interview conducted between December 2018 to May 2019 revealed the following three factors that played a role in the migration from ABC to RBC.

First, the bank determined that the ABC method, which they started using in 2006, had low suitability for management. According to Mr. Ueno, “the bank incorporated the ABC costing method into their process relatively early, but they did not put it to practical use” (Ueno 2019: 211). When I interviewed the bank, they stated that they had practically stopped updating ABC by 2010.

Secondly, the bank was not fully convinced of the cost accounting calculations generated by ABC. According to Ueno (2019: 211), “ABC was very difficult to use due to the immense number of activity types and allocation criteria,” while RBC was determined to be “very simple and easy to understand.”

The third factor is the belief that the costing method should be suited to the bank’s cost structure. The ABC method “was hard to manage and didn’t feel right in a bank setting where most costs are fixed costs, since the cost allocation variably changed based on transaction volume x transaction unit price” (Ueno 2019: 213). On the contrary, RBC is determined to be a mechanism in which

“expenses are set as period costs within a framework of managerial resources, allocated in advance to stores and customers as investment budget” (Ueno 2019: 213).

According to the figures presented in Ueno (2019: 212), RBC not only utilized customer transaction information, but also applied various contract information from investment trusts, insurance, and the Internet, as well as customer information such as whether the customer is institutional/retail, age bracket, and gender. An interview conducted in March 2019 confirmed that such information was used either separately or in combination with others.

4.2 Case Study 2 : RBC at Bank of Okinawa

In this section, the case study of RBC in the Bank of Okinawa is discussed. The examination of the Bank of Okinawa case study is based on the case study introduction published by Mr. Matayoshi of the Revenue Management Office in the Corporate Planning Department at the Bank of Okinawa (Matayoshi 2019), in addition to the details from an accompanying visit.

According to Matayoshi (2019: 183), the change from ABC to RBC was made in FY 2015, according to the medium-term management plan. Table2 indicates the comparison of ABC and RBC as observed at the Bank of Okinawa. This reveals RBC is a costing method that estimates capacity requirements per customer.

Matayoshi (2019: 182) states one of the objectives of Bank of Okinawa in switching to RBC was to urge action from sales offices and customers. Loan pricing is a case study of one such motivation. Loan pricing is the process of determining the interest rate for granting a new loan, typically as an interest spread (margin) over the base rate, conducted by the bookrunners. In other words, the case study demonstrates the application of RBC to set costs in a forward-looking manner.

According to Matayoshi (2019: 190), the costs associated with extending the credit (loan pricing) consists of "procurement costs + operating costs + credit costs + capital costs." The model encourages behavior that would achieve a lending interest rate exceeding "costs + expected profit margin." In addition, similar to the calculation of credit costs, one of the costs of the lending interest rate, Matayoshi (2019: 192) shows that costs are set according to credit rating.

Table2: Bank of Okinawa's conceptions of ABC and RBC

	ABC	RBC
Features/ Objectives	・A method that breaks down bank operations into individual activities and calculating costs along these smaller units. ・Aim for reduction of costs by reframing awareness by each business unit. Can also be used as BPR.	・A method that assesses overall cost as fixed costs and allocates them among the number of contracts and/or customers in each business, rather than allocating costs by the amount of time incurred by each business. ・Expenses are captured and allocated as fixed costs. Thus, even if a regular customer increases activity, the expenses do not increase, and the bank can continue to enhance the relationship.
Merits	・Expenses can be assessed in smaller business units. ・Can be used for the BPR of each business.	・Expenses are recorded as fixed costs; thus, sales activities and relationship building can occur without concern over the frequency of contact with customers. ・Maintenance is easy because there are less than a dozen activity units. ・Tabulation processes can be completed in a relatively short period. ・Expenses can be assessed from the perspective of customers, channels, and departments, thus making it possible to consider measures based on overall optimization, ex. allocation of managerial resources.
Demerits	・Large maintenance costs since the expenses are specified by business, and a constant review is necessary when the businesses are changed. ・It takes approximately 2 to 3 months to calculate expenses. ・Lack of support from sales offices as relationship building activities appear to be incurring costs.	・Not suitable for the BPR of each business unit since expenses are not known by the business unit. ・The cost is allocated by contract, so customers that only have deposits are regarded as deficit accounts (no incentives to attain more deposits)

(Source) Data based on Matayoshi (2019: 186).

