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Abstract

Financial institutions see the Internet as an important channel and many have built websites to inform and attract customers. Financial aggregation services as represented by "Account Aggregator" present an opportunity by which financial institutions can build stronger relationships with customers. Account aggregation services began in the United States, but they are now widely used by financial institutions in other countries. In this paper, we examine financial aggregation services by classifying aggregator types and the method for implementing their service. Second, we explain the differences between financial account *relationship aggregation* services in the U.S. and in Asia-Pacific countries, including Australia, South Korea, and Japan. We then discuss the status of financial *comparison aggregation* services and related issues. Owing to the popularity of WAP phones and the fast-growing market for mobile phone service in Asia-Pacific, we will also look into the development of *mobile aggregation* services. Finally, we examine future directions for aggregators in conjunction with universal and global banking concepts.

Keywords: Financial institution, Aggregation service, Universal banking, Global banking

I. Introduction

Financial institutions are one of the most influential businesses in the information technology (IT) revolution. Today, financial institutions see the Internet as an important channel and many have built websites to inform and attract customers. However, the number of people accessing financial information on non-financial websites, such as Yahoo, is higher than the number accessing the websites of financial institutions.[1] Financial aggregation services as represented by "Account Aggregator", which have recently shown remarkable online growth, present an opportunity by which financial institutions can build stronger relationships with customers. Account aggregation services began in the United States, but they are now widely used by financial institutions in other countries.[2]

We begin with an examination of financial aggregation services, by classifying aggregator types and the method for implementing their service. Second, we explain the differences between financial account *relationship aggregation* services in the U.S. and in Asia-Pacific countries, including Australia, South Korea, and Japan. We then discuss the status of financial *comparison aggregation* services and related issues. Owing to the popularity of WAP phones and the fast-growing market for mobile phone service in Asia-Pacific, we will also look into the development of *mobile aggregation* services. Finally, we examine future directions for aggregators in conjunction with universal and global banking concepts

[1] The ratio of reach in Japan: Yahoo! Finance 6.1%, Nomura Security 1.5%, DKB 1.7% (May 2000) [1]

[2] Thirty-five million Europeans are expected to use online account aggregation services by 2005 [2].

II. What is a Financial Aggregation Service?

1. Definitions

A financial aggregation service is defined as *a service that collects financial information transparently from multiple sources and analyzes it.* And a financial aggregator is defined as an entity of financial aggregation service. In this process, the aggregator interprets the information in various ways based on the meaning and context of the information being collected [3]. For instance, Yahoo and other financial portal sites only link information and provide that information for use without interpretation. They show the linked site by using the URL and display exactly as they are written. Therefore, if a user needs specific information from some part of the site, the user must search for the information on multiple screens. In contrast, a financial aggregator can extract information from multiple web sites using web-wrapping technologies, a process known as "screen scraping". By automating this process, a financial aggregator can gather all the financial information needed by the user and show it in one place. The most famous example of the financial aggregator is an account aggregator, which gathers personal account information from multiple financial institutions.

In the beginning of 2000, account aggregation services began to appear in web offerings by financial institutions across the United States. Originally, some U.S. banks opposed the use of an account aggregation services. However, major financial institutions in the United States now use it. Table 1 gives an overview of the history of account aggregation services. It shows that Vertical One, which subsequently merged with Yodlee in 1999, began the first account aggregation service in the United States. Then the service was exported to the Asia-Pacific countries, mainly Australia, South Korea, and Japan, by U.S. account aggregation vendors. Also, in Asia-Pacific countries, domestic account aggregation vendors entered this field directly, and they could provide services more suitable for these specific markets.

	Country	**Provider / Service name**
AUG 99'	US	VerticalOne launched
SEP 99'	US	Yodlee launched
JUN 00'	US	AOL *"AOL Personal Finance"* is announced.
JUL 00'	US	CitiBank *"My Citi"* launched
AUG 00'	US	Yahoo *"Yahoo Finance"* launched.
SEP 00'	AUSTRALIA	eWise launched.
	AUSTRALIA	AMP *"Account Minder"* launched.
OCT 00'	US	Chase Manhattan Bank *"Chase Online Plus"* launched.
FEB 01'	US	Merrill Lynch *"My financial picture"* launched.
	US	American Express *"Account Profile"* launched
MAR 01'	US	Wells Fargo *"Wells Outlook"* launched.
	US	Fleet Boston *"smallbizfleet"* launched
JUN 01'	AUSTRALIA	Macquarie Bank *"Enrichment"* launched
	KOREA	Hanvit Bank *"e-Clips"* launched
JUL 01'	AUSTRALIA	nineMSN *"Account Master"* launched
SEP 01'	JAPAN	Monex securities *" Money Station"* is announced.
OCT 01'	JAPAN	Nomura Security is announced
JAN 02'	JAPAN	E*trade *"Money Look"* launched

Table 1. The development of account aggregation service[3]

[3] Reference: each company's website and online news [4]

The early account aggregation services provided only account information, which was aggregated from multiple financial institutions. However, today's aggregators offer a variety of services, such as account summaries from multiple financial institutions, transaction histories of accounts and credit cards, and the status of frequent fliers mileage accounts. Users find that less time is spent surfing the Internet to gather this information. Account aggregation service providers, such as financial institutions, maintain huge amounts of data about each user's behavior, which gives them the opportunity to advise users about money management. While account aggregation services are still in the infant stage, the potential is high for financial institutions to use such services as both marketing and service tools.

