Financial Services in Supply Chains

Success Factors and Future Opportunities for Traditional Financial Institutions

by

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ABSTRACT

This thesis examines how the traditional banking institutions can add value in supply networks of products and services. The approach is based on a critical examination of the current range of services offered by traditional banks and similar financial institutions to supply chains and their component firms. Our primary hypothesis that we construct from such an analysis is that banking institutions have a vast field of opportunity to undertake more value-added roles in the operational aspects of supply chains; currently, the purview of many traditional banks is limited to the strategic aspects of supply chains, such as mergers and acquisitions, capital investments, and a largely passive or reactive monitoring of financial performance of supply chains.

In order to underscore the significance of the research question, we first review the strategic drivers and the success factors for most banking institutions as they seek to enlarge their role in the functioning of large markets; these strategic drivers could explain the positioning of the current range of services offered by banks to supply chains and broader markets. Next, working from the other end, we review briefly the strategic, tactical and operational issues and priorities facing supply chain managers of today, with a view to understanding the potential roles that financial institutions can play in order to engage supply chain managers for greater mutual benefit.

However, the research questions of this thesis are also motivated by the set of competitive challenges facing traditional financial institutions in their current sphere of influence and their current market domains. For example, on the one hand traditional banks are being driven to become more efficient in their offerings to their customers, given the greater transparency and range of offerings available to their end-customers as a result of information technology, the internet phenomena, and as a result of reduced cost of entry for many players. On the other hand, many supply chain innovators have also encroached upon the space of traditional banks, acting in effect as dis-intermediaries between banks and the end-customers of the supply chains. A good example of this is the profitable consumer credit lending business ventures of the automotive firms such as GM and Ford. Using the insights provided by the above critical analyses, we then propose that several specific opportunities exist for traditional banks to play a greater role in the tactical and operational aspects of supply networks for products and services, and provide

examples of how banks can undertake more value added and proactive roles in these supply chains.

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Table of Contents

1 Introduction

No one in this world can stay alive without the cooperation with some kind of partners; spouse, family, local community, social infrastructures and country etc. This mutual relationship forms a social network of interdependence. The network may arise spontaneously or artificially, but utility of each participant is heavily affected by structure and effectiveness of the network. The same principle applies to business entities. Typically, firms are connected to their various business partners as dictated by their strategic and operational objectives; even as they attempt to retain their identity and independence. However, it is also possible for firms to have differing end-objectives with respect to the partnership; for example, even with different strategic goals and operating cultures, a group of trading partners often act together as one larger business entity. In this respect, supply chain management perhaps involves the management of an ecosystem, or a group of firms connected by a common objective—such as the delivery of an end-product to the ultimate consumers.. In order to achieve the end-objectives, it is necessary for the firms in this ecosystem to work in a coordinated fashion to deliver the product or service to the customers.

In the discussion of supply chain management as a topic or as a set of business critical issues, the agenda usually consists of a discussion of the logistics network configuration, inventory management, centralized information, demand forecast, lead time reduction etc. The items on the agenda of a supply chain manager typically include (*i*) the design and control of physical product or material flow in the manufacturing supply chains, or the logistics of providing customer service in say, the knowledge and service industry, or (*ii*) the issues related to enabling services in supply chains, such as the management of information flows, business communication systems, and interoperability issues between supply chain partners. However, in this thesis, we examine a third and often overlooked component or dimension to the effective management of supply chains – the management of the financial flows within or between supply chains. From an economics perspective of course, firms exist to take actions that 'maximize the net present value of their investment of capital, assets, and resources', and the flow of funds, or the financial transactions within supply chains are often foremost in

the agenda of senior management of most successful firms. However, most of the focus of financial managers is reserved for the inflows and outflows locally at the firm, and a broader perspective on the financial flows of the larger supply chain is often not high on their list of issues to consider.

Although the timely and efficient flow of funds is so vital to the smooth functioning of a supply chain, the issue is also often relegated to the periphery in the discussion of supply chain management. This is partly because the responsibilities for the coordination and / or control of supply chain networks are usually vested with manufacturing, operations, or purchasing managers; where their main focus in often on material flows and timely management of information or business communications, or the management of an information systems infrastructure. Furthermore, financial flows are interlinked or considered as a corollary to the material management issues, hence material issues that impact near term operational performance, often have a higher priority to discuss than money issues. Thus supply chain managers may call upon financial service providers (typically banking or institutions lending credit) when the issue of a non-payment or a short term imbalance or disruption in the financial flow occurs, but such intervention is not usually sought in the strategic planning process.

From the standpoint of banks, they have skills related to investing in and financing projects involving a variety of stakeholders; for example traditional banks have accumulated knowledge of how to evaluate the value of a project and how to finance effectively. So they also prefer to use their analysis skills to decide the timing of financing of investment capital or of fixed assets which are required every once in a while, rather than devote their attention to working capital needs of supply chains, which are required in the daily operation of firms and in the coordination between supply chain agents. Furthermore, as managing material flow in a supply chain has not been their comfort zone (or for that matter under their purview), banks are typically not willing to get involved in the material management issues in supply chains.

Looking back at the practice of e-commerce as promoted by banks, they have not demonstrated much interest in information available readily to them about the logistics of managing and coordinating a supply chain. They have mainly sought to extract financial

information from activities in a supply chain in order to facilitate financial settlement services. Trading information is also transferred to grant credit in the form of letter of credit. Of course these processes play an important role in the functioning of a supply chain. However, they are discrete from the perspective of banks, isolated transactions (although they may be repeated millions of times in a given year) since the data from these individual transactions are not tied in with activities in other corners of the supply chain. To put it another way, in comparison to the volume of supply chain related data available to the banking institutions, their role in the operational and logistical aspects of supply chain management is passive to a large extent. Considering that banking in itself is a function that relies on the effective processing of information from supply chain sources, there is thus a lot of potential for banks to utilize and extract more information from the a supply chain data that they process on a daily basis. For example, they may be able to evaluate each player in the supply chain more accurately and more reliably, to provide more effective financial settlement services, or to manage risks from price fluctuation risks across the supply network.

Money, in the form of the profit motive is always a driving force of all the efforts of the firms in a supply chain to enhance efficiency locally in the network. For example, raw material suppliers would typically like to see demand in large volume, so that they can take advantage of economics of scope and scale. Manufacturing managers want to achieve high productivity through production efficiencies, leading in turn to low production costs per unit of goods delivered. The materials, warehousing, and outbound logistics managers typically want to minimize transportation costs by taking advantage of quantity discounts, minimizing inventory levels, and quickly replenishing stock; on the other hand, retailers need short order lead times and efficient and accurate order delivery. These operational objectives of the various agents in the supply chain are often derived from the overall profit objectives. On the other hand, a basic role of the banking sector in the functioning of today's supply chains is typically that of a finance intermediary function. However, given that the smooth financial processes are critical to these agents in achieving these objectives in a consistent fashion, we propose that there are also many operational and tactical roles banks can play in a supply chain network besides the initial capital infusion. In other words, there are considerable opportunities for banks and

financial institutions to support the orchestrators of a supply chain, and thereby play a larger role in the functioning of supply chains.

Some manufacturers, retailers and logistics service providers are already aware of the necessity of integrating cash flows with material flows in a supply chain. Some provide financial support for their trading partners and others offer financial services closely connected with logistics services; thereby integrating the financial services with their supply chain operations and boosting their profits. However for the traditional banking sector, this move by the supply chain agents represents not only a strategic threat, but also a loss of market share, along with potential loss of business opportunity. Another form of invasion to the financial service industry, and the new entrants can come. On the other hand, while the financial services industry is facing this threat of new entrants from brick-and-mortar businesses, it is difficult to find example of traditional banks proactively entering the supply chain management arena. The intent of this paper is to identify possible strategic options for the traditional banking sector to deal with these threats.

This paper is structured as follows. First, in chapter 2, the critical dimensions of service objective (or in other terms, the success factors) for financial firms are reviewed. In chapter 3, the current dimensions of supply chain management, as it is practiced today, are reviewed with the broader aim of highlighting the fact that the current set of priorities for most operations managers does not typically include the financial processes related to their supply chain flows. Next, in chapter 4, we examine the emerging competitive challenges faced by traditional banks, both from the diversification of their own marketing channels, but more critically from the increasing strength of traditional brick and mortar firms in providing financial services for their customer bases; we believe both of these trends in fact provide greater incentives for these institutions to play a more value-added role in the functioning of their customers' supply chains. Then in chapter 5, to elaborate on our hypothesis from chapter 4, we identify the potential value-added roles in supply chain operations that are available to banks as strategic opportunities, but that have not yet been explored with any substantial impact. Finally, in chapter 6, we conclude this thesis by prescribing a roadmap for these financial institutions to make the strategic shift to being more involved players in supply chains.

2 Strategic Drivers, Success Factors and Value Propositions for the Financial Services Industry[1]

Before discussing how a bank can create value in a supply chain, we first review the basic functions or services provided by traditional banks to a typical supply network of products or services. A banking institution typically provides a wide range of financial services such as acceptance of deposit, fund transfer / settlement, accommodation of funds, issue of notes, etc. However, these services can be further categorized into four dimensions: (*i*) transaction cost reduction, (*ii*) asset transformation, (*iii*) creation of liquidity and, (*iv*) settlement function.

Each of these four dimensions is reviewed in this chapter in our effort to identify possible opportunities to position these services for greater value-added roles within supply chain networks.

2.1 Transaction Cost Reduction

For an example, a financial transaction may describe the selling and buying of a contingent claim. 'Contingent claim' in this case is a right that one can claim under a certain condition at a certain time in the future. For example, a party A receives 10,000 dollars from party B and promises to pay its counter value back to B a year later when the outcome of the business investment is determined. This transaction can be understood that B purchased a bill issued by A with 10,000 dollars. The bill therefore represents a contingent claim.

There are two functions in a financial transaction. One is transfers of income from entities with financial surplus to entities with financial deficit. According to economics theories, financial surplus or deficit of each entity is equivalent to the difference between savings and investments. If there is no opportunity of financial transactions, each entity has to match its investments and savings. Thus the entity has to limit its investments within its savings, or it has to invest up to its savings even when it does not have a good

[1] Shunsaku Nishikawa, Kazumi Asako, Kazuhito Ikeo, Keiichi Oomura, Miyako Suda, "Economics and Finance" ("Keizaigaku to Finance"), Toyo-Keizai-Shinpo-Sha, 1995

investment opportunity. Financial transaction contributes to the efficient allocation of investment as a whole economy.

Another function in a financial transaction is the re-allocation of risks. If an entity can expect a high income in a booming economy but a low income in an economic downturn, it can reduce its income fluctuation by purchasing a contingent claim which pays a high return in a slump and a low return in a boom. Contingent claim can have various forms in terms of how the counter value is defined. For example, in a debt contract, the counter value is fixed regardless of the result of the business project (when the business is in slump, the debtor may not be able to pay back.) In an equity contract, the counter value is decided in proportion to the fruits of the business project. A variety of risks can be re-allocated by a combination of various types of contingent claims. This re-allocation of risks is also an important function of financial transactions.

"Portfolio theory" [2] expounds on the various mechanisms by which an entity can reduce its deviation of money received with the same expected return from its investment, mainly by combining a variety of contingent claims. However, there are some restrictions in achieving the optimum set of contingency claims. The minimum transaction unit may be fixed, the transaction fee may be required in proportion to the number of transactions, and the entity may not have enough skills to find the optimal allocation of assets, and so on. These are costs required to conclude a transaction. So they are called "transaction costs". Transaction costs in financial transactions tend to be large and further the volume tends to be proportional to the number of transactions rather than the value of transaction. Thus a financial transaction usually becomes more efficient when a certain entity with specialized knowledge and skills collects funds from other entities so that it can operate them as one big fund and save the transaction cost. This is the most fundamental function of financial institutions.

2.2 Creation of Liquidity

A financial institution is typically able to achieve the transaction cost reduction by collecting funds from many economic entities to form a portfolio of assets and

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[2] Brealey, Myers, "Principles of Corporate Finance" 7/E, McGraw-Hill/Irwin, 2003, Chapter 8

redistributing the returns to the entities. This objective is achieved by efficient management of investments which have different set of distribution of possible returns. It is possible to see that as a means to achieve this goal of efficient management of pooled investments, financial risk mitigation have to make the trade-offs between higher expected rates of return for their customers, and the mitigation of risks in the portfolio to ensure stability in the portfolio. Intertwined with this objective of risk mitigation is the need for financial institutions to also make the trade-offs between long term financial viability and short term access to cash for greater flexibility. To phrase this in simpler terms, it might not be a good idea to invest all our funds in fixed assets that cannot be redeemed until far into the future; in fact we normally aim to keep part of our funds as floating assets that can be redeemed in the short term to hedge against uncertainties in the near term. In other words, we also constantly make a trade-off between short term liquidity and long term viability and stability. The long term stability is typically offered by longer-term investment projects that may provide a lower but lower variable rate of return than short term assets. In fact this trade-off between long term stability and short term liquidity or flexibility is a critical success factors for small and large economies. Overall, this need for the efficient distribution of funds between short term and long term investments, translates into another strategic success factor for financial services firms.