4.3 Discussion of the Two Case Studies

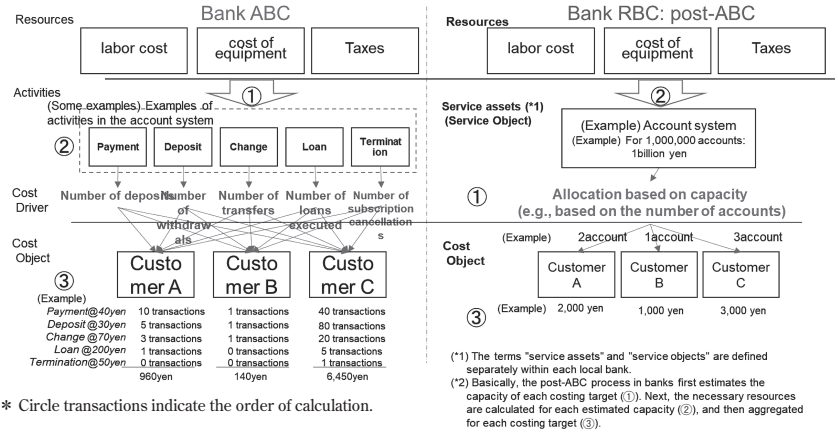
As described in the case studies of the two banks, RBC does not calculate allocation based on dynamic activity, but allocates the capacity requirements by each customer (cost accounting target) as investment budget and tabulates the total cost as a sum of the period costs. The estimation of capacity requirements requires information about period costs, that is, depreciation, maintenance, electricity, and rent over a set period. The overall cost is the total of these expenses.

In this section, the intrinsic nature of RBC is first examined, following which the customer-specific computational characteristics in comparison with ABC and TDABC are clarified.

(1) Calculation Process of RBC

We summarize the characteristics of bank RBC based on previous studies. Examples of the calculation of RBC for the Bank of Okinawa and Ehime Bank are shown in the Figure1.

Figure1 Example of calculation of bank ABC and bank RBC



∗ Circle transactions indicate the order of calculation.

(*1) The terms "service assets" and "service objects" are defined separately within each local bank.
(*2) Basically, the post-ABC process in banks first estimates the capacity of each costing target (①). Next, the necessary resources are calculated for each estimated capacity (②), and then aggregated for each costing target (③).

(Source) Prepared by the author.

From a mathematical model study based on a survey of the actual situation of several banks and a comparative study with the cost accounting of a major cloud service company（Tanimori 2017）, the content of bank RBC is as follows

Process steps for Bank RBC:
（Step 1）Estimate the capacity required for each costing object.
（Step 2）Calculate the cost required for that capacity during the period.

Here, “capacity” means the consumption capacity or allowable amount of people, goods, and money. It does not mean only the unused capacity, but also the capacity required for each cost accounting target as a whole. For example, capacity is estimated for assets such as dynamic real estate and software, as well as for people and various services such as cloud computing that are treated as expenses. In the case of banks, the capacity of “risk” that does not appear in financial statements is also considered.

The contents of bank RBC are described above. In order to examine the background to the change from bank ABC to bank RBC, it is necessary to fully analyze the change in content. Therefore, in the next section, I will analyze the changes in content in terms of3 allocation standards, calculation methods, and approaches in detail, referring to previous cost accounting studies in Japan and abroad.

（2）Allocation Standards of RBC

As it is said that “banking is an equipment industry”, most of the expenses of a bank consist of fixed overhead costs. Under the ABC system, fixed overhead costs were allocated based on the number of transactions, meaning the actual volume of banking business consumed, as the cost driver. Bank RBC, on the other hand, allocates fixed overhead costs based on the capacity to consume, or

“capacity basis. This is one of the characteristics of the RBC system.

According to previous studies, fixed overhead costs have traditionally been allocated using the multi-criteria allocation method: “The amount of fixed costs in the auxiliary sector is a function of the capacity of other sectors to consume the service, and fixed overhead costs in the auxiliary sector should be allocated as a percentage of consumption capacity, regardless of actual consumption” (Schlatter and Schlatter 1957: 363).

In Japan as well, “it is theoretically correct to divide auxiliary department expenses into fixed and variable costs, and to allocate fixed costs to the departments concerned based on their ability to consume the benefits of the auxiliary department, and to allocate variable costs to the departments concerned based on their actual consumption of the benefits of the auxiliary department” (Okamoto 2000: 217).

The above suggests that the RBC approach of banks, where most of the fixed overhead costs are incurred, is a return to the concept of “capacity-based allocation in the multi-criteria allocation method. However, the capacity criterion of bank RBC is only similar to the consumption capacity criterion of the multiple standard allocation method. In the case of allocation to cost accounting objects, the allocation standard is different.

In other words, the multi-criteria allocation method allocates product costs based on capacity utilization (i.e., consumption), although the consumption capacity criterion is applied only in the divisional allocation of manufacturing overhead costs. On the other hand, in Bank Post ABC, the capacity criterion is applied to the customer cost, which is the final cost accounting target. From this point of view, Bank RBC is completely different from individual cost accounting that applies the multiple criteria allocation method.