2. Financial Aggregator Classifications

Financial Aggregators can be classified into four types; *relationship, comparison, Intranet,* and *Internet* [3, 5] based on the information sources and the purpose of the aggregators as defined below.

- Relationship type: an aggregator who collects and displays various types of information related to a customer obtained from multiple organizations, e.g., MyCiti by Citibank.
- Comparison type: an aggregator who collects and displays the same information for a similar commodity, for comparison purposes, e.g., Bizrate.
- Internet type: an independent aggregator of information, which has no affiliations, is not constrained by tie-ups and contracts, who collects information freely from anywhere on the Web, e.g., Yodlee's account aggregation site.
- Intranet type: an aggregator that collects information within the same group, e.g., Nomura Security's own financial portal site, within its website.

Most aggregators fall into more than one type rather than fitting precisely into one classification. MyCiti by Citibank, for instance, fits into both the relationship and the Internet type. The need to display customized data and collect information from a broad spectrum is increasingly important as customers' needs become more diverse and competition among aggregators intensifies.

In addition, we have identified two other classifications based on how the aggregator implements the aggregation service: *application service* and *agent software:*

- Application service implementation: the aggregator collects information and a user can request data by using a web browser. In this method, the aggregation service can be accessed via any terminal capable of displaying the aggregator's website. However, security becomes an issue because access requires that an account number and personal identification number (PIN) be sent to the aggregator. MyCiti by Citibank and Account Minder by AMP are examples of the application service type.
- Agent software implementation: the software resides on each user's device, such as a PC, that collects and displays information. In this case, the account number and PIN are retained in the user's terminal. However, it is usually necessary to download software to use this service. Agent software also has two sub-categories: MS Money represents one type and eWise represents the other type.
    1) MS Money mainly processes at the user's PC and it provides a variety of services such as portfolio simulation, loan and mortgage calculations, and tax advice. Users have to purchase the software and install it on their own PC. If the service changes, users must purchase the new version of software.

2) eWise does much of its processing at the service provider's server, and most of its software is free. The software to be run on the user's PC is smaller than the MS Money type and downloadable via the Internet. Therefore, service providers can easily add to or change the service content.

The early account aggregators were only the application service type. The agent software type aggregator was introduced because of strong demand by users who were concerned about security.

III. Aggregation Services Today

1. Financial aggregation services in the U.S.

Account aggregation services began in the United States in the summer of 1999 when U.S. venture-backed companies began offering account aggregation services. However, by the end of 1999, First Union Bank had sued the account aggregator [6] because the aggregator had accessed their accounts directly. As a result of the ensuing court struggle, the term *aggregator* became widely known in the United States. By the summer of 2000, AOL, CitiBank, and Yahoo had started similar account aggregation services[4]. As other companies began similar aggregation services, First Union withdrew from the pending case, opting to provide account aggregation services via their own website. In 2001, mergers and acquisitions among the vendors occurred frequently. One of the best known and oldest in the industry, Vertical One, merged with Yodlee, which is the undisputed market leader today.

The latest issue of the account aggregation services for financial institutions is profitability. Most financial institutions expect the increase of their retention ratio and cross-sell ratio by adopting account aggregation services.

There are fewer comparison aggregators, which are represented by sites like Intellipoint.com and Bankrate.com, in the U.S. financial markets. One reason is that comparisons of service are more difficult than comparisons of commodities. Goods such as books and CDs can be bought in retail stores, and customers choose the stores based on their perceptions of price, shipping cost, and availability.[5] In contrast, service is an intangible in which there is little similarity among the elements, and the service itself is changeable. Therefore, aggregators that compare services require much different information and the method of display can become more complex.

2. Financial aggregation services in Asia-Pacific

The use of online financial sites in the Asia-Pacific region, identified in terms of access rates, vary from each country. A comparison of South Korea, the U.S., and Japan shows that utilization rates for online banking are 48.2% (South Korea), 31.2% (U.S.), and 3.6% (Japan)[6]. Additional usage rates for financial services in the Asia-Pacific region are shown in table 2. These figures clearly indicate South Korea's strong position in the use of online financial sites.

