Transaction Cost

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All communications and interactions within companies are also transactions, which incur enormous costs.

1.1 What Is Transaction Cost?

A transaction cost is the cost related to exchanges of goods and information.

The notion of a transaction cost has been receiving attention, and studies in the field have produced two Nobel Prize winners in economics.

A transaction is the smallest unit of economic activity—that is, the smallest exchange as a profit-seeking activity of individuals. Transactions, besides buying and selling activities between and inside companies, include all communications and interactions within companies. Although payment of money is not likely to occur between a manager and a subordinate in companies, all business activities in companies, are also deemed as exchanges of outcomes and rewards such as compensation and promotion. In other words, these are all transactions, one kind of economic activity, and actually take the same processes that accompany transfers of money in commercial transactions. Every activity between and inside companies can be analyzed by the notion of a transaction cost. The purpose of this book is to explain the structure of a deceptively complicated transaction cost as simple as possible, which is embedded in every activity of day-to-day operations and to propose theories, strategies, and practices to improve its efficiency and effectiveness.

The drastic growth in the complexity and significance of information processing in the current business environment has increased the value of analyzing transaction costs enormously. Measurement and evaluation of business activity currently depend upon accounting that is based on the double-entry bookkeeping system developed in northern Italy in the thirteenth century, far before the time of the Merchant of Venice when goods were crucially valuable. In other words, accounting was created for the purpose of measurement and evaluation of goods.

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Cumbersome and bulky products, such as steel and heavy machines, played a central role in the economy until recently. Costs meant *production costs* then, most of which were composed of material, parts, equipment, and factory labor. The way of thinking that resulted in software and services being bundled at no cost with a purchase of hardware is a typical example showing the mindset in that era. In the recent business areas of software and intellectual property, however, the ratio of hardware cost is extremely small, and the reproduction costs are nearly zero.

In contrast, activities of human communication continue increasing both in quantity and quality (diversity). In industries and companies operating in leading-edge areas, this change is conspicuous. Even in the heavy industries, software to operate machines and systems with complicated functions has increased in significance. More than ever, software controls hardware, determines product competitiveness, and supports business management. Software and intellectual property have begun to take more significant roles in every industry and company. However, analysis of human activity, especially the communications and interactions that are indispensable for creating value added, has hardly evolved.

In the past, even the cumbersome and bulky products were homogeneously simple, which were produced in a single company, distributed by the same company, and purchased in the same country. However, the situation has been changing rapidly. Various parts are produced all over the world and delivered to and purchased in various countries where market needs are wide-ranging. Strategic information regarding various diversified customers is transmitted to and shared by many operations in the world. Technical innovation advances rapidly, and the complexity and diversity of the communication have been increasing. Highly detailed information regarding markets and technologies is transmitted and utilized to develop new products continuously. Information of inventories is analyzed concurrently with customer information to shape the most efficient production and logistics plan. All stocks of end products and parts in the world are controlled at the smallest level. The same discussion applies to consumer goods, including perishables. The IT systems, which process the information, have been innovated drastically.

When business activities expand globally, the number of competitors increases, the result of which is fierce competition. Efficiency improvements are pursued comprehensively to reduce prices and delivery time, and all wastes are tracked and eliminated. Information regarding markets and technologies is processed and utilized to increase value added in product development.

At the same time, the value of customer services also becomes emphasized. Companies are required not only to deliver products but also to process information regarding the issues and needs of their customers, execute various customizations for each customer, and provide information and solutions to each customer to ensure proper use of their products. In order to complete those activities, a large amount of data regarding the activities of their customers must be collected and analyzed.

Customer needs have diversified and transactions have become more complicated. All the value added in product development, production, sales, service, and

so forth is created by human activity where exchanges of a huge amount of information are required. The amount of information processing corresponds to the complexity of the transactions, and the transaction costs should be deemed as a key for the analysis of transactions.

When transaction costs are reduced, people regularly execute transactions that were practically impossible in the past, such as transactions in the middle of the night, transactions with unknown transactors living on the opposite side of the globe, and transactions of extremely rare products. Actually, the reduction of transaction costs has been significant since human societies emerged; however, its magnitude was hardly recognized because transaction costs were buried in the huge cost of hardware. Phenomena in which reduction of transaction costs and augmentation of new transactions repeat reciprocally like a piston have been seen increasingly all over the world in the age of the Internet. And eventually analyses of transaction costs, or human activity cost, will become more significant than analyses of hardware cost.

The following sections in this chapter examine a large number of instances in which transaction costs were reduced, in order to illustrate this significance.

1.2 A Huge Number of Instances of Transaction Cost Reduction

Instances of transaction cost reduction have been seen increasingly with the spread of the Internet.

1.2.1 Instances Continuously Increase and Evolve

The Internet has provided opportunities for reducing transaction costs.

As a matter of course, responding to the increase in the number of transactions, various actions and trials have been executed to reduce the huge cost. The Internet has dramatically reduced global transaction costs in a short time. In fact, the postal mail system, telephones, and fax machines have achieved the same effect. Communication with remote locations and other countries had depended on faxes until just recently, and the postal mail system had been crucial for approximately 100 years prior to the introduction of fax technology. The postal media limited transactions to several times per day, but telephones reduced transaction costs and increased it dozens of times. Faxes, e-mails, and mobile phones increased them dozens of times further. It is indisputable that the increase in the number of transactions will continue due to the appearances of new infrastructures such as blogs, Twitter, and other social network sites (SNSs).

After information became digital, the contents of communication have been accumulated in databases and the Web. Today, past transactions are searched readily and the past digital contents are reused flexibly. Given the fact that

transactions can occur between a past provider and a present user through databases, transactions thus can be conceived of as having transcended time differences. These infrastructures also reduce transaction costs and increase the opportunity for transactions.

Ordering data from customers are readily reused as internal ordering data if tools developed for conducting Internet-based business such as electronic data interchange (EDI) are used. After the transaction costs of digital data decreased drastically with the growth of the Internet, the standardization of the data became a critical issue for further cost reduction. Standardization of data is extremely effective for reducing transaction costs, as the data can be reused without editing or modification. Examples include standardization for sharing information of statuses of inventory, production, and sales. When the biggest group of transaction costs at the time decreases, another reduction of the next biggest group becomes a target. And the next. And the next. This has been and will be repeated endlessly.

Both networks and databases, the most popular applications of IT, are technologies developed for the purpose of reducing transaction costs. It may be argued that almost all ITs have been developed for the purpose of reducing transaction costs.[1]

This hard evidence illustrates the magnitude of total transaction costs and efforts that have been and will continue to be expended for the reduction. The following is just a partial list of cases in which enormous efforts have been expended for the reduction of transaction costs.

1.2.2 Partial List of Cases

There are a countless cases.

1.2.2.1 Marketplaces and Online Marketplaces

In the era of the net bubble around the year 2000, although the expectation for the Internet exceeded its actual value, huge substantial changes occurred in the society. Formation of online marketplaces on the Internet in particular greatly contributed to reductions of transaction costs.

In the first place, the purpose of establishing markets has historically been to reduce the transaction costs of traveling and searching by adjusting venue and time. It would have been inconvenient for buyers and merchants to move around to several locations to seek goods or customers. Since place and time were standardized, it became much more efficient for everyone to execute transactions. Market sizes expanded necessarily to improve the efficiency. This was one of the largest and oldest attempts at transaction cost reduction in human history.

[1] Computer simulation calculations in fields such as fluid dynamics, astronomy, and genetic engineering are also important applications.

The same thing is happening in the online marketplaces. That is, searching for merchants and products, communication regarding product information, accreditation (assurance of quality of goods and payment, and the transaction entities), ordering and accepting, and after-sales service are performed in compliance with common standardized procedures. Thus, transaction costs incurred in the course of communication, negotiations, and adjustments are largely reduced. As a result, convenience and efficiency improve for both the merchants and the consumers. When transaction costs are reduced, transactions that were impossible before due to a huge amount of transaction costs become executable.

The old pricing mechanism of the conventional auction was applied to the e-auction to reduce transaction costs. However, the effect is not limited to the price negotiation cost. The presentation procedure of product information and the terms/conditions of exchange (e.g., payment and delivery) are fixed a priori, and respective credit information according to the reputation and the past records is shared by the participants. Therefore, the risk of engaging in a transaction became very small. The escrow service (a service to guarantee that delivery of products and payment of purchase are executed as contracted) was indispensable but expensive in the past. Including the escrow service, an e-auction functions as a platform of exchange and avoids troubles such as wrong product deliveries, nonpayment, and unsolved problems. On the other hand, in some developing countries where credit guarantee systems or robust business customs have not been established, the escrow service remains very valuable. Since the Alibaba of China and the post office of India have guaranteed payment and delivery, e-commerce in the two countries has expanded explosively.

Similarly, in e-commerce sites such as Amazon, Taobao of China, and Rakuten of Japan, innumerable sellers and buyers execute transactions in compliance with their standardized transaction procedures. As prices and transaction conditions are fixed, no negotiation cost is incurred. A key success factor for such online marketplaces is to provide means to reduce transaction costs as much and as appropriately as possible. When transaction costs decrease, transactions are promoted and reactivated, which increases popularity of the site—resulting in further increases of users. The consequent surplus resources are reinvested into the enhancement of the functions to reduce transaction costs, and transactions increase again. Thus, a virtuous circle is created.

E-commerce has become ubiquitous among consumers as a platform that offers means to reduce transaction costs even when consumers need information. It continuously expands product lines from PCs and household appliances to restaurants, apartments, and funeral services. It contributes to the reduction of total transaction costs in the society as an upper-layered platform established on the Internet.

All the above mentioned was regarding business-to-consumer (B2C) transactions. In fact, however, in the era of the net bubble, the growth of business-to-business (B2B) marketplaces was much more expected because businesses are deemed to be more sensitive to transaction cost reduction than are consumers and their motivation for the deployment appeared stronger. Since Wal-Mart, the world's

largest company in the distribution industry, completed its own online marketplace, resulting in drastic reduction of procurement cost, it had been a crucial strategic goal for all other distribution companies to compete against it. Consequently, global B2B marketplaces such as GlobalNetXchange (GNX) and WorldWide Retail Exchange (WWRE) launched operations with huge expectation.

Covisint, which unified part procurements of the automotive industry, is also one of the online marketplaces that attracted huge attention. Those B2B marketplaces were expected to reduce transaction costs and grow quickly. At present, however, many of those have already gone out of business or converted the business model, against expectations. This happened because the suppliers disliked price decreases as a result of encouraging competition. Online marketplaces are able to enhance functionality only when both buyers and suppliers participate actively. If suppliers reject cooperation to increase the number of goods or the participation per se, it would be difficult to provoke the virtuous cycle or even to stabilize the business. So far, only successful B2B marketplaces are driven by one supplier such as Cisco, or by one buyer such as Wal-Mart. Although those are private distribution systems or private procurement systems that are not generally defined as marketplaces, those are frequently cited as unique success cases. In contrast to B2C marketplaces, it seems difficult to destroy the existing orders of industries. This is going to be a central subject throughout this book.

One of the very few examples of successful B2B marketplaces is Alibaba. The reason for its success is that it targeted transactions with small Chinese companies that were growing rapidly. All the companies in the world had interest in conducting transactions with them; however, the cost to originate the transaction per se was too large. In the emerging market, there was no behemoth to dominate the industry order, and all the suppliers appreciated the innovation by the marketplace.

If the Internet sites with standardized procedures to execute transactions for sellers and buyers are defined as online marketplaces, then Web portals, YouTube, SNSs, and social games can be included. For example, SNSs provide functions to assist exchanges of personal information among the users and have been growing so rapidly that they have even become platforms that triggered national revolutions in some developing countries. These are online marketplaces of information that collect a huge number of people by providing various services for nearly free. Q&A Web sites, help forum Web sites, and social search engines such as Answers.com, Ask.com, and Quora have become indispensable for our everyday life. People can get free illustrations and photos on All-free-download.com. Personal blogs gathering many people are also marketplaces in which to exchange opinions and knowledge. Those Web sites earn revenue from advertisements by providing all those transaction assistance functions free and attracting "eyeballs."