Similar to individuals managing their accounts, supply chains and their component firms also deal with unpredictable events that take the form of risk in their operations. Large banks and financial institutions may support multiple firms or even supply chains, and offer them short-term deposit accounts—the defining feature of these deposit accounts is that the firms are allowed to liquidate these accounts at will (the principal is often guaranteed), or at short notice. Thus, in the event of a supply chain disruption or a balance of payments crisis, the firms may be able to liquidate these short-term accounts for greater flexibility. By positioning their ability to manage many different short term accounts effectively, the banking institutions are able to create a larger pool of short-term fund accounts. However, since the risk of liquidation for the pooled funds are lower than the risks for each individual accounts (risks for the financial institutions are often lower as their customer base and total assets increase), these banks are then able to treat their combined assets for long-term leverage or investment, and

potentially derive a profit from their operations. The key for a customer is that a deposit account may be more suitable for creating liquidity in their operations than an investment trust in the sense that the former guarantees the principal of the investment. While an investment trust cannot eliminate the risk of falling below par (unless the portfolio offsets all the risks, which is unlikely); in the case of a deposit, any remaining risk for the financial institution, after pooling the funds from their customers, is borne by the stockholders of the bank.

In this way, a key value proposition for banks is that their services satisfy their customers' need for liquidity (forn their operations) efficiently, and in a broader sense allows the economy to allocate more money to profitable long-term investment projects, while absorbing the risks for firms and supply chains that may be vulnerable to risk in their environment.

2.3 Management and Dissemination of Information

As already stated above, one of the fundamental value propositions of financial institutions is a reduction of the transaction cost. The reduction in transaction costs is primarily achieved by the economies of scale leveraged by banks over their typically large customer base. However, there are other significant operations related costs for financial institutions—significant among these are the costs borne by banks to evaluate and monitor the performance of their investment projects. To evaluate an investment project, a financial institution needs to investigate opportunities and risks of the project and to check other factors which may affect the outcome of the project either positively or negatively. Since such analysis frequently requires a skilled, competent and well-trained workforce, investment performance monitoring is one of the major cost factors for most financial institutions. The evaluation and monitoring activities essentially require in turn the creation of new information from data captured on the investment projects and from the market behavior.

Financial institutions seek to capture and process data, and generate new information and analysis in an efficient manner by segmenting their customer base, and through this, attempt to create further economies of scope and scale. Such knowledge and skills required to information creation is typically acquired by financial institutions by

cultivating expertise (through investment experience) in particular business sectors. They cultivate analytical expertise for a market sector by deploying sector-focused teams to invest in and manage the performance of assets in the specific sectors. However, such segmentation only provides depth in the analysis; whereas the investment performance typically depends on factors that go beyond narrow definitions of market sectors. For cross-sector analysis of the performance of investments, financial institutions therefore maintain groups with broader macroeconomic expertise, but more critically are also organized vertically to manage their larger customer accounts in an end-to-end fashion; this typically happens with turnkey investments that financial institutions are undertake (or under-write). Even in a broader sense, information scales in value when different sources are pooled, and the performance monitoring activity of banks is typically strongly dependent on not only the depth of their market sector or industry expertise, but also on the breadth of their knowledge on supply chain issues. Thus the productivity of information generation and management is typically increases when the scope of activity of the financial institution widens to cover more than one functional area of expertise. For example, maintaining a banking business and a securities business under the umbrella of one financial institution may provide a synergistic effect, because the institution can leverage its expertise in the multiple fields for better monitoring and analysis of their investments. There are however, many processes relating to regulatory and ethical checks and balances that must also simultaneously be implemented in this case.

In addition to the effect of cost saving, the creation of information by financial institutions has a positive effect in the sense of promoting transparency and efficiencies in corporate actions. A company is made up of various kinds of entities with different interests; executive managers, employees, shareholders, creditors, business partners, among others. While the members of a firm are identified with the common strategic objectives of the firm, their individual interests, however, may conflict in not only the means to achieve the strategic objectives of the firm, but also in the allocation, division, and in the re-investment of the fruits of their labor. Inefficiencies within the firm structure, as a result of the misalignment in the intent and actions of the members (for example misalignment between management and labor) are often studied in the form of the "principal agent" problem in the economics literature, and the associated losses or

costs for the firm are known as "agency costs". A manager may not invest effort into his or her job enough to maximize the combined benefit of the manager and shareholders (and creditors), in case that the marginal increase of corporate profit does not compensate for the marginal disutility of the manager. Or he or she may want to scale of the firm for the sake of prestige or other motives not pre-specified in the contract between the management and its shareholders.

Another, lesser known example of agency cost is in the relationship between shareholders and creditors. Shareholders have a claim to the residual of corporate value less the sum total of the debts of the firm. When this residual becomes negative, it is essentially regarded as zero for the shareholders; thus shareholders are liable only for the amount of their investment. Creditors on the other hand, have a claim to a certain contracted amount independent of a firm's earnings. When the firm cannot pay back the contracted amount, they can only receive what the firm can afford to pay. Hence, when a firm chooses an investment project with higher risk and higher rate of return, the shareholders of the company potentially benefit from this decision whereas the creditors stand to bear a higher risk of loss, because a part of the increased risk is shifted to the creditors while the increased expected return is mainly paid to the shareholders. This means shareholders tend to be risk lovers whereas creditors tend to be risk averse. When the shareholders force the managers to choose such an investment decision even if they know that it will hurt the corporate value, the corporate value is decreased due to the conflict of interest between shareholders and creditors. This can also regarded as an agency cost.

These agency costs are however, usually not very predictable in their range of outcomes. It follows that a new investor discounts all the agency costs when he or she makes an investment decision. Thus the new investor can avoid the agency costs and the costs are borne by the managements and the existing investors. If all the players in capital market make rational choices based on adequate understanding of future outcomes, the managements and the existing investors try to minimize their agency costs. However, given the uncertainties and the risks involved in the impact of agency costs, one preferred solution is to allow the investors to monitor the operations and activities of the firms to which that they lend credit. This monitoring has two effects; the agency cost can be held

down, while the monitoring cost arises. The firm wants to keep the monitoring costs low, at least lower than the agency cost. Here is the key value proposition for a financial institution. When a bank lends money to a firm, it monitors the firm with a cost lower than other investors. Thus the firm can save the monitoring cost by relegating the monitoring job to a bank. In addition, the fact that a firm is borrowing from a bank signals the market that its agency cost is held down by monitoring. This incentive is quite large when a firm is in need of external funds and when its bank wields considerable influence in the decision making of the firm.

2.4 Settlement Function

In addition to their roles as investors that described above, banks play another critical function as intermediaries in supply networks for products or services. Their settlement function is a service of channeling funds / payments between customers, or in a more narrow sense, a function of providing a means of settlement. A means of settlement can be defined as assets by the delivery of which receivable-and-payable contracts have been socially recognized as 'settled', or granted 'finality'.

The legal tender (i.e. central bank notes) is thought to be a settlement function in the most rigorous sense, because it has mandatory circulating power. In addition to this, when a financial asset is guaranteed as exchangeable for legal tender with a certain time with a certain ratio, it can be socially recognized as a means of settlement. Bank deposits payable on demand (checking account, saving account etc.) are typical examples.

Needs for Settlement System

In order for a financial asset to be socially recognized as a means of settlement, it is crucial that the asset can be transferred at low cost, high speed, and adequate safety and security. In order to make it happen, a system to transfer the assets needs to be established. Before the inter-bank networks were established worldwide, bank deposits could not really be means of settlement; in other words, only the system of inter-bank networks enabled the simple bank deposit to act as a means of settlement. Such system for the transfer of means of settlement is called a 'settlement system'. As a settlement

system reflects the recognition of the society, its form is decided by the trade practices and technologies available at each time in each country. When there is a technological breakthrough, the settlement system can be deeply impacted.

The basic structure of settlement system is defined by three steps in the process– payment, clearing, and settlement. (1) Payment is a process where a payment order is sent and received between banks and thereby debts and credits of customers are transformed to debts and credits of banks. (2) Clearing is a process where the payment orders are aggregated to calculate the net amount of settlement. (3) Settlement is a process where the net amount calculated by clearing process is transferred with finality. The finality is granted by the posting on the central bank's accounts.

To enable the above processes, you need two inter-bank systems. One is a message switching system which processes the data between private banks. The other is a central bank's settlement system which provides finality. To cite a case in the US, the Automated Clearing House (ACH) is a message switching system, and Fedwire (Federal Reserve's wire transfer system) is a central bank's settlement system.

Recent Improvements in Settlement System

As mentioned above, when there is a technological breakthrough, a settlement system can be impacted. The settlement systems have been deeply impacted by the recent breakthrough of information technology. Central banks can store and process information much larger than we could imagine before, and each bank participating the settlement system can send / receive information much faster than ever. Five trends can be observed in the recent improvements in settlement systems: (1) Central banks' RTGS (Real-time Gross Settlement), (2) Netting, (3) Link with securities settlement system, (4) Micro Payments, and (5) Financial EDI.

(1) Central banks' RTGS

The efforts to enhance settlement system have been set out to reduce risks which are involved in settlement transactions. One of the big risks in settlement transactions

resides in the time between initiation of payment order and its settlement with finality. In Real-time Gross Settlement (RTGS) system, the risk can be eliminated by finalizing the settlement as soon as the payment order is initiated. Since the last half of 1990's, RTGS system has been rapidly spread among central banks. EU countries have also migrated their settlement systems to RTGS.

(2) Netting

Netting is a powerful tool to reduce settlement risk. It is already used by some supply networks in their operations. Information sharing among trading partners is primarily meant for optimizing material flow and information flow. Using standard data format, partners can reduce handwritten documents and paper-related workloads. Monitoring material flow by real-time, they can reduce communication overheads and inventories. However, by sharing information among trading partners, their account payables and account receivables can be offset to reduce banking charges and risk exposures.[3] Banks, on the other hand, are experienced in netting in their own settlement system; the experience that be applied for settlement within supply chain network is therefore a key value proposition for banks.

(3) Link with securities settlement system

As the transactions of marketable securities increase, the securities settlement systems evolved accordingly. A securities transaction is usually settled in a "Central Securities Depository (CSD)", which serves safekeeping and book-entry settlement for participants. The operation CSD has been different in each country. Fedwire (US) and BOJ-NET (Japan) treat government bond only, but offer both fund settlement and securities settlement, so that the two settlement system are closely linked. CSDs in European countries treat various securities (government bonds, corporate stocks and other securities), but did not offer fund settlement. Therefore European countries promoted the link between fund settlement and securities settlement and the integration

[3] Case of "parts sourcing of Camera assembling plant" coordinated by Mitsui & Co., Ltd http://www.mitsui.co.jp/

of CSDs in 1990s. (Now there are two giant international CSDs in Europe; Clearstream and Euroclear.)

The link between fund settlement and securities settlement offers two merits. One is Delivery versus Payment (DVP). Linked with central bank's RTGS system, the delivery of securities and the delivery of fund are simultaneously executed with finality, so that the delivery risk is minimized. The other is the link between fund and collateral. The collateral to/from the central bank and the lending to/from the participants can be executed simultaneously.

These operations in CSD are the links between material flow and cash flow. If the material flow in a supply chain is standardized and securely operated like that in CSDs, it is expected that the operation style of CSD can be applied to the supply chain.

(4) Micro Payments

With the advent of Internet and mobile communication technologies as infrastructure of business, the convenience of settlement service has been dramatically enhanced. Various communication services are available anytime and anywhere, and various models of settlement business have been emerging within the existing infrastructures. As cash and paper-based settlements are being replaced by electronic settlement methods, the settlement service industry is thus transforming on a global scale. In the United States, for example, settlement with checks has been gradually decreasing since mid 1990s down to just 55% of total micro payments (excluding cash). Further, though plastic card settlement accounts for a large share of micro payment business, mobile settlement, e-Wallet and Pier-to-Pier internet settlement also show strong growth ; however, in general these services are extremely competitive, low-cost alternatives, and indeed many of these firms are struggling for survival in their sectors.