Internet users visiting online finance sites as a % of total users (January 2001) [10]	South Korea: 49.7% Hong Kong: 33.2%

[4] In the United States, it is speculated that by 2003, 76% of financial institutions will provide some kind of account aggregation service [7].

[5] Note that brand power is also related. There is a relationship between brand and price differences, i.e., a lower price tend to lead to retail shops with stronger brand power. [8]

[6] The audience of this research is over 18 years old and uses the Internet more than once a week. [9]

	Singapore: 31.5% China: 31.5% Taiwan: 28.2%
Electronic brokerage transactions; % of total (1999) [11]	South Korea: 65% Japan: 32% Australia: 22% Singapore: 10% China: 3% India: 2% Hong Kong: 1%

Table 2. Comparison of Internet access

The major account aggregation providers in United States had global influences. Thus, many financial institutions in other countries adopted the aggregation service of the same type, which is the application service implementation type, at the beginning. In the Asia-Pacific region, Australia was the first to start account aggregation services, and South Korea and Japan followed.

Australia

In Australia, account aggregation services have been offered since the early stages of the industry. Initially two local banks, Macquarie Bank and AMP Bank, provided the application service implementation type of account aggregation. However, problems developed with this type of service because customers were concerned about privacy issues.[7] When one financial institution tried to offer one-stop services that were aggregated, customers would not participate, and the project failed.

eWise started an agent type of aggregation service. Because account numbers and PINs are not stored at the service provider, concerns about privacy were reduced. Agent software gathers account data from multiple sources using the individual's personal information stored on his local PC. Banks are beginning to move from the application server method to the agent application method, and it is likely that the agent application type account aggregator will become more widely used in Australia.

South Korea

In South Korea, all major banks have started the Internet banking service and 12 banks out of 17 major banks in South Korea have already provided the account aggregation service. However, 2 foreign banks, which are Citibank and HSBC haven't offered by the end of 2001. Many bank branches offer high-speed Internet connections, and approximately 40% of Internet users make use of them. There are also PC banks where all business is conducted online; there are even PC vans, with a single PC, and users schedule time for online use. But because many strangers share one PC, again concerns over security and privacy arise. In an attempt to pacify those concerns, the software "Xecure Web", which automatically downloads to a PC when connecting to a customer's online banking site for the first time, was developed and made available by Kookmin Bank.

The mainstream of the account aggregation in South Korea is the agent software type, because of strong privacy protection laws. Anxiety about transmitting personal information over the web is high, and it is thought that the Internet connection environment in South Korea influences this concern. "With Money" offered by nMoneybank, introduced by Kookmin Bank and Korea Exchange Bank, is the one example of the agent software type Both banks also provide a document management service called "With Apply" and a time

[7] In the United States, about 50% of customers are not afraid to use account aggregators [12].

deposit comparison called “With Account”, and it is expected to provide integrated financial services that will combine account aggregation, auction settlement, and an electronic signature.

Japan

In Japan, Nomura Security Company planned to begin an account aggregation service in June 2001, a joint project between Nomura Research Institution (NRI) and NTT data. [13] However, because the economic situation worsened at that time and funds diminished, major banks postponed such offerings. Therefore, NRI and NTT decided to postpone their joint account aggregation service, and since November 2001 NRI has provided its aggregation service individually, with fewer aggregatees. Monex started the original account aggregation service but information was gathered from only a few financial institutions. Both of these financial aggregators are the application service implementation type.

In January 2002, E*Trade started an account aggregation service of the agent software implementation type. It is expected that the spread of the agent software implementation type of aggregation will eventually exceed the use of the application server type aggregation.

Financial aggregation services in Japan developed around brokerage firms, largely because online trading is more highly competitive than online banking in Japan. Different from the U.S., account aggregators in Japan can only perform screen scraping to collect information from financial institutions that have agreed to cooperate beforehand. The aggregatee often agrees to participate based on previous business relationships. Therefore, it becomes advantageous for banks to recruit their customers to form a large aggregation base within that group, but managing accounts for customers is not suitable because the number of aggregetees is limited and customers can not gather their all account information. It is likely that customers find less convenience and the diffusion of aggregation services slows down.

There are several explanations for the differences in Japan compared to other countries. In general, financial customers expect to be provided accurate details of their account anytime. This tendency seems to be stronger in banks in Japan than in the United States. In general, banks will not start a new service if they feel apprehensive about it in any way. In an account aggregation service that relies on screen scraping, customers could not be guaranteed that they would receive the most timely and accurate data. Therefore, account aggregators especially in Japan tend to avoid screen scraping. Instead, they cooperate with each aggregatee and gather customers’ account data through mutual agreement in order to provide complete data.