As the examples of SNSs exhibit, transactions in online marketplaces are not only for commercial purposes. There exist all the transaction elements except payment, and the technologies to streamline all those transaction elements are crucially significant to activate the Web sites, in order to gather more people and to increase the revenues.

This online marketplace innovation has accelerated even after the Internet revolution seemed over. A subsequent movement, "WEB 2.0," has encouraged the creation of values by interactions among consumers and citizens. Transaction costs incurred by those micro-transactions among consumers were relatively too large for them without the online marketplaces including SNSs.

In this manner, the decrease of transaction costs and the increase in the number of transactions will continue reciprocally. Revolutions after the WEB 2.0 revolution after the Internet revolution after whatever—revolutions of transaction cost reduction will continue endlessly.

1.2.2.2 Mobile Marketplaces for Smartphones

One of the key factors for Apple's amazing successes of the iPhone and iPad is that the iTunes Store (and the App Store) has dominated music online marketplaces, download markets of digital contents. Utilizing the dominant platform, the contents and application software of the iPhone and iPad had competitiveness in both quantity and quality from the very first launch. Since Apple also altered the application development, providing a simpler computer language, an enormous number of developers and artists entered into the market, resulting in the price decrease. The marketplace is now the main revenue source for Apple. Currently, competition for the online market share has been intensifying with the entries of most of the world's telecommunication companies, smartphone manufacturers, PC hardware manufacturers, Intel, Microsoft, and so forth, all of which are in quest of the standard position. Nexus of Google, Kindle Fire of Amazon, and Kobo of Rakuten are reportedly all distributed below cost to acquire the standard position of a window to the online market.

1.2.2.3 Logistics Management by Supply Chain Management

A huge cost of inventory management in whole supply chains was incurred before the introduction of supply chain management (SCM). Examples include inventory cost, disposal cost of wasted inventory, opportunity loss, and document handling cost (e.g., informing customers of changes in delivery) due to the improper inventories in each process of sales, distribution, and production. An enormous amount of time was wasted due to the mutually tangled information of inventories, order statuses, changes of schedules, and so forth. UCCnet, a US-based standards body for product master data, estimated the loss of sales as more than 40 billion US dollars in 2003. All those costs had been perceived as a significant issue intuitively; however, those had been left unsolved due to the difficulty of innovating processes.

A methodology called SCM that integrated all those conflicting data into one database through networks was proposed at that time. It was no more than an electronic ledger, the function and effect of which everyone understood. However, the impact of the software package, which allows the maximal use of databases and networks, was so huge to encourage many companies to challenge the innovations of supply chain processes, resulting in drastic improvements in efficiency. Dell attracted the world's attention when it presented its advanced use of SCM, which is known as the Dell model. A new industry of electronic manufacturing services

(EMS) emerged and has grown rapidly due to their great utilization of SCM. The business model had started on the US soil and enjoyed its competitiveness for some time, but moved to Singapore and Taiwan, and recently to China, all of which provide much lower labor costs. It is not an exaggeration to argue that China's remarkable economic growth fully depends on business models enabled by SCM. It also changed the whole pictures of some industries, such as the apparel industry, which has been innovated totally by specialty retailers of private label apparel (SPAs) such as ZARA of Spain, H&M of Sweden, and UNIQLO of Japan.

Although SCM brought significant cost savings, many large companies still do not utilize SCM well. Despite the fact that SCM systems and valuable data have been provided, it has been difficult for many companies to prioritize total optimization before self-optimization and to overcome mutual distrust between departments. Achieving this large-scale innovation depends on a huge number of transactions among change originators, change agents, and employees in charge of local operations (e.g., sales, logistics, and production). Consensus making for the introduction of the innovation incurs transaction costs as well. Because these transaction costs are too large to execute the transactions, all the wastes have been left ignored. Even though an innovation is deemed reasonable, many companies cannot overcome the barriers of transactions to obtain consensus for the new business processes and to implement the changes. In many cases of SCM deployments, suppliers and customers need to be involved in projects, which increase transaction costs further. Innovation requires a huge amount of transaction costs anyway.

1.2.2.4 Economic Growth of China, India, and Taiwan Due to Reduction of Transaction Costs

The countries that gained the biggest benefit from reduction of transaction costs due to the Internet were China and India. It was quite uncommon to outsource manufacturing to those companies before the 1990s. The first barrier was to find where the potential companies were. Even if they could be accessed, the credibility of their quality, delivery, and other management operations and their trustworthiness had to be investigated. How problems could be solved and controlled had to be determined because they might have different business customs. There existed many risks for Chinese and Indian companies as well, such that customers did not make payments. Therefore, the transaction costs were perceived as too large to start such promising businesses. However, the cost decreased drastically with the worldwide spread of the Internet, and smoother communication became possible with the lower cost. Finally, China became a manufacturing hub and India became a global IT operations hub. Many Chinese Americans and Indian Americans must have contributed to the successes by reducing transaction costs due to differences in languages and business cultures.

Taiwan has been focusing on outsourcing businesses as a national strategy. In particular, the success of its foundry[2] business, and the outsourcing of

[2] Manufacturers who specialize IC manufacturing.

semiconductors as typified by TSMC, pioneered the national innovation. Hon Hai Precision Industry and its subsidiary, Foxconn, which deal with most of the manufacturing of Apple, Nintendo, and Sony and earn more revenue than any of the Japanese large-sized electric manufacturers, are most well known among the companies in the country at present.

Some of the companies started OEM businesses with their own brands. HTC used to assemble Palm devices, which once dominated the personal data assistant (PDA) market, and now is one of the main suppliers of Android-based smartphones. ASUS, a Taiwan-based PC manufacturer, used to focus on the supply of PC motherboards and now manufactures its own branded netbook PCs and ultrabook PCs.

MediaTek grew expansively with semiconductors for the mobile phones, and it dominated the market of the central IC modules that play the most significant functions. It is said that its market share of the IC modules for the Shanzhai mobile phones, the Chinese imitation mobile phones with pirated brands, reached 90 %. The company uses TSMC for manufacturing, without having its own production facility.

Yue Yuen Industrial, a Taiwan-based Hong Kong-listed company, supplies shoes to most of the major brand sports shoes companies in the world such as Nike, Adidas, Reebok, and Asics, earning the largest revenues in the world. In addition, Pou Chen and Feng Tai, its competitors, are also growing rapidly. Other illustrative examples of the contract manufacturing services (CMS) in Taiwan include Giant and Merida for bicycles and Yulong for automobiles.

1.2.2.5 Demise of the Vertical Integration Model

The iPad from Apple triggered the emergence of the tablet PC market. The Kindle Fire from Amazon, the Nexus 7 from Google, and the Surface from Microsoft were brought to the market afterward. Google also has already launched products such as the Nexus Q (a media player), Google TV (a smart TV), and Google Glass (a wearable computer). It is astonishing that none of those companies is classified in the manufacturing sector. Google and Microsoft acquired the mobile device business division from Motorola for $12.5 billion and Nokia for EUR 5.44 billion (mainly for the purpose of acquiring their technologies and patents). That is, conventional PC hardware sales and manufacturing companies are considered to decrease their competitiveness, and the companies in other sectors invaded their market as great powers. This can be attributed to the spread of readily procured manufacturing and sales functions that were definitely enabled by the reduction of transaction costs with the contract manufacturers and consumers of the world. The location of key success factors shifted from sales and manufacturing to innovative product development, brand power, and risk acceptance capability. In terms of profitability, the development capabilities of application software and contents are of increasing significance. These imply the obsolescence of the silo model or the vertical integration model, which adheres to possession of all functions including manufacturing and sales, a result of which is the dispersion of resources.

1.2.2.6 Integrated Transaction Processing Provider

Amazon has been expanding its B2B transaction processing provider service, which has processed all of its clients' transactions, including SCM, logistics, and marketing, since 2012. Its clients can concentrate their scarce resources on product developments, relegating the processing of all those transactions to Amazon's system. This service offers great opportunities to start-up companies because the young companies can launch new businesses readily. This business model is also called "third-party logistics" and appears to be an efficient means of reducing transaction costs on the whole.

As widely known, Amazon started business with the online sale of books, CDs, and DVDs and became a general retailer dealing with all kinds of consumer goods, taking approximately 25 % share of the fast-growing online market in the USA. Its revenue has been growing by more than 30 % yearly, on average, and has reached $50 billion. The key success factors of such a fast growth are twofold:

- Universal procedures of transactions across all products (presentation, order and acceptance, delivery, ex post processing such as returning)
- A highly efficient logistics system that carries inventory in-house and delivers products for free on the same day (those are actualized by as many as hundreds of thousands of servers and its management system. Amazon is opening up all those resources and technologies to clients for profit as described above)

The following transaction processing functions are provided to the clients of the service:

- Merchandising of their products on the WEB
- Orders and acceptances
- Charging and payments
- Inventory control
- Shipment
- Sales data analysis (information provisions of the best- and worst-selling products)
- Recommendation of products for promotion to visiting consumers
- Call center

As all the services can obtain the full benefit of economies of scale (advantages of scale) structurally, the transaction costs decrease greatly, providing the company stable competitive advantage.

1.2.2.7 Global Economy Revitalized by Establishments and Enhancements of the Transaction Infrastructures

Besides the Internet, another new great means of reducing transaction costs is the expansion of low-cost carriers (LCCs). This business model totally depends on the Internet by which the air tickets are distributed with much lower costs. In addition, various costs are reduced throughout the operation by all means in order to realize that amazingly low price, which is similar to the shop floors of Japanese manufacturing companies. Passengers, including students and low-income people, use them just like buses on streets, revitalizing not only the industry but also a wide range of transactions in societies. Accessing the infrastructure on land was also

established at the same time. Shuttle buses to airports depart regularly and punctually, and passenger traffic runs very smoothly at the dedicated airports.

Although most face-to-face meetings have been substituted by the Internet video phones, people still need to meet each other in person. Reduction of the traveling costs is indispensable for expansion and activation of transactions. LCCs generated an enormous number of new transactions, which used to incur prohibitively large transaction costs in the past.

Although LCCs facilitated travel beyond borders, it remains still troublesome to travel in unfamiliar cities. Mobile phones, especially smartphones, assist travelers in finding locations, directions, and train and bus schedules. In many countries at present, travelers can purchase SIM cards from a vending machine, insert them into their smartphones, and make voice calls and gain Internet access instantly. They can refill them easily by purchasing a secret number at kiosks or through the Web. In contrast, mobile phones are bundled with the telecommunication carriers in countries such as Japan, incurring huge transaction costs to replace carriers. Even in the EU, the international roaming services using the same SIM card charge largely to travelers, and the EU government has been recommending that telecommunication companies decrease the prices. Reduction of transaction costs in the EU area is definitely the government's biggest mission.

In the past, people used to expend time and cost for monetary exchange, the transaction costs of which obstructed transactions in the EU. The monetary unification, however, reduced the transaction costs. Furthermore, various infrastructures, including clearance and settlement, transportation, and business customs, have decreased transaction costs further and revitalized the economy of the area. Expectations for its future have swelled to bursting; however, the fundamentals of the economy are strong. The appropriate investment on infrastructures like the EU is another key success factor for most of the developing countries.

The globalization of companies and consumers contradicts the concept of nation in origin. Nations impose transaction costs by a means of regulations such as tariffs to construct barriers mutually. Regulation benefits a group of vested right holders inside and outside governments such as China and other developing countries, and the regulation is especially likely to be imposed intentionally. As nations can easily become anti-globalism, a stance that coincides with nationalism, those are likely to win public supports. However, all those transaction costs incurred by regulations are imposed on consumers and citizens eventually. The EU selected the present policy to overcome those issues and to reduce transaction costs for their economic, social, political, and cultural growth in the future. Following the EU, EPAs (Economic Partnership Agreements) and FTAs (Free Trade Agreements) such as NAFTA (North American Free Trade Agreement) and TPP (Trans-Pacific Partnership) have been established worldwide. Governments that can make citizens understand the benefits of the decrease of transaction costs, including Korea, are strategically positive to these treatments.