In addition, Johnson and Kaplan (1987) argued that increasing overhead costs were being allocated for financial statement purposes and were not useful to

management. However, this does not mean that the multiple-criteria allocation method and the ability-to-consume allocation were considered problematic. Furthermore, the multi-criteria allocation method was not institutionalized in the cost accounting standards. In other words, it is not only for financial purposes, but also for managerial purposes that domestic companies have adopted the multi-criteria allocation method. Therefore, the application of the capacity criterion, which is the same concept as the traditional consumption capacity criterion, by the banks RBC does not mean that they will return to the lost relevance status. On the contrary, it can be said that the allocation standard for management purposes regarding fixed overhead costs, which is found in traditional cost accounting, has been further developed in order to make it relevant to management in the modern IT and digital environment. In other words, the bank's RBC can be said to be an attempt to learn from the past with respect to the allocation standard for fixed overhead costs for business purposes.

(3) Costing by capacity estimation instead of cost allocation

A characteristic of RBC is that it uses customer information. It is not merely calculated by linear regression. For example, in the first case study (Ehime Bank), the capacity requirements are estimated based on various customer information, given the determination that contract details improve with stronger relationships, leading to more active transactions.

This is rooted in the perspective of information volume, where stronger relationships lead to medium-to-long term accumulation of customer information, and the statistical idea that larger information volumes reduce uncertainty when making an estimation. In other words, in general, further customer information will be collected and accumulated as customer relationships grow, and statistically, future prediction accuracy will increase. As relationships improve, RBC aims to increase estimation accuracy of customer capacity requirements. However,

this is only a matter of prediction accuracy and does not affect the predicted capacity requirements.

In this section, an overview of the differences in calculation procedure from TDABC, which performs estimations on time, is presented. Kaplan and Anderson (2007: 75) stated, "TDABC (... omit ...) should be called 'capacity-driven ABC'." Although TDABC makes estimations assuming time as the only measure of capacity, Kaplan et al. originally believed capacity-driven ABC would estimate all types of capacity, not just time.

In other words, Kaplan et al. likely considered TDABC to be a form of capacity-driven ABC. However, unlike TDABC, no papers on capacity-driven ABC have been published so far, thus it is still a concept.

However, the RBC method, seen in the banking case studies, estimates all forms of capacity without distinction. Therefore, it can be regarded as a real-life example of capacity-driven ABC planned by Kaplan et al.

Furthermore, the estimation accuracy differs between the capacity-driven ABC discussed by Kaplan et al. and the RBC cost accounting method using the estimation of capacity requirements as described in the banking case studies above. The TDABC system estimates the time equation through a simple regression model (a linear model considering only time), while RBC can estimate the capacity requirements in a more statistically accurate manner using a multiple regression model or a discrete model.

As mentioned above, Bank RBC estimates the required capacity of each costing object and calculates the cost of that capacity during the period. In other words, Bank Post ABC is "resource-aggregated costing based on estimated capacity" (A).

According to Kaplan and Anderson (2007) and Ito (2011), the same feature is found in TDABC, which was developed to solve the operational problems of ABC. According to Kaplan and Anderson (2007), the originators of TDABC, "TDABC

may be called ‘capacity-driven ABC’” (Kaplan and Anderson 2007:75). In other words, TDABC is a “resource-aggregated costing based on estimated capacity” (B) that focuses only on time.

Based on (A) and (B) above, Bank RBC can be regarded as capacity-driven costing, which is a development[1] of TDABC as envisioned by Kaplan et al. Let us examine the mathematical model of Balakrishnan et al2012. The Table3 shows the mathematical models for traditional cost accounting, ABC, resource consumption accounting (RCA[2]), and TDABC, and the mathematical model for Bank RBC in the same form.

As shown in the Table3, most of the conventional cost accounting is based on allocations, while TDABC and Bank RBC are not allocations, but rather calculations (aggregations) of costs based on estimates and quotations. Furthermore, Bank RBC uses the same calculation approach as TDABC, and Bank RBC is a model that estimates not only time but also various other capacities. Therefore, the mathematical model shows that the Bank RBC is a development of the TDABC. In particular, the mathematical model shows that ABC is proportional to TR (Transaction; number of transactions, consumption), and Bank RBC is not simply correlated with TR, but is nonlinear.

1　RBC was not designated as capacity-driven ABC because it does not assume activity costs. Similarly, TDABC itself is not strictly necessary to calculate activity costs, so even if ABC is in the naming, it is not the original meaning of ABC.