In small cross-border remittance business, banks are working to reduce cost and processing time by linking clearing houses in different countries. Until recently, each country had its own electronic settlement system named "Automated Clearing House (ACH)" and it treated domestic settlement only. Thus each bank had to use its own network with other overseas banks to relay the fund. However, remittance transaction is

growing in number and fierce competition is driving down the remittance fee. Thus the low-cost cross-border settlement method has been required in industry-wide basis. There are several projects to link or consolidate ACHs in Europe. In the United States, NACHA[4] is working to establish a global small settlement system by linking ACHs in many countries.

(5) Financial EDI

Business-to-business communication accelerates the introduction of Electronic Data Interchange (EDI). As EDI becomes prevailing in material flow such as order and delivery, the need to incorporate information flow and cash flow in the EDI arises. Business customers of banks continue to demand for the ability to transfer their EDI data through the settlement network among financial institutions so that the flow of material and auxiliary information can be processed together with the settlement information. Such systems are often commonly called Financial EDI. To comply with the demand, some settlement systems have started to incorporate Financial EDI. ACI in the US started to offer EDI service in early 1990s, CHIPS in the US started EDI service in 2001, whereas BACS in UK started it in 1998.

Financial EDI is thus a direct response by financial institutions to the demand from supply networks for greater and tighter integration between the flow of funds, the flow of information, and the flow of goods. Its evolution, however, depends on the existing infrastructure capabilities of traditional EDI in business-to-business communication. Therefore the introduction of financial EDI is not as active in countries where trade EDI is not yet pervasive. At the present stage, therefore, banks are just forwarding EDI data from business customers and not using the data contents of material flow and information flow.

[4] National Automated Clearing House Association

3 Critical Issues for Supply Chain Managers

Before discussing what a bank can do to play more value-added roles in supply chains, we need to review what supply chain management is, and what the key issues and priorities are for supply chain managers. Then we would look into the relevance between each key issue and each function of banking in the following chapter.

Simchi-Levi defines supply chain management in his book, "Designing and Managing the Supply Chain"[5]: "Supply Chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements." This definition would be beneficial for understanding the position of banking business in supply chain and thereby for ruling out issues irrelevant to banking business in my analysis. Supply chain management is an effort to integrate different businesses, and they are fundamentally connected by *merchandise*. I think however that the key word here is 'integrate'. Though each commercial transaction might expect little engagement of banking, once the transactions are integrated to become a more efficient system as is the objective of many supply chain managers, there might arise needs for optimization of financial transactions, just as there is a need for the optimization of logistics and distribution.

William T. Walker describes the basic building block of network flows in his book "Supply Chain Architecture"[6] in the following figure.

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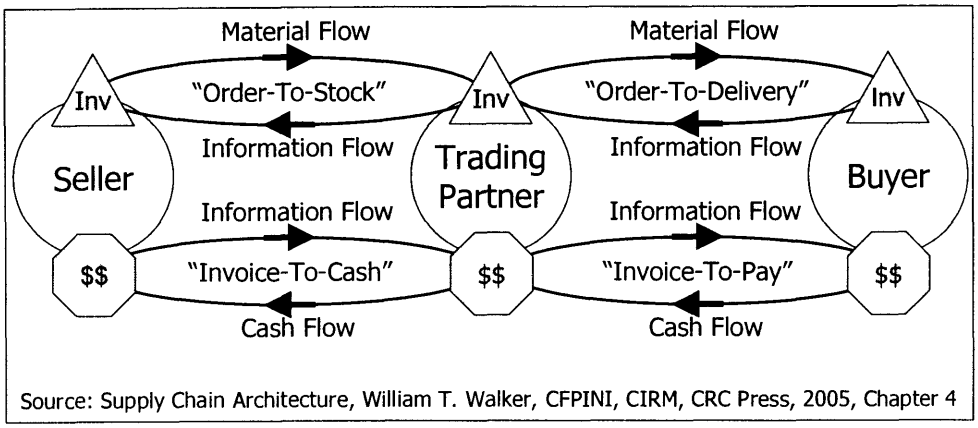
[5] Simchi-Levi, David; Kaminsky, Philip; and Simchi-Levi, Edith. "Designing and Managing the Supply Chain", McGraw-Hill/Irwin, 1999

[6] William T. Walker, CFPIM, CIRM, "Supply Chain Architecture: A Blueprint for Networking Flow of Material, Information and Cash", CRC Press, 2004



Source: Supply Chain Architecture, William T. Walker, CFPINI, CIRM, CRC Press, 2005, Chapter 4

Consider a network in which a single trading partner buys from a single supplier and sells to a single customer. The supplier and the trading partner each have starting inventory positions (the triangles in the above figure). They have independent inventories of products or components in their respective stocks. The product does not move as long as it remains in stock. The trading partner wants to deliver product to the customer and to replenish components from the supplier (the arrows of "Material Flow" in the above figure).

The customer and the trading partner also each have starting cash positions (the octagons in the above figure). They have independent inventories of cash in their respective bank accounts. The cash does not move as long as it remains in the accounts. The trading partner wants to receive a cash payment from the customer for the product and to make a cash payment to the supplier for the components. As the network operates, physical inventory shifts downstream toward the customer and cash shifts upstream toward the supplier (the arrows of "Cash Flow" in the above figure).

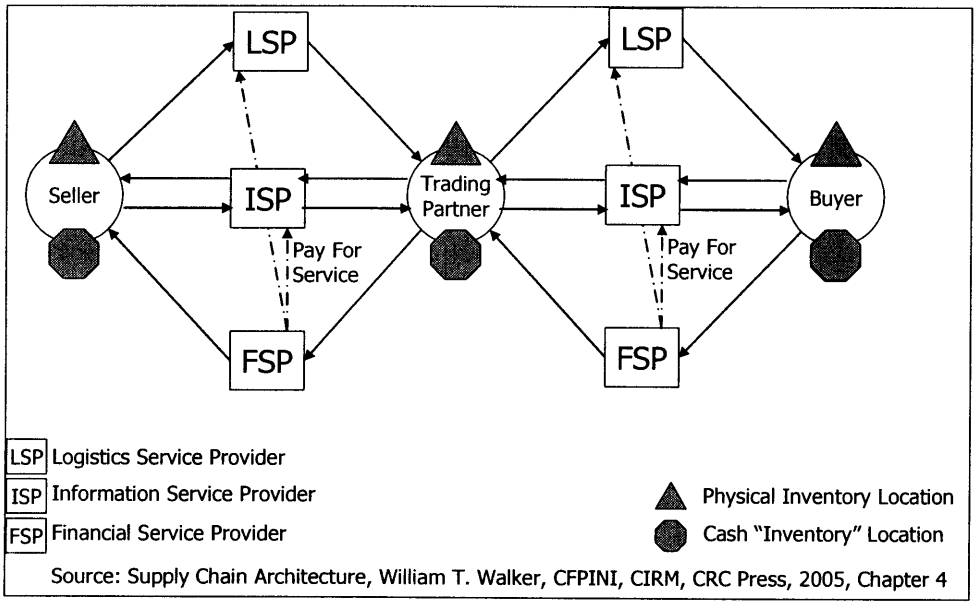
There are order-to-delivery-to-cash cycles connecting each pair of the trading partner's inventory locations and bank accounts. The cycle breaks down into four sub-cycles as shown in above figure.

- *The order-to-delivery subcycle* – They buyer's order (information flow) is paired with the trading partner's delivery (material flow). An order causes product inventory to flow from the trading partner to the buyer.

- *The order-to-pay subcycle* – The trading partner's order (information flow) is paired with the seller's delivery (material flow). An order causes component inventory to flow from the seller to the trading partner.
- *The invoice-to-pay subcycle* – The trading partner's invoice (information flow) is paired with the buyer's payment (cash flow). An invoice causes cash to flow from the buyer to the trading partner.
- *The invoice-to-cash subcycle* – The seller's invoice (information flow) is paired with the trading partner's payment (cash flow). An invoice causes cash to flow from the trading partner to the seller.

The network design must take into account these four sub-cycles for each of the trading partners. The completion of each sub-cycle is a requirement for the supply chain network to function properly.

Where do banks come into play? The answer is found by tracing each information-cash flow pair. Typically, Logistics Service Providers (LSPs) are required to complete the physical distribution flow connection, Information Service Providers (ISPs) are required to complete the information flow connection, and Financial Service Providers (FSPs) are required to complete the cash flow connection, as figure below.



It is often possible and highly desirable to use the same service provider in support of several trading partner sub-cycle loops. For example, large-freight forwarders

and third-party logistics service providers (3PL) can provide regional or international coverage across multiple modes of transportation. On the other hand, some logistics companies specialize in handling certain regions (like Latin America) or specialized modes of transportation (like ocean-rail intermodal transport). Consolidated business drives lower costs, increased flexibility, and a greater willingness by the LSPs to invest in information system connections and standardized performance measures.

By the same token, it is expected that banks can provide regional or international coverage across multiple modes of settlement. They also can specialize in handling certain regions or specialized modes of settlement. Based on this assumption, my approach from banking business to supply chain is to review the key issues in supply chain management and then analyze the relevance to the functions of banking discussed in the previous chapter. The book of Simchi-Levi introduces seven key issues in supply chain management; (1) Distribution Network Configuration, (2) Inventory Control, (3) Distribution Strategies, (4) Supply Chain Integration and Strategic Partnering, (5) Product Design, (6) Information Technology and Decision-Support Systems, (7) Customer Value. And it analyses these issues from a large spectrum of a firm's activities, from strategic through the tactical to the operational levels:

- The strategic level deals with decisions that have a long-lasting effect on the firm. This includes decisions regarding the number, location, and capacity of warehouses and manufacturing plants, and the flow of material through the logistics network.
- The tactical level includes decisions which are typically updated anywhere between once every quarter and once every year. These include purchasing and production decisions, inventory policies, and transportation strategies including the frequency with which customers are visited.
- The operational level refers to day-to-day decisions such as scheduling, lead time quotations, routing, and truck loading.

3.1 Distribution Network Configuration

Manager of supply chain should select a set of warehouse locations and capacities, production levels for each product at each point, transportation flows between facilities, in such a way as to minimize total production, inventory, and transportation costs and satisfy service level requirements. This issue has traditionally seemed to be irrelevant to banking services, because it mainly discusses issues regarding the logistics network between production plants, warehouses, and retail facilities, and so on. Efficient configurations are typically reached by analyzing (sometimes complex) logisticsdata such as transportation cost structures, warehouse sizes, manufacturing limitations, inventory turnover ratios, inventory cost, and service levels.

However, in what follows, we show that logistics issues are indeed quite relevant in a supply chain setting to the participating financial institutions. An investment decision of a project is typically based on the analysis of net present value (NPV) from cash flows. Banks are used to analyzing a single firm's value on financial statements, rather than analyzing the effect of distribution network configuration change on the valuation of each player in the network. Understandably, it is often difficult to measure the effect of network configuration changes on the financial valuation of any firm within a network.

However, as an example, if a bank is convinced that a distribution configuration change can reduce the logistics cost by a certain amount, say, six million dollars, it can take this fact into account in its evaluation of Cash Flow and NPV for the network. Such figures can be obtained only through the in-depth analysis of complex elements in logistics. It is, however, not under the purview of banks to collect logistic information and determine optimal configurations. Thus the question for interested financial institution is: what information and analytical skills would banks need to have in order to be convinced of any suggested effects of structural changes in supply chains, or when and how often they should review such information, towards their aim to monitor their investment projects within such supply networks.

3.2 Inventory Control

What can a bank do towards inventory control or indeed how can a bank derive a direct benefit from inventory management in supply chains? According to accounting theory, inventory is measured by the *inventory turnover ratio* calculated as cost of goods sold divided by the average inventory during the period.

$$InventoryTurnoverRatio = \frac{CostofGoodsSold}{AverageInventory}$$

Companies prefer to sell as much of their goods as possible with a minimum of capital tied up in inventories. An increase in the rate of inventory turnover between periods indicates reduced costs of financing the investment in inventory. On the other hand, management does not want to have so little inventory on hand that shortages could signal a loss of customers, thereby offsetting any advantage gained by decreased investment in inventory. Companies must balance these considerations in setting the optimal inventory levels and, thus, the accompanying rate of inventory turnover.[7] It seems the inventory turnover ratio is the only metric for a financial manager to evaluate the inventory and it is not sufficient to evaluate inventory management system in a supply chain. Turnover is the outcome of inventory management efforts by supply chain, not indicating any information of future inventory costs.