1.2.2.8 Open Source

In the IT-related industries (including the household appliance industry and the automotive industry, which utilize IT heavily) these days, the proportion of open source software has been increasing. Linux, an operating system (OS) that took the central role in open source software's growth, is examined here as a typical success instance of transaction cost reduction.

As is generally known, for many years Microsoft, the strongest monopolistic company in history, ruled over the market with its Windows OS, and every CEO of every industry, including distribution, finance, and automotive, was frightened at the menace of the company. The combination sales using the standard OS were extremely powerful, and nobody could expect that the power would ever weaken. However, it is open source software, Linux in particular, that brought a stir there and changed the momentum greatly.

The open source activity leveraged two approaches to the cost reduction.

First, open source software adopted a special licensing methodology, the GNU General Public License (GPL). The GPL was developed on the basis of an idealistic philosophy that asserts all software should be used freely by anybody in order to encourage cooperation among people. Under this type of license, software is used, duplicated, modified, and redistributed by other programmers freely.[3] There is no rule that enforces free distribution, as is often misunderstood; however, any person may and some persons certainly will redistribute acquired software for free under this license, and, as a result, the price of software will become zero, eventually. From a perspective of transaction costs here, it is important to note that the conventional licensing, especially negotiation of pricing, incurs considerable cost, but the cost of negotiation under the GPL disappears since the price is agreed as zero a priori. This has facilitated the utilization of others' outcomes and has accelerated the pace of open source software development, including Android OS.

Another breakthrough of reducing transaction costs accomplished by open source was attributed to its methodologies for development project management. The number of users and programmers expanded rapidly due to the advantage of the licensing, and thousands of programmers from all over the world participated in each project. Systems to assist the collaboration were introduced so as to increase efficiencies of development projects, thus saving time and energy. For example, the "Current Versioning System" properly numbers and organizes all programs developed, one after another. The "Bug Tracking System" tracks all the bugs and assists the assignments of responsibilities for fixing them—that is, the bug fixing processes of finding bugs, extracting solutions, assigning programmers, corrections, confirmations, distribution, notification, and standardization are controlled securely and efficiently. GitHub, an information and data sharing system with SNS

[3] Someone who obtained a software program under the GPL is obliged to adopt the GPL continuously when he or she seeks to redistribute the program after modification. That makes a philosophical difference from open source, which does not necessarily require the continuity.

functions, has been introduced recently and started supporting the community more strongly to further improve its efficiency.

Through open source, these two innovative approaches have collected and utilized powers scattered all over the world and facilitated more than equal competitiveness over the historic monopoly.

The international, high-impact success of open source has attracted attention and generated various derivatives. For example, OpenCourseware, an initiative used for sharing university courseware for education driven by Massachusetts Institute of Technology, was triggered by the success of open source and opened their faculty members' courseware materials to the public on the Web. Many countries such as China, which prioritizes the establishment of university education, have been quite active with this initiative. Courseware materials are provided by faculty and searched and used by students in their standardized formats, and only a very low transaction costs are incurred between them. Sebastian Thrun, Google VP and fellow and a former Stanford professor, started free online classes, Udacity. The courses are so well prepared that they provide better learning outcomes than do regular offline classes. It is now possible to take various high-level lectures for free from anywhere in the world. Khan Academy was founded in 2006 with grants of $2 million from Google and $1.5 million from the Bill and Melinda Gates Foundation to provide more than 3,000 free classes, mainly to poor children in developing countries.

Wikipedia is a free encyclopedia with more than 4.3 million articles covering keywords in almost all areas. It is also based on the philosophy of open source as well as Wiki, which is a software platform of Wikipedia. Creative Commons was also provoked by the philosophy and has been trying to expand its cover from only software to all areas of intellectual properties generally. Since an intellectual property of Miku Hatsune, the first humanoid character platform born in Japan, was opened to the public, many musicians and artists started collaborating on the platform to create numerous contents in music, animation, and various fields, which is now expanding worldwide.

Book reviews and product reputation comments are provided by many voluntary users, which assist others in their purchase decisions. The sharing of such information has become popular, and the function is served by all online marketplaces these days.

Waze of Israel, which was merged by Google in 2013 for the price of more than $1 billion, provides a map service with a traffic information sharing function. Users add and modify routes on the map and report traffic jams and accidents, just like playing a game. As the number of users increases, the accuracy improves due to the increase of the volume of data. In addition, the collected big data will be analyzed in various manners such as average travel time, and useful navigation information is provided to drivers for free.

The concept of open source has finally expanded into hardware production. Design diagrams of hardware are being shared by the open source license called *open source hardware* (e.g., Thingiverse). As low-price 3D printers for individual use have spread, people began to manufacture hardware readily by themselves at

home. When they acquire design diagrams for free, they can produce hardware with little additional cost.

While open source is a success case of reducing transaction costs by setting the price at zero, some trams in the EU are interesting cases that eliminate payment per se (the price is not zero) to reduce transaction costs. In some public transportation systems in the EU, passengers are supposed to purchase tickets before rides, not to make payment in cars. People who are caught attempting to ride for free must pay large penalties. This system has various advantages. As tram-drivers concentrate on only their driving without troublesome tasks of payment, exchange, and inspection, which requires knowledge of the complicated time-dependent discount fare system, their operation becomes much simpler, reducing initial training cost and enabling utilization of lower-cost laborers. The management cost of cash (e.g., cash handling, security management, risks of loss, and payment equipment) also drastically decreases. Furthermore, because all exit doors can open at the same time, many passengers can get in and out of cars without creating jams at the doors. It diminishes travel time, enhances punctuality, and eventually increases competitiveness against other transportation systems. Although there is a small problem in that first-time tourists may get confused,[4] total transaction costs are reduced enormously.

As this example shows, huge transaction costs are submerged everywhere in businesses and life without being recognized consciously. They amount to an incredible volume and obstruct many valuable transactions that might otherwise arise.

1.2.2.9 Zero-Price Business Model

After the brave business model of zero-price was originated by Google, it has been attracting attention widely and growing rapidly. This was also enabled by reduction of the transaction costs.

Examples of the zero-price model include:

(1) Zero-price cloud computing businesses of Google
   - Google search engine: This is a typical advertisement revenue model by which a free search engine collects consumers.
   - Gmail: Microsoft, Yahoo, and some other companies offered free mail services, but Google increased the volume of free data storage, triggering competition among those competitors, all of which provide quite enough volume for regular individual use. This is accessible across locations and PC machines, the same as all other Google services.
   - Google Calendar: Users can share their schedules with families, friends, and colleagues.
   - Memo
   - To-Do List
   - Google Maps: Detailed maps and satellite photos are available for free. In addition, the free functions of route searching and automatic navigation

[4] Basel, Switzerland, day tickets, which are included in the hotel accommodation charge, are provided to all tourists when they check into hotels in order to avoid this confusion.

are nearly equivalent to the car-mounted navigation systems, which cost a few thousands in US dollars. Street views and provision of information about restaurants and shops have been increasing.
- Google Documents: Although Google's online functions for creating office documents are not as rich as those of Microsoft Office, they are sufficient to meet regular users' needs. Functions of sharing data are also well supported.
- Google News
- YouTube
- Picasa: Photos are edited, organized, archived, and shared with communities.
- Phone directory assistance: An automated operator assists in searching phone numbers. It is said that the service is provided free to collect user voice data samples.
- Android OS
- Google Books: Books and magazines, the pages of which Google has scanned, are open to the public and easily searched and read for free.

Although a part of those services are provided for advertisement revenue, most of them are just for the purpose of increasing Internet users, which will eventually increase their revenue of advertisements in the long term.

(2) Zero-price businesses by others

The following is a partial list of zero-price businesses called *freemiums*, which are continuing to grow on the Internet:

- Media Players: RealPlayer, Windows Player, Quicktime, and Flash Player have been distributed for free.
- Adobe Acrobat: The viewer of PDF files is distributed for free to obtain a standard position.
- Wikipedia: Its contents are equivalent to encyclopedias, which were priced at a few thousands of US dollars in the past. The site is operated by user donations.
- Q&A Web sites: Users exchange knowledge and know-how basically for free.
- SNSs: Communication and online community assistance services of Facebook, Twitter, and Google+ are provided for free.
- Social games: Various games are provided for free except the purchases of additional items for enthusiasts.
- Internet phones/TV phones: Skype, Google Hangouts, and Line provide free communication services, which include chatting, file sharing, and conference calling.
- Free WiFi: Many restaurants, hotels, and shops provide free WiFi connections to their guests all over the world. Fon provides free connections to its members, who open their WiFi connections to Fon members in return.
- Microsoft BizSpark Program: All software needed for business operation is provided free of charge for 3 years to startup companies that develop software and are less than 5 years old and earn $1 million annual revenue.

It should be noticed that even a company such as Microsoft, which has been setting the extremely high prices, has started using a zero-price model.
- Groupon: Discount tickets for restaurants, hotels, and shops are distributed online for sales promotion. It is not completely free, but the prices are set lower than the costs. It is called online to offline (O2O), and it has attracted a lot of attention as it explores the freemium model in the offline real world.

The reason why these free products and services have arisen on the market depends on the reduction of distribution cost, one of the transaction costs, of sales promotion offers. The significance of standardization as a strategic objective as a purpose of the free distribution will be discussed in Chap. 3.

1.2.2.10 Accelerated Growth of Exchanges/Sharing of Idle Home Resources

Not-for-profit online marketplaces for exchange/sharing of resources that are excessive, idle, or dead at home are rapidly growing.[5] After Lehman's fall, as the citizens became more conscious about conservation and ecology, they obtained great popularity. The following is a partial list of those marketplaces:

- Online marketplaces for sharing personal cars: Different from regular car sharing systems that use the system operators' cars, they provide services to share personal cars while these are not used. Examples include WhipCar, RentMyCar, and Drive My Car Rentals. Resource efficiency of the society is improved, and the members are able to earn extra incomes as well. Many similar sites arose in many countries after 2010.
- Online marketplaces for sharing personal houses/rooms: Individuals register open houses/rooms for a short-term rental with reasonable prices to accommodate and make friends with world travelers and, at the same time, to earn some extra income. Examples are AirBnB, CouchSurfing, Roomorama, and SabbaticalHomes. Although some argue that the services are not compliant with hotel laws and tax laws, they are growing rapidly.
- Online recycling sites: Disused goods are exchanged in hundreds of recycling sites basically for nonprofit all over the world. Examples include swap.com and my.freecycle, in which a million members swap 2 million goods. The number is increasing.
- Online rental listing sites: They match demands and supplies of rental of almost any kind of personal items, such as cars, power tools, camping equipment, event spaces/goods, and party goods. Examples are Zilok, HotPads, Oodle, and Trulia.
- Online peer-to-peer exchange of fallow farmland: The marketplaces, such as SharedEarth.com and LandShare.net, match idle land owners and seekers such as personal vegetable gardeners and agricultural venture start-up companies. US-based SharedEarth.com and UK-based LandShare.net have affiliated their services to expand worldwide for nonprofit.

[5] Please refer to Botsman, R. and R. Rogers (2010), *What's Mine Is Yours: The Rise of Collaborative Consumption*, HarperCollins.

– Social lending: Transactions of lending money between individuals are supported online by Prosper, Zopa, and the like. The interest rates are determined by the reverse auction model. Many similar sites are proliferating all over the world.

All those sites, both for profit and nonprofit, are growing rapidly and it is becoming a worldwide trend. If all dead, idle, or excess resources are searched and utilized further due to the further reduction of transaction costs, the world economy may alter drastically.

1.2.2.11 Open Innovation

Transfer of information incurs transaction costs. It obstructs innovation for which various kinds of irregular communication are indispensable. Either in-house innovation or open innovation by unknown individuals in discrete organizations incurs much more transaction costs than day-to-day communication does. It has been too large to execute the transaction to achieve innovation.

Consider computer programs exchanged in open source projects, for example. Computer programs are collections of information in which ideas are described in a certain language, a computer language. In open source projects, a tremendous number of ideas are transferred, distributed, and integrated. For creation of new ideas, it is much easier to integrate other ideas than to produce them from scratch. Therefore, innovation corresponds to integration of other outcomes, and it is critical to establish such environments that promote the integration.