2　For RCA, based on Clinton and Keys (2002) and Clinton and Webber (2004).

Table3. Theoretical model of cost accounting for indirect cost allocation

cost accounting	Mathematical model (excluding unused consideration)	contents
Traditional Cost Accounting Balakrishnan et al. (2012：5)	the cost in pool j is $CP_j = \sum_i \alpha_{ij} RC_i$ for $j = 1$ to J the cost object k is $CO_k = \sum_j \beta_{jk} CP_j$ for $k = 1$ to K $\beta_{jk} = \frac{CD_{jk}}{\sum_k CD_{jk}}$	Allocation based on cost drivers (CD) by capacity utilization.
ABC Activity Based Costing Balakrishnan et al. (2012：9)	the cost in pool j is $CP_j = \sum_i \alpha_{ij} RC_i$ for $j = 1$ to J the cost object k is $CO_k = \sum_j \beta_{jk} CP_j$ for $k = 1$ to K $\beta_{jk}^{N} = \frac{TR_{jk}}{TR_{jk}^{N}}$	Allocation based on cost drivers by transaction (TR).
RCA Resource Consumption Accounting Balakrishnan et al. (2012：14)	decompose RC_j into RC_i^{prop} and RC_j^{fixed} $\beta_{jk}^{Th,fix} = \frac{TR_{jk}}{TR_j^{Th,fix}}$	Differentiate resources into variable and fixed costs, and allocate fixed costs based on cost drivers with theoretical capacity (TR).
TDABC Time-driven ABC Balakrishnan et al. (2012：17)	$CO_k = \sum_i \eta_{ik} (RC_i \sqrt{RCap}_i^{prac})$ η_{jk}：Capacity Cost Ratio (Resources per hour) $RC_i \sqrt{RCap}_i^{prac}$：Time equation (estimate of time required)	Estimate the time required by the time equation and calculate the resources corresponding to the time required by multiplying by the capacity cost ratio.
RBC：post-ABC Capacity Estimation Type Cost Accounting Tanimori (2017：115)	$CO_k = CO$ η_{jk}：Tolerance estimation function $f_c(x_j)$：Cost calculation based on X_j	Estimate the capacity and aggregate the resources corresponding to that capacity.

(Source) Prepared by the author.

5. SUITABILITY TO FUTURE BANKING BUSINESS AND APPLICABILITY TO OTHER INDUSTRIES

In the previous section, two case studies where banks implemented RBC to replace ABC were examined. Therefore, this section examines the suitability of RBC to future banking business and its potential to expand into service industries outside of banking.

Future profitability is not expected to significantly improve in the banking business due to shrinkage in market size from declining birthrate and rural depopulation, changes in transaction format due to the rise of FinTech and cashless payments, and intensifying competition from players of other industries.

Specifically, banks are entering an era in which it will become even more important to maintain customer relationships to earn and grow sustainable revenue in the future.

The examination of RBC in the two case studies brings up the following two points with respect to the suitability for RBC with future business strategies in banking.

The first is that RBC can become a cost accounting method for service-dominant（S-D）logic, or the new paradigm of customer marketing, as it emphasizes customer relationships as was evidenced in the case studies of Ehime Bank.

The other is that RBC is highly suited to forward-looking management, as evidenced in the Bank of Okinawa case study.

From these points of view, the suitability of RBC for future banking business and the applicability of RBC not only to future banks but also to the service industry in general will be examined.

5.1　Cost Accounting Using Service-Dominant Logic

Traditionally, a dominant idea in marketing has been that services have four characteristics that differentiate them from goods: intangibility, heterogeneity, inseparability, and perishability. The banking industry has long considered ABC, a method that conducts cost accounting based on “activities” that possess the four characteristics of services, to be a suitable method for the industry.

These four characteristics of services are based on the goods-dominant logic（G-D logic）. Lusch and Vargo（2014: 5）conceptualized G-D logic to be “the idea that value is embedded in the product itself, and the value swaps from company to customer when the customer purchases the product.” The product-centric logic believes services are add-ons to products and merchandise, otherwise to completely distinguish goods and services. Therefore, a basic prerequisite is an

equivalent exchange of value between company and customer, that is, an exchange value.

The role of traditional cost accounting (including ABC) has been to calculate this exchange value of products and services based on G-D logic. In other words, if G-D logic was used to assess banking services, the costs calculated by ABC is suited to measure the exchange value per unit of banking services.

However, there was a paradigm shift in 2004 to service-dominant logic (S-D logic). Lusch and Vargo (2014: 104) explained S-D logic to be a marketing approach that takes a service-centric view on all relationships between company and customer. In S-D logic, a good or product is regarded as just one type of service. Recent newsworthy products, Komatsu's KOMTRAX, Toyota's KINTO, and Amazon's Kindle or Echo are all products based on S-D logic. There are numerous successful case studies in the market.

In the banking business, which is a service industry, customer relationships do not end with the first visit, for example opening a bank account or taking out a loan. The customer enhances utilitarian value and experiential value through the end of term by using services such as deposit/withdrawal, funds transfer, loan repayment, and overdraft. In recent years, the banking business has started to reorganize based on S-D logic, the new paradigm.