From the viewpoint of supply chain management, what metrics do they use to evaluate inventory management? Simchi-Levi introduces two rules of inventory management as follows; "Matching supply and demand in the supply chain is a critical challenge. To reduce cost and provide the required service level, it is important to take into account inventory holding and set-up costs, lead time, and forecast demand. Unfortunately, the so-called *first rule* of inventory management states that *forecast demand is always wrong*. ... The *second rule* of inventory management is that *aggregate demand information is always more accurate than disaggregate data*. That is, aggregate demand data has much smaller variability...."[8] The two *rules* of inventory management

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[7] Stickney, Weil, "Financial Accounting", South-Western College Pub; 10 edition, 2002, Chapter 5
[8] Simchi-Levi, David; Kaminsky, Philip; and Simchi-Levi, Edith. "Designing and Managing the Supply Chain", McGraw-Hill/Irwin, 1999

suggest that the uncertainty can never be eliminated, but can be captured with statistical probability approach.

It is difficult for a bank to be involved with the decisions regarding inventory levels, because a bank is positioned as a service provider in the network, and far too distant from the information to be analyzed (such as end-customer demand). On the contrary, a bank might receive information from within the network to generate value. The uncertain but statistically aggregated demand information contains opportunities in risk hedging through financial technologies. By closely and frequently communicating with the network, a bank may be able to provide sophisticated risk hedging services which are seamlessly integrated with other services such as settlements.

Thus it is worthwhile to look into the practice of inventory managers, to consider the possibilities of support from financial institutions. According to the survey to materials and inventory managers about effective inventory reduction strategies, the top five strategies are as follows:

- Review inventory periodically to identify slow-moving and obsolete products and to decide on the order size each time.
- Tightly manage usage rates, lead times, and safety stock to keep inventory at the appropriate level.
- ABC approach. Classify items into three categories of A (account for 80% of sales), B (next 15% of sales), and C (last 5% of sales); Review Class A most frequently and reduce the frequency for Class B, and then Class C.
- Reduce safety stock levels by reducing lead time.
- Find the right balance between inventory holding and ordering costs.

3.3 Distribution Strategies

The literature on supply chain management discusses distribution strategies in terms of mechanisms that are most suited to a particular supply chain. Direct shipment, warehousing, and cross-docking are three distinct distribution strategies.

In *Direct shipment* strategy, items are shipped directly from the supplier to the retail stores without going through distribution centers. *Warehousing* is the classical strategy in which warehouses keep stock and provide customers with items as required. In *Cross-docking* strategy, items are distributed continuously from suppliers through warehouses to customers. However, the warehouses rarely keep the items for more than 10 to 15 hours. Each strategy has its own pros and cons from various viewpoints; for example from the point of view of risk pooling, transportation costs, holding costs and allocation and so on.

3.4 Supply Chain Integration and Strategic Partnering

Once a bank decides to become an involved decision-maker and partner in a supply chain, it becomes a part of strategic alliance. Here I use a framework for analyzing strategic alliance introduced by Jordan Lewis[9], to consider the kinds of supply chain related strategic alliances which a bank may be able to forge.

Adding Value to Products

As a bank does not have the expertise to impact the product development process (other than through capital investments), it cannot contribute to a supply chain at strategic or tactical level, in terms of the core product positioning or marketing issues such as enhancing time to market, distribution times, or repair times to help to increase the perceived value of a particular firm. At the operational level, however, there may be a possibility that a bank could add value to products. When there is some operational inefficiency in the logistical or commercial flows due to the delay of financial transaction, financial institutions may be able to add value to the product flows by simply eliminating or mitigating the impact of such inefficiencies. For example, if a supply chain is delayed due to reconciliation of a number of fulfilled orders with accounts payable or settlements, the delay may be eliminated by inter-connecting the relevant databases and monitoring for such discrepancies.

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[9] Lewis, J. "Partnerships for Profit" New York: Free Press, 1990.

Improving Market Access

This is an approach to use partnerships that lead to better advertising or increased access to new market channels. This approach works when the new market channels are meaningful for a product or service in the supply chain. To apply this approach to banking service, we need to find some market channels of banking industry in which financial service product can play a complementing role for a particular product or service. A typical application of this approach can be credit sales at retailer / dealer. However, this financial service is so simple that many manufacturers and dealers can easily provide it directly to their customers. They are closer to the product and to the customer than a bank, and so they are a better fit for providing such services. In order to compete with them in this field, a bank would need to offer some additional value which cannot be provided by others.

Strengthening Operations

Alliances between firms can help to improve operations by lowering system costs and cycle times by using facilities and resources more efficiently. This approach is discussed through issues related to operational efficiency, such as usage of warehouses and trucks. There seems to be no room for banks to contribute here.

Adding Technological Strength

Partnerships in which technology is shared can help add to the skill base of both partners. Also, the difficult transitions between old and new technologies can be facilitated by the expertise of one of the partners. Many new opportunities have high entry barriers. Partnership might enable firms to pool expertise and resources to overcome these barriers and explore new opportunities. This can be a good strategy for a firm which is trying to enter an unfamiliar market or technology. For a bank, however, it is unlikely to aim to open a new market in manufacturing industry or to develop a cutting-edge technological breakthrough. This approach is not discussed in this paper.

Enhancing Organizational Skills

Alliances provide a tremendous opportunity for organizational learning. In addition to learning from one another, partners are forced to learn more about themselves and to become more flexible so that these alliances work. As it seems to be a by-product rather than the main purpose of alliances, this approach is not to be discussed in this paper.

Building Financial Strength

Alliances can help to build financial strength. Income can be increased and administrative costs can be shared between partners or even reduced owing to the expertise of one or both of the partners. Alliances also limit investment exposure by sharing risk. As we mentioned earlier in this chapter, integration of banking services with supply chain operations is a critical factor for banks to value creation and differentiation from other new entrants. On the other hand, integrating the supply chain is quite difficult because of its dynamics and the conflicting objectives employed by different facilities and partners. Generally, the key to a successfully integrated supply chain is information sharing and through this, better operations planning. Then, how a bank can integrate its services into a supply chain? This is a common question which is posed by and for each partner in a supply chain. The question is broken down to following sub-questions:

- What information should be shared and how should it be used?
- How does information affect the design and operation of the supply chain?
- What level of integration is needed?
- What types of partnerships can be implemented
- Which type should be implemented for a given situation?

The above questions from a viewpoint of banking services will be investigated in chapter 5.

3.5 Product Design

Product design is so far away from the sphere of influence of financial services that it seems to be irrelevant to the purpose of this paper. It is, however, worthwhile to look into this issue because product design could rank among the most decisive factors for example, manufacturing supply chains, in determining their customer value and effectiveness. To enhance the effectiveness of logistics, products are designed for efficient packaging and storage, for reduction of manufacturing lead time, or for postponing product differentiation. To achieve this, it becomes critical to integrate partners in the supply chain into the product design process. Suppliers are the most important partners for product design, but banks are not necessarily required here.

Another important concept in product design is "Mass Customization" introduced by Joseph Pine II[10]. Mass customization involves the delivery of a wide variety of customized goods or services quickly and efficiently at low cost, while in the past, there had been a trade-off between mass production (with low-cost / low-variety) and craft production (with higher-cost / higher-variety). To implement mass customization, there are several key success factors; modules and processes must be linked together very quickly (*Instantaneousness*), the linkages must add little cost to the processes (*Costless*), the linkages and individual modules should be invisible to the customer (*Seamless*), and networks must be formed with little overhead (*Frictionless*). And the key to making mass customization work is highly skilled and flexible workers, processes, and modular units, so that managers can coordinate and reconfigure the modules to meet specific customer requests and demands. As this concept of mass customization in general can be applied to any of the service interfaces within a supply chain, these success factors are also relevant when we consider the integration of banking services with supply chain operations.

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[10] Pine, J.B. II. "Mass Customization" Boston: Harvard University Business School Press, 1993.

3.6 Information Technology and Decision-Support Systems

Information technology is a critical enabler of effective supply chain management. Indeed, much of the current interest in supply chain management is motivated by the opportunities that appear due to the abundance of data and the savings that can be achieved by sophisticated analysis of supply chain data. The issues related to information technology in supply chain management are:

- Data to be transferred and the usage of the data
- Consideration of the impacts of Internet and e-Commerce
- Infrastructure (internal and external)

Data to be transferred and usage of the data

Though the data composition may be different for a given supply chain, in a given industry, and in a given country, I am going to focus on generic data configurations in this paper. This application will be discussed at some length in chapter 5.

Consideration of the impacts of Internet and e-Commerce, and Infrastructure

Financial EDI: As described earlier in chapter 2, financial institutions are required to follow industry-wide trends in Electronic Data Exchange (EDI). The demand from their customers is that financial settlement network should be able to transfer commercial distribution data (e.g. billing details etc.) as well as settlement data (payment order). For example, if a notification of credit and its billing data can be received in electronic form, the company can save considerably on the workload of accounts receivable reconciliation. In the United States, ACH started EDI service since early 1990s and the transaction volume has been rapidly increasing. CHIPS started EDI service in 2001. In the United Kingdom, BACS started an EDI service named REMIT from 1998. Though this trend is called 'financial EDI', electronic data transferred within such an infrastructure is not yet utilized for service enhancement or for value-add by banks. For example, CHIPS EDI message can transfer (1) UN/EDIFACT format, (2) ANSI X.12 format, (3) S.W.I.F.T. format and (4) proprietary format agreed with counterparties. Thus

it can practically convey any format. Yet, currently, CHIPS performs only simple validation checks (data size, character set etc.) but does not check the content of EDI data. Such freedom in format may be convenient for the member banks to implement EDI format which is demanded by their customers. However, it is also implied that banks are not interested in using the data because they were passively prompted by their customers and did not have spontaneous motivations. In another sense, this trend is good for a bank that wants to exchange data in a supply chain with financial settlement systems, because it provides relevant infrastructure for implementing such processes.

RFID technology: Consumer products industry giants started to look RFID technology as an elaborate infrastructure for supply network. RFID stands for radio frequency identification, and is a technology that has existed for several decades. At a simple level, it is a technology that involves tags that emit radio signals and devices called readers that pick up the signal.[11] In June 2003 the world's largest retailer, Wal-Mart, announced that it will require its top 100 suppliers to install RFID tags in the goods sent to its distribution centers starting in January 2005. A few months later Sun Microsystems, Inc. announced that it will open an RFID test center where Wal-Mart suppliers can test their RFID solutions to guarantee compliance with the Wal-Mart standard. Another huge operator, the US Department of Defense, announced in September 2003 that it too will require its suppliers to apply passive RFID tags to their shipments. Such statements by these enterprises – especially Wal-Mart, which is widely recognized as a technology catalyst in this field – creates significant momentum in the field. RFID is an enabling technology for tracking material flow in supply chain. Being able to track individual pallets automatically and accurately would enable material handling companies to reduce the number of pallets in circulation, charge customers appropriately for their use on an individual pallet basis, and better maintain the pallets.

[11] EPCglobal Inc. http://www.epcglobalinc.org/

Similarly, transportation and logistics companies will be able to track returnable containers and racks, thereby improving the utilization of these items.[12]

The real-time tracking of material flow by RFID enhances information flow and cash flow as well. Before RFID, buyers received information in the form of expected delivery date and time as a shipment notice from trading partners in advance of actual shipment, and received information in the form of actual delivery date and time after the delivery. Through RFID, buyers may indeed know of the delivery of products immediately after the delivery time. Thus the core of the operations function (shipping, receiving, payments, etc.) is improved and an immediate audit trail is enabled. As referred to above, payment order can be linked with actual delivery information by RFID. Though this is one application of RFID for financial service providers in supply chains, it is indeed implies a passive role for banks because the payment order is initiated by the trading partners rather than by financial service providers.

3.7 Customer Value

The way companies measure the quality of their product and services has evolved from internal *quality assurance* to external *customer satisfaction* and from there to *customer value*. Internal quality measures, such as the number of defects, dominated company goals in the era of supply-driven manufacturing. Customer satisfaction concentrated on the company's current customers and their use of a company's product and impression of its service. The current emphasis on customer value tries to establish the reasons a customer chooses one company's product over another's, and looks at the entire range of products, services, and intangibles that constitute the company's product and image.

Dimensions of Customer Value: What determines customer value in different industries? The customer perception can be broken down into several dimensions; the ability to offer what the customer wants and needs, product selection, price and brand,

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[12] Yossi Sheffi, "RFID and the Innovation Cycle", Research Report, MIT Center for Transportation and Logistics, Cambridge MA 02139, 2004; pp 10.

value-added services, relationships and experiences. There are a lot of arguments as the correct approach to achieving higher performance along each dimension, but in this paper I am going to focus on customer value added through financial services. Value-added services can be a major factor in a customer's decision to purchase a product. When only the price matters and all other features are identical, profitability and competitive advantage of products are eroded since the firm's products essentially do not have an edge in the market. Thus the company needs to get closer to the customer to be able to understand how to differentiate their products. The improvement in information technology capabilities indeed makes this approach possible for many supply chains. In order to support this objective, information access has become an important value-added service. Customers value visibility of information with significant premium for the provider of the information; for example a customer might reward the service provider for the information regarding the status of an order. Providing financial information along with the status of an order can be an even larger value-added service, and the service is possible when financial information is matched with commercial or logistic information within a supply chain.