Another difference in Japan is the prolonged economic slump in Asia. Big banks have merged with each other and smaller banks have failed because of bad debts. Most banks do not have sufficient margins to invest in IT. In the last two months of 2001 alone, over forty banks in Japan were forced into bankruptcy. If some big banks started an account aggregation service at the same time, other banks might rush to follow, because of a tendency to “follow the crowd”. After bank mergers stop and an economic recovery is underway, investment in IT—including account aggregation services—is expected to resume.

Unlike the U.S., there are no comparison type financial aggregators that use data scraping in Japan. The financial information sites that provide the list of deposit rate like Yahoo!Finance and Sofia[8] do not use screen scraping. Instead, they get the data from financial publishing companies, which collect information by telephone or fax from each bank. Eloan Japan, which compares various loan products, gathers data only from their affiliated financial institutions.

[8] One of the popular financial information sites in Japan: http://www.sofia.ne.jp/compare/savingscom.html

Other parts of Asia-Pacific

Examples of financial aggregation in the Asia-Pacific region are DollerDex.com (Lycos of Hong Kong, an interest rate comparison site), Admortgage.com (Hong Kong, a loan advice service, with user navigation methods), cash-on-line.com (Hong Kong, offering profit and loss analysis of the real-time market value of registered stocks).

3. Issues facing financial aggregation services

In the past, most financial institutions offered similar services and products. Today, with the wide variety of services offered by forward-thinking financial institutions, there is a tendency toward accounts that are established solely to meet a specific need. For example, in Japan online bank accounts established specifically to handle capital settlements have increased as online auctions have increased.[9] Customers establish a separate account exclusively for the purpose of handling auction settlements. Therefore, with more accounts for customers to keep track of, the need is growing for account aggregators.

For financial aggregators today, information inquiries are the primary function. Nevertheless, 57% of U.S. users consider fund transfers to be an important use of web aggregation services, according to research by Star Systems [15]. However, it is rare to see account aggregators offering a fund transfer function, either in the U.S. or in Asia-Pacific countries. The main reason fund transfer is not offered widely is security concerns.

We believe it is crucial for account aggregators that hope to establish a core position in financial services to eventually provide a fund transfer function, which means taking whatever steps are necessary to mitigate security concerns.

We believe also the agent software type will become the mainstream for all countries, even in United States. There are no difference of service contents between an agent software type aggregation and an application type aggregation recently. Therefore, Customer selects eventually the agent software type because it doesn't disclose the customer's account number and PIN.

IV. Universal Banks and Global Banks

In order to increase their assets and number of customers, banks set two kinds of goals: universal and global. We define a universal bank as one that provides multiple financial products and services; a global bank operates in multiple countries.

1. Universal Banks

A universal bank provides a large variety of products and services, such as stocks, mutual funds, insurance, and loans. Until recently, each bank, individually, expanded its services with an eye to becoming a universal bank. For instance, in Japan, only brokerage firms could issue national loans over the counter. After deregulation of Treasury bond sales, most major banks began to sell T-bonds.

Through consolidation and capital tie-ups, many financial institutions have expanded the variety of services they can offer. For instance, CitiCorp, with its banking and trading capabilities, and Travelers Group, with its insurance capabilities, merged in 1998. The merger of these two financial institutions enabled the new entity to offer a wider range of products

[9] Japan Net Bank in Japan has tied up with Yahoo Auction, resulting in six times more accounts than prior to the merger (around 400,000 accounts in September 2001) [14].

and services, both in banking and insurance, thus enabling the new entity to become a universal bank. Industrial Bank of Japan (IBJ), Daiichi-Kangyo Bank (DKB) and Fuji Bank joined under the umbrella of Mizuho Holding Company to establish Mizuho Financial Group in September 2000. This set a precedent for many financial institutions to join together under the umbrella of one holding company. The individual banks changed their strategies from that of an individual bank aiming to become a universal bank, to a becoming a universal bank as a result of the consolidation of several banks. The range of services that a universal bank can provide its customers is expanding rapidly because financial institutions can now provide new services through consolidation in a short period of time.

2. Global Banks

Global banks provide products and services in overseas offices and branches that have been established in many countries. Until recently, banks established overseas branches largely for the convenience of their customers, providing services that were similar to those offered domestically. Moreover, the parent company could obtain various data from its overseas branches.

The focus has shifted somewhat today. Banks want to gain more foreign customers and add deals through services they can offer in overseas offices. For example, during the 1980s, the Royal Bank of Canada (RBC) expanded into the U.S. market as a part of its global banking strategy. Many other major banks also have overseas networks. Fleet Bank (U.S.) has 100 offices in many countries that utilize twenty different languages; Bank of Tokyo-Mitsubishi (BTM) has 110 offices and branches in 44 countries.

To establish activities overseas, one method is for a domestic bank to buy an overseas financial institution instead of establishing its own overseas branch. For example, in Japan, Ripplewood Holdings, a private equity fund based in New York, bought the long-term credit bank of Japan (LTCB) that had declared bankruptcy, thus enabling Ripplewood to set up a base in Japan.