When that happens, banks will need to review cost accounting methods accordingly. The ABC method, which had been Suitable for G-D logic, cannot be sufficiently applied to the interpretation of customer service based on S-D logic. Specifically, due to the most important feature of S-D logic, "that value is co-created in collaboration between the service provider and the customer (value co-creation)." This is a feature which not considered in G-D logic.

In other words, the company provides or proposes a place, equipment/devices such as IT, and usage environment (channels such as store, ATM, Web) for the use of their services. At this time, not only is exchange value generated, but the

customer also co-creates value such as utilitarian value and experiential value (perceived value) by using the products and services offered by the company. The ABC method used by banks is limited to calculating the exchange value of activities and is not sufficient as a cost accounting method to assess co-created value.

Therefore, the exchange value, generated during service exchange, co-created value (utilitarian and experiential values), generated subsequently, and the effects of relationships on customer costs at the point when each value is created, are examined.

(1) Costs of exchange value

In the case studies of the two banks, the customer costs incurred during the sale, provision, and proposal of services were not simply allocated based on business volume. The mechanism estimates the required costs of the transaction by consulting the customer information.

Specifically, at banks, the time of "sale, provision, or proposal of services" refers to the start of financing or loan tenure. For example, in the Bank of Okinawa case study, the costs associated with credit determination and approval, generated at the start of lending, was predicted, or estimated using information rooted in customer relationship, such as credit rating (Tanimori 2015c: 23).

In most cases customers who have borrowed numerous times are accustomed to document preparation and can use their previous transaction experience to complete the process in a brief time. However, it takes a considerable amount of time while taking out a mortgage for the first time. In particular, costs related to the introduction of bank products and services, usage training, and procedures such as verification of credit and identity are unnecessary or can be omitted depending on the relationship with the customer.

Furthermore, the experience curve effect will take effect as the relationship is

heightened, and the bank will gain proficiency from increased transaction volumes, due to increased knowledge and experience with the customer. Services offered to experienced customers is faster and more efficient than those offered to new customers, as both the company and customer have experienced the service already; this leads to an optimization of the necessary capacity and bank resources.

In other words, during value exchange, stronger relationships yield lower customer costs due to the experience curve effect. As a result, the customer service profitability (exchange value – customer costs) increases for the provider. Furthermore, RBC is a calculation method that applies not only time but also various customer information through multiple regressions, and estimates the capacity required for each customer. The experience curve effect corresponding to customer relationship can be easily applied to this structure. Therefore, in RBC, the costs corresponding to the exchange value of the service is not constant. The RBC mechanism is such that this cost decreases as the customer relationship strengthens.

(2) Costs of co-created value

A premise of G-D logic is that products and services are provided unilaterally by the company. In particular, the costs associated with the post-transaction process were assumed to be mainly the repair costs of the after-sales service. However, S-D logic, which has been used since the recent marketing paradigm shift, emphasizes co-created value such as utilitarian value and experiential value, which are gained after the product or service reaches the customer, rather than exchange value, which is obtained at the time of product or service provision (proposal). For example, there has been a transition away from mobile and smartphone devices that communication providers such as NTT DoCoMo used to provide, into a subsequent model where profit is driven by communication ser-

vices, this new model can be interpreted as S-D logic. By applying S-D logic, the manufacturing industry can be converted into a service industry. Besides the service industry, major manufacturers have also realized businesses based on S-D logic

The key to customer cost accounting assuming S-D logic is how to account for the costs of the co-created value generated in the post-transaction process. Co-created value refers to the utilitarian value or experiential value for customers; we expect co-created value to increase further as relationships deepen and collaboration progresses. This can be viewed as a relative cost reduction for companies with the increase in co-created value. Strict monetary conversion of co-created value is difficult as it is made up of the utilitarian and experiential values to the customer, but the co-created value creates a sense of bargain, that is, a "conceptual recovery of costs."

It is no longer enough for companies to unilaterally calculate customer costs based on G-D logic. Globally, it is necessary to consider S-D logic as the basis of the cost accounting methods to accurately reflect the new business models put forth by GAFA (sharing economy, subscription model, platform business, etc.).

The same applies to the banking industry. With the rise of FinTech and AI, the subscription and modeling of financial services and migration to platforms is expected in the banking business. The aforementioned case studies of banks reveal the likelihood that banks reviewed their cost accounting methodology assuming S-D logic to rule banking business in the future.

In RBC used by the case studies above, deeper customer relationships led to more active transactions, enhancing the utilitarian and experiential values to the customer, and creating a relative sense of discount in customer cost. In other words, RBC takes into consideration the relative reduction in costs to co-created value (utilitarian and experiential values) through enhanced customer relationships.