When relationship between the company and its customers acquires greater depth, customers become more loyal to the company, because the customers have invested their time to establish the relationship with the company. Relationships with customer also become valuable when companies build specific user profiles and utilize this information to enhance sales as well as to retain customers.

Customer value measures: Because customer value is based on customer perceptions, it requires measures that begin with an understanding of customer needs. Even supply chain performance, in this logic, needs to be measured with respect to customer value. Service level is usually related to the ability to satisfy a customer's delivery date because delivery performance and availability is so critical to success in today's markets. Setting the right service levels also requires an understanding of customer value. When customers prefer low cost, information, or customization to immediate delivery, we may drop the service level of delivery date while enhancing the other dimensions of the service provided.

Customer satisfaction can be measured in several ways. Surveys are used to measure sales performance and to feedback for necessary improvement. However, as

they are measured at the selling point, it does not say enough about how to retain customers. Thus it becomes more important to measure Customer Loyalty by analyzing patterns of customer repurchase and customer defections. Analyzing customer defections is more difficult than analyzing customer repurchase, because dissatisfied customers can cancels an account so that one cannot deal with them in the future to understand the change in their behavior.

Measuring supply chain performance needs criteria for performance measures that apply not only to individual partner, but also the combined efforts of these partners. Thus standardization initiatives such as the SCOR model have been developed. SCOR (Supply Chain Operations Reference Model) has developed a set of metrics for supply chain performance. Table 1 lists examples of metrics used to evaluate supply chain performance in SCOR. They are good examples of supply chain metrics and have the potential to become an industry standard. As noted above, however, the weight of each measure should be evaluated separately and carefully for each company according to its own unique environment.

Table 1 : SCOR Level 1 Performance Metrics

Performance Attribute	Customer-Facing			Internal-Facing	
	Reliability	Responsiveness	Flexibility	Cost	Assets
Delivery performance	✓				
Fill Rate	✓				
Perfect order fulfillment	✓				
Order fulfillment lead time		✓			
Supply-chain response time			✓		
Production flexibility			✓		
Supply chain management cost				✓	
Cost of goods sold				✓	
Value-added productivity				✓	
Warranty cost or returns processing cost				✓	
Cash-to-cash cycle time					✓
Inventory days of supply					✓
Asset turns					✓

Source: Supply-Chain Council, Overview of SCOR Version 5.0[13]

[13] http://www.supply-chain.org/slides/SCOR5.0OverviewBooklet.pdf

Usage of information technology in enhancing customer value

Information technology has produced many valuable benefits for customers. They are categorized in three different dimensions: the opening of the information boundary between the customer and the firm, the use of information to learn about customers, and the enhanced business-to-business interaction capabilities within supply chains. Opening databases to customer inputs enhances customer value (typically through a value-added service) while reducing costs for the supplier of the information. ATM and voice mail are the examples in early stage. The Internet, for example, allows users to access their accounts and perform transactions from any location at any time. Here the information channel or sink is part of the product. Internet has also had some effects. Intangibles such as brand, service capabilities has become more important because customers have become accustomed to ordering products from unseen sales people over Internet. Customer expectation has increased because customers can compare similar products and services over Internet. Moreover, the information captured in the supply chain allows companies to learn about customers. It can be used for statistical analysis of purchasing patterns, or for tracking each individual customer's preferences and requirements.

Thus, information technology allows companies to improve the performance of their suppliers and service providers. By sharing information with their partners, companies are also to outsource important functions or business processes while retaining control over partner actions, and thereby reducing costs in the supply chain.

4 Challenges for Traditional Banks in Their Domain

In the previous chapters, I have reviewed the functions of banks and supply chain managers based on the existing literature on the topics. In this chapter, I examine the competitive challenges to banks arising from the recent changes in supply chain and financial governance structures. Our motivation for doing so is to present further evidence of significant opportunities for financial institutions to explore the common ground between banks and their supply chain partners to create the next generation of financial services.

4.1 Internet Challenge

In his thesis "Changing Capital Market Industry Structure: The Internet Challenge to Incumbent Leaders"[14], David Berray analyzes the competitive strategy of investment banks against their new entrants which take advantage of information technology which has become available for anybody. Though his analysis focuses on capital markets, it represents well the challenges for the whole banking industry. Berray compares the legacy model (pre-Internet) and the new model (post-Internet) using Porter's Five Forces model[15] as follows.

Table 2: Porter's Five Forces for past and present of investment banks

	Legacy Model (pre-Internet)	**New Model (post-Internet)**
Rivalry	Stable Limited competition of price Acquisition for scale and scope	Intensified by new entrants without scale or scope Open competition of price
Suppliers	Issuers of debt and equity Fragmented and had little bargaining power	Empowered by Internet Trying to bypass banks
Buyers	Investors could not find optimal price due to inefficiencies of market	Inefficiencies of market fade by the connectivity of Internet / ECN[16] threats existing players
Entry barriers		Fallen

[14] Berray, David, "Changing Capital Markets Industry Structures: The Internet Challenge to Incumbent Leaders", MIT Sloan School of Management, 2000
[15] Porter, Michael, "Competitive Strategy", Free Press, 1980
[16] Electronic Communication Network

	Legacy Model (pre-Internet)	New Model (post-Internet)
		Infrastructure, capital, technology become inexpensive
Economies of scale	High	Internet offers the greatest scale of distribution imaginable
Substitutes	Few Concentration of liquidity was preferable	ECNs, online brokers and online issuers
Complementors	Exchanges, institutional investors and information agencies	New complementors fill in links in the value chain of ECNs and online issuers

The thesis describes the industry as mature incumbent investment banks challenged by the Internet-enabled new entrants. He discusses that vertical integration and horizontal consolidation have come to dominate structure of investment banking industry until very recently, but this trend has been reversed by Internet technology. While the incumbent big banks are proposing value to the customer by utilizing the Internet for their integrated financial services very effectively, customers preferred free choice and power of aggregation enabled by Internet rather than being loyal customers of a specific bank. Thus, as a whole, the industry is expected to shift from vertical integration and horizontal oligopoly to a more modular and decentralized phase of industry development.

According to the market research by Merrill Lynch quoted in the thesis:

"Traders will use automated solutions for vanilla transactions, and will prefer them if they are cheaper and/or more efficient. Yet, in order to guarantee service for large, complex, or otherwise sensitive trades, professional money managers will continue to rely on trust based human agents. Merrill's own conclusion was "Simple trade execution and research are top "E" needs, but don't lose the personal touch." " Berray observes that "information inefficiencies may be eliminated by the web, but information overload will be a growing issue. Trusted agents and advisors will be valued and will be able to get paid for the value they create."

Thus the prescription of the thesis is that the strategy for incumbents should provide "truly value-enhancing client services" and create positive feedback loops where

value to both supplier and client continues to grow with repeated iterations with the achievement of a trusted-agent relationship with the client.

4.2 Challenges from Supply Chain Innovators

Back to the relationship of supply chain and banking, I am going to review the threats to banks from innovators who have seen an opportunity to introduce new financial services to their customers that are in direct competition to those offered by the traditional financial institutions. Here I take UPS, United Parcel Service, as an example of such innovators and see what can be taken as threats for banking industry.[17]

UPS Capital

Founded in 1907 as a messenger company in the United States, today UPS has become the world's largest package delivery company and a leading global provider of specialized transportation and logistics services. UPS has grown in its domain as a logistics and shipping company, and now operates an international small package and document network in more than 185 countries and territories, spanning both the Atlantic and Pacific oceans. By the late 1990s, UPS had begun to branch out and focus on a new channel, services. The company's expertise in shipping and tracking positioned it to become an enabler of global commerce, and a facilitator of the three flows that make up commerce: **goods, information, and capital**. To fulfill this vision of new service offerings, UPS began strategically acquiring existing companies to serve its customers in a new way.

By providing unique or tailored supply-chain solutions, UPS allowed its customers to better serve in turn their own customers, and reserve their focus on the core competencies in their business area. In 1995 UPS formed **UPS Logistics Group** to provide global supply chain management solutions and consulting services based on customers' individual needs. Later, in 1998 **UPS Capital** was founded with a mission to

[17] UPS website: http://www.ups.com/content/us/en/about/index.html

provide a comprehensive menu of integrated financial products and services that enable companies to grow their business.

UPS has become an expert in global distribution. At UPS, global distribution involves managing not only the movement of goods, but also the flow of information and finance that moves with the goods. UPS customers increasingly asked to tap into this expertise, which ultimately led to the formation of **UPS Supply Chain Solutions**. UPS Supply Chain Solutions is a streamlined organization that provides logistics, global freight, financial services, mail services, and consulting to enhance customers' business performance and improve their global supply chains. UPS Supply Chain Solutions are delivered by UPS Capital, UPS Logistics Group, UPS Freight Services, UPS Mail Innovations and UPS Consulting.

UPS does not define itself as a mere Logistics Company. It views its business as a total support of global distribution, and financial services are inevitably included in their scope. UPS Capital offers a portfolio of financial services including working capital, long-term financing, equipment leasing and other finance-related services to help companies accelerate cash flow, grow globally, minimize risk, leverage assets and obtain financing.

Smoothing Cash Flow – *Collect on Delivery (C.O.D.)* is a service option through which UPS offers collects payment for the goods from the buyers upon delivery. UPS customers can have payment remitted within a week to 10 days after delivery of goods. UPS Capital provides enhanced services of C.O.D. Automatic (funds transfer within 2~3 business days and daily status reports) and C.O.D. Secure (guaranteed payment up to a pre-determined limit).

Asset-based loans provide working capital by leveraging the assets of customer's business. The value, quality and liquidity of the business assets determine the loan amount for which the business can qualify. This lending tool is a way to accelerate cash flow and help the customer operate during seasonal periods or difficult cycles. UPS Capital also offers Lease and Credit Card. Furthermore UPS Capital provides *advances of account receivables* for closely integrated customers. In the financial services and logistics agreement between UPS Capital and Eurofrut, one of Europe's largest fruit

importers and distributors, UPS Capital advances the customer up to 85% of the value of the invoices within one day of its receipt of the documents, which greatly increases the customer's cash flow and enables it to pay the fruit growers much faster. This is enabled by co-working with Fritz, another UPS company, managing the customer's distribution chain.[18]

With the global network of UPS group, UPS Capital *uses the inventory as collateral* to extend loans to its customers. Scovill, a producer of fasteners, snaps and buttons, had problems financing its increasingly international operation for years. As labor has become cheaper abroad for clothing manufacturers, suppliers of clothing inputs such as Scovill have had to send their finished goods, produced mainly stateside, to their customers overseas in order to complete a sale. The crux of Scovill's problem is that once its finished goods went overseas, they could no longer serve as collateral for credit lines the company established with a number of traditional commercial banks. Traditional banks were not equipped to deal with receivables and inventories that are non-domestic. So it decided to bank with UPS. UPS Freight Services ships goods manufactured in the U.S. by Scovill to warehouses in Hong Kong and Texas. While storing the goods at the UPS warehouse, the UPS Logistics Group works to create distribution models to move the goods to Scovill customers in Asia and Mexico. UPS Freight then ships the goods to clothing within the next few days. UPS never loses control of the inventory and so it can continue to offer the working capital loans necessary to grow.

Managing Trade Risk – UPS Capital offers insurance services to mitigate risks which come with distribution: Cargo Insurance, Credit Insurance, and a variety of customized protections.

International Trade Support – UPS Capital offers Receivables Management Services, in which UPS Capital assumes the risk of collections of accounts receivable so that customers may obtain quick access to cash. In the shape of loans, UPS Capital offers short-term loans for export working capital, finance to foreign buyers of UPS customer,

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[18] Euromoney Institutional Investor PLC, Trade Finance: 10(2), February 2002. ISSN: 1464-8873, "Eurofrut puts trust in UPS Capital's integrated solution."

finance for sales to the United States. It serves commercial letters of credit (L/C) through electronic system, and offers C.O.D. service for international delivery.

Small Business Lending – UPS Capital offers a variety of lending for small businesses. In August 2001, UPS acquired First International Bank, adding First International's structured trade finance and commercial lending programs to the supply chain financing capabilities of UPS Capital, and it became the top 10 of the nation's Small Business Administration lenders.