Even in the process of innovation, the number of kinds of information transferred and shared is usually very limited. The more specialized a field becomes, the more specific the information transferred becomes. Although information can be exchanged quite readily within a community, it becomes costly to do that outside the group. When individuals with high processing capabilities pursue new and unfamiliar information, ideas, and concepts in different fields, there had existed huge transaction costs.

In Fig. 1.1, a road to achieve innovation is illustrated. A certain individual distributes information or an idea to others. Among the many individuals who receive that, one individual adds information or an idea and redistributes it. Among the many individuals who receive that, one individual integrates it with his own idea and accomplishes a breakthrough. The greater the number of transactions of information that are executed, the higher the probability that innovations will fail. Transaction costs have obstructed innovations severely in this process.

Innovators need information to solve their problems. It is very seldom that they can acquire what they need in any given moment. The location of the information is unknown, and the search is very costly. Although they may encounter seemingly useful information, determining whether it is advantageously valuable or not incurs considerable transaction costs. When it is judged as valuable, developing more profound understanding for utilization requires time and effort, especially in the case of information acquired from an unknown source.

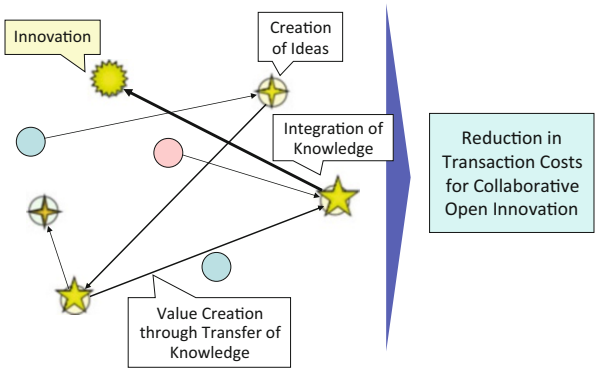

Fig. 1.1 Promotion of open innovation by reduction of transaction costs

These enormous transaction costs have obstructed and restricted communications that might have led to a breakthrough innovation. Even in companies where information and ideas should be exchanged and shared freely, the situation is nearly the same. For example, the sharing of various kinds of significant information related to product development is typically restricted to certain departments, groups, and individuals. It is because the transaction costs are unrecognized and the methodologies for reduction are undeveloped. If all transactions were executed efficiently and effectively, the probability of reaching new valuable solutions and creation of ideas and of earning huge profits must increase drastically.

University-to-business collaboration, B2B collaboration, and open innovation are all challenges for new creation across a variety of fields. Those intend to execute cooperative activities that have seldom arisen in the past due to huge transaction costs such as searching, mutual understanding, exchange, payment, problem solving, and enforcement, as described previously. While the costs have been too huge to perform a trial, successful cases were increasingly reported from the Silicon Valley area, with astonishing outcomes; collaborations began to be considered as a key success factor for innovation, and many attempts in various regions and countries were subsequently carried out. However, other success cases have rarely been observed.

Regarding what distinguishes the successes and the failures, Henry Chesbrough, a professor at the University of California at Berkeley and the author of *Open Innovation*, pointed out the standardization of communication as a crucial key factor after he investigated many cases in Silicon Valley. In contrast, the methodology adopted in Japanese trials has been the appointment of *collaboration coordinators*, which ended up without any perceivable reduction of transaction costs.

The difference in the methodologies of reducing transaction costs; the standardization of communication (including the establishment of communication platforms) and development of communication capabilities; and the appointment of coordinators are also going to be the central discussion subjects of this book.

1.2.2.12 Reducing Transaction Costs Incurred at Matching Demand and Supply of Electricity by the Smart Grid

The smart grid, which has been called the Internet revolution of the energy industry, was developed to process the gigantic volume of transaction information between suppliers and buyers. Situations in which only one monopolistic electric company supplies all the electricity are fairly simple, as calculation and estimation of all demands and supply are the only processing needed. In the USA and some European countries where the electricity industry is deregulated, the number of combinations of suppliers and demanders is enormous. Because it is difficult to coordinate the balances, large-scale blackouts frequently occur. A huge number of households are becoming the suppliers, as they are now being equipped with electricity generators such as solar energy, wind energy, and micro-water energy, a result of which complicates the coordination much more. The new smart-grid technology will monitor the energy consumption and generation of each household accurately and process the matching on online marketplaces. Transactions of measurement, invoicing, and payment will also be automatically processed.

1.2.3 Decrease of Digital Processing Cost as a Driver of Reducing Social Transaction Costs

Costs of the transaction in the digital space are decreasing drastically.

All the cases above depend heavily and indisputably upon the huge reduction of transaction costs in the digital space. It is not an exaggeration to argue that all digital technologies aim at the reduction of transaction costs. It seems intuitively obvious that the Internet infrastructure has enabled transactions and new business models such as the *freemium* that were impossible in the past, but the impacts will be examined quantitatively in this section.

The huge reduction depends on not just the Internet perceivable to all consumers but as well as the fundamental digital technology innovations underneath the surface. There are three key innovations as follows:

(1) Increase of information-processing speed and decrease of the cost (Moore's law)
(2) Increase of telecommunication speed and decrease of the cost
(3) Increase of data storage capacity and decrease of the cost
(1) Increase of information-processing speed and decrease of the cost (Moore's law)

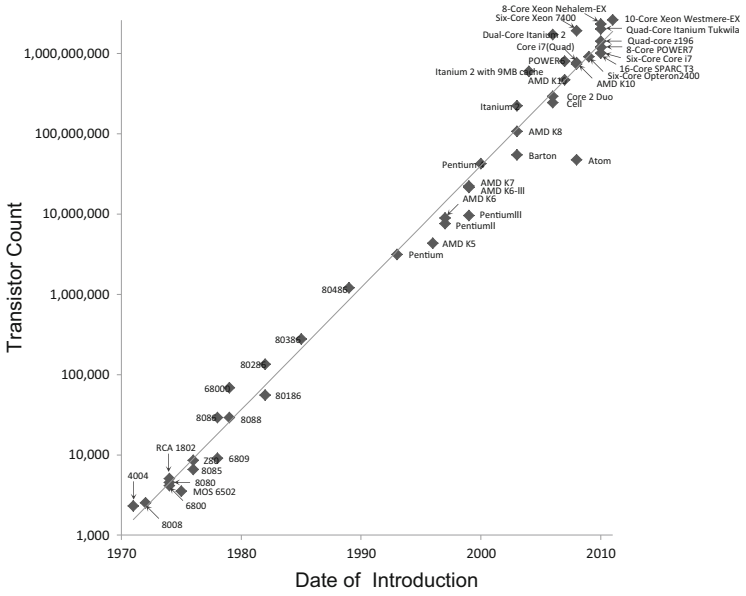

Fig. 1.2 Increase of microprocessor transistor count. Source: Wgsimon, http://commons.wikimedia.org/wiki/User:Wgsimon. This chart is licensed under the Creative Commons Attribution-Share Alike 3.0 Unported license.

The most well-known technology innovation is an increase of semiconductor density, called "Moore's law." Information-processing cost per unit decrease is correlated to the density. Gordon Moore, a founder of Intel, argued in his paper contributed to *Electronics Magazine* that the density of transistors on a semiconductor doubles every 2 years. It is equivalent to 40 % per year, and, actually, the increase rate in the last 40 years was approximately one million times or 40 % per year as shown in Fig. 1.2, which corresponds to a decrease rate of cost per transistor. This also has been increasing the telecommunication speed.

(2) Increase of telecommunication speed and decrease of the cost

The telecommunication speed of computers has increased 6.9 million times in the last 30 years, and the telecommunication infrastructure costs have decreased less than one millionth,[6] which is equivalent to 60 % per year, surpassing the rate of semiconductors.

(3) Increase of data storage capacity and decrease of the cost

Increase of storage capacity of the hard disk drive (HDD) was argued in the bestselling book *The Innovator's Dilemma*[7] as an example of innovation and

[6] *Information Economy Innovation Strategy*, 2010, Ministry of Economics, Trade and Industry, Japan.

[7] Christensen, C. (1997), *The Innovator's Dilemma*, Harvard Business Review Press.

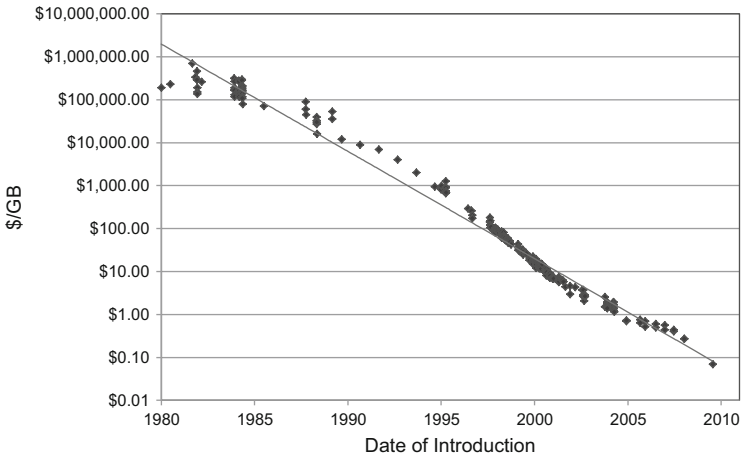

Fig. 1.3 Decrease of HDD cost per unit. Source: Mkomo.com, http://www.mkomo.com/cost-per-gigabyte

has become known worldwide. As shown in Fig. 1.3, the decrease of the cost per gigabyte in the last 30 years is amazingly more than one 10 millionth or 70 % per year. This surpasses even the rate of telecommunication cost.

(1), (2), and (3) above have collectively increased processing volumes of data, which leads to the enhancement of resolution in presentation and communication. It has promoted the transactions of digital contents and enabled free video conferences.

1.3 Industry Structures from Perspectives of Transaction Cost

Many new implications regarding industry structures are obtained from perspectives of *transaction cost*.

1.3.1 Transactions Are Universal Beyond Industries

There are production and transactions in any industry universally.

Businesses are usually classified by industry sector, such as manufacturing, distribution, service, and so forth. However, many manufacturing companies such as Sony and General Electric earn most of their profit from their financial services. The present industry classification is obviously insufficient to explain the conglomerates. In addition, the classification is not any more in accordance with the reality or the structural changes occurring in the world economy. Perspectives of a transaction cost will extract commonalities among industries and ongoing structural changes, which are rich in strategic implications.

Table 1.1 Examples of "service" and the methodologies to charge

Business	Value to customers	Charge methodology
Hotel	Concierge	Rooms
	Planning and management of wedding ceremonies and parties	Food, flowers, gifts, wedding costumes, etc.
Manufacturer of commodity products	Business consulting to resellers who sell their commodity products	Commodity products
Franchiser		*Franchise fees*
IT Consulting	Planning and development of IT	*Consulting*
IT Reseller/VAR		Hardware/software products
Franchise restaurant	Centralized production and distribution of foods and centralized control of manuals	Processed foods + *services*
Machine manufacturer	Maintenance services	Machine products
		Maintenance services
		Consumables
Department store	Comfortable and convenient environment	Products
Business consulting	Research and recommendation	*Consulting*
Private equity, venture capital		Capital gains

Items charged as "service" are shown in *italics*

For example, "service" is misunderstood due to its unreasonable classification as an industry. Table 1.1 exhibits examples of businesses that are usually deemed as "service," their values, and their methodologies to charge fees, showing the contradictions of the classification.

Hotels could be one of the most typical "service" businesses. They charge to their customers not by concierge service or party planning, which are their biggest competency, but by rooms and flowers in parties. That is, they are real estate agencies and florist shops as long as their methodologies for charging are concerned, especially in developing countries.

As salespersons at manufacturing companies of commodity products cannot differentiate themselves by product (a commodity is defined as a product that is not differentiated by product per se), they compete with services to retailers such as consulting of stock/order management, merchandising, and competitive strategy against their neighboring stores in recent years. Although they do not charge by those consulting services, franchisers charge franchise fees openly on their identical services.

In the IT industry, a customization service called *solution* provides value to customers, increasing the significance. However, the IT-related companies that do not carry the term *consulting* in their company names need to charge their customers by hardware or software products instead of charging a consulting fee, as all their services are provided for free, especially in developing countries.

