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Changing Negative Ways of Thinking about the Use of IT to Positive Ones

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According to the "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute (NRI) in November 2010, Japanese companies have been moderately increasing their investments in information technology (IT) although such investments shrunk because of the global financial crisis that occurred in 2008. When we look at the purposes of IT investments, we find that a large percentage of enterprises have still been investing in IT as part of their cost-cutting measures such as improving business efficiency and standardizing business processes. Nevertheless, the number of such companies has decreased somewhat. Instead, the number of responding companies selecting the "creation of business and service" that remained small for a long time began to increase.

Because of the Great East Japan Earthquake that occurred on March 11, 2011, many companies will be forced to substantially reduce costs and will also take a cautious approach towards IT investments for the time being. However, simply resorting to cost-cutting measures will not lead to the achievement of a V-shaped recovery from the unprecedented major disaster. In addition to IT investments based on negative ways of thinking as represented by the purposes of cost reductions, now is the time for enterprises to selectively make IT investments that bring about positive effects that can become a source of rapid recovery and new growth.

IT has evolved from a means of automating business processes and improving business efficiency to tools for communication, collaboration and trial and error activities in digital form. In order to enhance a series of intellectual activities conducted by an organization, i.e., "find, explore, measure, analyze, try, judge, implement and use," and to improve organizational capabilities, enterprises must make full use of this IT power. It is also necessary for management to show the appropriate direction so as to lead all employees towards creative work that generates positive effects as well as to change the way in which governance is applied for reforms and human resources are utilized. The optimum use of IT as a means of improving organizational capabilities as well as driving the recovery from the current crises facing Japan is a pressing issue for all enterprises to address.

I Current Status of IT Investments by Japanese Companies

1 IT investments remain low

Since 2003, Nomura Research Institute (NRI) has annually conducted the "Survey on the Actual Status of the Use of IT by User Companies," targeting Japanese companies in all industrial fields. In 2010, this survey was conducted in November with responses from 473 companies. Every year, the survey asks questions about the same topics in relation to the use of information technology (IT) to enable time-series analyses of the findings, such as human resources, objects and cost/investment, together with a different specific topic each year. In 2010, the special theme was the "use of IT to improve organizational capabilities." This paper analyzes the results of the survey on this theme.

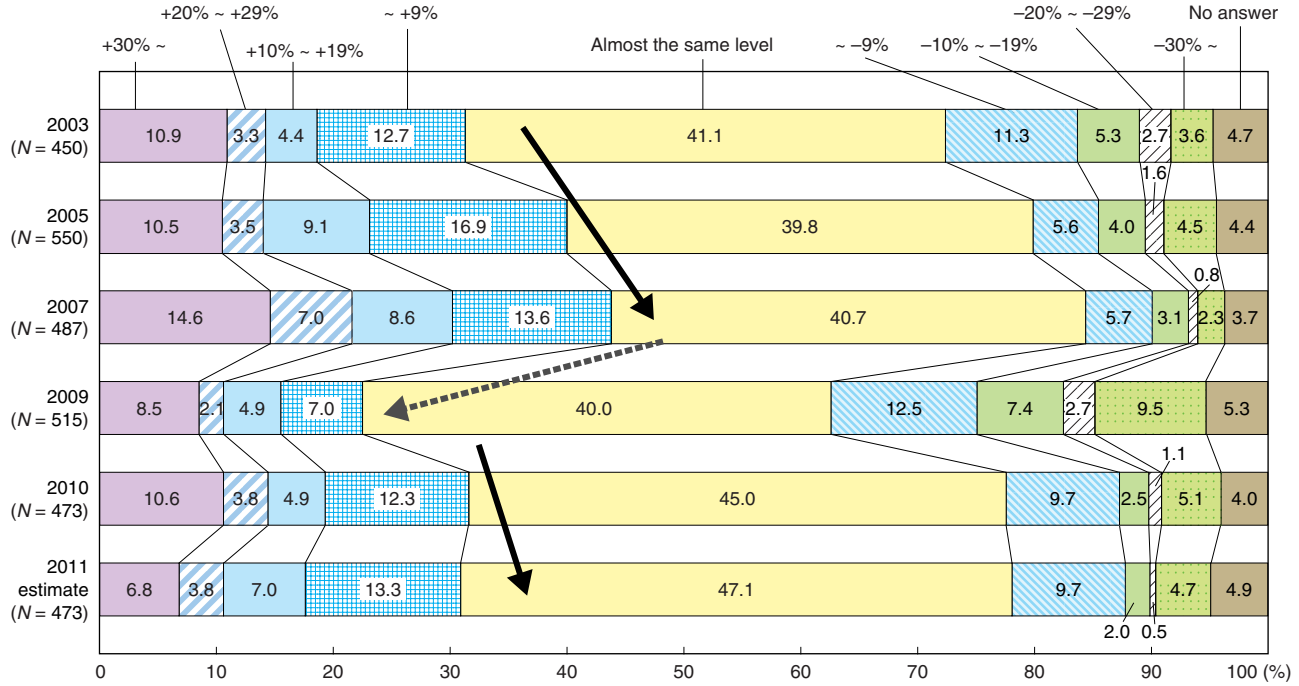
Since 2003 when this survey was initiated, Japanese companies had moderately increased their IT investments in the trend toward recovery from the collapse of the IT bubble. This trend was verified by the fact that the proportion of responding companies that selected "will increase IT investments" had increased year by year. In 2008, however, a turnaround was made from the increasing trend to a decreasing one because of the global financial crisis. In 2009, IT investments were further decreased, resulting in the proportion of companies increasing IT investments becoming less than that of 2003. While IT investments increased somewhat in 2010, it appears unlikely to expect further recovery in 2011 (Figure 1). The survey results indicated in this paper are from the survey conducted in November 2010. Accordingly, it is reasonable to assume that because of the Great East Japan Earthquake that occurred on March 11, 2011, Japanese companies are now taking a more prudent approach to IT investments. Under such circumstances, for what purposes are Japanese companies allocating their limited IT investments?

2 The purpose of IT investment changes as the life cycle stages of business operations change

The author believes that the principal purpose of the use of IT by a company will change at each stage of the life cycle of business operations. It is assumed that the life cycle of a company's business operations is made up of six stages—(1) starting a business, (2) growing, (3) maturing, (4) reorganization (consolidating companies), (5) specialization to concentrate on the strong field, and (6) repeating trials to create new business models and creating new value. Because the characteristics of the reform needed at each stage change, the themes of the use of IT to which priority is given also change (Figure 2).

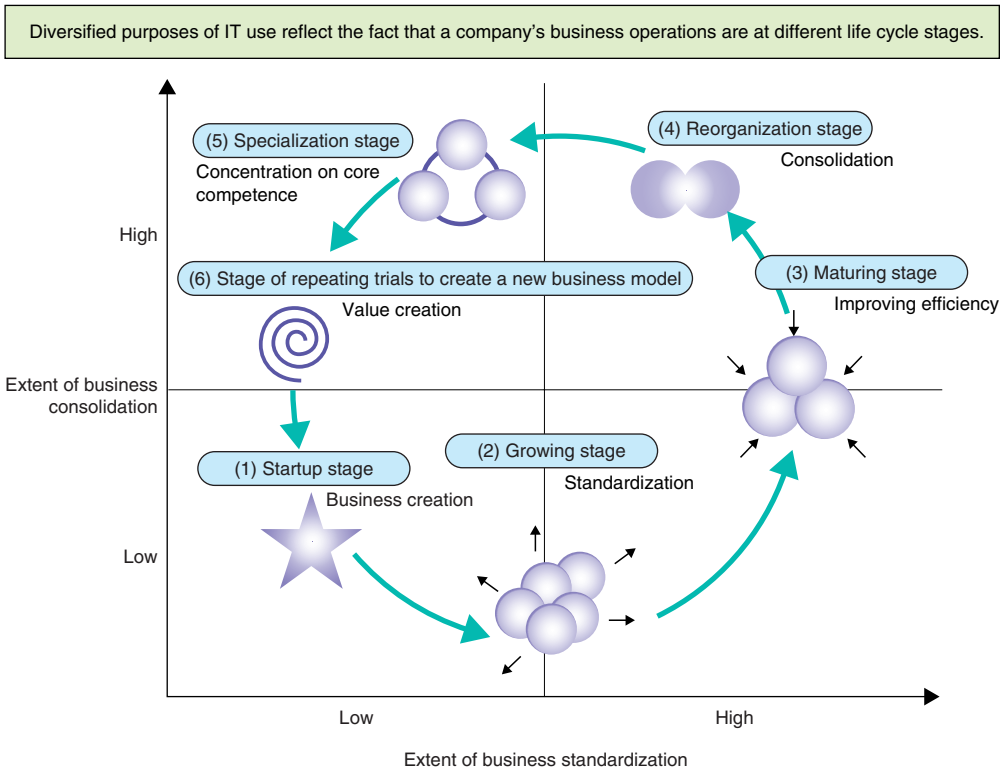
Figure 1. Changes in IT investments by Japanese companies

When we see year-on-year changes, we find that the number of companies that increased their IT investments over the previous year increased until 2007. In 2008, a reversal was made to a decreasing trend, which continued in 2009. While IT investments increased somewhat in 2010, it appears unlikely to expect further recovery in 2011.



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2003, 2005, 2007, 2009 and 2010.

Figure 2. Purposes of IT use that change at each business life cycle stage



(1) At the startup stage (business creation), the purpose of reform is to create a new business model. To this end, a new information system must be quickly developed.

(2) At the growing stage (standardization), reform must aim to expand business by proliferating a company's own business model that was created at the startup stage. An information system required at this stage is one that can support the standardization of business processes by transforming tacit business knowledge and expertise into explicit ones that can be articulated, codified and documented and that can facilitate growth by applying standardized processes to all departments that have contact with customers.

(3) At the maturing stage (improving efficiency), the purpose of reform is to optimize management assets that have expanded excessively at the growing stage and to improve the efficiency of business processes. At this stage, an information system to support these efforts that is optimized for all business operations is required.

(4) At the reorganization (consolidation) stage, the purpose of reform is to establish a consolidated business infrastructure by promptly consolidating companies and to achieve consolidation effects as quickly as possible. An information system that is agile in consolidating business processes is necessary at this stage.

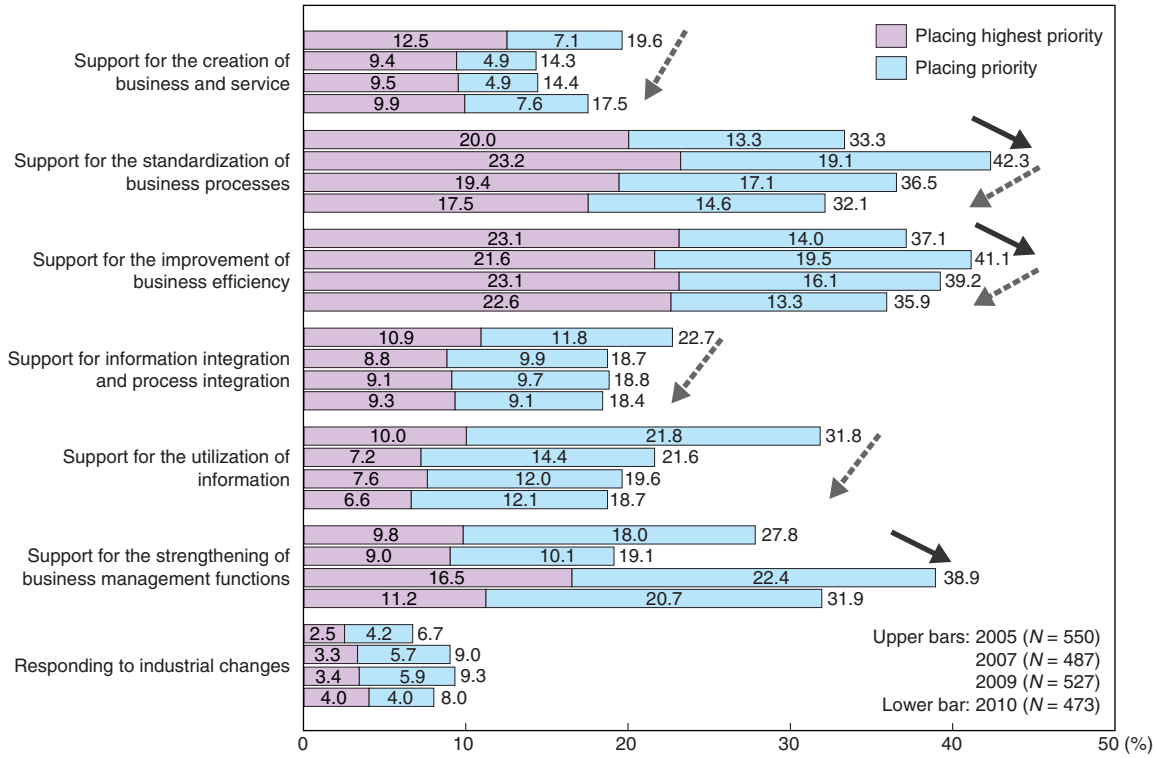
(5) At the specialization (concentration on core competence) stage, each company strives to concentrate its management resources on its core competence, and functional differentiation occurs in accordance with a company's strengths. A federation-type organization will be established by consolidating each company's business functions via the network. While due consideration is given to the autonomy of each company, this stage requires an information system that enables all companies to reuse business functions that can be shared.