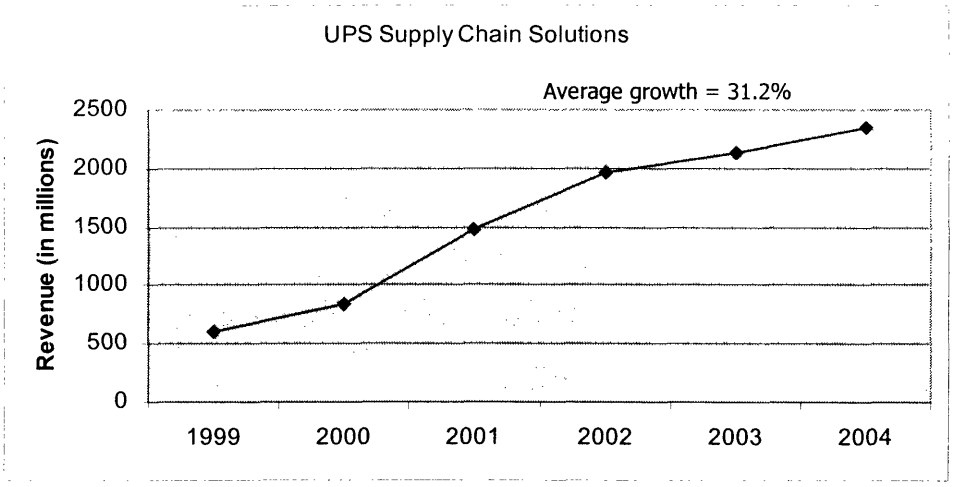
Threat of UPS Capital to incumbent banks

The above financial services of UPS Capital are all related, directly or indirectly, to distribution services required by supply chains. UPS approaches financial service business focusing on the synergy effects with distribution service, its core business. Considering its focus on serving for small-to-medium-sized enterprises, the UPS strategy is to provide incentives to SMEs to allow UPS to play the role of a supply chain orchestrator; in this sense, the UPS Capital strategy is not growth for its own sake, but to play as a promoter or catalyst for the integration of SMEs into the UPS network. Still, while the overall objective is to embed UPS solutions in the business processes of its customers and boost their shipping volume, financial services also can be a lucrative sideline for cash-rich companies like UPS. A prime example of the latter phenomenon for traditional brick-and-mortar companies is the case of General Electric's GE Capital Services unit.

On the other hand, traditional banks have not paid much attention yet to the critical logistics function in supply chains. For example, their financial analysis is based on financial statements at each term end, so that working capital on the balance sheet is captured as stock rather than in the form of flows. They have offered trade finance such as documentary bills and letters of credit, when customer needs have arisen. They have created funds transfer service on demand of customer. In terms of added value to supply chain, these services are triggered by customers needs, where banks have passively responded to their customer needs. This is in contrast to for example, the third party

logistics companies like UPS that have expanded their business scope to re-enforce their core business.

Is this business model a threat to incumbent banks? Yes. Because it encroaches upon the banks' mainstream business, such as short-term and long-term loans, trade finance, and funds transfer. And the threat is growing. They do not aim to take over the whole financial services business, but as their business grows, it will significantly intrude into the market share of incumbent banks. Revenue from UPS Supply Chain Solutions has expanded steadily at the average growth more than 30% in the past five years. Financial support services is supposed to be growing at least at the same pace, and as each supply chain expands in size, financial transactions volumes are also expected to increase correspondingly. What is even worse, from the perspective of banks, is that the customers are locked in the integrated service of logistics, information and financing.



Source: Quarterly Historical Income and Operating Data (http://www.ups.com/)

This type of entry into the financial services sector is not restricted to the case of UPS; rather the same expansion model may be (is being currently) duplicated by many firms that seek to better integrate the materials, information and cash flows in their networks. Thus, the pressure to promote operational efficiency through the confluence of these three flows is universal. Large corporations are developing financial products and services and offering then to their customers, especially to the SMEs, to ensure lock-in of

their business relationships. The banking industry has long enjoyed prosperity for without facing such threats to their core business model from outside the industry; this long period of peace and security may have caused some of the tendency to underestimate the new threats from their erstwhile supply chain partners. We hypothesize, that this tendency in part has allowed the rapid growth of, for example, the financial services arm of the logistic industry.

In order to avoid losing any more of their market share in this sector of financial services, traditional banks need to adapt to this new threat, and in a timely fashion. However, the banking industry faces several challenges in formulating an effective response, primarily because supply chain orchestrators or logistics companies are in a better position to integrate the financial flows with the material and information flows in their networks. Specialized skills in financial services do not form an entry barrier for logistics companies or supply chain coordinators, because they can even purchase banking firms to obtain expertise in financial services; foe example UPS acquired First International Bank to bolster its Small Business Administration lending business.

Thus the most effective means to co-evolve with supply chains appears to be greater partnership with these supply chain players. For those companies that aim to step into cash flow management function within their supply chain, integrating their systems to link material flow with cash flow is still a challenge. Here there is a need for more traditional expertise in financial services. While traditional banks have not found them promising, they allowed UPS to build a financial support system for the smaller supply chain players operating on the periphery of the supply networks. If banks approached supply chain management as an integral part of their core business model, they may be able to offer their services to supply chain players who may need to outsource part of financial services functions wherever scale economies of scale favor such a move.

The need for financial services in supply chain operations has by no means been completely fulfilled. Firstly, the market for such services is not yet saturated and there are yet a lot of companies that are still struggling to provide the kind of seamless integration of financial, materials, and information flows. Second, the coverage of financial services offered by supply chain coordinators is typically limited by geography. For example,

UPS offers "Exchange Collect", its international "Collect on Delivery (COD)" service, which covers shipments only to 17 countries (Australia, Austria, Belgium, Canada, France, Germany, Hong Kong, Italy, Malaysia, Mexico, Netherlands, Puerto Rico, Singapore, South Korea, Switzerland, Taiwan, and the United Kingdom[19]). Thirdly, there is still room for newer and more sophisticated financial services that can enable smoother supply chain operations.

Considering the field of opportunities available, and in order to deal with the threat from supply chain coordinators, banks need to move fast to exploit these unsaturated markets, and in particular in new geographies with unfulfilled needs. As financial services become integral parts of a supply chain, as much as logistic and information service providers currently are, banking institutions need to develop capabilities to access information from logistics and information flow in supply chains.

[19] UPS Capital website: http://capital.ups.com/solutions/exchange_collect.html as of March 10, 2005

5 Opportunities for Traditional Banks

In chapter 2, I listed four strategic drivers or success factors for banks; *transaction cost reduction, the creation of liquidity, the management and dissemination of information, and the settlement function*. In chapter 3, I examined seven critical issues for supply chain managers of supply chains; *Distribution Network Configuration, Inventory Control, Distribution Strategies, Supply Chain Integration and Strategic Planning, Product Design (Mass-customization), Information Technology and Decision-Support System, and Customer Value.* In chapter 4, I reviewed the general challenges that banking industry has come to face with the advent of Internet, and as a result of the emerging threat from traditional brick-and-mortar moving into the financial services function.

Strategic Drivers for banks	⇔	**Critical Issues for supply chain managers**
Transaction cost reduction (e.g. Economy of scale / scope)		Distribution Network Configuration (e.g. optimization of warehouse location)
Creation of liquidity (e.g. Deposit)		Inventory Control (e.g. demand forecasting)
Creation of information (e.g. Financial analysis)		Distribution Strategies (e.g. cross-docking, warehousing, direct shipment)
Settlement function (e.g. RTGS, Netting)		Supply Chain Integration and Strategic Planning (e.g. selecting data to share, choosing partners)
		Product Design (e.g. product with standard size, mass-customization)
		Information Technology and Decision-Support System (Infrastructure, key to differentiation)
		Customer Value (Metrics, Velocity)

Based on the review of literatures and the analysis thus far, this chapter looks at some possible financial services that are able to match the existing capabilities of the financial institutions, with the needs of supply chain managers as they address the various critical logistical issues in their own domain. The following table shows the range of services I propose in this paper that attempts to bridge this gap between the needs of supply chains and the offerings of the financial sector.

Proposed Financial Service	Strategic Strength of Banks	Issue Addressed in the Supply Chain
Synchronizing Material Flow and Cash Flow	Creation of Information	Distribution Network Configuration
Streamlining of Cash Flow – Accounts Receivable	Creation of Information; Settlement Service	Inventory Control Information Technology
Streamlining of Material Flow – Inventory	Creation of Information; Settlement Service	Inventory Control; Information Technology
Streamlining of Information Flow – e-Commerce	Settlement Service	Supply chain integration Information Technology
Application of Financial Settlement Systems	Transaction cost reduction Liquidity creation Settlement Service	Supply chain integration Information Technology
Strategic financing for the whole network	Creation of Information	Distribution Strategy
Mass customization	Creation of Information	Product Design (Mass Customization)

5.1 Synchronizing Material and Cash Flows

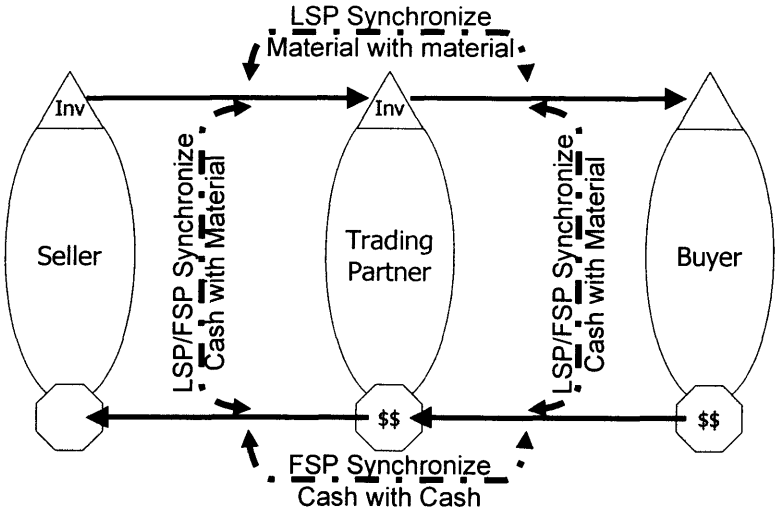
Referring to the figure in Section 2.4: for an efficient supply chain operation, managers aim to have some degree of simultaneity in the physical flow of products and material between supply chain players; for example a supply chain orchestrator will aim to have product deliver to a store front, even as the manufacturer delivers the next batch of product or materials to the intermediary inventory location (such as a wholesaler or distributor). However, in order for such synchronized physical flow of product to being implemented, we need to have a parallel and synchronized flow of cash in the supply chain. With only the order-to-delivery and order-to-stock sub-cycles synchronized, just half of that trading partner's order-to-delivery-to-cash cycle is synchronized. Thus, in a synchronized supply chain operation, there should be a parallel flow of cash out of each buyer's cash buffer and into each seller's cash buffer.[20]

The synchronization between different sub-cycles in a supply chain needs to be supervised by some responsible agent in the supply chain. Traditionally, this role has been assumed by the main player who is dominant among all of the trading partners in the supply chain; for example, in the past this company was expected to wield the baton

[20] William T. Walker, "Supply Chain Architecture", 2005, CRC Press, chapter 8

to coordinate its supply chain network. This type of supply chain management required strong leadership and/or negotiation skills to direct the attention the other partners towards the same target objectives. Firms such as Wal-Mart or Dell are examples of companies that have assumed this role within their supply chains. However, in the emerging models of governance, the synchronization or orchestration roles are being assumed by smaller players who strive for controlling smaller segments or networks within the larger supply chain.

The logistics service provider, or LSP, offers management of material flow and the accompanying information flows. As LSP has direct control over material flows, its role is best suited to achieving the objective of synchronizing material flows in different parts of the supply chain. The FSP on the other hand offers management of cash flow and accompanying information flows. As the FSP has direct control over cash flows, its role is best suited to achieving the objective of synchronizing cash flows in different parts of the supply chain. However, this still leaves us with the task of synchronizing the cash and material flows in the supply chain. Since neither the LSP nor the FSP has direct control over both the material *and* cash flows, there is therefore a need here for greater information sharing among LSP, FSP and all trading partners.



To make this schematic work, organizations need to embrace recent advances in business process solutions. For example, paper orders, paper invoices, and net 30 days terms need to make way to paperless orders, paperless invoices and synchronous cash payments. Even if the FSP can serve Electronic Funds Transfer (EFT) service to enhance

the synchronization, the overall velocity of cash flow depends on the policies of each trading partner in the supply chain. Therefore the overall impact of the services and solutions offered by the FSP depends on the technological readiness of each supply chain. Therefore the FSP need to choose its approaches to offering solutions to a supply chain, based on the readiness of various sections of the supply chain. For example, small and medium sized enterprises on the periphery of supply chains may not have the same level of technological readiness as the larger players controlling the supply chain.