5.2 Forward-Looking Cost Accounting

Banks estimate credit costs based on credit ratings. Credit costs signify the probability of bankruptcy/default and the forecasted loss in the event of bankruptcy. Financial accounting systematizes the allowance for bad debts; however, banks calculate credit costs probabilistically, statistically, and according to a more detailed credit rating system. Credit costs signify the cost of corresponding risk in terms of management accounting.

Tanimori (2018a) states that the banking industry has traditionally calculated risk-adjusted profitability by subtracting credit costs, along with expenses, from revenue. This was achieved to comply with integrated risk management as recommended by financial authorities, and this figure has been applied to decision making and performance evaluation.

The specific calculation method for credit costs is as follows: perform Monte Carlo simulation based on customer information, calculate the probability of default (PD), and calculate the expected loss (EL) which is the average credit cost. Furthermore, in international financial accounting, a forward-looking calculation method is used to compute the cost of risk as per IFRS 9: Expected Credit Loss (ECL).

All Basel-regulated banks (not only those mentioned in the case studies) calculate credit costs using similar methodology. In that sense, it could be said that the traditional management accounting method used by banks possessed a mechanism to estimate future expected costs based on customer information.

Referred to as a process industry, banks have made immense technological investments, and will continue to require even greater investment with the rise of FinTech. In such instances, the management of period costs, which become accounting costs due to investment, becomes more important than the tabulation of incurred costs.

As mentioned above, Bank of Okinawa used RBC to estimate future costs in

the same way as using credit ratings to estimate credit costs. In other words, RBC is not a backward-looking cost accounting method that aggregates costs, but rather a forward-looking cost accounting method that estimates costs based on accumulated customer information, and according to the degree of customer relationship.

Forward-looking cost accounting is more compatible to earning sustainable returns in an uncertain future environment. That is, RBC use is expected to grow considerably in the banking business, which will continue to face challenging environments in the future. Similarly, the cost accounting method has moderate applicability to other service industries in the future.

6. VALIDATION: ACTION RESEARCH OF ANOTHER BANK

The hypothetical costing model employing the capacity-estimation approach was validated by applying it to an actual resource usage-type enterprise. The action research conducted is summarized below:

1. Company researched and research methodology:

(1) Company researched:

Action research was conducted at "X" Bank[3], a regional bank with approximately 100 branches.

(2) Research period and frequency:

Approximately six months starting from October 2015. One biweekly site visit followed by meetings.

(3) Participating company departments and employees:

The participant pool consisted of executives and managers in charge, group heads and officers responsible for the following departments engaged in the

3 To prevent identification of any personal customer information, the bank's name had to be concealed. From the outset, the bank's name was not a prerequisite of this study.

management/processing of customer profitability/costing data: Management Planning Department (key department), General Business Department, Financial Planning Department, Audit Department, and General Operations Department. The participant breakdown was as follows: Management Planning Department (5members), General Business Department (3members), Financial Planning Department (3members), Audit Department (2members), and General Operations Department (4members).

(4) Research data:

Anonymous customer transaction data maintained by the bank (approximately 1 million customers) comprised the research data, masked beforehand by the bank to prevent any personal customer identification. However, industry type, business scale, and corporate/individual customer categories were disclosed.

(5) Research agenda:

Customer cost accounting based on the capacity-estimation approach and the ABC-based costing system currently utilized at "X" Bank were mathematically compared and evaluated. Relative to its banking peers, "X" Bank had adopted ABC earlier on as its customer cost accounting method. The action research objective was to validate Equation B of our model based on knowledge derived from a cloud service enterprise.

(6) Validation method:

To validate suitability for decision-making, the standard of "persuasiveness" as assessed by bankers was applied to customer cost and profitability data.

When the major function of credit/loan appraisals is performed at a bank, together with loan interest rate settings, judgments are made as to whether loans should be increased, maintained, reduced, or liquidated. Consequently, we premised that in decision-making, evaluations are based on the persuasiveness of customer cost and profitability data.

Between the capacity-estimation approach and the conventional cost-

consumption approach to customer cost accounting and profitability analysis, actual bank employees evaluated the suitability of each approach to decision-making, based on their persuasiveness assessment.

2. Implementation

The hypothetical costing model of the capacity-estimation approach in the preceding section was applied to “X” Bank. First, a table of resources providing services (hereinafter, “service resources”) was set up. Although a table of activities is created in ABC, service resources here are “resources” offering a variety of activities.

To illustrate, let us turn to one banking service resource: the accounting system/ATM network. First, in addition to depreciation/maintenance costs, accounting systems incur electricity, equipment, building/data center leasing, and systems development labor costs. Similarly, with ATMs as a service resource, in addition to depreciation /maintenance costs, electricity, security, cash replenishment, and systems development/maintenance labor costs are incurred.