(6) At the stage of repeating trials to create a new business model (value creation), in-house and outside experts who have optimal wisdom work together and repeat trials to create a new business model by requesting consumers who are interested in new products and services to participate in such trials as assumed customers. An information system that is capable of forming such an open business network is required at this stage.

Based on the above concept, let's see at what stage Japanese companies currently are from the perspective of the purposes of IT use (Figure 3). For many companies, "support for the improvement of business efficiency," "support for the standardization of business processes" and "support for the strengthening of business management functions" have long remained three major themes of the use of IT. However, the number of responding companies that selected these purposes peaked in 2007 and 2009, and somewhat declined in 2010. While many companies still place an emphasis on the standardization of business processes and the improvement of business efficiency, which are the purposes of IT use at the

Figure 3. Changes in the purposes of IT use

"Support for the improvement of business efficiency," "support for the standardization of business processes" and "support for the strengthening of business management functions" constitute three major themes. However, we now see signs of change.



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2005, 2007, 2009 and 2010.

growing stage as listed in Item (2) and the maturing stage as listed in Item (3), we can see signs of change in their policies to pursue only these purposes.

Furthermore, the number of responding companies that selected support for information integration and process integration as the purpose of IT use decreased. On the other hand, the number of responding companies that selected support for the creation of business and service increased, albeit slightly, in 2010 although the number continued to decrease in 2007 and 2009. These findings suggest that in many industries, the need for system integration has leveled off because moves to reorganize companies have almost come to an end. Instead, most companies are now turning their efforts to the strengthening of business using their core competence at the specialization stage, as listed in Item (5), and attempts to develop new businesses at the stage of repeating trials to create a new business model, as listed in Item (6).

While in overall terms, companies are not so highly motivated to increase their IT investments, we now see fewer cases of IT investments for defensive purposes such as reducing costs and dealing with risks. Rather, the current trend is towards IT investments for positive purposes to realize business strategy even though the number of companies having such thoughts remains small.

3 Now is the time to shift to IT investments that bring about positive effects

Cost reduction by improving business efficiency is and will continue to be an important purpose of IT use. This is particularly true for many companies that suffered serious damage in the Great East Japan Earthquake. In order to cope with the difficulties they are currently facing, they will be forced to substantially reduce costs for the time being. However, simply resorting to cost-cutting measures will not lead to the development of new competitive advantages or the creation of new added value. It appears that most companies have already completed IT investments for improving business efficiency and have already gained major benefits from such investments. Even if a company continues to make further investments for this purpose, it would be difficult to expect any additional significant effects. Furthermore, even if further efforts are made to improve cost advantages, the cost factor alone will no longer enable the company to successfully compete in the global arena. In other words, it would be impossible to achieve a V-shaped recovery from the unprecedented major disaster by only making IT investments for defensive purposes.

In addition to IT investments based on negative ways of thinking as represented by the purposes of cost reductions, now is the time for companies to selectively make

IT investments that contribute to producing strengths that can become a source of positive effects such as rapid recovery and new growth.

II IT for the Improvement of Organizational Capabilities that Brings about Positive Effects

1 Improvement of organizational capabilities contributes to the creation of positive effects

No matter what goal a company pursues—expanding the market globally, supporting the recovery of the domestic market or tapping new markets and customers, a company's real competitive advantages must be developed and its ability to appeal to customers and to create value must be increased in order to turn the bottom line (profit) of a profit and loss statement to a positive number. This requires a high level of organizational capability. To overcome the current crises, Japanese companies must exhibit even higher levels of organizational capability than ever before.

Organizational capability refers to the ability of a company's organization and employees to engage in high quality intellectual activities. An organization's intellectual activities consist of a series of processes as described below (Figure 4).

- "Find" some signs by exploration.
- Analyze the meaning of such signs and properly "understand" them by defining them as a model.
- "Judge" the validity of the model through trial.
- "Realize" the model in the form of a product or service.
- Put the product or service on the market and "adapt" it to the market, generating profit from the value of such product or service.

It is essential to fully develop the abilities of each and every employee who is engaged in these activities.

2 IT for the improvement of organizational capabilities

IT can be utilized to achieve the purposes discussed above. IT is generally used to improve the processing capability of computers in an accelerating manner, to develop higher speed networks and for work automation by using personal and mobile information devices. In addition, IT has come to play an increasingly powerful role as a means of communication, collaboration and trial and error processing in a digital format. A company must adopt a positive approach toward the use of this IT power ahead of its competitors.

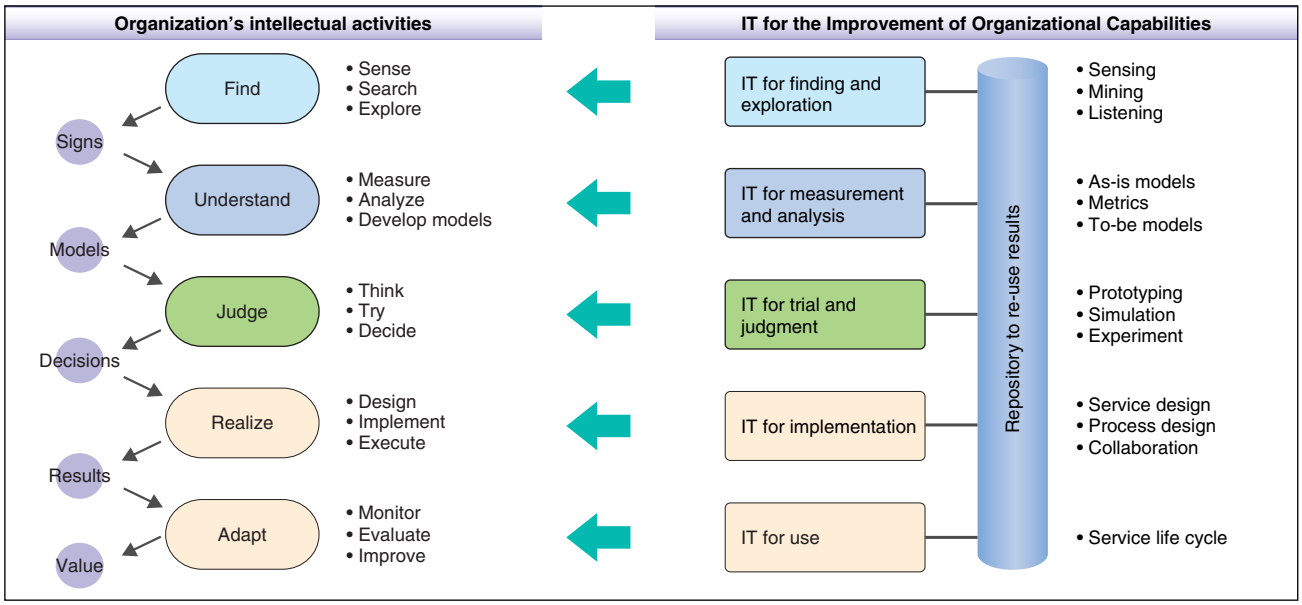
For a series of processes mentioned above, that is, "find," "understand," "judge," "realize" and "adapt," IT utilization for each of the following purposes is possible.

(1) To find and explore
(2) To measure and analyze
(3) To try and judge
(4) To implement
(5) To use

(1) IT for finding and exploration

To find and explore signs and indications, IT tools that make the best use of the power of the Internet and information terminals that have generally penetrated into all

Figure 4. Overall structure of the improvement of organizational capabilities by IT



user segments including individual users have appeared one after another. These tools include social media such as Twitter, which deliver the opinions and views of consumers, Customer Experience (CX), which gives companies an insight into customers' responses, evaluation and expectations, an abundance of diverse contents that exist on websites and Collective Intelligence (CI, discussed in Chapter III), which gathers the wisdom of many and unspecified experts that are connected via the Internet. Furthermore, to explore and search the information that has significance for any particular user from among such a vast amount of information, advanced technologies have become available such as text mining and data mining (again discussed in Chapter III) (Figure 5).

The amount of information that is obtained through extensive networks is too enormous for any individual to assimilate. In addition, most available information is open to the public, and is not asymmetric information that is available to only certain individuals or groups. Success or failure depends on whether a company has highly sensitive ears that can quickly listen to a wide range of information and whether it has a brain to select valuable information from among all information available and to understand the meaning lying behind such information. IT can bring about effects that raise the ability of a company in the capacity of an observer to perceive and explore.

(2) IT for measurement and analysis

At the stage of measuring and analyzing information, discovered signs are examined by using various methods such as statistical methods, business process modeling methods and financial analysis techniques to define as-is models, which show the actual status behind such signs, on computers. Methods such as key performance indicator (KPI), balanced scorecard (BSC) and activity-based costing (ABC) are used to measure key indicators. The measurement results are analyzed to create to-be models (Figure 6).

Such analysis and measurement based on models represents methodology that has often been used by researchers in the past to prepare their reports. Companies have also used business process models for business analysis and business improvement, statistical models for market trend analysis and production process improvement, and financial analysis models aimed at strengthening business management functions. However, these models sum up and analyze the data that have long accumulated at a slow pace of once per month or per year.

Currently, with advanced IT, it has become possible to collect data from observation points that are widely deployed throughout the country on a real-time basis. In addition, computers, which now have a high level of information processing capability, are able to analyze such vast amounts of data at high speed. As such, these models have become tools that are more powerful. These IT tools bring about the effects of increasing the ability of a company in the capacity of an analyzer to build models and to understand the actual status.

(3) IT for trial and judgment

At the stage of trial and error and eventual judgment, efforts are made to optimize a to-be model that is created based on a hypothesis and confirm the improved effects through computer simulation. Another method is creating a digital prototype on a computer and then repeating efforts to improve the prototype. After such improvements, a physical product prototype is created (Figure 7).

At the trial stage, the engineering world was ahead of the business world in the use of IT. In the manufacturing industry, in the product development phase, the use of 3D computer-aided design (CAD) to create a virtual prototype is widespread, enabling manufacturers to repeat trials at a faster pace and at lower costs.