Where supply chain players are already in the process of implemented processes with the objective of synchronizing or streamlining operations, there are possibly needs in those sections to synchronize the cash flow with material flow to further accelerate the order-to-deliver-to-cash cycle. The FSP can add value to such network by implementing, for example the EFT service and streamlining working capital as discussed in this chapter. Finally where sellers and buyers in a section of the supply chain are not yet synchronized in their material flows, the FSP may provide EFT to speed up sub-cycles around the customer, in the knowledge that the impact of synchronization would be local and limited. However, this would be an opportunity for the FSP to play a leadership role in the integration and coordination of the material and information flow between such partners.

5.2 Streamlining of Cash Flows – Accounts Receivable

Sources of operational profitability

In financial accounting terms, the rate of return on assets (ROA) measures a firm's operating performance based on how it uses its assets to generate earnings.

$$ROA = \frac{NetIncome + InterestExpenseNetofIncomeTaxSavings}{AverageTotalAssets}$$

ROA can be disaggregated into the product of two other ratios:

$$ROA = Profit\ Margin\ Ratio\ for\ ROA \times Total\ Asset\ Turnover\ Ratio$$

The total assets turnover ratio measures a firm's ability to generate sales from a particular level of investment in assets. The smaller the amount of assets the firm needs to

generate a given level of sales, the larger its ROA measure. The total asset turnover results from the turnovers of the individual asset components. The analyst generally calculates turnover ratios for accounts receivable, inventory and fixed assets. By increasing turnover ratios of these assets, a firm can increase its ROA and consequently its profitability.[21]

From this standpoint, the work of the LSP, ISP and FSP is a value-added service to reduce the amount of assets (inventory and accounts receivable) and thus to increase the profitability of trading partners in a supply chain. The LSP provides logistic services and attempts to enhance the efficiency of material flow in a supply chain; for example, inventory level are controlled by the LSP so that the physical materials move smoothly and with low risk. As LSP serves the effective operation of material flow which optimizes physical inventory level, so can FSP serve the effective operation of cash flow which minimizes the 'cash' inventory level (i.e. account receivable and account payable). Similarly, accounts receivable and accounts payable are essentially 'stocks' of cash, the FSP attempts to control the levels of the case buffers in order to smooth the flows in the supply chain. Let us then consider the current range of financial services for supply chains chain and then study the expanded roles for the FSPs in supply chains.

Utilizing expertise on hand

Financial EDI services are implemented in some financial settlement systems. They are meant to 'forward' information and the contents of EDI data are not interpreted in information system in banks. This scheme speeds up the inflow of payment orders, but does not add value by itself. Without additional value, trading partners have an incentive to switch between the FSPs in search of the lowest cost/ price offer. Even in this case, best price strategy may not help for long because the technology is widely available; even a small, inexperienced player can offer a better price when specialized within a niche network. Then, how can the FSP use the information stream in a supply chain to create additional value?

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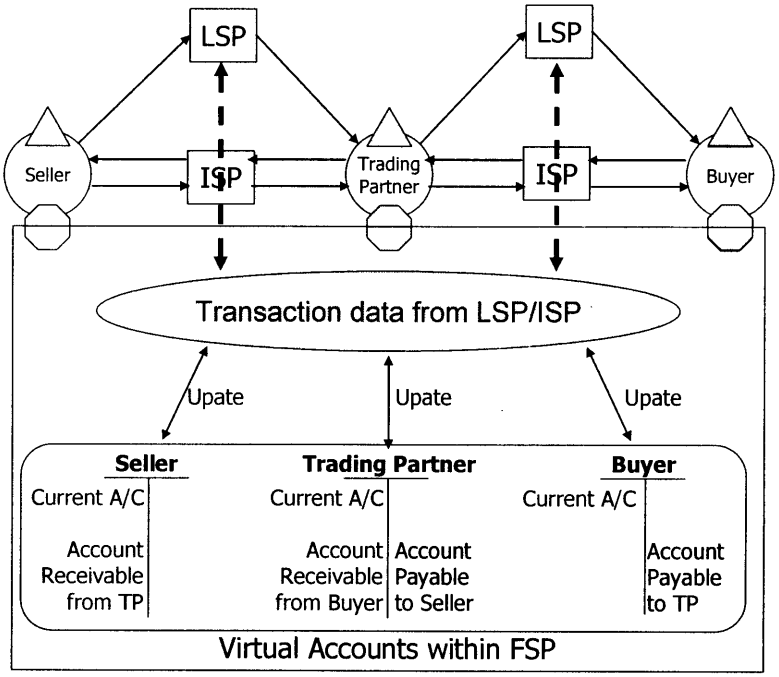
[21] Clyde P. Stickney, Roman L. Weil, "Financial Accounting", South-Western, 2003, chapter 5

Cash management service (CMS) is provided by some banks for customers who deploy branch offices nationwide and worldwide, so that customers can effectively monitor and manage their funds. Such services providers monitor the balances of customer accounts in various branches worldwide, and transfer funds automatically or manually to minimize the cost. CMS can be expanded to trading partners in a supply chain, if relevant transaction information is provided to FSP through the help of LSPs and ISPs. The FSP keeps the balances of working capitals for each trading partner in the supply chain. Upon receiving the information from LSP/ISP, FSP updates the balances accordingly and feeds back the result of the update to relevant trading partners.



In this scheme, the account entries occur within the database of the FSP. The system can be designed to update real bank accounts immediately after the data is received or in a specific time frame, according to the needs of the supply chain. The FSP may be able to allow account balance in red or to provide very short-term loan to optimize the cash flow of a supply chain. Or the FSP may be able to balance the account payables and account receivables between different trading partners. The design can benefit from the banks' experience of building and managing RTGS systems and Netting systems.

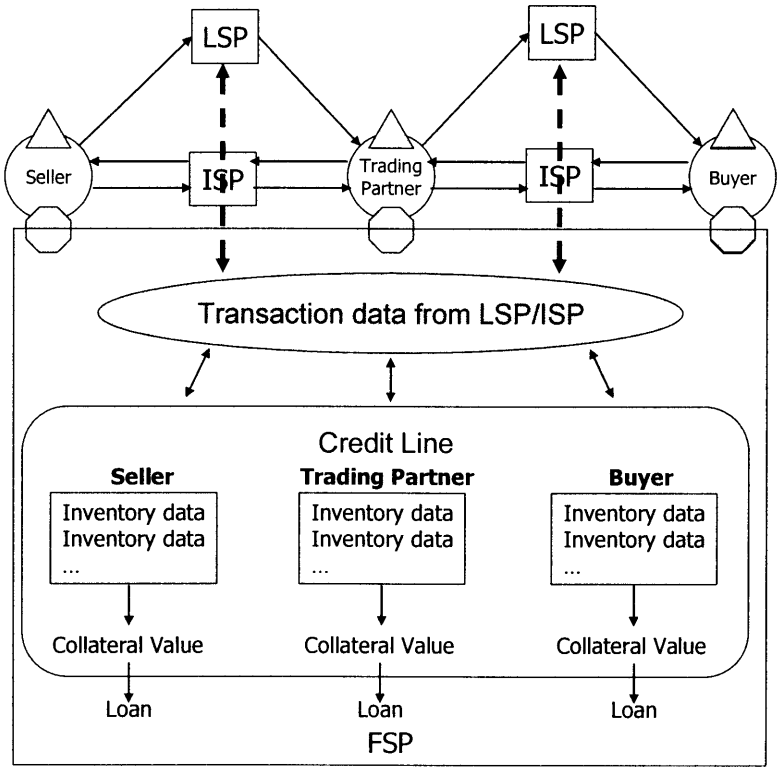
Advance Payment of Account Receivable

This service is already offered by UPS Capital (see the case of Eurofrut described earlier). The advance payment of invoices is based on the trust on other UPS Group companies. In the case of Eurofrut, another UPS company, Fritz manages distribution chain, handling the air freight; pick-and-pack; import and export documentation; transportation from Cape Town to the UK; and clearance through British customs. When the LSP provides the same service level of operational excellence and transparency to trading partners and the ISP/FSP in a supply chain as the case of UPS, it would be possible for banks to provide advance payment for account receivable to trading partners.

This service can be enhanced by monitoring the working capital of the debtor/creditor of the customer in the supply chain. Along with the expanded CMS service, FSP monitors and forecasts the working capitals of all trading partners so that it can calculate the amount of advance payment which can be provided within reasonable limits on credit risk.

5.3 Streamlining of Material Flows – Inventory Management

The material flow is primarily managed by the LSP. How can the FSP use the information on inventory levels in the supply chain? Once again, we provide the example of UPS Capital, whose operating schema uses the inventory as collateral. Using inventory as collateral increases the risk for the creditors, particularly when the goods are perishable or quickly become obsolete. Therefore the FSP needs to collect the required information to evaluate each inventory item as collateral: product number, lot number, date of manufacture, date of packing etc. These data are all available from the supply chain through LSP or ISP. As the data is provided almost in real time, the FSP can calculate the present value of inventory as collateral with product information such as best-before period, new product release, market price etc.



The loan based on this calculated collateral value can be flexibly applied to settle the account payables when the trading partner is in short of cash position. When a trading partner is short of cash, the cash flow within a supply chain stagnates at the point. This local shortfall of cash can cause chain reactions to its upstream / downstream partners and the whole supply chain may be impacted. In such a case, the initial cash shortfall should be repaired promptly to minimize the extent of the disruption to the whole system. This short term loan scheme is similar to schemes aimed at providing liquidiy in financial settlement systems. Principal member banks of these settlement systems have experience in to providing liquidities for emergency shortfall of cash in other banks and they have sophisticated financial techniques such as same-day SWAP to manage temporary disruptions. Banks have the possibility to apply such operational tactics in non-financial networks as well.

5.4 Streamlining of Information Flow – e-Commerce

Financial service providers offer a variety of services as e-Commerce businesses: Consolidated Payment Capabilities, Electronic Bill Presentment and Payment, Electronic Commerce Gateway, Electronic Invoice Presentment and Payment, Electronic Payment Collection System, Electronic Statement Presentment, Online e-Commerce Transactions, Payment Acceptance and Authentication etc.[22] These services are quite useful as tools for streamlining the "Invoice-To-Cash" and "Invoice-To-Pay" sub-cycles. However, there are two potential problems. One is the technology can be exploited by new entrants and hence, it reduces the barrier against new entrants to this field. Another is that the banks do not add values from the data stream developed.

E-Commerce services are indispensable as infrastructures of FSP in a supply chain, but banks need to bite into supply chain to add value for the network. When a bank plays an important role to enhance the whole supply process and is firmly tied with each trading partner, the bank can lock in them as loyal customers and lock out the other competitors. To achieve this, banks will need to understand the customers' supply chain enough to be able to offer suggestions for supply chain improvements. As UPS obtained the financial expertise by acquiring First International Bank, it may make sense for banks to seek partnership or acquisition of logistic companies to obtain expertise of dealing with material flow and consulting skills for supply chain network.

5.5 Application of Financial Settlement Systems

In traditional check clearing schemes, the amount on a check cannot be used by the beneficiary until the check is cleared at the clearing house. It took a few days to clear the check and it was a cause of delay in cash flow. Financial settlement systems have been developed for settlement speed, data security, risk management and higher transparency. These schemes are considered to be a form of supply chain management where the central bank collectively controls all the material (check or payment order) flow and the accompanying cash flow. Though they deal with cash flow between banks

[22] JPMorgan Chase website, http://www.jpmorganchase.com/

only, this model in terms of its processes and technologies can be applied to other businesses, especially where settlement speed with controlled risk is beneficial.

RTGS system processes gross balance of the sending bank's account with the central bank before the result is notified to the fund receiving bank. So the received fund is already finalized when the beneficiary customer gets to know the fact of fund transfer. The ultimate goal to speed up the cash flow between banks is RTGS system, because there is essentially no 'inventory' in this scheme. In return for the efficiency, RTGS is a high-cost system because it requires a high level of operational skills and collateral to secure its reliability.

Netting system is an alternative solution to reduce settlement risk. Unlike RTGS, a netting system does not update the central bank's account immediately. It pools the payment orders (i.e. material inventory) in the system until a certain closing time, aggregates the amount by debtor and creditor, calculates the net debt or credit of each participant, and then updates the central bank's account. The merit is that the number of transaction with the central depository (central bank's account) is minimized and the settlement cost is saved. The demerit is that there is some delay in settlement, compared with RTGS. The merits and demerits are captured by the trade-off between cost and speed. To mitigate the impact of settlement delays, the frequency of final settlement has been increased in some netting systems. When the frequency of final settlement comes close to continuous settlement, the delay time may not be a problem for customer.