It is widely known that the revenues of the manufacturers of machines such as elevators and photocopiers accrue from the maintenance services of products instead of their products per se. Some of those companies charge their customers on consumables instead of the maintenance service fees.

In reality, the fast-food shops serve centralizedly manufactured goods to their customers almost without any value added; however, they are classified as being in the service sector instead of the manufacturing sector. Their minimal services such as heating by juvenile part-timers can be seen in Japanese convenience stores, which are classified in the retail sector. Most of the fast food shops request customers to dispose of their waste, while the attendants who were trained at hotels serve potential customers a cup of expensive coffee in Lexus distributors that are managed by a manufacturer, Toyota. Which are *service* companies?

The financial industry, another representative example of the service sector, distributes financial products centralizedly produced as well. Japanese financial services in particular do not add value to the products, and those are being replaced by the Internet. The business model is identical to that of the manufacturing sector, instead of the services sector.

There are many other examples of businesses categorized as *service* that are not recognizable as *service*. All industries have service functions more or less these days to enhance their value added at the point of sales. In other words, there exists *service* as a function or a task in addition to *service* as an industry.

It should be noticed here that all industries have processes of production and transactions. Flows and structures of transactions are universal beyond industries, and produced goods are not delivered to the customers without them. The only difference is strategic allocation of resources to production or each element of transaction. Some industries allocate more resources prominently to the service function than others do.

In addition, changes in the market situation have been altering companies' attitudes toward the service. For example, although almost all manufacturing companies have been enhancing services offered to their customers, the resources allocated to the service have been much less than the service industry, relying on mass marketing such as TV commercials. Since the mass consumer market has been their target, they created the image that they do not prioritize the service. However, they began to get involved in the service function by replacing their distributor function with their own customer centers, their own consulting departments (IT-related companies), and their own attendants trained at hotels (high-end automobile manufacturers).

This is because the competitions became fiercer and the companies began to pursue their differentiation by customization, thus responding to the more diversified needs of the markets. The trend certainly has accelerated.

As for the restaurant business, an example of the service industry, the services also vary from company to company. At "mom and pop" restaurants, both production and transactions are executed by chefs or the owners themselves. In contrast,

chain food shops are very similar to manufacturing companies, where production is controlled efficiently and systematically and transactions are done in the same way with low-cost laborers. High-end restaurants at hotels try to deal with any requests from customers thoroughly to differentiate themselves and to achieve high profitability.

Distribution and retailing industries execute transactions on behalf of manufacturing companies. In the past years, manufacturers have developed their own distribution channels and logistics because they were the first modernized large-scale organizations that had accumulated enough resources. Afterward, distributors and retailers matured enough to be independent from their sponsoring manufacturing companies and reorganized themselves to deal with products of multiple manufacturers. The newly independent distributors and retailers have followed manufacturing companies to become modernized.

Those examples clarify commonalities among manufacturers, distributors, retailers, and servicers. All industries have a universal structure composed of production and transaction. It should be emphasized that analyses of mutual comparison applying this universal structure—that is, production and transaction, and additionally each element of transaction—provide many strategic implications. Analyses based on the classification and extraction of common success/failure patterns that can be applied to every industry and company are the most valuable. The present industry classification is based on an obsolete structure of markets and does not keep up with the present situations after the businesses' continuous innovations with their risks and efforts. The perception of *service* has differed from industry to industry despite the structures being universal, resulting in fewer opportunities to learn from each other. The significant lessons can be obtained by applying the transaction structure.

1.3.2 Structural Changes of Transactions with Industries Level

Valueless transactions are replaced by IT, and valuable transactions expand.

The discussions above illustrated some kinds of transactions that decrease or disappear (being replaced by IT) and also other kinds of transaction that increase or emerge. A typical kind of transaction becoming less important is obviously that of commodity products. The most complicated element of a transaction, determination of specifications, is fixed a priori with commodity products. Therefore, the transaction is much simpler and is more readily executed by online ordering/acceptance, substituting human activities. Actually, the substitution of human activity by online automated processing technology started from the simple elements of a transaction, such as connection, ordering/acceptance, presentation, and logistics (e.g., online delivery of digital contents), and extended to the more complicated elements, such as credit information provision, maintenance (e.g., online marketplace of repair goods), and education (e.g., know-how sharing among users). Technology

innovation in machine learning, which automates the customer services, has been advancing rapidly in this field.

Contract transportation companies have been undertaking deliveries of various products collectively, and digital contents (e.g., movies, music, and games) have been distributed through the online markets. As those examples exhibit, the tasks in each element of a transaction have strong commonality in their characteristics, processing methodologies, and procedures. Therefore, the concentration of tasks embodies economies of scale and improves efficiencies greatly and easily. This perspective is significant throughout this book.

Tasks that are readily outsourced include IT, accounting, recruiting, general affairs, welfare, and call center. In addition to those, even production, design, R&D, and sales are also considered seriously these days. Those are perceived as transfers of internal activities to external outsourcers. This trend is caused by the reduction of transaction costs with external servicers—that is, transaction costs of the transfers such as searching of the substitutes, presentation, negotiation, and contracting for the transfers. The reduction of transaction costs has been arising not just internally (in day-to-day operations) but as well as externally (in substitutions of transaction partners), which embodies the outsourcing of any function.

As described above, the transactions of substituting business partners have increased because companies can more readily access and interact with substitutes with much less transaction costs. The trend of modularization of mechanical components is proceeding based on this background. An increasing trend of the modular structure among companies can be explained in the broader sense of the terminology. And modularization is conceived to be embodied by the establishments of interfaces and the reduction of transaction costs.

Substituted tasks are collectively concentrated to one company achieving economies of scale for higher efficiencies of operation. Due to the reduction of external transaction costs, tasks are thoroughly decomposed, and each fragment with strong commonalities is collected to pursue economies of scale. Horizontal distribution of functions among companies and industries is proceeding, resulting in an open economy.

It should be noticed that the spread of the Internet and various products and services built up on the Internet, the infrastructure, have decreased transaction costs drastically. Utilizing this opportunity, an enormous number of companies have begun to establish and standardize their own interfaces to promote their substitution functions. As a result, transaction costs (not only in day-to-day operations) of searching for, presenting to, and contracting with substitute business partners have decreased incredibly, a result of which is to promote fiercer competition to decrease transaction costs further.

1.4 Where and How Transaction Costs Are Incurred

Establishment of a transaction interface incurs transaction costs.

1.4.1 Structure of Transactions and Transaction Cost Incurrence

A transaction is composed of five elements: connection, presentation, negotiation/agreement, exchange, and ex post processing.

In order to reduce transaction costs and to increase the efficiency and effectiveness of a transaction, an essential understanding of transactions is indispensable. In this section, the structure of transactions and the incurrence of transaction costs are discussed. Starting with a simpler case of commercial transactions (between companies), the commonality of organizational transactions (inside companies) will be examined subsequently.

A transaction is basically a simple exchange in which a certain outcome is supplied and a counter value is paid in return. As described previously, it exhibits a universal pattern in all aspects of business beyond products, outcomes, companies, industries, functions, and so forth.

All activities except transactions produce outcomes to be exchanged. Activities of production vary depending on outcomes such as cars, mechanical components, apparel, software, design diagrams, movies, services, and so forth. All those activities are defined as *production* in this book, and any difference in production is not an object of this book. The focus of this book is on transactions, which have a universal pattern.

Production cost includes all costs to produce an outcome such as component/material costs, equipment/facility costs, assembly/fabrication costs, labor costs, and management costs. Production costs and transaction costs compose the whole cost.

There are broad and narrow definitions of transactions, which should be distinguished carefully[8]:

- Broad definition: all activities of exchange including production
- Narrow definition: all activities of exchange excluding production

Although logically a *transaction* refers to the narrow definition, sometimes it also implies the broad definition customarily. When transaction costs are mentioned, a *transaction* refers to the narrow definition. However, when somebody says "a *transaction* with Company A was completed," it often refers to the broad definition.

This book refers to only the narrow definition in which a transaction is composed of five elements, each of which is also decomposed to sub-elements, as described in Fig. 1.4. Transaction costs are incurred in processing of these elements.

Those five elements are as follows:

(1) *Connection*

In the first element of a transaction, a transaction partner is searched, selected, accessed, and communicated with, and *presentation*, the next element, is proposed. It is possible, of course, for both transaction partners to reject further communication even if the other desires to continue. In organizations, as

[8] In addition to the definitions in economics, a *transaction* also refers to a unit of information processing, especially database processing, which has no concern with the discussion in this book.

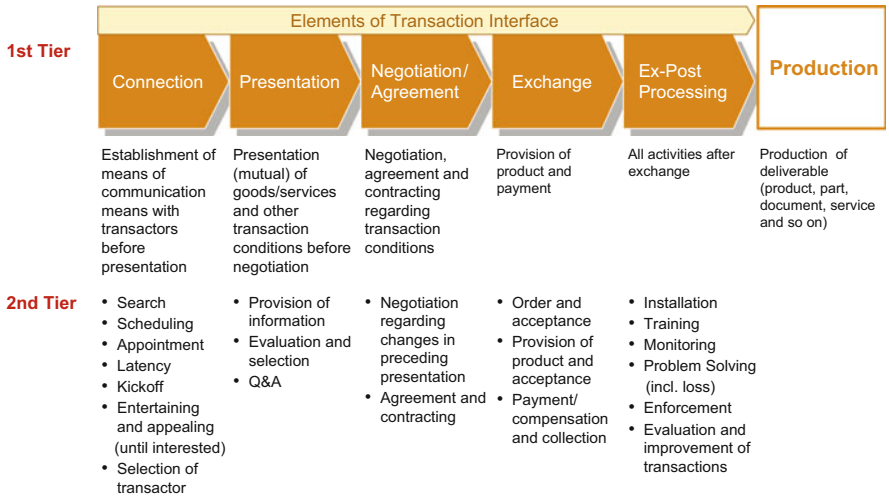

Fig. 1.4 Elements of transaction

potential transactors are usually known or designated a priori, the necessary activities are limited to the coordination of time, venue, and method of access, travel, and so forth. Therefore, the related costs are relatively small. However, in a case of starting a commercial transaction with an entity located on the opposite side of the globe, the cost will be enormous. First of all, potential suppliers of resources or prospects who are interested in products should be searched and accessed in a certain way. These days, it is quite possible to communicate with any entity in the world by email, but the communication with entities in developing regions still necessitates faxes, telephones, postal mail, or hand-carried private letters like in the past. Next, the appeal to potential transactors to accept a presentation regarding themselves is made, which is not only from suppliers but also from customers who may not be perceived as credible, especially without past records. Planning and preparation of the appeal is also one of the significant activities in *connection*.

(2) *Presentation*

The *presentation* element starts after both transactor partners agree to communicate. Presentations of information are bilateral, and the information is provided from both the supplier and customer sides. The information required by the customer side is regarding the potential supplier's products and capabilities, such as the quality, cost, and delivery. In addition, all other transaction conditions such as payment and discount conditions should be confirmed. Moreover, the information regarding the credit, responsibility, and sincerity of the transaction partner and its problem-solving capability also needs to be provided. Suppliers need more information than customers, such as customer's requirements and satisfaction with the background information. One of the most significant pieces of information for suppliers may be the customer's credit information—that is, if the customer will or can complete

payment.[9] The potential of the transaction partners is considered as well. Q&A regarding the presentation is included in this element.

(3) *Negotiation/Agreement*

After the bilateral presentation for basic understanding of each other, the transaction partners negotiate and agree about concrete specifications and detailed conditions of the transaction that they are going to execute and conclude contract documents. Various conditions regarding the specifications, prices, deliveries, contingencies, and so forth are negotiated and adjusted mutually. In addition to basic pricing systems, methods to adjust prices by changes of ordering dates and quantities may be determined. It usually requires internal coordination on both sides.