Figure 5. Use of IT for finding and exploration

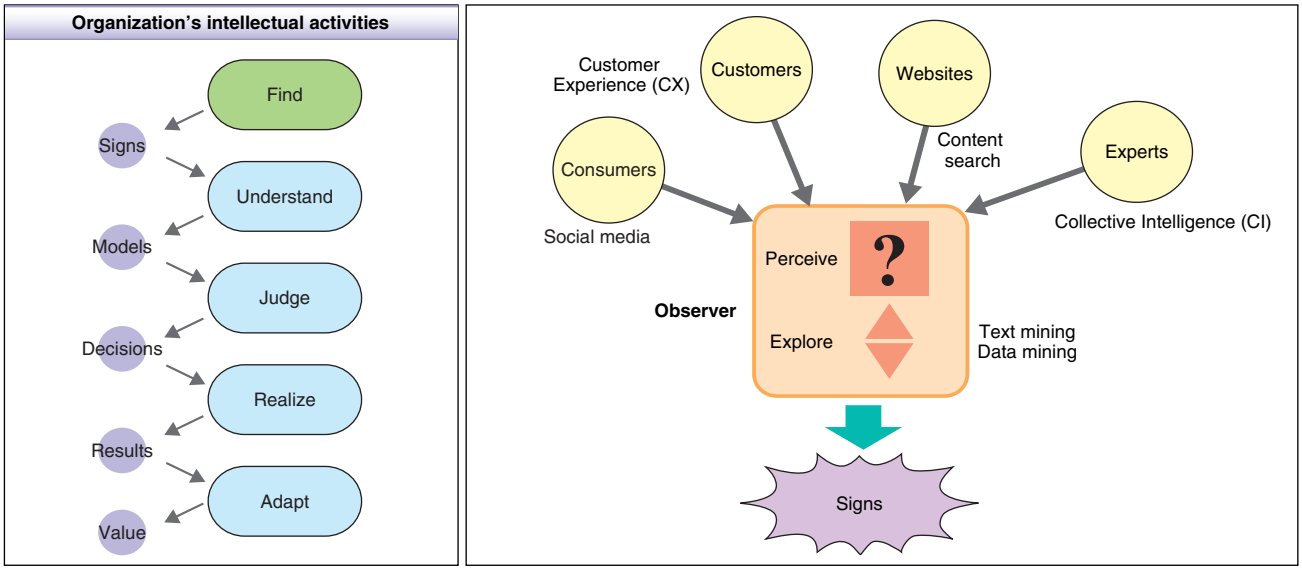


Figure 6. Use of IT for measurement and analysis

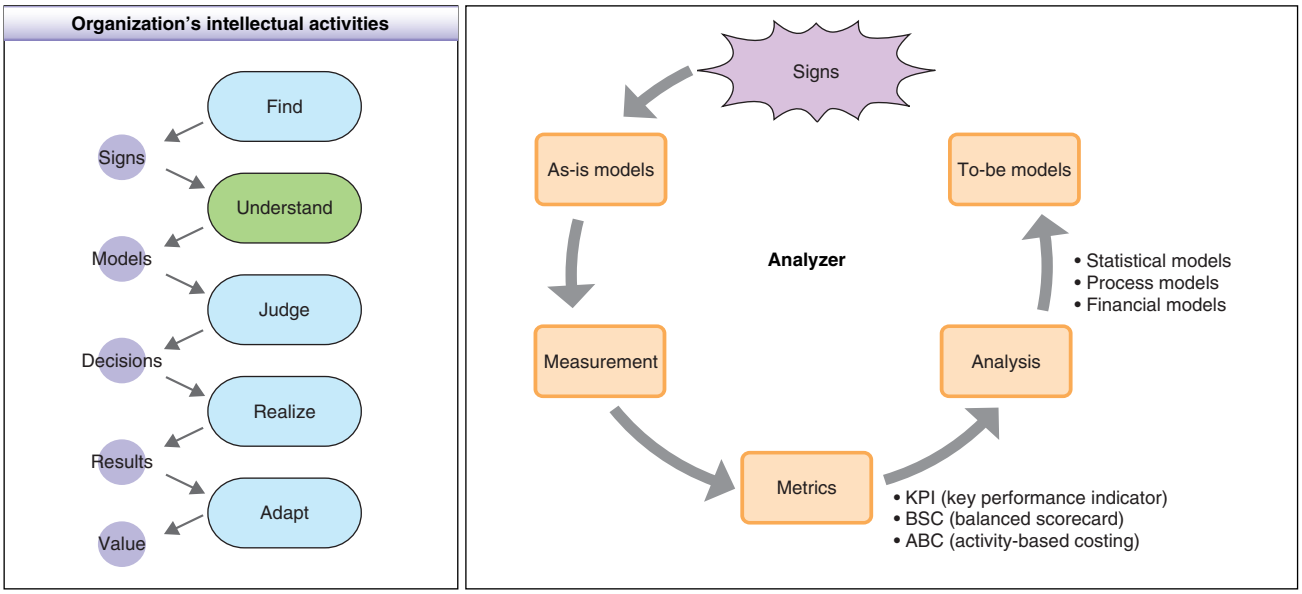
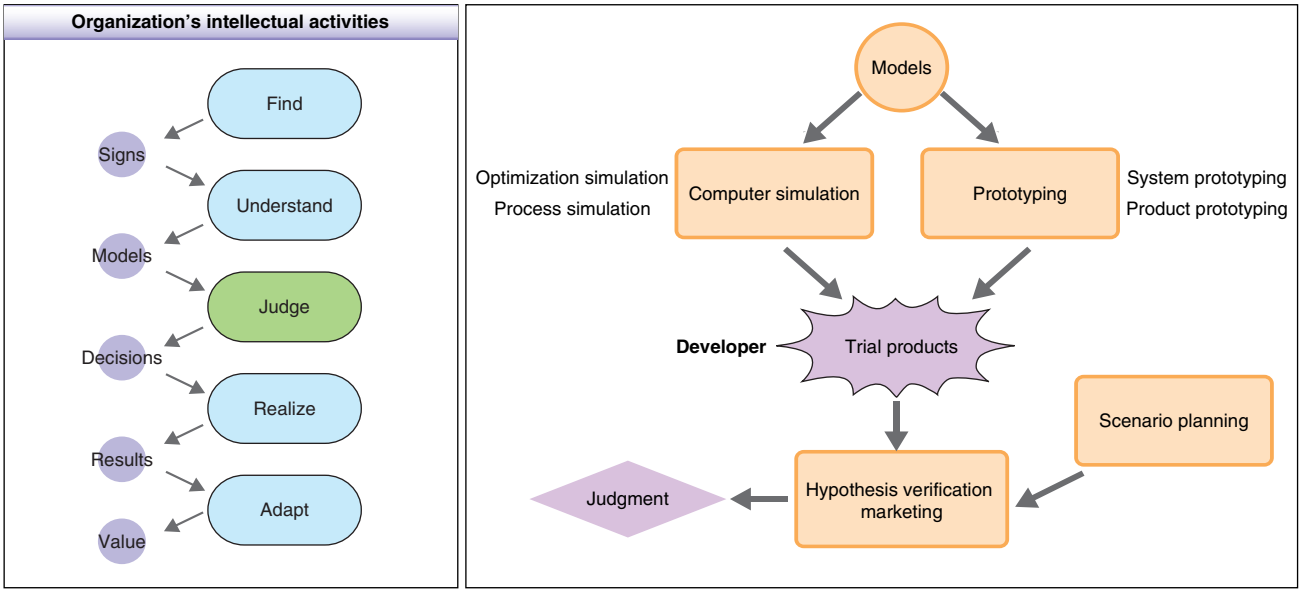


Figure 7. Use of IT for trial and judgment



As such, IT makes it easy to repeat trial and error processes. This is also true in the world of business systems. Actually, some companies now conduct hypothesis verification marketing in which trial products and services that are created based on multiple assumed scenarios are offered to customers via the Internet for testing purposes. The appropriateness of the scenarios is verified while confirming customer responses. In this way, products and services are repeatedly improved.

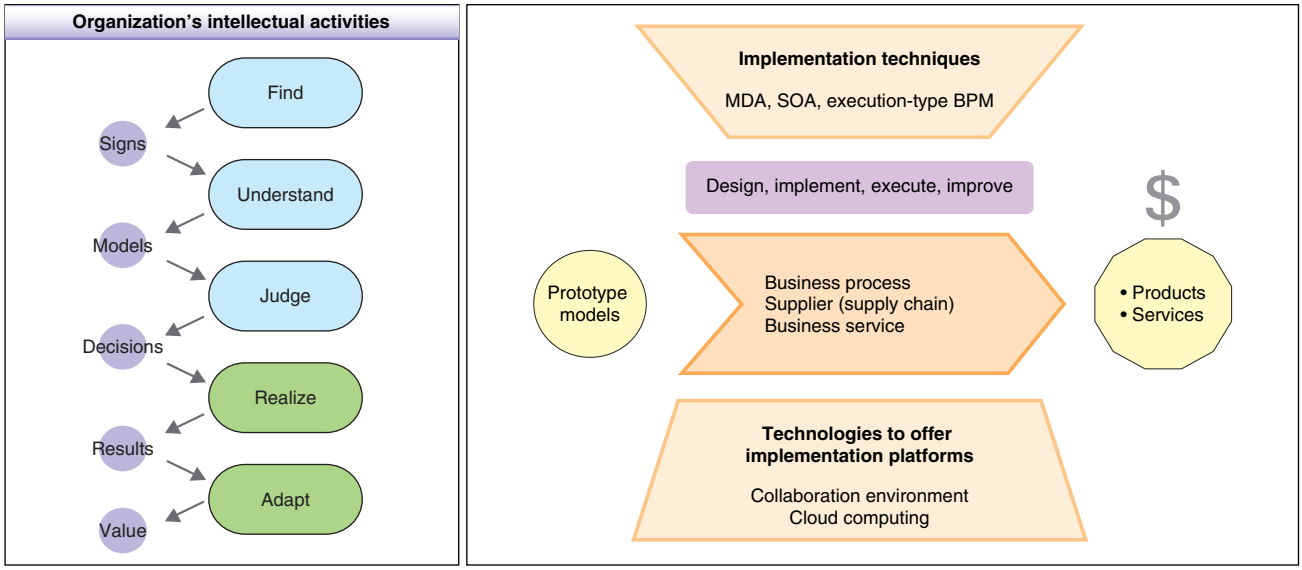
Because IT enables substantial cost reduction for the trial and error process, a company can quickly move on to a trial stage without having to spend a lot of time increasing the accuracy of a hypothesis by analyzing an enormous amount of data in advance, which leads to more agile development of products and services. Such use of IT that makes full use of digitization can bring about effects that increase the ability of a company in the capacity of a developer to test and evaluate.

Companies must successively develop innovative products and services that support Japan in its recovery from the current crises and quickly bring them to the market. Faster trial and error processes by means of IT will drive this development cycle.

(4) IT for implementation and use

At the stage of implementation and use, IT is employed to design, implement, execute and improve business processes and business service functions in order to offer models and trial products as final products and services. The IT tools that support this stage include the

Figure 8. Use of IT for implementation and use



Notes: BPM = business process management, MDA = model-driven architecture, SOA = service-oriented architecture.

collaboration environment and cloud computing, which are technologies to offer implementation platforms, model-driven architecture (MDA) and service-oriented architecture (SOA), which are implementation techniques, and execution-type business process management (BPM) (Figure 8).

These IT tools enable a company to use a combination of optimal functions and resources that are available inside and outside the company, rather than requiring that all of the functions and resources needed to build up a business process be within the company. By concentrating its resources on its core competence, a company must quickly launch an innovative business process. If a company adopts the approach of doing everything by itself, any effort at recovery would result in slow progress. Now is the time for companies to make effective use of implementation techniques that enable the reuse of business and system functions that are available both internally and externally. Such IT that supports implementation brings about effects that increase the capabilities of a company as a supplier of products and services and that generate profits from the value created through a series of intellectual activities (Figure 8).

III Actual Status of IT Use at Enterprises

1 Survey on the status of IT use to improve organizational capabilities

The survey conducted in November 2010 listed candidate IT tools that are considered useful at each stage of an organization's intellectual activities. Two questions were asked of the responding companies. They concerned the "status of use" and the "recognition of effectiveness" at enterprises. The following choices were provided for each question.

- **Status of use**
  "Frequently use," "sometimes use," "used before, but ceased to use," "plan to use," "have never used" and "don't know"
- **Recognition of effectiveness**
  "Very useful," "somewhat useful," "can't say either way," "not so useful," "totally useless" and "don't know"

(1) Actual status of IT use for finding and exploration

Candidate IT tools for these purposes are described below.

- **Utilization of social media for business**
  Social media such as social networking services (SNS) and Twitter, which provide venues where many specified and unspecified individuals communicate interactively by using the Internet and web technology, are used to hear the opinions of consumers who gather at these sites to utilize such opinions for business.
- **Search of web content**
  A wide variety of information available on the web such as content, websites and blogs is searched based on keywords. In efforts to find new signs and indications, information on themes of interest is collected and classified by theme, and the relationships between two or more content subjects are analyzed.
- **Text mining**
  Text information such as content on websites, in e-mails and in call center records is analyzed by parsing the text by words or paragraphs. Suggestions that

might be useful for business are discovered based on the frequency and trend of their appearance.