Thus banks have been working to enhance the efficiency of both speed and cost in settlement systems or to tune in the system to a good balance between speed and cost. By replacing payment order with material products, these schemes can be applied to other supply chain networks.

5.6 Strategic Financing for Supply Networks

Though traditional banks have traditionally avoided the connection with material flows, the gap between material and information has been closed pretty well with the help of information technology. Using the experience accumulated in cash flow management,

they are in a good position to expand their roles to material flow management. When banks learn to analyze material flow as well as cash flow, a new market for services can open up to them.

Investment decisions are taken by the analysis of net present value of a project. Profitability of a company is evaluated by the analysis of financial statements. Then, how can the investment decision and profitability of a supply chain network be determined? For example, does the summary of the balance sheets and income statements of all the trading partners in a supply chain represent the value of the whole network? If so, banks can individually make investment decisions for each trading partner. However, usually it is not the case. As the network grows, it becomes more difficult to synchronize the cycles in the network, and thus there always some room for improvement in terms of operational efficiency. The circumstances surrounding the network changes frequently; and a once-optimal system becomes obsolete over time. When a supply chain network is taken as a dynamic system, it is not enough for banks to simply cover temporary working capitals or to process cash transfer faster.

When one component in the network is in a lower league of efficiency and it disrupts the whole system, the part should be upgraded to the level of other components. In this case, the investment to one company will enhance the efficiency of the whole system. Banks can contribute to the evolution of supply network by making the right financing decisions in the right place and at the right time. The right time and place cannot be determined by financial analysis itself, because it depends crucially on the banks' relationships with trading partners.

5.7 Mass Customization

The role of the service providers (LSP/ISP/FSP) is to support various core supply chain activities. Therefore, serving only a few supply chains do not make sense for these support organizations, because they are essentially playing a secondary role in the network, however important these roles are for the network. Hence, in order to make their business profitable, they need to expand their customer base. Supply chain giants such as

Wal-Mart have their own strategy and they will evolve their own systems to suit their goal. As they have strong leadership roles, their supply chain partners would have limited discretion in deciding the configuration of the network. Understandably, it is even more difficult for service providers to propose major structural changes to such dominant supply chain customers in its portfolio. Therefore, in the short term, the main targets of service providers are in the form of small-medium businesses (SMBs), where service providers are allowed some voice in the strategy of the network.

In order for service providers to serve supply chain solutions to a number of SMEs, the solutions need to be flexible enough to be easily customized according to the needs of each supply chain customer in various business environments. Solutions of service providers need to be modularized so that they can be selected as components. As the FSP, banks need to team up with ISP and LSP to consolidate material flow, information flow and cash flow. It may be an option to obtain their knowledge in each specialized area through carefully planned acquisitions. Similarly, the differences in regions, countries, conventions for specific business need to be managed by outsourcing the components to local service providers. To achieve this, the interface with outsourcing partners should be simple and easy to implement.

6 Conclusion

Several potential opportunities have been discussed in the previous chapter for traditional banks to add value in the supply chain networks by using their existing strengths and available technologies. As a conclusion of this paper, we summarize the strategic proposals to the financial institutions through four simple points: (1) Focus on the whole supply network rather than individual companies, (2) Link cash flow management to material flow and information flow, (3) Find existing strengths and form reliable and stable partnerships, (4) Form a separate organization to execute these changes.

Focus on the whole network: Regrettably, traditional banks have not reserved enough focus on learning their customers' supply chain networks, except for those processes that involve cash flows. Most of existing services that banks offer to enhance supply chain efficiency currently are restricted to processes aimed at the enhancement of cash flow. Typical examples are Financial EDI and Cash Management Services. These services offer shorter delay time between order and execution of cash movements or reduced risk exposures of customers. Banks are not currently concerned about the material information such as the origin of the cash movement for these services and thus can stay in their comfort zone. Because such services deal with abstract values on bank accounts without respect to their customers' individual needs, it is difficult for banks to differentiate their services from competitors. They may compete on low costs and high performance, and the services can be applied to virtually any customer because they concentrate on cash flow only and are designed to offer high compatibility to attract as many industries as possible. Thus the abstractness of cash flow enhancing services contributes to the lowering of barriers for new entrants; the customers can then easily switch to other financial service providers when offered superior attributes.

Link Cash to Material and Information in Supply Chain: The opportunities discussed in this paper mainly focus on the velocity of "flows" of material, information and cash. Banks have directly enhanced the cash flow of trading partners in a supply chain. But they have additional opportunity to enhance the efficiency of the whole network system by synchronizing cash flow with information flow and material flow.

When we consider the realization of these opportunities, we need to be aware that, by very definition of the supply chain, none of these enhancements are sustainable without a deep understanding of the material flows and the information flows of the network. In general, the banks need to raise entry barriers for your competitors through these value added services. Even though banks have been competing for loyal customers through customization and learning, they are essentially limiting themselves if they stick to the world of cash management. A new frontier of services needs to be explored to propose unique solutions tailored for each of their customers.

Few financial service providers have targeted this frontier; and hence the growth of the market is fairly slow. There are indeed some notable success stories, but they are small in number and not widely known or acknowledged. These pathfinders are young and small. They originally came from other industries (e.g. logistics) to the financial world because of their initial goal to satisfy their own needs for financial services not matched by the financial institutions. After some successful experience, these pioneers have noticed there is demand for their expertise and knowledge related to such financial services. This phenomenon can be a threat for the traditional banks, because the old and mature giants in the financial industry may not have thought much of these small niches in the market for services, until now. The pioneers are still not sure how to harvest the fruits most effectively and how to secure the territories against the giants. Now they are learning the new services to answer these questions and keep quiet to be below the radar of big traditional banks. Therefore I have proposed that the traditional banks should investigate this opportunity and threat in supply chain management and take appropriate countermeasures that counter the threat from new entrants. The question, therefore, is how to align execution with this strategy.

Find Existing Strengths and Form Reliable Partnership: Banks have to search for their own set of core strengths to deal with threats from other industries, because technology diffusion has made it relatively easy for latecomers to imitate the leaders, especially if the business model is based solely on generic components available to everyone. Experience in managing cash flows may translate to strength in managing material flows as well. Similarly, excellence in operational control accumulated in dealing with elaborate financial service systems may be useful to control operational risks

in supply networks. More detailed studies and experiments are necessary to know which features work best as competitive advantage for traditional banks.

Furthermore, there is a need on the part of these banks to capture material flow and information flow in the supply network. Hence, there is also a need for negotiating with trading partners in a supply chain to incentives them to reveal such information. Here it becomes important to seek out trading partners who have information that accounts for the differences between among industries / companies and that provide a comprehendible input to the FSP. The prime candidate for such an intermediary function is a 3rd party logistics firm or an LSP.

Take UPS as an example. One of the success factors of UPS in supply chain management service is that they acquired First International Bank to add the expertise in structured trade finance, commercial lending programs, and similar supply chain financing capabilities (Chapter 4). The company recently formed UPS Capital, its financial subsidiary. UPS Capital has good access to logistic information of the customers of its parent company, and uses the information effectively to enhance cash flow in the customers' network. A reverse approach can be followed by banks to acquire expertise in unfamiliar processes and industries. A bank has a chance to acquire or form a strategic partnership with a 3rd party logistics company to get access to logistics information of its customers.

Form a separate organization: Finally we suggest creating a new organization which focuses on serving supply chain partners, separately from existing sub-groups in a bank. There is an extra barrier that impedes approach of banks to supply chain network – the perception of borrowing companies. Banks play a role of a supervisor of borrowers so that it can analyze the financial status of them in a neutral manner and thus minimize their "agency costs" (as explained in chapter 2: Dimensions of Financial Services). Therefore, from the standpoint of the managements of the borrowers, a bank is seen as a policeman who keeps them from jeopardizing the right of investors. If a bank judges a borrowing company has no chance to pay back its loan, the bank may withdraw loans to the company for the sake of its investors. In this sense, the interest of borrowers' managements conflicts with that of a bank. They provide financial information to the

bank only because it is a requirement, but they would find hardly any incentives to provide extra information willingly to the bank.

On the other hand, sharing information among trading partners is a critical element of effective supply chain. Different partners in a supply chain normally have conflicting goals and it is a common challenge for any supply chains to align these goals with a higher value as a whole. In this context, a bank wants to get information of material flow and information flow among a supply chain so that it can streamline the overall financial flows. However it has a conflicting goal. It may use the same information to withdraw funds from the supply chain to protect its investors. As long as a bank is seen as such a self-interested party, it is unlikely that the bank gets trusted by the trading partners enough to share trading information.

Because the bank's role as a supervisor comes from its roots as an investor, this dilemma is difficult to handle as long as the same entity plays both roles – a supervisor and a trading partner at the same time. We therefore propose that the role of a trading partner in supply chains therefore needs to be separated from traditional bank's functions.

7 References

Books on Finance, Accounting, and Financial Services

1. Brealey, Myers, "Principles of Corporate Finance" 7/E, McGraw-Hill/Irwin, 2003
2. Shunsaku Nishikawa, Kazumi Asako, Kazuhito Ikeo, Keiichi Oomura, Miyako Suda, "Economics and Finance" ("Keizaigaku to Finance"), Toyo-Keizai-Shinpo-Sha, 1995
3. Stickney, Weil, "Financial Accounting", South-Western College Pub; 10 edition, 2002, Chapter 5

Books on Supply Chain Management and Strategy

4. Christensen, C.M., "The Innovator's Dillemma", Harvard Business School Press, 2003
5. Jared Diamond, "Guns, Germs, and Steel", Norton, 1999
6. Lewis, J. "Partnerships for Profit" New York: Free Press, 1990
7. Pine, J.B. II. "Mass Customization" Boston: Harvard Business School Press, 1993.
8. Porter, Michael, "Competitive Strategy", Free Press, 1980
9. Simchi-Levi, David; Kaminsky, Philip; and Simchi-Levi, Edith. "Designing and Managing the Supply Chain", McGraw-Hill/Irwin, 1999
10. William T. Walker, CFPIM, CIRM, "Supply Chain Architecture: A Blueprint for Networking Flow of Material, Information and Cash", CRC Press, 2004

Academic Articles on Technological Innovation

11. Bass, M.J., "A strategic study of disruption, dis-integration, and modularity in the microprocessor industry", MIT Sloan School of Management, 2000
12. Berray, David, "Changing Capital Markets Industry Structures: The Internet Challenge to Incumbent Leaders", MIT Sloan School of Management, 2000
13. Trent, Tracy R., "Changing the rules on market leaders: strategies for survival in the high-performance workstation industry", MIT Sloan School of Management, 1997
14. Yossi Sheffi, "RFID and the Innovation Cycle", Research Report, MIT Center for Transportation and Logistics, Cambridge MA 02139, 2004; pp 10.

Current Media and Research Reports

15. Euromoney Institutional Investor PLC, Trade Finance: 10(2), February 2002. ISSN: 1464-8873, "Eurofrut puts trust in UPS Capital's integrated solution."
16. Euromoney Institutional Investor PLC, Trade Finance: 4(1), June 2002. ISSN: 1464-8873, "UPS Capital in expansion mode. (Market moves: a round-up of personnel changes and corporate developments)"
17. Fairchild Publications, Women's Wear Daily: 13, November 19, 2002. ISSN: 0149-5380, "Scovill Finds Green in Brown."

18. Knight-Ridder/Tribune Business News, Atlanta Journal & Constitution (GA), June 10, 2000. ISSN: 0093-1179 , "UPS Launches Global Financial Unit to Boost International Shippers"
19. Reed Business Information, Logistics Management & Distribution Report, 41 (4): 5, April 2002. ISSN: 1098-7355, "UPS has united its supply chain and logistics-related businesses"
20. Thomson Media, Small Business Banker, 1 (5): 13, June 01, 2000, "Loans and Leases: UPS Capital Offers "Next Day" Leasing Service"
21. Thomson Media, US Banker: 24, November 2002. ISSN: 0148-8848, "Financing: Fastening a Company to A Firm Built on Parcels: Snap-and-button maker Scovill's deal with UPS clears up major problems-distribution and lending. It's another coup for the delivery firm's"

Websites

22. Mitsui & Co., Ltd http://www.mitsui.co.jp/
23. EPCglobal Inc. http://www.epcglobalinc.org/
24. Supply Chain Counsil http://www.supply-chain.org/slides/SCOR5.0OverviewBooklet.pdf
25. United Parcel Service http://www.ups.com/content/us/en/about/index.html
26. UPS Capital http://capital.ups.com/solutions/exchange_collect.html
27. JPMorgan Chase http://www.jpmorganchase.com/