(4) *Exchange*

According to the agreed transaction conditions, the delivery and acceptance of the product, the inspection, the payment, and so forth are executed administratively and technically. While it is an exchange of a product and cash at commerce, the future cash such as evaluation for promotion instead of real cash is paid in the organization. The activities of ordering and acceptance are classified as *exchange* activities, which are just executed administratively and technically. In this process between companies, first, ordering/acceptance documents are exchanged for confirmation of execution (as is often the case even within organizations); next, confirmation and inspection of the delivery are executed; and finally, invoicing, payment, and confirmation of payment are executed.

(5) *Ex Post Processing*

It is not the end of a transaction when the *exchange* is completed. There exist various significant sub-elements in the *ex post processing*. Products may need to be installed or retrofitted at customers. Complicated machines and equipment may need operation training. Customers need to monitor their running for validation of the specifications. If there are any problems, those should be solved by themselves or reported to the supplier for solution. Problem-solving costs are imposed on customers if those are relatively small. If not, they claim the supplier to pay the cost with some administrative paperwork. The customers may need to attend the repair. All those are also transaction costs that are likely to be neglected as managerial objects. If the supplier rejects problem solving, a legal transaction may be needed, which incurs far more transaction costs. Last, the transaction is evaluated to make a judgment of the continuation and modification.

As the five elements above are usually sequentially processed, they can be called *steps* as well. However, this is not always the case. For example, *production* is processed at a certain moment before the *exchange* element is executed on the suppliers' side, specification design on the buyers' side may be processed before

[9] In the case of an organization, it corresponds to the information regarding whether the customer, or boss, evaluates and rewards fairly.

connection with the suppliers, and required specification is presented before *connection* in online marketplaces. Therefore, the term *element* instead of *step* will be used in this book.

All the cost except for transaction costs is production costs. In order to clarify a *transaction cost*, *production* is elaborated below:

(0) *Production*

In this book, *production* refers to all activities to produce an outcome (e.g., a product, a component, information, or intellectual property), including fabrication, assembly, writing, editing, planning, designing, development, and so forth, which is exchanged in the transaction.

The concept of a transaction cost has never existed in the past, and therefore it has been allocated and embedded in this *production* cost. It is impossible to measure, analyze, or manage embedded costs.

There have been numerous challenges to analyze activity cost and its efficiencies—in particular, overhead cost. Actually, classification of activities and effectiveness analysis by cost elements has been one of the major revenue sources of management consulting firms. During their analyses, all targeted activities are classified for their decisions of demise, integration, or standardization.

All those conventional classifications of activity costs have depended on this *production* and have been designed or modified according to the produced outcome. In addition to an obvious deficiency of the cost classification based on *production* by which transaction costs are not measured, analyzed, or managed, it is incapable of benchmarking data. Because *production* varies by industry sector, type of business, company, department, individual, date and time, and so forth, standardized classification and comparison analysis have been impossible. Comparison analysis including best practice benchmarking provides significant implications for evaluation of efficiency and effectiveness.

The lack of comparison is, of course, caused by the lack of a standardized classification. For example, management consulting firms create a new classification of activity cost measurement and analysis for their clients with each project because the classification varies. They usually charge a few hundred thousand US dollars per project, which is too expensive for most of the companies to afford despite its significance. If a standard classification could be established utilizing the universal structure of a transaction, the project costs above would drastically decrease. Super expensive elite consultants would no longer be necessary, and IT would be able to be fully utilized for the measurements and analyses.

While the classification of transaction costs is possibly standardized based on the universal structure of a transaction, production cost classification still remains to be customized by products. However, a huge portion of production costs is composed of transaction costs[10] because production activity involves many transactions. It is

[10] The structure of *transaction costs in a production cost* will be clarified by defining levels of a transaction such as a company level, a department level, and an individual level. Detailed definitions including this leveling will be explained in the next chapter.

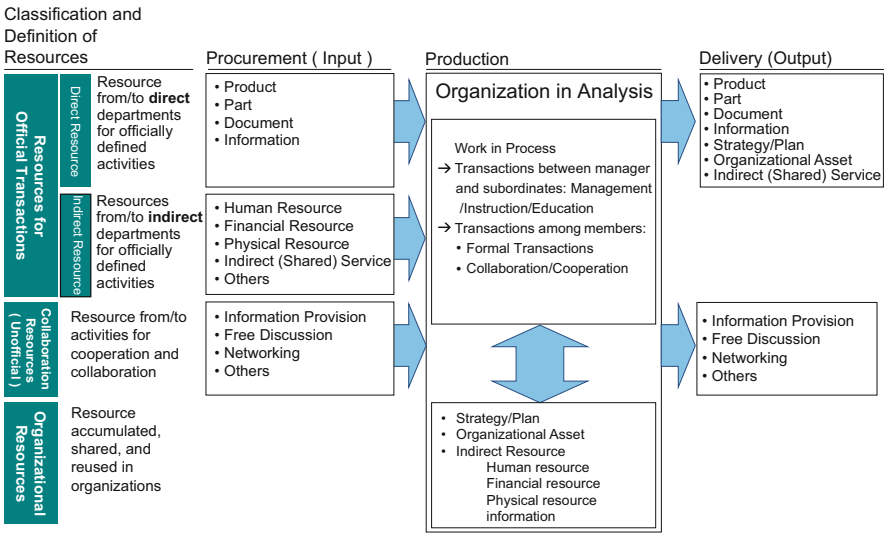

Fig. 1.5 Classification of resources transacted

especially true in intellectual activities such as research, planning, and software development, which are highly transaction driven. Therefore, even a standard classification of transaction costs only (excluding production costs) creates benefits.

Another standard classification for transacted resources as proposed in Fig. 1.5 can also be useful in order to make the comparisons more precise among various functional departments, such as a production department versus a sales department, a R&D department versus a personnel department, and so forth. It classifies transacted resources in a standardized manner.

(1) Direct resource for officially assigned activity

This class of resource is delivered from *direct departments*: business departments, which are contributing revenues directly (e.g., sales, design, and production), as an outcome such as products, parts, documents, information, and so forth, for the production activity officially assigned to the targeted department, or is delivered to direct departments as an outcome of the targeted department.

(2) Indirect resource for officially assigned activity

This class of resource is delivered from *indirect departments*: administrative departments with supporting functions (e.g., personnel, general affairs, and accounting) which are not directly associated with revenues, but delivers indirect resources and indirect (shared) services (e.g., human, financial and physical resources, and information) plus a strategy/plan, which are classified as *organizational resource* here, for production activity officially assigned to the targeted department. In this standardized manner, the activities of direct and *indirect departments* can be compared to each other.

(3) Collaboration resource

This class of resources is delivered from and to other departments for voluntary collaboration and cooperation, such as information provision, free discussion, networking for the future collaboration, and so forth.

(4) Organizational resource

This class of resource is developed to be accumulated, shared, and reused in the targeted department, such as the strategy/plan, organizational assets (e.g., work process and manual), and indirect resources (e.g., human, financial, and physical resources and information).

It is especially important that all resources transacted in any industry sector, any company, any department, and any individual are classified in the standardized manner, a result of which embodies comparisons even between indirect and direct departments and provides valuable perspectives for the cost analysis. And assuming that innovation is promoted by not officially assigned activity but collaborative exchange of information, the *collaboration resource* is designed to be tracked separately in this classification.

1.4.2 Transaction Costs Are Incurred on the Customer Side As Well

Transaction costs incurred with customers should also be analyzed especially at the point of transfer of information.

The perception of a transaction cost clarifies the costs incurred with not just suppliers but as well as customers or buyers. Although the transaction costs on the suppliers' side is usually analyzed and managed for reduction, buyers seldom recognize even the incurrence per se. The perspective has been seriously missing in *production*-centric researches. Transactions are frequently obstructed due to too high transaction costs, which should be analyzed for reduction, especially in the present era when the transactions of information should be encouraged proactively for innovation.

Transaction costs incurred with buyers include:

- Connection cost: Searching and accessing the most appropriate suppliers
- Presentation cost: Presenting their needs and requirements to the suppliers and understanding and evaluating their products/services and characteristics.
- Negotiation and agreement cost: Negotiating and contracting all transaction conditions, including price and specifications with the suppliers, and also coordinating with their own departments internally.
- Exchange cost: Processing documentation of orders, confirmation of acceptances and deliveries, inspections, payments, and so forth.
- Ex post processing cost: Installing the delivered product, training themselves for operation, and embedding it in their own business processes. Monitoring the performances and reporting and solving the problems, if any. Requesting and enforcing the solution. These transaction costs may be larger on the buyers' side.

The reason that one-stop shopping at shopping centers and large-scale online marketplaces is popular is that reduction of transaction costs was recognized as valuable, even by the consumers. However, it is just an intuitive perception. Due to the characteristic of transaction costs, in which the effectiveness of the transaction improves as more transaction costs are expended, transaction costs should not be simply reduced but analyzed carefully for reduction while monitoring the change of effectiveness.

This characteristic will be discussed in detail in the next section, but as a simple example here, in spite of the fact that the more the searching cost, the higher probability of finding most appropriate suppliers, customers rather frequently select suppliers who visit every day because it is easier. Although competitive quotes should be obtained while negotiating with a supplier, this is often neglected just because it is cumbersome. Despite the fact that transactions involving a great deal of information from a countless number of entities will increase the possibility of leading to breakthrough innovations and appropriate information sources should be searched and accessed as much as possible, it usually does not happen. It is important to decrease valueless transactions in order to increase valuable transactions.

To be more precise:

- Efficiencies of searching and selecting most appropriate suppliers should be increased in order to increase probabilities of encountering them.
- Efficiencies of understanding potentials should be increased in order to increase the volume of the information processing, which leads to selecting the most appropriate suppliers.
- Efficiencies of negotiating and contracting should be increased in order to increase the number of transactions, which leads to finding the best win-win and sustainable relationship.

Information valuable for innovation will never come up by just sitting and waiting. This is the reason why transaction costs should be analyzed and reduced carefully so that transactions are processed agilely, thus increasing the number of transactions and improving the effectiveness.

As described above, the perception of a transaction cost on the buyers' side is increasingly important, and the development of the methodologies for the management is indispensable. In any case, the first step is to perceive the existence and comprehend the concept of a transaction cost.

1.4.3 Transaction Costs Are Incurred at Transaction Interfaces

Issues of *transaction costs* correspond to issues of a transaction interfaces.

In this section, the concept of a transaction interface, which is the source of transaction costs and the most critical factor for modern management, is discussed. The transaction interface exists between transaction entities. The adjustment of the differences between entities by establishing the interface incurs the transaction

costs. That is, the issues of transaction costs correspond to the issues of transaction interfaces.

It should be noticed here that transaction costs are *nearly* (the explanation of using the term *nearly* will follow) equal to the cost of establishing transaction interfaces. Consequently, the analysis of transaction costs *nearly* coincides with the analysis of transaction interfaces.

Transaction elements are classified into two major categories:

(1) Agreement on interfaces (specifications and transaction conditions) for exchange—that is, activities in the elements of the *connection*, *presentation*, *negotiation/agreement,* and *ex post processing*[11] (the *exchange* is excluded).
(2) Execution of exchange complying with the agreed interfaces (specifications and transaction conditions)—that is, activities in *exchange* such as ordering/acceptance, delivery, inspection/confirmation, payment/confirmation, and so forth.

Obviously, (1) corresponds to the establishment of transaction interfaces and is indispensable for (2) the execution of exchange. (2) is the less significant administrative and technical activity, just involving compliance with the interfaces established in (1). Most of increases in transaction costs these days are related to the activities of (1), and therefore the efficiencies and effectiveness of organizations significantly depend on (1). The methodologies to execute (1) efficiently and effectively are increasingly crucial.

Some researchers exclude (2) ordering/acceptance, inspection/confirmation, payment/confirmation, and especially transportation from the definition of a *transaction cost* (please refer to Chap. 7). However, this book prioritizes simpler structuring and defines all activity cost (except for production costs) including transportation as a transaction cost. Information exchanges such as confirmation of delivery, confirmation of inspection, invoicing, receipt, and payment are often performed concurrently with transportation activities. In those cases, it is practically unmanageable as well to separate only the transportation costs.