- **Data mining**
  Various data analytic techniques are applied to vast amounts of data in order to discover new trends and facts that are unanticipated.
- **Customer experience**
  Customer opinions, behavior and responses are analyzed to see what value customers feel about the products and services a company offers. The results are reflected in the company's efforts to improve customer satisfaction.
- **Collective intelligence**
  A community is organized on the Internet in which many specified and unspecified experts and concerned persons participate. Their opinions and ideas are used to develop and improve a company's products and services.

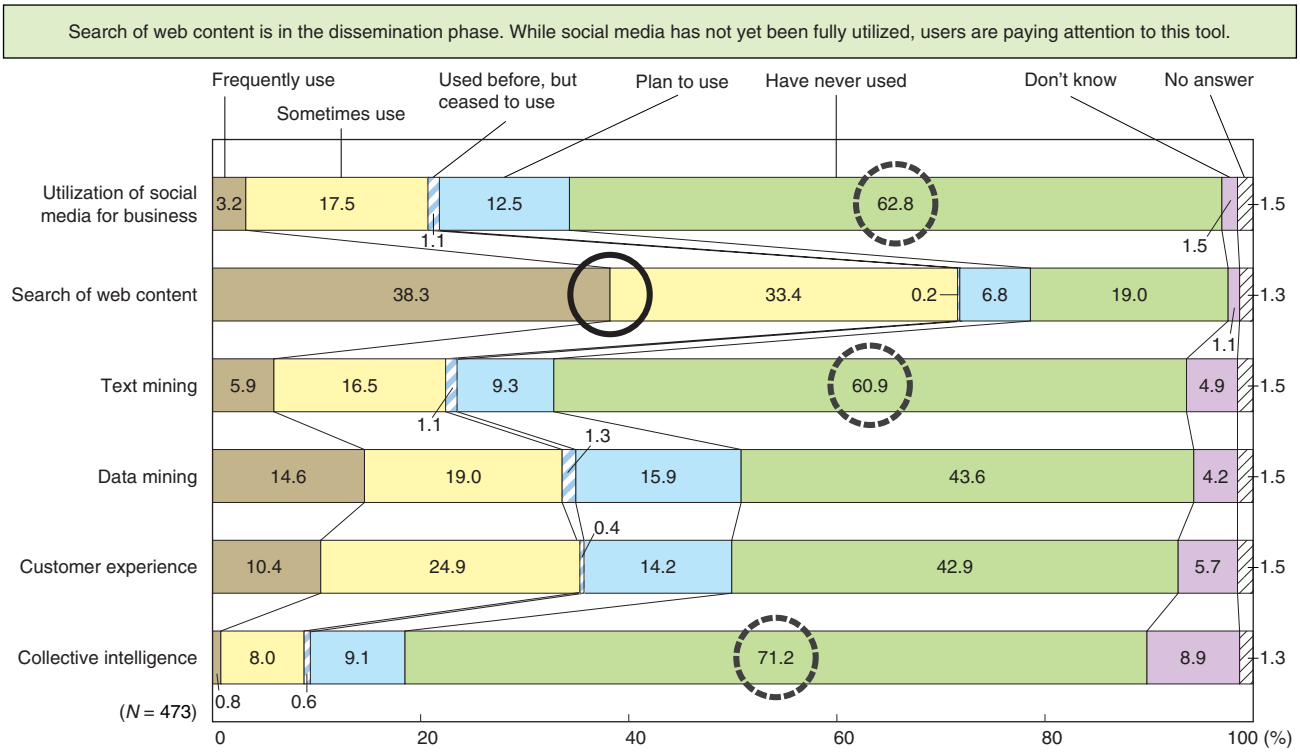
When we look at the "status of use," many responding companies selected "frequently use" or "sometimes use" for search of web content. As such, it is reasonable to assume that "search of web content" has entered the dissemination phase. IT tools that ranked next in terms of frequency of use are data mining and customer experience. If the number of responding companies that selected "plan to use" is included, nearly half of the responding companies "frequently use," "sometimes use" or "plan to use" these IT tools. On the other hand, more than 60 percent of responding companies answered that they "have never used" social media and text mining, with more than 70 percent giving the same answer for the technology of collective intelligence (Figure 9).

Similar responses were given for the question of "recognition of effectiveness." A majority of responding companies considers that a search of web content is "very useful" or "somewhat useful." While more than half of responding companies selected "very useful" or "somewhat useful" for data mining and customer experience, there were still more than 15 percent that answered "don't know." With respect to the utilization of social media and text mining, the proportion of responding companies that answered "not so useful" exceeded 10 percent, with more than 20 percent answering "don't know." For collective intelligence, the proportion of responding companies that said "don't know" was 30 percent (Figure 10).

As such, in terms of both "status of use" and "recognition of effectiveness," the order of these IT tools is as follows: search of web content > data mining and customer experience > utilization of social media and text mining > collective intelligence.

When we look at the proportion of companies that answered "frequently use" by industry, we find that 33.3 percent of responding companies in the financial industry frequently use data mining, with 25 percent in the communications industry and 21.1 percent in the service industry. Customer experience is frequently used by 25 percent in the communications industry and 18.4 percent in the service industry. Text mining is frequently used by 25 percent in the communications industry and 23.7 percent in the service industry. Social media are frequently

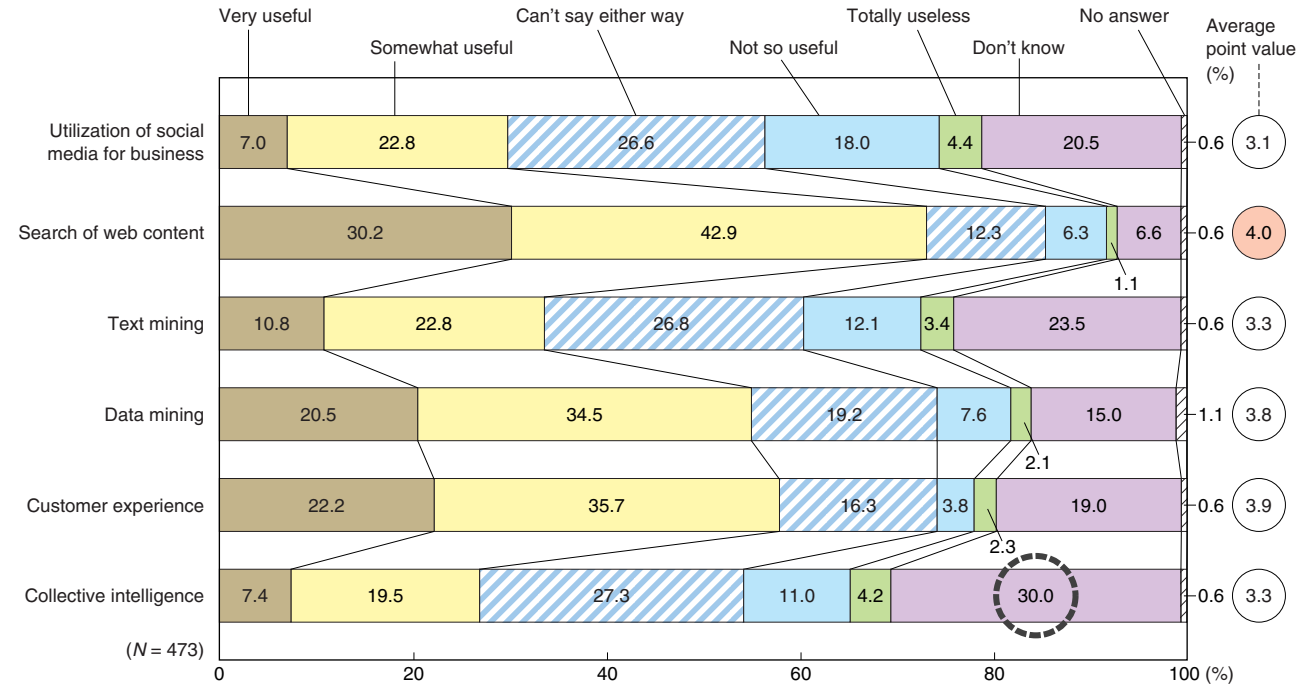
Figure 9. Status of use of IT for finding and exploration



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

Figure 10. Recognition of effectiveness of IT for finding and exploration

Search of web content is useful for the majority of users. Data mining and customer experience are effective for users who have the ability to use these tools.



Note: The average point value is calculated by assigning the following points: 5 for "very useful," 4 for "somewhat useful," 3 for "can't say either way," 2 for "not so useful," 1 for "totally useless."
Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

used by 25 percent of responding companies in the communications industry and 9.1 percent in the media industry, which percentages are higher than are those in other industries. The proportion of responding companies that frequently use collective intelligence is low in every industry.

As such, the communications industry, which operates networks, was the first to collect and explore data through networks. This trend has been spreading to the service industry. Data mining is popular in the financial industry where banks and insurance companies have vast amounts of customer data. The utilization of social media began in the media industry, which is a group of media experts. However, the percentage of companies in the communications industry that frequently use social media is high. The reason for this high percentage is that one specific company that often uses social media was included in the four companies surveyed in this industry. We must note this particularity when comparing the figures for each industry.

Web content search includes various cases ranging from simple use such as keyword searches using a search engine to sophisticated use such as the analysis of reference relationships among websites and the exploration of semantic information within content. Nevertheless, it is reasonable to assume that the high percentage revealed in this survey for the frequent use of web content search is because keyword search has become common in many companies and has proved quite useful.

The use of other IT tools for finding and exploration is still limited to particular industries and companies having high IT capabilities. Among them, however, data mining, customer experience and text mining are likely to enter the phase where ordinary companies will start using them. A typical example of such use is the analysis of complaints from customers received at customer service centers. The recognition of collective intelligence is still low because many people do not even know this term.

(2) Actual status of IT use for measurement and analysis

Candidate IT tools for these purposes are described below.

- **Statistical model**
  A population that serves as sample is analyzed by using statistical analysis methods so that a trend and a correlation are discovered and verified.
- **Financial analysis model**
  The financial statements that reflect the performance of a company or any particular business are evaluated and analyzed, and a forecast is made for future performance.
- **Business process model**
  Models are defined by schematizing current business processes. Based on the models, issues are analyzed and plans for improvement are drawn up.

- **Key performance indicators (KPI)**
  The quality, cost and delivery (QCD) of the current business processes is measured, and an analysis is made to see if there is any room for improvement.
- **Balanced scorecard (BSC)**
  Goals are set from four perspectives, i.e., learning and growth, internal business processes, customer and financial perspectives, for the performance of a company or any particular business or the implementation of specific business strategy. The levels of achievements of these goals are evaluated and analyzed.
- **Activity-based costing (ABC)**
  For activities that are necessary to create products and services, the cost for each activity is calculated based on the unit cost of resources and the amount of input resources. Based on this cost, the cost for implementing each business process and the product cost are calculated and evaluated.

When we look at the status of use, more than half of the responding companies answered that they "frequently use" or "sometimes use" the statistical model and the financial analysis model. If the number of responding companies that selected "plan to use" is included, more than half of the responding companies "frequently use," "sometimes use" or "plan to use" the business process model. As the required level of analytic capabilities increases—in the order of key performance indicators, balanced scorecard and activity-based costing, the proportion of companies answering that they "have never used" increased and exceeded 40 percent. In particular, more than 50 percent of the responding companies said that they "have never used" activity-based costing (Figure 11).