The advance into global banking leads to an expansion of available services and products for the bank's customers. This will result in dramatic changes in financial services in countries that are in the early stage of financial system development and thus have less service variety. For example, the major banks in New Zealand are all foreign banks. The New Zealand banks lost out in competition with Australian banks. However, the advantage for customers in New Zealand is they now have access to more services and products. Thus, a global bank brings advantages for domestic and overseas customers.

Big banks like Citibank and RBC are now pursuing both a universal banking strategy and a global banking strategy. For instance, Citibank has established a huge network of branches in over 136 countries, and RBC operates security and insurance businesses as well as a bank business in Canada.

3. The relationship between universal/global banking and online banking

Among the Top 50 banks in the *Fortune* Global 500 list, all have their own websites [16], including nine banks from the Asia-Pacific region (6 Japanese banks, 2 Chinese banks, one Australian bank). Most of the world's large banks are pursuing online banking as well as universal and global banking strategies. In the case of the six Japanese banks, all have overseas branches and handle investment funds. They are all online banks that are considered to be universal banks as well as global banks.

As general banking services and products continue to expand, online banking will also expand. Information volume and the number of sites will continue toincrease remarkably. For example, the number of Bank of Tokyo-Mitsubishi (BTM) websites, as indicated on its site map, shows more than 120 links. In the case of Fleet Bank, the number of links is around 180. In contrast, CitiBank Japan shows only 22 links. However, it takes longer for CitiBank Japan users to find what they are looking for because the website does not have a search window and the site map hides its HELP function. Therefore users must go through many sites to obtain the information they seek. If a user wants to compare interest rates on savings accounts and foreign currency deposits, he/she has to go through each site to check the account balance, foreign exchange rate, and interest rate.

If a bank focuses on becoming a universal bank and a global bank, online banking users gain access to a wider variety of products and services. This is the point at which a financial aggregator provides a key service. Online banking sites need good tools, such as financial aggregation, that enables users to easily compare data and obtain objective data, both domestically and in other countries.

V. The Future of Financial Aggregators

1. Universal financial aggregators

A universal financial aggregator (UFA) is a financial aggregator that collects information on multiple financial products and services (see Figure 1)

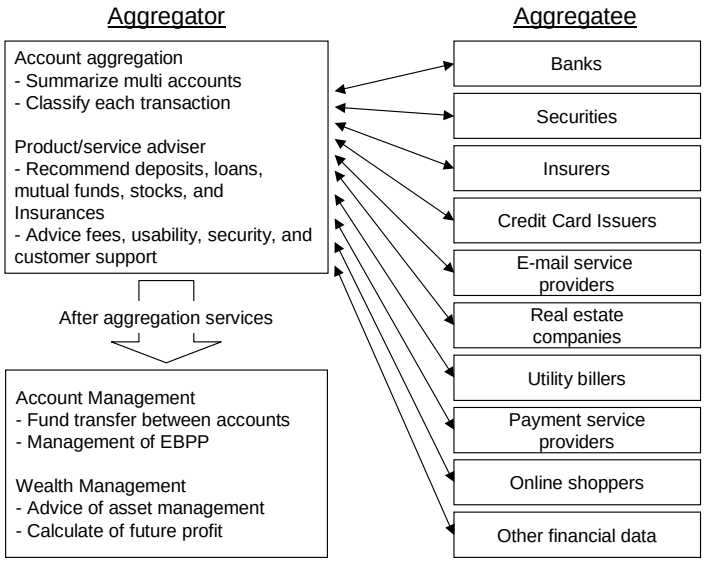

Figure 1: The Universal Financial Aggregator

A UFA can support the products and services of universal banks over the Internet. Obviously, customers will not use every product and service available. For instance, cautious customers may not look at information on stock investment. Instead, they need information such as the calculation of their monthly electricity expense with an analysis of the past transaction history. At physical branches, customer representatives can talk face-to-face with customers and

understand their needs in order to select the most suitable products and services. In online banking, customers learn about products and services by using the Customer Relationship Management (CRM) system, which contains all the customers' accumulated data and can obtain any specific information. Thus, like a customer representative at a branch, the requisite information can be collected using aggregation technology. In order to provide services on the Internet that is similar to the service at a branch, CRM data and data aggregated by an aggregator are both indispensable. Therefore, the relationship type aggregator, such as a UFA, holds the key to success in online universal banking.

2. Global financial aggregators

We define the global financial aggregator (GFA) as an aggregator that collects data from sites in multiple countries (see Figure 2).