Because (2) activities of the *exchange*, ordering/acceptance, delivery, inspection, confirmation, and payment, are different qualitatively from (1) the central activities of a transaction, it is possible to separate them to create another category of cost. However, the increase of the number of category complicates the classification system. Inclusion of (2) in the definition of a transaction cost is the reason why "transaction costs are *nearly* equal to the cost of establishing transaction interfaces."[12]

Hereinafter, throughout this book, the concepts and methodologies of establishing transaction interfaces will be further examined.

[11] Ex post processing is included in (1) agreement on interfaces because it is the activity to confirm the interfaces as agreed and to adapt their own interfaces as agreed.

[12] In other words, if (2) *exchange* is not included in the definition, transaction costs *completely* become equal to the cost of establishing transaction interfaces.

1.4.4 Reduction of Transaction Costs by Fixing Transaction Interfaces

Transaction costs are reduced by fixing transaction interfaces.

The transaction interface corresponds to agreed transaction conditions. Both transaction entities need to adapt their internal activities to the interface agreed. One or both of the entities need to alter their own business processes and document formats such as ordering/acceptance, their internal interfaces, and so forth to the interface newly agreed.

If those are not shared or standardized, they need to alter them every time when they change their transaction partners. If there is a socially standardized interface, they are able to fix their internal interfaces to adjust to the standard. It increases the usage, enhances economies of scale, and enables systemization and replacement by lower wage labors to decrease the costs. For an example of credit information of transaction partners, a considerable cost would be incurred if they collect and analyze the information for every potential partner by themselves. In contrast, if they accept the information of a credit bureau and fix the process as an internal interface, they are able to reduce the cost greatly.

If entities have different transaction conditions such as specification, delivery time, payment method, and so forth, both entities are required to adjust to each other. If they fix the interface instead of adjusting and determining every time, the transaction costs will be reduced considerably.

As described above, the concept of fixing interfaces or establishment of fixed interfaces and the economies of scale obtained consequently has significant implications for the analyses of transaction interfaces.

1.4.5 Costs that Are Not Transaction Costs

Pure production costs, which do not contain a transaction cost, are very limited.

In order to deepen our comprehension of a transaction cost, the costs that are not transaction costs will be examined in this section. It was previously explained briefly that *production costs* comprises component/material costs, equipment/facility costs, assembly/fabrication costs, labor costs, and management costs of all the above. Focusing on *production costs*, which are frequently contrasted with *transaction costs* in economics, the concept of a transaction cost will be examined here.

Before transaction cost economics was introduced, the cost was only *production costs*. Since transaction costs were separated from them, the cost that is not transaction costs is supposed to be *production costs*. There exist several dozen definitions of a transaction cost in economics, as described in Chap. 7; consequently, the definition of a *production cost* is vague. Actually, various kinds of transactions can be observed in production when the activity of production is decomposed. For example, a production department has transactions of information with a sales department such as production control (e.g., order information and

production schedule) and product development (e.g., market needs and mass-production technical constraints). Ordering parts and materials to suppliers is also a transaction. Delivery information will be distributed from the procurement team to other teams and other departments. There are various departmental and internal transactions. On shop floors of production facilities, managers and foremen may order and educate their laborers, and these are also classified as transactions. The production costs that are never related to a transaction are limited to only parts/material cost, production facility/equipment cost, and labor cost of the workers who operate those machines.

Creating design diagrams for product development involves information not just for production but also for confirmation of requirements with customers, which is supposed to be classified as a transaction cost. If many internal presentations for approvals of executives are required to launch a product development project, huge internal transaction costs are incurred, including preparations for the presentations.

Activities to determine internal standards of transaction conditions regarding a company's own products may be regarded as production costs. However, presenting and negotiating the transaction conditions with customers or suppliers, even in the production department, must be classified as a transaction cost.

For reconfirmation, the definition of a transaction in this book includes all kinds of internal communication, in order to develop the standardized and universal methodologies to analyze organizational activity.

In contrast, alternative definitions for a *production cost* are also shown below. Those have apparent contradictions and are difficult to justify.

(1) All costs incurred in a production department

The biggest problem of this definition is that definitions of a *production department* vary from company to company. Whether a production department includes design functions or not, how much product development functions belong to a production department, which may belong to a marketing department in other companies, and so forth vary considerably. In short, because a precise definition of *production department* is impossible, it should not be used to define something else.

(2) All costs related to production activity

Definitions of production activity are vague. All those activities should be defined as production or not, such as drawing diagrams to confirm requirements with customers, adjusting delivery dates with customers, negotiating prices with customers to change specifications, installing products for a customer, maintaining products at a customer, and many others. Eventually, the definition of a transaction is required for the definition of production activity.

(3) All costs related to production and design activities

Design activities are able to be included in *production* as long as a company's own in-house products following its own standard specifications are concerned. However, determination of design specification at order-driven contractors includes adjustments and negotiations with customers, which are obviously regarded as transaction costs.

(4) All costs except for commercial transactions with external entities such as customers and suppliers

This definition includes only external commercial transactions in transaction and excludes internal organizational transactions. The disadvantages of being incapable of analyzing internal communication, the managerial value of which has been increasing drastically, are not negligible.

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As shown above, the definition by which all communication is perceived as an economic transaction is most concise and can provide valuable implications.

However, a transaction depends on which level of entities is targeted. For example, when an external transaction between companies is focused, most of the transactions in a production department on the suppliers' side should be considered as *production* because they do not transact with the customer and they do not relate to the external transaction subject to the analysis. That is, by designating the level of a transaction (e.g., company level, department level, and individual level) and recognizing activities as *production* that are not related to the transactions subject to the analysis, the analysis becomes much simpler. *Production* depends on the determinations of not just the transaction but also the level of a transaction that is subject to an analysis. A methodology to simplify the seemingly complicated structure of a transaction will be discussed in detail in the next chapter. It is limited here to a statement that a production cost defined as all the cost of activities that exclude transactions between the entities subject to an analysis, and in order to do so, the level (the entities) of transactions that are subject to an analysis should be determined.

1.5 Reduction of Transaction Costs Leads to Increase of Sales, Enhancement of Product Development, and Development of Resources

Reduction of transaction costs improves not just efficiency but as well as effectiveness.

1.5.1 Efficiency and Effectiveness

What are the differences between efficiency and effectiveness?

1.5.1.1 To Distinguish Between Efficiency and Effectiveness in Business Is Critical

Cost in the term *transaction cost* automatically invokes the cost issues in management such as cost reduction, efficiency improvement, and so forth. Analysis of transaction costs is likely to be understood as incapable of handling the issues such

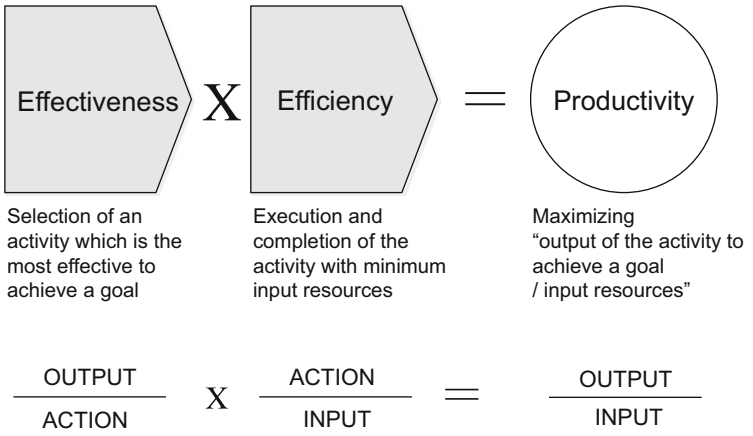

Fig. 1.6 Effectiveness and efficiency

as increase of sales/profits, enhancement of product development, and development of managerial resources. In other words, analysis of transaction costs does not contribute to solve the significant management issues that most companies are currently facing. This is totally a misunderstanding. The analysis strongly relates to effectiveness issues (e.g., sales, product development, and resource development), and rather it is not an exaggeration to describe that it is for effectiveness issues.

In order to explain this, it should be confirmed first that the axes of evaluating business activity include *efficiency* and *effectiveness* and productivity of business is the product of *efficiency* and *effectiveness* (Fig. 1.6). The axis of *effectiveness* refers to how effective (appropriate) a certain activity is for an achievement of a managerial goal (e.g., increase of sales, reduction of cost, increase of market share, and enhancement of product development) independently of its efficiency. And the other axis, *efficiency*, refers to how small an amount of resources a certain activity expended independently of its effectiveness.[13]

Productivity is frequently confused with efficiency. To do the right thing is *effectiveness* and to do the activity with minimum input resources is *efficiency*. The product of those two becomes *productivity*. The terms *effectiveness* and *efficiency* are also used confusingly on a daily basis, but those two should be distinguished carefully in any aspect of business, particularly in analyses of transaction costs.

1.5.1.2 ROI of IT Development Projects as an Example

Complexity of effectiveness is explained here using a case of the return on investment (ROI) of IT development projects (Fig. 1.7). Explicit qualification of

[13] Infinite amounts of resources can be expended for perfect effectiveness, and totally ineffective activities can be executed with perfect efficiency. *Effectiveness* and *efficiency* are mutually independent.

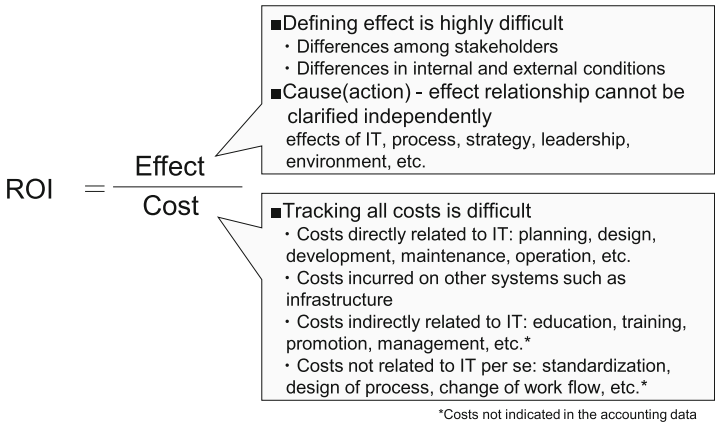

Fig. 1.7 ROI of IT investment projects

ROI has been imposed on project managers of IT development by CEOs from the past, and the accuracy or even the feasibility of the calculation has been repeatedly debated. The reason this issue has been extremely controversial is because the qualification of *effectiveness* is highly difficult.

In order to calculate ROI of IT investment, the effect or outcome of investment is divided by cost or investment. A bottom and a top of the fraction are discussed respectively in the following.

(1) The denominator: cost (investment)

The denominator, the cost or the amount of the investment, appears simpler, but the reality is still complicated. The issue here is a definition of the expended or invested cost—that is, which costs should be or can be included in this calculation. Fees paid to IT hardware and software suppliers are tracked and recorded without exception, which are easily included in the *cost*. However, it is obviously just a small piece of the total enormous costs actually expended.

First, the activities for planning and designing of the new IT system should be considered. An enormous amount of the time of executives and the new IT system users is expended for these activities. The more time they expend, the more appropriateness they achieve. However, those costs are seldom tracked or measured. Activities of business process redesign and standardization for the new system incur a huge cost as well. All professionals related to IT development understand very well that those activities determine either success or failure of projects. Standardizations of data and other processes indispensable to the system development necessitate a huge amount of time, especially in a case in which the establishment of consensus among departments becomes confused. Although the improvement of work process takes a significant role in any IT project, whether and how much those costs should be included in *IT costs* varies from company to company. The decisions differ even in one company, according to conditions.

Furthermore, education and training for operating the new IT system incur a huge cost as well. Network infrastructure must have been already established in

larger-scale companies the asset costs that should be allocated to the new IT system. Other similar infrastructure costs incurred in past projects such as the training on basic operation of PC and office software and the establishments of user support departments are the same. The issue is not how much of the hidden costs should be included but whether those costs have been tracked and recorded or not. After a concept of *IT life cycle management* was proposed, the costs in the calculation have been becoming more accurate and closer to reality. However, it is not yet enough.