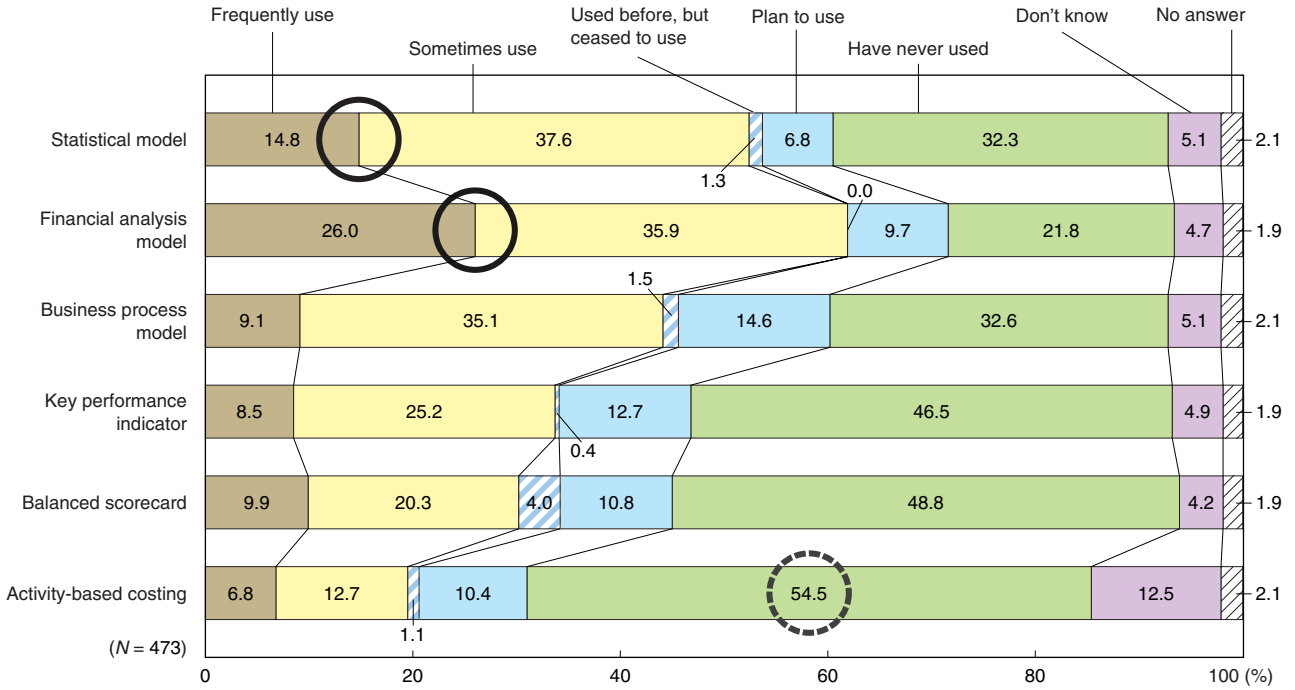
A similar trend was observed for the question of "recognition of effectiveness." More than 60 percent of the responding companies consider that the statistical model and the financial analysis model are "very useful" or "somewhat useful." The proportion of companies that selected "very useful" or "somewhat useful" for the business process model exceeded 50 percent. However, for key performance indicators, balanced scorecard and activity-based costing that require higher levels of analytic capabilities, the percentage of companies that answered that they "don't know" exceeded 20 percent. In particular, more than 30 percent of companies selected "don't know" for activity-based costing (Figure 12).

As these findings suggest, from the perspectives of both "status of use" and "recognition of effectiveness," the order of these IT tools is as follows: statistical model and financial analysis model > business process model > key performance indicators > balanced scorecard > activity-based costing.

When we look at the proportion of companies that answered "frequently use" by industry for each tool, we find that for the statistical model, the proportion is high in electric power and gas companies (40 percent), the

Figure 11. Status of use of IT for measurement and analysis

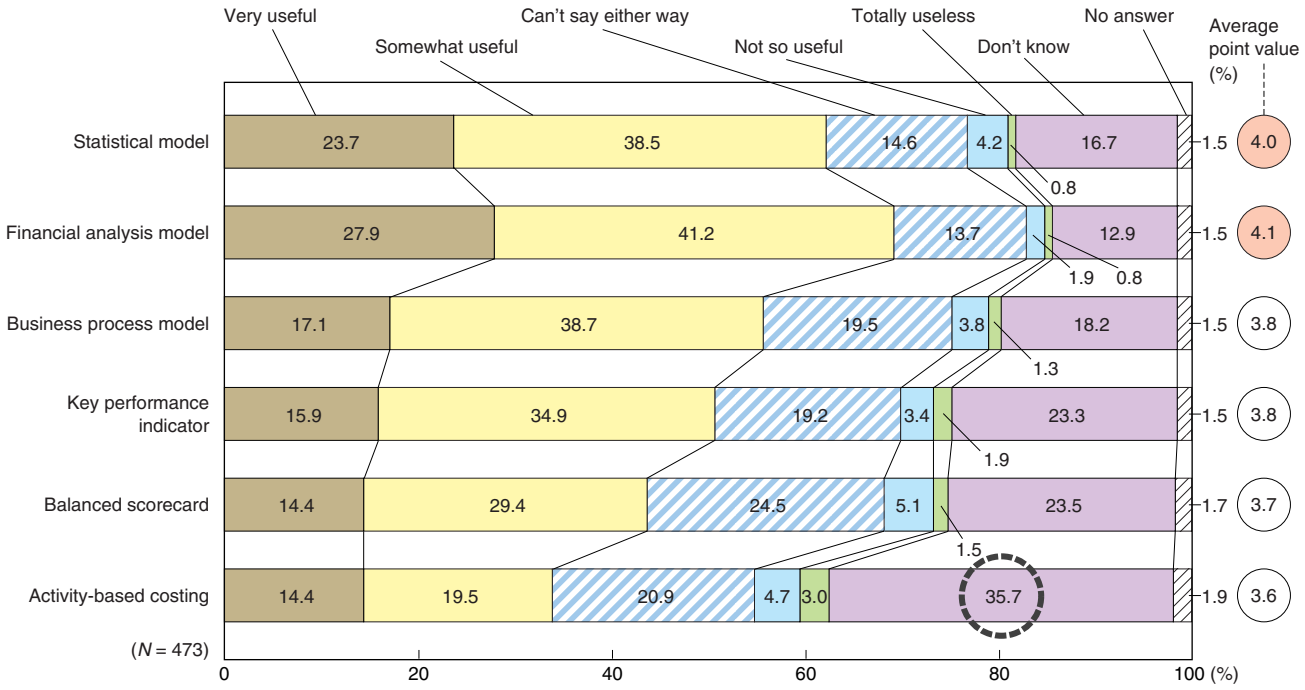
The statistical model and the financial analysis model are commonly used in industries where such models are necessary. The proportion of responding companies answering that they have never used these models increases as the required level of analytic capabilities increases—in the order of KPI, BSC and ABC.



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

Figure 12. Recognition of effectiveness of IT for measurement and analysis

The statistical model and the financial analysis model are useful in industries where such models are necessary. The higher the required level of analytic capabilities, the fewer the number of companies that have a command of using such advanced process analytic techniques, i.e., KPI, BSC and ABC.



Note: The average point value is calculated by assigning the following points: 5 for "very useful," 4 for "somewhat useful," 3 for "can't say either way," 2 for "not so useful," 1 for "totally useless."
Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

financial industry (30.6 percent) and ferrous and nonferrous metal companies (30 percent). For the financial analysis model, the percentage is high in the communications industry (75 percent), the financial industry (55.6 percent), the electrical and precision machinery industry (45 percent) and electric power and gas companies (40 percent). For the business process model, the highest proportion is recorded by oil and rubber companies (20 percent), followed by the financial industry (19.4 percent). For key performance indicators, 21.7 percent of transportation equipment companies frequently use this tool, followed by oil and rubber companies (20 percent) and the financial industry (19.4 percent). The balanced scorecard is frequently used by 27.8 percent of companies in the financial industry, followed by those in the communications industry (25 percent) and electric power and gas companies (20 percent). For activity-based costing, the proportion is high in the communications industry (25 percent), the financial industry (19.4 percent) and chemical and pharmaceutical companies (18.2 percent).

As is clear from these findings, the financial industry is ahead of other industries in using all of these IT tools for measurement and analysis. The reason for the high proportion in the communications industry, oil and rubber companies and electric power and gas companies is that one specific company whose usage is outstanding is included in each of these industry groups.

For the statistical model, ferrous and nonferrous metal companies that use mathematical sciences in the process of production management recorded a high proportion. For the financial analysis model, the proportion is high in the financial industry where this model is often used for credit analyses. These results reflect the business characteristics in each industry.

Transportation equipment companies showed a high proportion for key performance indicators because a company in the automotive industry, which is the originator of *Kaizen* (continuous improvement) and is well known throughout the world, is included. The proportion for the balanced scorecard is high in the financial industry because work improvement is equal to strengthening key facilities in the financial industry. Chemical and pharmaceutical companies recorded a high proportion for the activity-based costing. It is assumed that these trends stem from the fact that the number of companies that have been using relevant techniques for work improvement is relatively large in the respective industry.

The statistical model and the financial analysis model are analytic techniques to which particular industries such as the financial industry have been accustomed from the past. The business process model has recently been adopted by many companies for purposes such as work improvement.

With respect to key performance indicators, specific key performance indicators are set and measured to

evaluate and analyze business processes in a more quantitative manner. The balanced scorecard is a comprehensive management framework for such indicators. The activity-based costing is a costing model in which required cost is separated into that for each of the activities that consist of business processes, and the appropriateness of the cost incurred is analyzed. As such, all of these three tools are techniques to make business process model analyses more detailed and quantitative, and are designed for persons who have higher analytic capabilities. It appears that because of the higher level of capabilities required, the number of companies that use these tools is limited.

In particular, because a special management accounting mechanism is necessary to introduce the activity-based costing, it appears difficult for many companies to use this tool.

(3) Actual status of IT use for trial and judgment

Candidate IT tools for these purposes are described below.

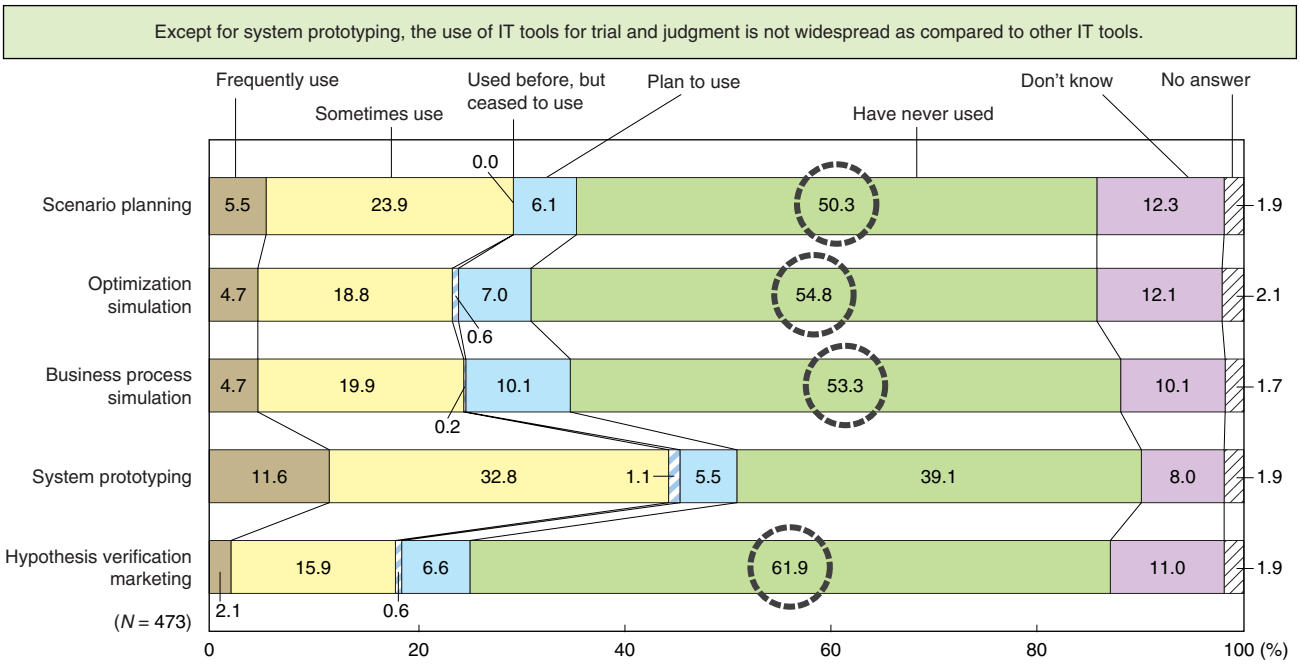
- **Scenario planning**
  Multiple scenarios that can be anticipated in response to uncertainties in a company's external environment are set and management strategies to deal with such uncertainties are prepared.
- **Optimization simulation**
  Optimal methods to minimize or maximize a target indicator under certain restrictive conditions are discovered by heuristic search.
- **Business process simulation**
  When improvements are made to business processes that are defined as models on a system, how QCD of each business process changes and improves is simulated.
- **System prototyping**
  Before developing a final product or system, a prototype is created on a system to verify effectiveness and feasibility.
- **Hypothesis verification marketing**
  A product or service is developed under a hypothesis in a short period, and is put on the market. Based on market responses, the initial hypothesis is evaluated and quickly corrected, leading to repeated product/service improvements.