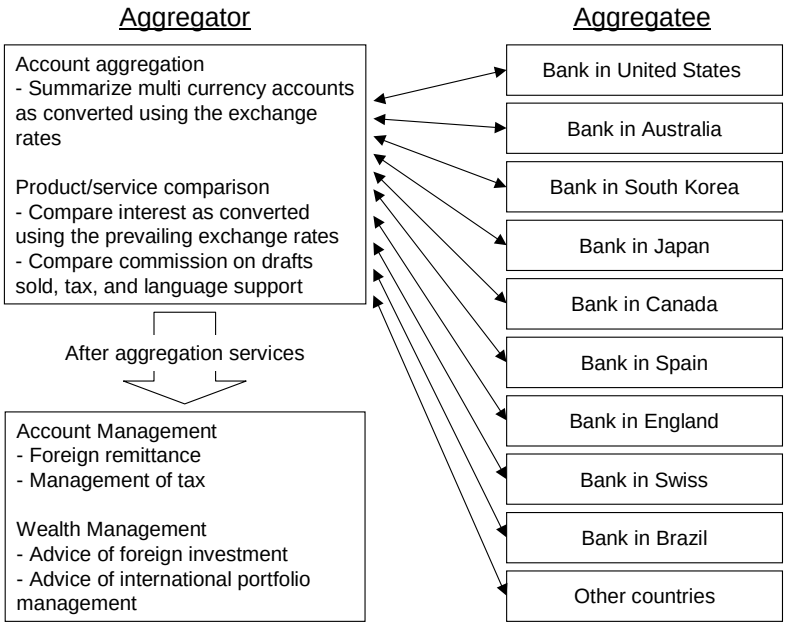

Figure 2: The Global Financial Aggregator

GFAs often support overseas financial transactions over the Internet. Nowadays, auction sites such as eBay, which facilitate overseas exhibiting and bidding, have increased. This creates more opportunities for customers to send overseas remittances and/or set up individual overseas accounts. Moreover, to settle online auction accounts that involve smaller amounts of money, customers are seeking services with cheaper commissions when making payments and transactions. This raises the issue that customers need to better understand overseas services and their availability and profitability.

Some sites are developed based on an expectation that they will be used by local customers, although there are no restrictions for overseas customers. For example, one can expect different languages in different countries. In the case of remitting money from Japan to the U.S. for instance, a GFA could provide a list of service providers based on the amount of commission charged, to help customers decide which bank is most suited for their needs.

Another capability of GFA is to aggregate information about all available types of saving accounts, both locally and globally, and produces comparisons on rates of interests, commissions, number of free transactions, and some kind of rating. The calculations of exchange rates and translations of service restrictions are managed by the aggregator. Moreover, aggregators could also provide their own original ratings and/or customers' comments, similar to the service offered by Amazon.com at its website. Therefore, the comparison type of aggregator, such as a GFA, holds the key to future success in online global banking.

3. Mobile aggregators

In the Asia-Pacific region, three in four households have at least one mobile phone, although the penetration of mobile phones among individuals is greater in Asia than in the Pacific. In Asia, approximately one-quarter of homes with mobile phones have at least three mobiles. Furthermore, most homes have only one source of Internet access; although in Hong Kong and Taiwan more than one in five homes have two or more sources of Internet access [17].

Yodlee US (the major financial account aggregation technology provider) provides wireless account aggregation service on its own website. It also provides service to Five Cents Savings Bank, AOL, and Morgan Stanley Dean Witter. However, skepticism regarding the use of online banking via mobile equipment is widespread in the United States.[10] In contrast, among Japanese subscribers of I-mode,[11] 10% use the service to conduct financial transactions. Moreover, mobile phone subscribers in both Japan and Singapore can transfer funds, check account balances, and receive advice about housing loans or the expiration of time deposits. In Norway, the "solo service" by Merita Nordbanken offers payment settlement services via mobile phone.

All these leading-edge uses indicate that there is enormous potential for mobile phones to function like debit or credit cards. Mobilecome Company, part of a German telephone company, is taking this idea one step further by acquiring a banking license and it now participates in the banking business. Similarly, Hanvit Bank began providing application type account aggregation services in mobile banking in December 2001.

In Japan and Taiwan, the diffusion of cellular phones and the availability of access to the Internet via mobile phones are high. However, the use of phones for mobile commerce, including online banking, remains low. This is the case because information read-out is limited due to the small size of the mobile phone screen, the connection speed is slow, and the cost is based on data volume (e.g., when accessing multiple websites via mobile phone, more cost is generated).

This is precisely the kind of environment in which a financial aggregation service works best. First, account aggregation services reduce the Internet access cost and increase the usability via mobile phone, because customers don't need to access multiple sites in order to check their financial information. The summarized and selected financial information provided by account aggregator is suitable for small screen of mobile phone. Secondly, an comparison aggregation service could bring together specific information that could be personalized. To provide personalized information, each customer's personal information, including customer status and location, is indispensable. The user's position can also be identified through the

[10] The top 100 North American financial institutions lag behind in the wireless race, with a penetration rate of 45% by 2004, or approximately half of European and Asian penetration levels [18].
[11] A popular mobile phone service with Internet access, provided by NTT Docomo.

mobile phone's GPS function as well as its ability to track mobile phone numbers. For instance, when a customer wants to exchange money, the financial aggregator is able to gather the data based on the GPS information and show the best place. In the future, it will be possible to access an account aggregator to obtain information about restaurants, receive coupons as incentives to choose specific restaurants, or information about credit cards that give better deals on miles and discounts.