Next, service resources are apportioned to customers in the contracted amounts. The accounting system is set up to allow ordinary savings account customers some access to various services (e.g., balance checking, deposits, and electronic transfers). This limitation is imposed as customers with the same type of savings account are entitled to access services unlimited times within the same period. Of course, when setting transaction fees, surcharges may be levied in stages depending on off-hours use and usage frequency. However, it is inconceivable that additional accounting system costs are incurred by such usage.

Further, as multiple customers can utilize the bank’s accounting system side by side and concurrently, as with the above-described cloud services, the system constitutes an open-access service resource. In actuality, some bank accounting

systems had already been migrated to cloud services. Accordingly, with respect to the accounting system, costs were aggregated with the above cloud service enterprise's costing in mind.

Next, in the case of ATMs, we may deem an ordinary savings account customer entitled to ATM usage to the extent appropriate for one such account. At the time high-cost ATM hardware is purchased, it has already been designated as a resource providing customer services. When a customer opens (i.e., contracts) an ordinary savings account, the "contracted" portion of the ATM service resource is designated for the customer's exclusive use. However, as reflected in the long month-end lineups for ATMs, an ATM is a dedicated service resource occupied by individual customers one at a time.

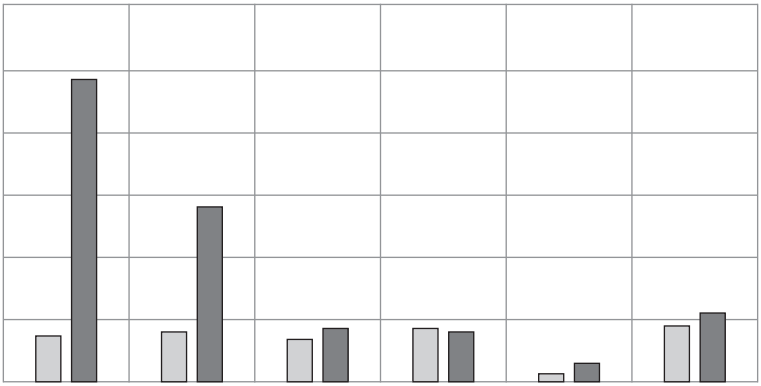
In such dedicated service resources, contracted "time" is secured for each customer. For instance, for each ordinary savings account, the customer may be assured up to 20 minutes of dedicated time on an ATM per month, as by virtue of opening an account, a customer holds the right to occupy an ATM for a specific time period. Accordingly, costs may be calculated based on usage of one ATM for up to 20 minutes monthly.

In a similar way, humans as pseudo-resources are dedicated service resources. Human branch tellers apportion time dedicated to one ordinary savings account customer at a time. This apportionment is synonymous with TDABC's time equation theoretically explored above.

3. Implementation results and considerations

In Figure2, using a sample of customers, the capacity-estimation approach and the cost-consumption approach were compared according to each customer. The capacity-estimation approach was based on Equation B, while the cost-consumption approach was embodied in the results of ABC already in place at the bank. Similarly, Figure3 shows the customer profitability comparisons.

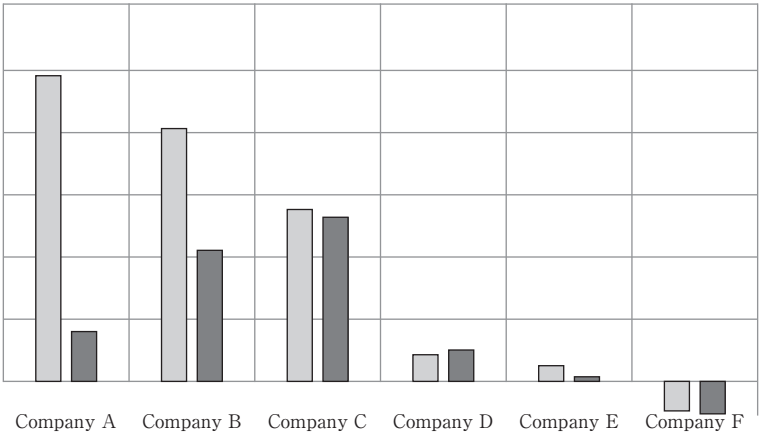
Figure2. Comparison of customer costs according to the RBC and the ABC



Left:　Costing based on the RBC
Right:　Costing based on the ABC

Source: Tanimori (2017: 118).

Figure3. Comparison of customer profitability according to the RBC and the ABC



Left:　Costing based on the RBC
Right:　Costing based on the ABC

Source: Tanimori (2017: 118).

Figure2 illustrates the relative magnitude of ABC-based costs as: Company A > Company B > Company C, but under the capacity-estimation approach, Companies A, B and C show almost no difference in magnitude. In Figure3, the capacity-estimation approach and ABC show diametrically opposite trends in customer profitability. The participants themselves compared and evaluated the results,after the actual company names were disclosed to them prior to the evaluation.