In terms of "status of use," more than 50 percent of responding companies answered that they "have never used" any IT tools for trial and judgment, except for system prototyping. In particular, the proportion of such companies that selected "have never used" exceeded 60 percent for hypothesis verification marketing. As for system prototyping, nearly half of the responding companies "frequently use," "sometimes use" or "plan to use" this tool (Figure 13).

A similar trend was seen for the question of "recognition of effectiveness." More than 30 percent of responding companies selected "don't know" for any IT tools for trial and judgment, except for system prototyping. The proportion of companies that selected "very useful" or "somewhat useful" for system prototyping was close to 50 percent (Figure 14).

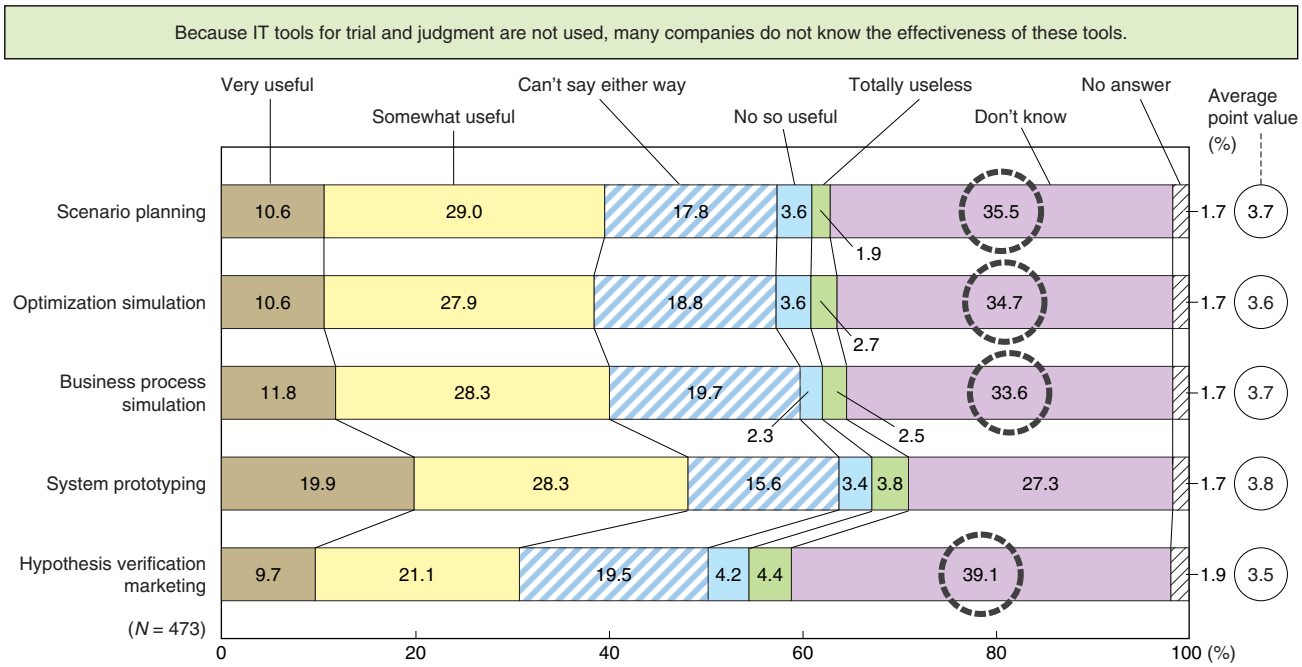
As such, from the perspectives of both "status of use" and "recognition of effectiveness," the order of IT tools for trial and judgment is as follows: system prototyping > scenario planning > optimization simulation > business process simulation > hypothesis marketing.

Figure 13. Status of use of IT for trial and judgment



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

Figure 14. Recognition of effectiveness of IT for trial and judgment



Note: The average point value is calculated by assigning the following points: 5 for "very useful," 4 for "somewhat useful," 3 for "can't say either way," 2 for "not so useful," 1 for "totally useless."
Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

When we look at the proportion of companies that answered "frequently use" by industry for each tool, we find that for system prototyping, the proportion was high in electrical and precision machinery companies (28 percent), electric power and gas companies (20 percent) and oil and rubber companies (20 percent). For scenario planning, the percentage was high in oil and rubber companies (20 percent). For optimization simulation, the highest proportion was recorded by the communications industry (25 percent), followed by oil and rubber companies (20 percent). For business process simulation, 25 percent of the responding companies in the communications industry frequently use this tool, followed by chemical and pharmaceutical companies (18.2 percent). While the proportion for hypothesis verification marketing is low in all industries, this tool is used by 4.8 percent of responding companies in the food industry, with 5.3 percent in the wholesale and retail industry, 5.5 percent in the financial industry and 6.5 percent in the transportation industry.

The reason for the high proportion for prototyping and simulation in oil and rubber companies, electric power and gas companies and the communications industry is that one specific company whose usage is outstanding is included in each of these industry groups. Except for this particularity, the use of IT tools for trial and judgment is characterized by the fact that the proportion for system prototyping is high in electrical and precision machinery companies that use this tool for product development, and that the proportion for business process simulation is high in chemical and pharmaceutical companies that fall under the process manufacturing industry category.

While the use of hypothesis verification marketing is not widespread in any industry, some consumer goods manufacturers and retail companies that "frequently use" this tool have appeared.

System prototyping that enables a manufacturer to repeatedly create prototypes on a computer without needing to develop physical prototypes is projected to enter the phase of practical use at many companies. This tool is expected to bring about major benefits.

Optimization simulation is one domain of operations research (OR) for which various optimization techniques have already been developed, and its effectiveness has been proved. However, because applicable business fields are limited, the typical response in the general business system world tended to be "don't know."

Because business process simulation is to be introduced after the business process model analysis is adopted, the use of this simulation is projected to increase after the number of companies that analyze business process models increases.

Even if a company considers that hypothesis verification marketing appears useful, it must provide a mechanism of putting a product or service on the market in a short period, making it difficult for the company to actually implement this technique.

(4) Actual status of IT use for implementation and use

Candidate IT tools for these purposes are described below.

- **Collaboration environment**
  This refers to the environment where many persons, both employees and outside partners, use a system

to work together. This environment facilitates joint work through collaboration among users by means of sharing data and expertise via the network and communicating with one another at remote sites.

- **Execution-type BPM**
  Along business processes that are defined as models on a system, this tool generates actual workflow, executes work and monitors work execution status and results.
- **Service-oriented architecture (SOA as design and implementation technology)**
  Business functions and system functions are designed as reusable components (services), which are implemented within a system as service components. These service components are combined to realize business processes and systems.
- **Model-driven architecture (MDA)**
  Business processes and business functions are defined as models, which are written based on standard writing methods. These models are input to automatically generate system components, and the prototype of an actually operating system is created.
- **Cloud computing**
  Virtualized servers that are located somewhere in the world are shared through the Internet to operate a company's system functions. In this survey, cloud computing refers to a public cloud service that is offered by a third-party outside vendor for shared use.

When we look at the "status of use," we find that if the number of responding companies that selected "plan to use" is included, more than half of the responding companies "frequently use," "sometimes use" or "plan to use" the collaboration environment and cloud computing. However, the proportion of responding companies that answered that they "have never used" execution-type BPM and SOA exceeded 50 percent. As for MDA, more than 60 percent answered "have never used" (Figure 15).

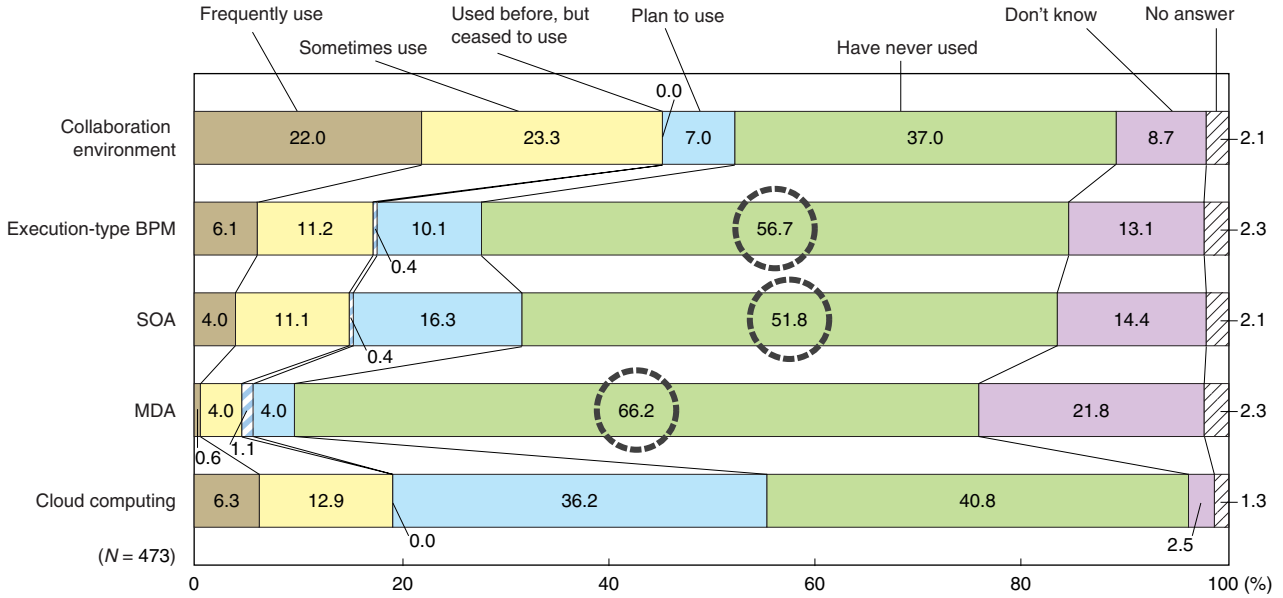
Similar responses were made to the question of "recognition of effectiveness." More than 50 percent answered "very useful" or "somewhat useful" for the collaboration environment and cloud computing. However, the proportion of responding companies that answered "don't know" for execution-type BPM and SOA exceeded 30 percent. As for MDA, more than 50 percent answered "don't know" (Figure 16).

As such, from the perspectives of both "status of use" and "recognition of effectiveness," the order of IT tools for implementation and use is as follows: collaboration environment and cloud computing > execution-type BPM > SOA > MDA.

When we look at the proportion of companies that answered "frequently use" by industry for each tool, we find that for the collaboration environment, the proportion was high in the food industry (47.6 percent), the media industry (45.5 percent) and the construction industry (36.7 percent). For cloud computing, the proportion was high in the order of the media industry (18.2 percent), the information service industry (18.2 percent) and the real estate industry (15.4 percent). For execution-type BPM, the proportion was high in the order of the communications industry (25 percent), chemical and pharmaceutical companies (13.5 percent), electrical and precision machinery companies (12 percent) and the financial industry (11.1 percent). For

Figure 15. Status of use of IT for implementation and use

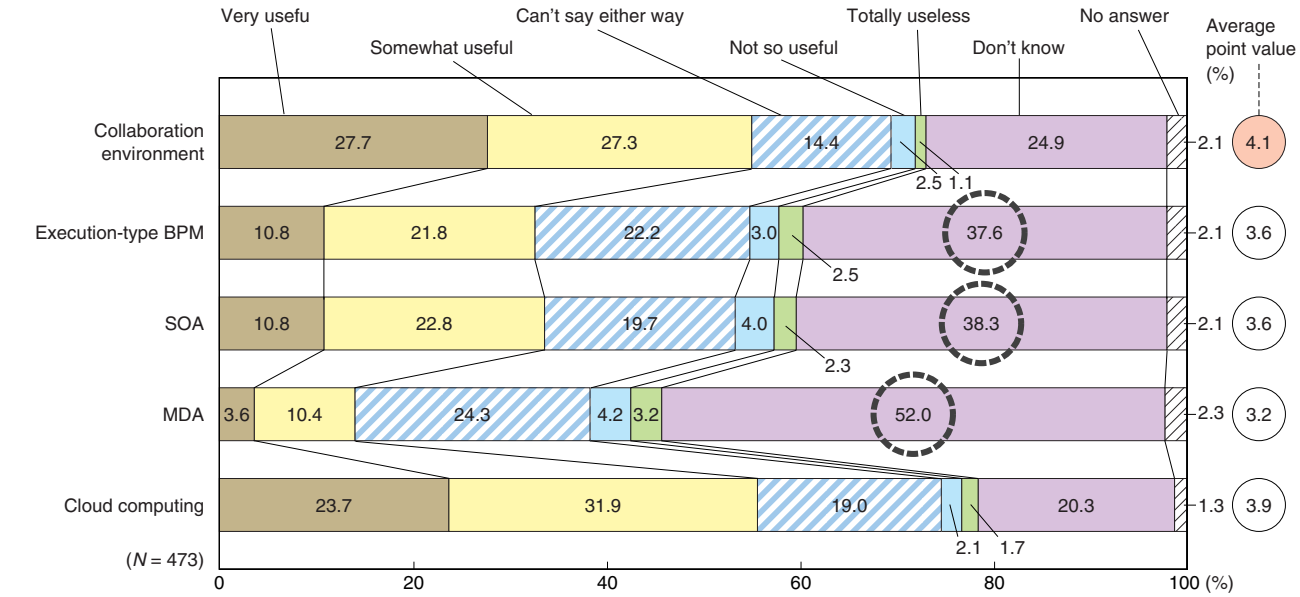
If "plan to use" answers are included, more than half use the collaboration environment and cloud computing. There are many "have never used" answers for execution-type BPM and SOA. Nearly 90% selected "have never used" or "don't know" for MDA.



Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

Figure 16. Recognition of effectiveness of IT for implementation and use

The collaboration environment is useful. Cloud computing appears to be useful. However, the effectiveness of execution-type BPM and SOA is not so obvious to us. As for MDA, we have no idea of its effectiveness.



Note: The average point value is calculated by assigning the following points: 5 for "very useful," 4 for "somewhat useful," 3 for "can't say either way," 2 for "not so useful," 1 for "totally useless."
Source: "Survey on the Actual Status of the Use of IT by User Companies" conducted by Nomura Research Institute in 2010.

SOA, the proportion was high in the communications industry (25 percent), oil and rubber companies (20 percent) and electrical and precision machinery companies (12 percent). The percentage for MDA was low in all industries.

The characteristic of the collaboration environment that the survey revealed was the high proportion in the food and construction industries that often require cooperation among employees located at remote sites as well as in the media industry involving collaborative work through digital media. Cloud computing first began to spread in the information service industry that offers this service and in the media industry. It is interesting to note that this tool is utilized in the real estate industry where full-scale system resources are not required. The reason for the high proportion for execution-type BPM and SOA in the communications industry and oil and rubber companies is that one specific company whose usage is prominent is included in each of these industry groups. Except for this particularity, the proportion for execution-type BPM was high in chemical and pharmaceutical companies, electrical and precision machinery companies and the financial industry, which are focusing their efforts on the improvement of business processes. Electrical and precision machinery companies are also moving toward the introduction of SOA.

In the future, it will become commonplace for many companies to implement collaborative work by using networks and computers and to use cloud computing, which enables the use of IT without owning an assortment of system resources.

While significant progress is being made in the development of these IT platforms, the introduction of tools that support the quick implementation of business and systems such as execution-type BPM, SOA and MDA is still limited to specific industries and companies. As such, more time will be necessary for the widespread use of these tools. In particular, the recognition of MDA is still low.

IV Analysis of Survey Results

1 Classification of IT tools based on the extent of use and the level of recognized effectiveness

Candidate IT tools for the improvement of organizational capabilities that have been discussed so far are classified into several groups based on the extent of use and the level of effectiveness as recognized by companies.

First, IT tools are divided into the following three groups according to the extent of use.

- IT tools for which the proportion of "frequently use" and "sometimes use" answers exceeded 50 percent
- By adding "plan to use" answers, IT tools for which the proportion of "frequently use," "sometimes use" and "plan to use" answers exceeded 50 percent
- Other IT tools for which the proportion of other answers exceeded 50 percent, that is, IT tools for

which the proportion of companies that do not use them exceeded 50 percent

Next, in terms of the level of recognized effectiveness, the average value is calculated by assigning the following points: 5 for "very useful," 4 for "somewhat useful," 3 for "can't say either way," 2 for "not so useful," 1 for "totally useless." Based on the point value, IT tools are divided into the following four groups.

The first group is:

- IT tools for which the proportion of "don't know" answers exceeded 30 percent. For these tools, the effectiveness is uncertain.

Other IT tools for which the effectiveness is evaluated are divided into the following three groups.

- The average value of effectiveness is 3.0 or higher and lower than 3.5
- The average value of effectiveness is 3.5 or higher and lower than 4.0
- The average value of effectiveness is 4.0 or higher

According to this classification, candidate IT tools are mapped in Figure 17, which shows the four groups of IT tools.

(1) Group of IT tools that are already "widespread"

The proportion of companies that "are using" or "plan to use" was 50 percent or more and the average value of effectiveness was 4.0 or higher. These IT tools include financial analysis model (effectiveness of 4.1), search of web content (4.0), statistical model (4.0) and collaboration environment (4.1).

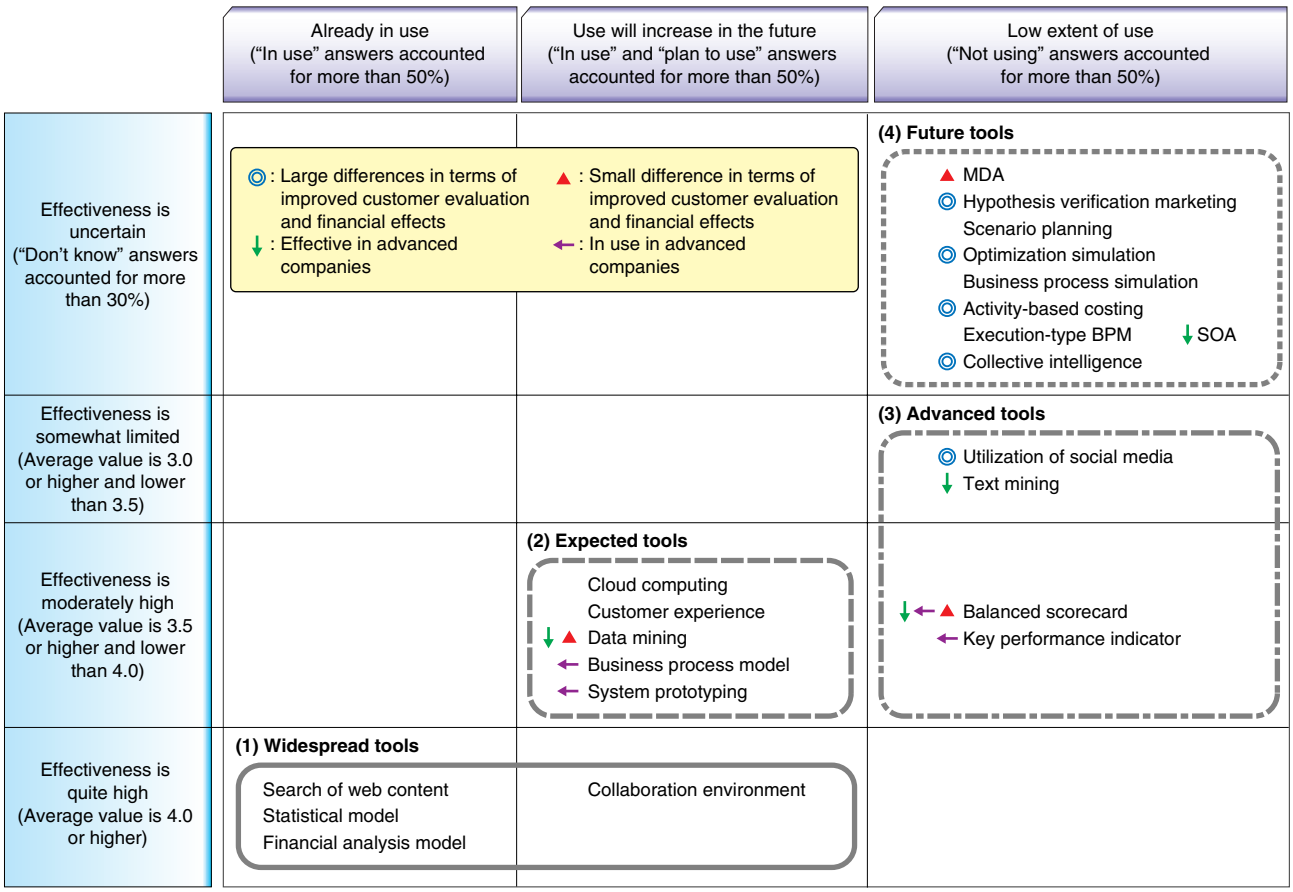
(2) Group of IT tools that are "expected" in the future

Although the proportion of companies that are "already using" was less than 50 percent, the percentage increases to more than 50 percent if "plan to use" answers are included. The average value of effectiveness was 3.5 or higher and lower than 4.0. These IT tools include customer experience (3.9), cloud computing (3.9), data mining (3.8), business process model (execution-type BPM) (3.8) and system prototyping (3.8).

(3) Group of IT tools for "persons who have higher IT abilities"

The proportion of companies that "are not using" exceeded 50 percent and the average value of effectiveness was 3.0 or higher and lower than 4.0. These IT tools include key performance indicators (3.8), balanced scorecard (3.7), text mining (3.3) and utilization of social media (3.1).

Figure 17. Classification of IT tools according to the extent of use and the level of recognition of effectiveness



(4) Group of IT tools that are currently considered "future tools"

The proportion of companies that "are not using" exceeded 50 percent and the proportion of "don't know" answers to the question of effectiveness exceeded 30 percent. These IT tools include collective intelligence (30.0 percent gave "don't know" answers), business process simulation (33.6 percent), optimization simulation (34.7 percent), scenario planning (35.5 percent), activity-based costing (35.7 percent), execution-type BPM (37.6 percent), SOA (38.3 percent), hypothesis verification marketing (39.1 percent) and MDA (52.0 percent).

2 Transition in the use of IT

Choosing an IT tool to use depends on the approach adopted by an individual company towards IT, rather than involving the characteristics of each industry. The 2010 survey also asked about the positioning of IT by each responding company. The results included the following responses.

- IT is a company's key facility and is a core technology that gives rise to strengths: 145 companies
- IT is a company's key facility, but is not a core technology that gives rise to strengths: 172 companies
- IT is not a company's key facility, but is a core technology that gives rise to strengths: 103 companies
- IT is neither a company's key facility nor a core technology that gives rise to strengths: 48 companies

The answers by each of these four groups to the questions of "status of use" and "recognition of effectiveness" were analyzed for each IT tool. As a result, companies that have a positive attitude toward IT and answered "IT is a company's key facility and is a core technology that gives rise to strengths" recorded a higher proportion for all IT tools in terms of both "status of use" and "recognition of effectiveness" than did those in other groups.

IT tools for which large differences were seen in the average point value in terms of effectiveness include text mining (3.7 to 3.0), data mining (4.1 to 3.5), balanced scorecard (3.9 to 3.3) and SOA (3.9 to 3.2).

Only among companies that answered "IT is a company's key facility and is a core technology that gives rise to strengths," did the proportion of companies that are already using business process modeling and system prototyping exceed 50 percent. For balanced scorecard, if companies that plan to use are included, the percentage of companies that are already using and plan to use exceeded 50 percent.

In other words, data mining, business process modeling and system prototyping that belong to the "expected tools" group are already in the "widespread tools" group among the group of companies that have a positive attitude toward the use of IT. Key performance indicators and balanced scorecard that belong to the "advanced tools" group are already in the "expected tools" group among this group of companies. Similarly, SOA that belongs to the "future tools" group is already in the "advanced tools" group among these companies.

These findings suggest the following transition of IT tools. New IT tools to be developed are "future tools" that are unknown to many companies. Before long, some companies will start using them and the tools will become "advanced tools." At the next step, the tools will become "expected tools" even by general companies. Eventually, these tools will become "widespread tools."

V How to Create Value through the Use of IT

1 What IT tools are effective?

The 2010 survey also asked companies whether a reform brought about the effect of improved customer evaluation and the financial effect. By awarding 5 points for a response of "effective," 4 points for "somewhat effective," 3 points for "can't say either way," 2 points for "not so effective" and 1 point for "no effect," an average value was calculated. The average point value in terms of improved customer evaluation was 3.1, while that for financial effect was 3.3.