Thus, the needs among mobile phone users for financial aggregation services will increase as Internet based applications simplify financial transaction. For example, when aggregators can provide a settlement function, mobile phones will become an important channel for collecting and providing information for financial aggregators. A service that was complicated when used with PCs will soon be able to provide real-time information via mobile phones.

VI. Conclusion

In this paper we have provided a number of insights into the importance of financial account aggregation in the Asia-Pacific region. The three main points are as follows:

- Under the present situation of account aggregation services, the use of application service aggregators and agent application aggregators varies from country to country. However, it seems that the agent application type will become the mainstream in all countries.
- A comparison financial aggregation service is essential to providing superior global financial services, while the relationship financial aggregation service is indispensable for providing universal financial services.
- Aggregation services will become even more important as the use of mobile phones connected to the Internet increases.

It has been forecasted that intermediaries would become unnecessary because customers would be able to deal directly with providers via the Internet. However, as the development of e-commerce progresses, the range and volume of products and services have expanded. Thus, it has become more difficult to choose the most suitable products and services. As a result, the role of Internet intermediaries such as financial aggregators remains important to customers.

We believe that in the future financial aggregators will become one of the basic financial services. However, their service will not succeed simply by collecting information and offering efficient service content. It is crucial to provide financial aggregation services based on different customer needs and via the most appropriate channel.

In particular, it is expected that commodities and services will diversify and become more complex in financial industries due to specialization and globalization. In that case, both the financial institutions and the customers will need aggregation services. Such aggregation services will be crucial for financial institutions seeking to provide commodities and services across two or more countries. It will also be valued by the customers who will use the service to combine commodities and services. This is especially true in the Asia-Pacific region where the marketplace is not as unified as it is in EU and North America. Therefore, the role of aggregators in Asia-Pacific is extremely important.

Account aggregation services are also useful in the B2B market. Most companies have their own accounting system and use PCs as office automation tools. Some companies have already connected their system directly to a bank system. Today Internet use is common in most companies. However, corporate account aggregation services are not fully developed. This may be one reason why companies avoid opening their account data to other companies, both

third-party providers and banks. The agent service type appears to be a useful solution for B2B aggregation service.

Technical and context issues still remain. Financial institutions have not yet adopted a standard XML scheme (e.g. OFX), and other industries are making their own standards. Moreover, language and currency differences complicate the adoption of aggregation globally. If aggregation service providers aggregate a higher volume of data and can offer more varieties both universally and globally, it will become a major incentive.

Account aggregation services are one example of financial aggregation service that is widely adopted, but it is certain that aggregation services of various types will be provided in the future. It is also likely to become as natural as having bank ATMs on every street corner. Thus, it is crucial now to identify and develop the complete set of functions and roles that will be needed. Just as the most suitable and effective financial functions for ATMs exist today, there are specific functions required for aggregation services. Aggregation services will become as versatile as a basic information service; however, they are not omnipotent. Therefore, now is the time to identify the advantages and limitations of aggregation services and make every improvement that is necessary.

The Asia Pacific region is well suited to take advantage of these services while learning from past experiences in other regions of the world.

References

[1] Video Research, *Internet Audience Research Data: Finance and Investment Website Traffic Trends*, May 2000. <http://www.videor.co.jp/eng/report/internet/survey.html>.

[2] Datamonitor Report DMFS1433. *Account Aggregation: The Right Way Forward*. Dec 2001.

[3] Madnick, S., Siegel, M. *Seizing the Opportunity: Exploiting Web Aggregation. MISQ Executive*, **1**(1), 1-12.