(2) The numerator: effect (outcome)

Effect, the top of the fraction, is more difficult to measure. The first difficulty is to overcome the differences in viewpoints of stakeholders who evaluate: CEOs, heads of strategic business units, managers, equity holders, customers, and employees. For example, while the CEO is interested in effects contributing company-level optimization, unit leaders are interested in only their own local optimization. Equity holders have different preferences on profits, growth rates, and risks. That is, the value of effectiveness varies greatly according to who evaluates and when and how it is evaluated.

Furthermore, when an effective outcome is accomplished, it is absolutely difficult to judge that the cause is the new IT system, a leadership by a newly appointed CEO, or newly hired recruits who are exceptionally capable and lucky. Each of the innumerable outcomes accomplished in a company depends on a countless number of causes, and all those are interlinked. None of them is able to be measured and analyzed with perfect independency and objectivity.

1.5.2 Objective Evaluation of Effectiveness in Management Is Impossible

Effectiveness in management is just a subjective issue.

It should be noticed that effectiveness is unable to be measured, assessed, analyzed, and discussed objectively when productivity in business is discussed. Questions may arise that business is unable to be improved without an objective discussion about effectiveness. The detailed explanation is as follows.

There are an infinite number of goals in business, such as increase of sales, increase of profit, reduction of cost, increase of market share, enhancement of brand image, strengthening of function (e.g., product development, R&D, and marketing), enhancement of customer relationship, enhancement of relationship with Customer A, development of skill, development of skills of Mr. B, and so forth. Increase of sales and profit is usually located on the top of the list, but an innumerable number of goals are in quest by managers and employees every day synchronously and concurrently, which are judged super multidimensionally by all managers and employees either consciously or unconsciously.

In addition, accelerating the changes of business environments complicates the decisions further. Intensive and objective analyses of market needs is not good

enough for launching products because markets become so diversified and change so promptly. An attitude of trial and error by introducing as many products as possible into a market and of "do your best and let God do the rest" should be accepted.

There exist other influential factors such that the dimensional basis of managerial judgment frequently varies from person to person and from time to time. For example, even the evaluation of activities to increase sales is very complicated. Salesperson A obtained an order that caused a deficit from Customer X, who was expecting a large-scale successive order in the future. Salesperson A neglected the axis of short-term profit. Salesperson B resold inventories returned from another customer due to a defect; that is, he gained his sales at the cost of his company's trust. Sales in the short term at the cost of neglecting activities to develop employees' skills are also possible, but losses in the future are obviously the same as neglecting customer satisfaction. While Salesperson C focused on a new product with a strategic significance, Salesperson D sold only an old product that does not need his additional efforts. Salesperson E gave an important role to one of his favorite staff members merely to provide him/her an opportunity of growth.

Decisions regarding the day-to-day business are not simple or easy. It is impossible to track and evaluate all the results.

A sales effort to Company X instead of Company Y is caused by someone's judgment that the expected value from Company X will be larger than the one from Company Y. However, that anticipation regarding the future is subjective and not so accurate. Salesperson C focused on a strategic product without accomplishing his sales target, instead, Salesperson D focused on obsolete products that led to a huge amount of sales readily. Which salesperson should be evaluated more highly?

It is not easy to conclude an action of adding inventories, whether in preparation for upcoming increases of sales or just falsifying sales records. Effectiveness of activities increasing sales is highly difficult to quantify objectively, despite its significance.

It is the same in terms of prediction of the future that an investment on Department X is prioritized over an investment on Department Y for the purpose of increasing sales. Staff G was promoted for the opportunities of growth but Staff H, who has more experience and is expected to contribute to an increase of short-term sales, should have been promoted instead. Those managerial decisions are nothing but just subjective predictions of the future made by certain managers based on their past experiences. In short, it is impossible to evaluate the effectiveness of business activities objectively.

Strategy and rule are determined by someone who is appointed or claims to do so from his/her past experiences. It is often a person who just speaks loudly with a big attitude. It may just be an organizational custom or groupthink.

In studies of managerial decisions, the Garbage Can Model[14] by March, Cohen, and Olsen is widely accepted, which argues that problems and solutions are

[14] Please refer to Cohen, M, D., J. G. March, and J. P. Olsen (1972), "A Garbage Can Model of Organizational Choice," *Administrative Science Quarterly* 17.

accumulated separately in a garbage can, and integrated and pulled out by decision makers at a moment with certain triggers determining whether these are correct or wrong. They asserted that decision makers and their information, assumptions, and axes for logic are inconstant and inconsistent, and decisions are always enforced to make in such garbage cans, meaning any reasonable decision in organizations is impossible.

In reality, persons in charge of making decisions predict consequences in the future and make final decisions. The decisions frequently reverse expectations or failures may often cause breakthroughs. As described above, all activities in business are evaluated by a countless number of axes consciously and unconsciously, and all of the evaluations totally depend on the future predictions. There is no argument that scientific approaches should be pursued as much as possible in any aspect, but eventually decisions in business are heavily subjective and intuitive.

1.5.3 Evaluation of Efficiency Is Much Easier

There are many evident opportunities to improve efficiencies, the evaluation of which is easier.

While the objective evaluation of effectiveness is highly difficult, efficiency is measured, analyzed, and evaluated much more easily. Cost invested or expended is possibly tracked if it is intended to do so. It is evident to everyone that there exist many activities with little or no value in operations. Repetitions and redundancy in activities are obviously less valuable.

For example, there are numerous valueless activities observed easily in meetings, such as repeating presentations of a document only for a participant who did not attend the previous meeting, repeating the same discussion regarding one issue, wasting outcomes of a participant caused by other participants' violated commitments, even though they agreed to them in a meeting, and floating discussions without focus due to lack of defining assumptions. There are also countless activities evidently with little or no value to companies such as multiple uncooperative visits to one customer by different salespersons and multiple business trips that could be arranged as a one-day trip.

Assuming that effectiveness does not deteriorate, if evident wastes could be eliminated, some volume of activities and costs would decrease certainly. This is an issue of *cost* thus far.

However, based on another assumption that total time of activity is constant, when the evident waste is eliminated, the rest is activities that were conceived not valueless. It could be effective or not, or it could end up wasted or lead to a breakthrough. As described previously, it is impossible to evaluate effectiveness objectively. One thing for certain is that the rest has more effectiveness than the waste that was eliminated.

That is, for example, if 25 % of total activity that is evidently valueless is eliminated, and if the total time of activity is constant, the effectiveness increases

by 33 % (calculated by 100 % ÷ 75 %) for certain. It may be attributed to increase of sales or profit, enhancement of product development, R&D, brand image or customer satisfaction, development of human resources, or shaping innovative strategy. In any way, total effectiveness increases definitely by theory. This is the logic: that the analyses of transaction costs involve not merely cost (efficiency) issues but also effectiveness issues.

Outsourcing the activities with strong repetitiveness, even in departments of sales or human resources, to the business process outsourcing (BPO) servicers has obtained popularity worldwide. Relegating the activities with minimum value to the BPOs, companies focus on high value-added activities themselves. Outsourcing is targeted to the repetitive and redundant activities that can be systemized and replaced by laborers so that companies focus more on effectiveness.

To extract evidently valueless or inefficient activities is much easier than to improve the effectiveness of activities. To eliminate absolute waste is the best solution, because to evaluate and increase absolute effectiveness is impossible. Although any challenges to decision-making capabilities regarding effectiveness are always significantly important, the elimination of wastes should be most prioritized. As shown in Chap. 8, as practical examples of measurement, there exist numerous wastes in companies, which are perceived very easily. Companies with this attitude are likely to accomplish a much higher business performance than the average.

This approach, which emphasizes eliminating wastes, benefits especially governmental organizations, as evaluating the effectiveness of public administration is much more difficult than evaluating businesses.

Finally, it cannot be overemphasized that excess time obtained from elimination of wastes should be allocated to higher value-added activities. In other words, possessing an attitude toward innovation is indispensable as a condition under which the discussion above comes into effect.

1.5.4 Value of Transaction Cost Analysis in Improvement of Effectiveness

The more transaction costs are expended, the more effectiveness is gained.

A structure in which the more transaction costs are expended, the more effectiveness is gained—that is, the reverse of the normal cost issue—is elaborated in this section. Transaction costs are incurred in each element below, all of which increase effectiveness as those are expended more.

1. *Connection*: If more time is expended for creating a longer list of potential transaction partners who have the capability of supplying the best cost-performance products or who intend to purchase products with the highest price, the probability of encountering the best partner increases. That is, the expected value of the transaction or the expected effectiveness of the transaction increases.

2. *Presentation*: If more information regarding a partner, such as capabilities, credit, loyalty, and flexibility, and regarding products and transaction conditions, such as specification, price, and delivery, is presented in both directions, the probabilities of selecting the best product and partner and of determining transaction conditions that satisfy both transaction partners must increase. Therefore, the effectiveness of the transaction increases.
3. *Negotiation/Agreement*: In this element, both partners negotiate, adjust, and agree with transaction conditions bilaterally. If more time is expended on this element, the probability of reaching an optimal point increases—in other words, the summation of satisfactions or the effectiveness of the transaction increases.
4. *Exchange*: If more time for inspection is expended, the probability of avoiding problems and augmenting the effectiveness increases.
5. *Ex post processing*: The activities related to assuring the performance of supplied products that are executed in this element include installing, training/education for operation, monitoring a specified performance, solving problems, and improving relevant issues for the future. All of them increase the effectiveness of the transaction.

This characteristic clearly distinguishes transaction costs from production costs, which is purely a cost issue. In production, which arises *after* specifications and transaction conditions are determined, the cost reduction is one of the most critical goals. This is the cost issue under normal circumstances. In contrast, transaction costs are incurred, *while* specifications and conditions are being designed, selected, and agreed upon, the consequence of which is that the effectiveness increases as more time and cost are expended.

Although the effectiveness increases as more transaction costs are expended, it is obviously unacceptable to expend an infinite amount of transaction costs. That is, the issue of effectiveness corresponds to an issue of cost (resource) allocation and, at the same time, the issue of transaction cost reduction. It is essentially an issue to extract waste resources from total resources and convert them to valuable resources.

As confirmation again, it was not meant to assert that any analysis of effectiveness is negligible or insignificant. Rather, the analysis of effectiveness is perpetually crucial. One of the managerial tools for evaluating and managing effectiveness that has been taking root in businesses is the Balanced Score Card (BSC). A BSC assesses effectiveness by scoring decomposed business activities, but the scoring inevitably depends on the subjectivity of the assessors. Here happens the problem repeatedly that objective and absolute assessment is impossible, as the future is not predicted. The elimination of evident wastes is more credible. Concurrent analyses of effectiveness and efficiency based on transaction costs are conceived as a significant methodology to advance the science of management studies.

1.5.5 BSC as a Means for Effective Assessment

The BSC, which is becoming a standard position, is just a subjective assessment.

The BSC is becoming a standard methodology for assessment of effectiveness, but it is literally a *scoring* methodology; that is, each individual's subjective evaluation is directly quantified by *scoring*, a result of which reconfirms that evaluation of effectiveness is merely subjective.

The BSC assesses performances of organizational and individual activities on four dimensions. While four dimensions are not enough to cover all of an infinite number of possible evaluations, it seems appropriate as an increase of the number possibly causes confusion in practice. BSC uses the following dimensions:

- Financial
- Customer
- Internal business processes
- Learning and growth

Usually, those four dimensions are decomposed further to key performance indicators (KPIs). Examples of KPIs include sales/profit by customer, number of new contract deals, ratios of repeat customers, submission lead time of quotes, levels of customer satisfaction, and claim rates.

However, as previously mentioned, it is easy for any individual to obtain higher evaluations by outmaneuvering the BSC dimensions. In order to deal with this typical problem, companies decompose goals and increase the number of KPIs to as many as a few dozens or hundreds. That is, a vicious cycle of decomposition and outmaneuvering has arisen and caused the creation of complicated and costly evaluation systems.

No matter how decomposed activities are, it is not enough to track perfectly. The perpetually valuable activities such as customer satisfaction and human resources development are not always visualized by the BSC. In the mature markets such as services where value adding plays a significant role, individual professionalism and work ethics in locals are critical. Those are not overcome merely by the further decomposed evaluation. Transaction cost analysis will provide various methodologies discussed in the following chapters for solving this ultimate management issue.