The opinions expressed by participants preferring the capacity-estimation approach were mainly as follows. Although Companies A, B and C all contracted similar financial products, the actual volume of transactions with the bank were ranked as: Company A > Company B > Company C. However, the participants asserted that regardless of whether transaction volume increased/decreased, costs such as systems-related expenses and labor costs remained unchanged. Accordingly, the capacity-estimation approach, under which costs associated with Companies A, B, and C were constant regardless of transaction volume, was more persuasive in evaluating customer profitability.

Further, they concluded that in the first place, increased transaction volumes are not a negative factor leading to increased expenditures (costs)/diminished profits. On the contrary, they are a positive factor contributing to future profits and ensuring consumer loyalty by expanding customer relationships. Consequently, while ABC-based customer profitability in Figure3 evoked strong feelings of dissociation, the capacity-estimation approach pointing to higher customer profitability in step with higher transaction volumes was favored as highly suitable for decision-making.

Banks incur massive, fixed costs (committed costs) in the form of labor costs and equipment/software depreciation costs accompanying investments in systems. Increased profits because of more customers and transactions bring about fixed cost recovery, as additional expenditure costs are not incurred.

Despite the absence of additional bank expenditures, ABC's cost-consumption approach allocates fixed costs to customers in the manner of variable costs via cost drivers and practical operating rates, thereby diminishing its persuasiveness.

As a suitable basis for decision-making, the bankers preferred the capacity-estimation approach theoretically formulated above to the conventional cost-consumption approach. It was demonstrated that the capacity-estimation approach is extremely important to a resource usage-type business in cost-based decision-making.

It should be noted that in the management meeting of the bank where the action research was conducted, the issue of customer costing was revisited, and then the bank shifted from ABC to RBC, which is a capacity estimation method. And recently, the bank has entered the stage of applying AI to capacity estimation for faster, more detailed, and more accurate estimation（Tanimori 2021）.

7. CONCLUSION

This study examined actual case studies to clarify the factors involved in the transition from ABC to RBC methodologies in the banking business, and further investigated the suitability of RBC to future banking business and the applicability to other service industries.

The case studies published by banks that have applied RBC have mentioned the reduction in workload and ease of analysis when used in the workplace. Thus, we compared the RBC method, used by the banks, with traditional cost accounting methods and TDABC; the comparison clearly expressed that the key point is the estimation of service assets that generate costs rather than the calculation of cost allocation.

Furthermore, the study examines the compatibility of RBC with sustainable banking business in the future, as well as the applicability to other service industries. As a result, from the following three viewpoints, we regard RBC to have

high suitability to future banking business and applicability to other service industries.

First, RBC is a cost accounting method that estimates capacity requirements based on various information such as customer information, thus it is suited to the customer relationship-oriented strategy to counter declining domestic birthrates and rural depopulation.

Second, RBC is a cost accounting method that supports S-D logic, which shifts goods and products into a type of service; thus, it is suited to the banking business, which is expected to change dramatically with the rise of cashless payments and FinTech.

Third, RBC is a forward-looking cost accounting method; thus, it is suited to earning sustainable profits in the uncertain future environment.

Next, with conventional manufacturing overhead allocation, ABC, RCA, and TDABC mathematical models as references, we constructed a hypothetical costing model based on the capacity-estimation approach. As a result, based on our premise that labor costs are generated by humans acting not as a primary resource but as a pseudo-resource, we concluded that of all the above methods, only TDABC incorporates a propensity for the capacity-estimation approach, while the rest embody the cost-consumption approach.

Furthermore, RBC was organized into a mathematical model, which was then validated by action research of another bank. Consequently, it was demonstrated that relative to the traditional cost-consumption approach, the capacity-estimation approach to costing is more suitable for resource usage-type enterprises.

RBC is a cost accounting method that not only resolves the problems of the ABC method, a method that had been used by banks for a long time, but also optimizes management decisions with respect to future changes in the banking business (rise of FinTech, business integration, cross-industry alliances, etc.).

Moreover, RBC's suitability for management is not limited to the banking busi-

ness. The cost accounting theory has the potential to fully contribute to the service industry, which aims to apply new business models to achieve international results. In particular, the method can be used for profitability management and pricing strategy of IT-based services, platform businesses, and companies that conduct subscription-model business.

However, the logic to estimate capacity requirements must be improved to make broader medium-to-long-term predictions based on industry and regional information, as well as various information on socio-economic conditions and demographics. Further, simulations must also be made possible. The use of AI, such as machine learning and deep learning, holds the key to make such improvements. The application of AI will undoubtedly become an important theme in the future, therefore, cost accounting methods such as RBC can continue to make appropriate forecasts and decisions despite the uncertain future environment.

ACKNOWLEDGMENTS

This work was supported by JSPS KAKENHI Grant Number JP18K01921.

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