[4] **VerticalOne**: Vartanaian, T.P., Ledig, R.H., *Scrape It, Scrub It and Show It: The Battle Over Data Aggregation*: <http://www.ffhsj.com/bancmail/bmarts/aba_art.htm>
Yodlee: press release, Sept 28, 1999:
<http://www.yodlee.com/company/pressreleases/launchfinal.html>
AOL (AOL Personal Finance): Yodlee press release, June 7, 2000:
<http://www.yodlee.com/company/pressreleases/aol.html>
CitiBank (MyCiti): press release, July 18, 2000:
<http://www.citigroup.com/citigroup/press/000718b.htm>
Yahoo! (Yahoo Finance): press release, Aug 30, 2000:
<http://docs.yahoo.com/docs/pr/release585.html>
eWise: company's website: <http://www.ewise.com.au/ewise/info/aboutus.asp>
AMP (Account Minder): BRW, *Online, it's harvest time*, Oct 23, 2000:
<http://newsstore.f2.com.au/rlprod/rlsearcher?ac=search&sy=age&ss=AGE&dt=selectRange&so=relevance&sp=0&rc=10&kw=Online%2C+it%27s+harvest+time&dr=5years&pb=all_ffx&sf=article>
Chase Manhattan Bank (Chase Online Plus): Yodlee press release, Oct 16, 2000:
<http://www.yodlee.com/company/pressreleases/chase_launch.html>
Merrill Lynch (My financial picture): press release, Feb 20, 2001,
<http://www.ml.com/about/press_release/02202001-2_financial_picture_pr.htm>
American Express (Account Profile): news release, Feb 15, 2001:
<http://home3.americanexpress.com/corp/latestnews/account_profile.asp>
Wells Fargo (Wells Outlook): Yodlee press release, Mar 7, 2001:
<http://www.yodlee.com/company/pressreleases/wellsfargo.html>
Fleet Boston (smallbizfleet): news release, Mar 12, 2001: <http://www.corporate-

ir.net/ireye/ir_site.zhtml?ticker=fbf&script=460&layout=-6&item_id=157951>
Macquire Bank (Enrichment): *Macquarie Bank Limited Uses Teknowledge's Tekportal(TM) Software to Offer Account Aggregation in Australia and New Zealand,* Java Industry Connection, June 19 2001. <http://industry.java.sun.com/javanews/stories/story2/0,1072,37561,00.html>
Hanvit Bank (e-Clips): Cane, E., *Asian banks begin to embrace account aggregation.* FinanceAsia.com, June 12 2001. <http://www.financeasia.com/articles/4E873409-5BED-11D5-81CB0090277E174B.cfm>
nineMSN (Account Master): ninemsn, *Australia's leading portal launches nettposition account aggregation service.* Parker's Edge News, July 27 2001.
<http://www.parkersedge.com.au/company/news/news_date33.asp>
Monex security (Money Station): japan.internet.com, Internet Stock report, Sep 22, 2001,
<http://japan.internet.com/isreport/20010922/2.html>
Nomura Security: Nikkei news paper, Oct 24, 2001
E*trade (Money Look): press release Jan 22, 2002:
<http://search.etrade.ne.jp/info/press/prestory020122_2.html>

[5] Madnick, S., Siegel, M., Frontini, M.A., Khemka, S., Chan, S., Pan, H. *Surviving and Thriving in the New World of Web Aggregators.* Center for eBusiness@MIT. Working Paper #144, October 22, 2000, p.5.

[6] Trombly, M. *Banks Join Forces with Online Account Aggregators.* Computerworld, Nov 13, 2000.
<http://www.computerworld.com/cwi/story/0,1199,NAV65-665_STO53923,00.html>.

[7] Shevlin, R., Doyle, B., Renyi, C., Boynton, E.H., *Personalizing Financial Services.* Forrester Research Inc. December 2000.

[8] Brynjolfsson, E., Smith, M.D. *The Great Equalizer? Consumer Choice Behavior at Internet Shopbots.* Center for eBusiness@MIT. Working Paper #137, July 2000.

[9] Japan: e-Japan forum, *EFJ2000 research,* May 22 2001.
<http://www.ejf.gr.jp/report.htm>.

[10] NetValue, January 2001.
<http://www.emarketer.com/analysis/easia/20010605_asia.html>.

[11] Sato, S., Hawkins, J., *Electronic finance: an overview of the issues.* BIS Paper No.7. November 2001, p. 2, Table 1.

[12] Jupiter Media Metrix press release. *Nearly Half Of US Online Financial Consumers Are Ready To Consolidate Their Accounts At A Single Institution, Reports Jupiter Media Metrix.* October 24 2001.
<http://www.jmm.com/xp/jmm/press/2001/pr_102401.xml>.

[13] NTT Data News release, March 13, 2001.
<http://www.nttdata.co.jp/en/media/2001/0313_e.html>.

[14] Sankei Newspaper July 19 2001.
<http://www.sankei.co.jp/databox/pc/0107html/19kei008.htm>.

[15] Star Systems, Inc. *Web Aggregation: A Snapshot.* August 2000, p. 41.

[16] FORTUNE GLOBAL 500, *The World's Largest Corporations: Global 500 by the Numbers*, July 23, 2001: http://www.fortune.com/lists/G500/index.html

[17] AC Nielsen, *Home Internet access dominates; Asian mobile penetration booms; Aussies and Kiwis keen online shoppers.* June 12, 2001.
<http://asiapacific.acnielsen.com.au/news.asp?newsID=38>.

[18] Descamps, F., Marenzi, O., Lee, S., *Wireless Financial Services: A Global Overview*, Celent, July 2000.