To determine the average point value for the improvement of customer evaluation and the financial effect, companies that made use of a particular IT tool were separated from those that did not. By doing so, we attempted to identify which IT tool produced measurable effects.

As a result, we found that in terms of the financial effect, companies that made use of any particular IT tool scored higher average values than did those that did not. However, the differences between companies using them and those not using them were insignificant—0.1 to 0.3. In terms of improved customer evaluation, companies that employed any particular IT tool scored higher average values. However, we observed slightly significant differences for some IT tools.

IT tools that produced such differences were: utilization of social media (3.4 to 3.0), search of web content (3.2 to 2.8), collective intelligence (3.5 to 3.1), activity-based costing (3.4 to 3.0), optimization simulation (3.4 to 3.0) and hypothesis verification marketing (3.4 to 3.0).

The majority of companies use search of web content. We should note that those companies that are not using it lag behind the majority in terms of improved customer evaluation. Except for search of web content, the remaining five IT tools are classified as either "future tools" or "advanced tools." Although the number of

companies using these tools is still limited, companies that have adopted them enjoy progress in improved customer evaluation. That is to say, the use of search of web content appears to be an obvious choice, while the other five IT tools provide a company with a means of differentiating itself from other companies if the company uses them ahead of other companies.

2 Process of improving corporate value by means of IT

What, then, is the process that each IT tool follows to contribute to the improvement of the value of a company? Figure 18 explains this process by using the balanced scorecard.

(1) Learning effect—Promoting invention by increasing the level of knowledge work by individual employees within an organization

To improve an individual employee's information literacy, "info-mate IT" is useful. This is used for scenario planning, web content search, mining, modeling, monitoring, simulation, prototyping and hypothesis verification (experiment). While not enumerated in this paper as candidate IT tools, in-house SNS that is useful in bringing about new ideas through informal exchanges of views among individual employees can be included in "info-mate IT."

(2) Process effect—Creating products and services by enabling collaboration within an organization or between organizations based on invented ideas

To enhance collaboration either within an organization or between organizations, "collaborative IT" is useful. This includes the collaboration environment, execution-type BPM and SOA. To promote collaboration among many and unspecified individuals beyond any organizational confines, we can look to collective intelligence and cloud computing.

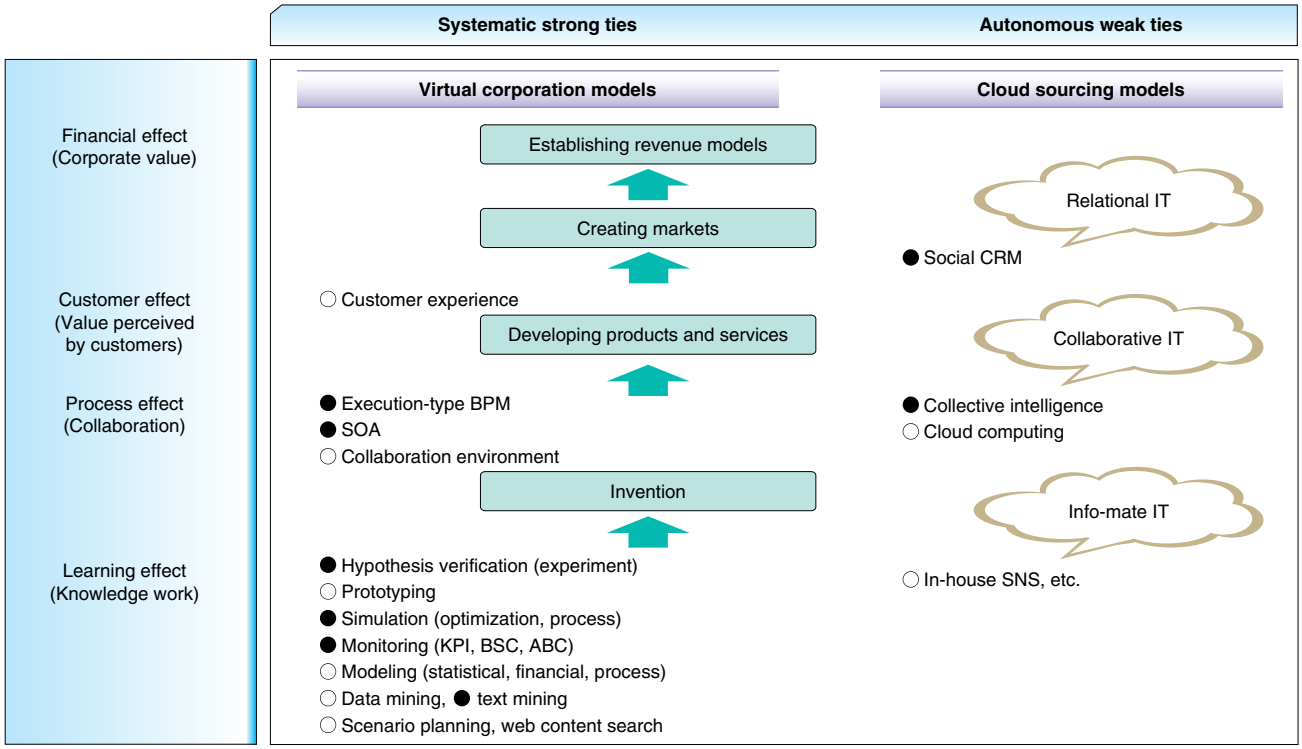
(3) Customer effect—Strengthening relationships with customers and society to create a market to supply products and services

To strengthen relationships with customers and many and unspecified consumers, "relational IT" is useful. This includes the customer experience, whereby relationships can be established with customers, while social media can be used to create relationships with many and unspecified consumers. This IT is called social CRM (customer relationship management).

(4) Financial effect—Improving the value of a company by supplying products and services to the market and establishing a business model for generating high earnings

The IT tools that are discussed in this paper do not necessarily contribute to the achievement of financial effect. Even if a good product is created and this product reaches the stage where it merits high reputation among customers through the use of IT tools, such achievement does not necessarily lead to business that can generate

Figure 18. Process of improving corporate value by means of IT



Notes: CRM = customer relationship management, SNS = social networking service.

high earnings. What is ultimately required is the management capability to build a business model in which customers pay an appropriate price for the value of a product and such price is properly divided among the parties involved in providing such value.

In Figure 18, IT tools that are used to create systematic "strong ties" within a company or between companies are separated from those that are used to create autonomous "weak ties" among many and unspecified individuals beyond the confines of a company or any particular organization.

In the past, many business models were built based on strong ties. In other words, the creation of a supply chain for products and services has relied on the building of a virtual corporation model in which responsibilities such as the sharing of roles, the scope of responsibility, the anticipated results and interfaces are all defined before the start of collaboration within a company or between specific companies.

On the other hand, businesses began to emerge that adopted a cloud sourcing model in which services are provided based on wisdom and resources provided by many and unspecified individuals and organizations through the use of weak ties.

VI Evolution of IT Use that Creates Positive Effects

1 Starting with the strengthening of strong ties

In Figure 18, according to the state of use that was revealed in the 2010 survey, "widespread tools" and "expected tools" are prefixed by "○" and "advanced tools" and "future tools" are prefixed by "●." Currently, the use of IT tools that creates positive effects such as improving organizational capabilities and creating value is mostly seen in those areas that are based on strong ties. Among these IT tools, by connecting those IT tools whose usage frequency is high, we can consider the following scenario of IT use that creates positive effects. Each employee working in a company uses mining to extract information from content that was searched from websites, creates a model and then a prototype. Based on the prototype, organizational functions are concentrated in developing a product under the collaboration environment. The product is put on the market while employing customer experience technology to gain high customer evaluation, giving rise to positive effects. This is the method by which companies are currently applying IT tools.

As a result of using IT tools in this way, there may be a moderate and gradual effect such as that of herb medicine whereby the collection, analysis and sharing of information will gradually be upgraded. While this way of using IT tools can be regarded as an extension of information systems that are currently in use, is it possible to expect a more dramatic effect?

To achieve such a dramatic effect, we should step into the next phase of IT use. One example of IT use in a company is to repeat trials and errors and hypothesis verification in digital form more frequently and at higher speed for the processes leading up to the development of a product. Another is to use execution-type BPM and SOA on a full-scale basis to promptly build a business process of supplying products and services. Such usage directly makes the best use of the effect of digitization by means of IT through innovation of key business processes such as the product development process and the product/service supply process.

2 Challenging the use of weak ties

Lying further ahead is the use of IT tools under weak ties. The meeting of individuals having different interests and sensibilities can give rise to concepts that have not previously been seen. By bringing together the wisdom and skills of many talented people from all over the world, we can achieve product development that would not be possible with only in-house personnel. By hearing the opinions and views of many and unspecified consumers that could become potential customers and providing meaningful responses to such opinions and views on a real-time basis, we can successfully communicate with them. The use of these IT tools provides companies with huge potential.

In this field, while there are some successful examples of start-ups, the methodology to ensure the generation of positive effects is yet to be established. Currently, success depends entirely on the wisdom and ideas of individual people.

For example, recently, some companies have introduced in-house SNS, allowing their employees to freely create communities. Although this in-house facility does much to improve communication and cut down on wasteful meetings, there are many companies where positive effects that accelerate employee creativity are yet to emerge.

There are also some well-known examples of companies engaged in the extensive use of networks to collect ideas for product development from specialists and consumers. These examples include Procter & Gamble's "Connect and Develop" open innovation initiative and a T-shirt design content offered by Threadless that anyone can enter.

In such cases, however, if the participants in these communities are not recognized for their contribution or not appropriately remunerated, these initiatives may end up in being approaches that do not contribute much to an increase in business earnings.

While more and more managers are interested in the influence of comments on Twitter, most still repeat trials and errors as to how they can use such influence to improve business earnings.

Nevertheless, as revealed by the 2010 survey, for those companies that have been using IT tools for trials and errors and those using the tools for weak ties ahead of other companies, the effect of increasing customer evaluation that was brought about by reform is greater than average. As such, for those companies that are looking to IT tools for creating positive effects, it can be said that IT tools in these fields will be the leading edge of the future. Japanese companies should adopt these advanced IT tools quickly as part of their post-quake innovation to achieve a V-shaped recovery.

VII How to Best Promote the Use of IT that Creates Positive Effects

1 IT alone is not a magic wand

In comparison with IT tools that bring about cost-cutting effects through automating business processes and improving work efficiency, it is difficult to visualize the consequences brought about by IT tools that create positive effects through improving organizational capabilities. Actually, if we look at the results of the latest survey, we find that, on average, there is very little discernable financial difference between those companies that have deployed IT tools listed in the survey and those that have not.

Certainly, there is no particular IT tool that, when introduced, always produces clearly discernable effects in a manner similar to waving a "magic wand." It is often said that not only IT but also organizational culture are important factors for improving organizational capabilities. For example, "if we were to create innovative products and services, we need a culture that tolerates failure" or "an open organizational climate is important to promote collaboration beyond the confines of an organization." Yes, these remarks are certainly true. However, how can we foster such a corporate culture?

2 Governance of reform that produces positive effects

To attain the above, it is first essential for management to take the lead by changing the way in which governance is applied to any IT-based reform. Rather than adopting negative measures such as reducing costs or cutting workforce, the first requirement is that management places the highest priority on positive actions that generate a company's unique value, allocates the required management resources to such efforts and takes the lead in these endeavors. When we look at the cases of companies that achieved IT-based innovation in the face of a major business crisis, we always see an exhibition of prominent leadership on the part of management.

Furthermore, management should guide investment projects to achieve reform in such a way that challenging projects that are likely to generate positive effects accounts for more than a certain proportion in the entire investment portfolio. When there is a choice between projects that will definitely improve efficiency, albeit small, and those whose effectiveness is untried but that offers the promise of a much larger effect, there is a tendency that only the former, safe projects are selected for investment if no selection guidelines are available.

At investment assessment conferences or similar business management committees, a certain framework must be allocated for investment in projects that are expected to create positive effects and a common recognition must be shared regarding the standards based on which projects generating positive effects are selected. In addition, a president or any management executive should be able to make a decisive decision on investing in a project that falls outside the scope of the standards. This is because there are some cases in which "projects that everyone endorses actually fail."

It is also necessary to remember that it may take some time before a positive effect is achieved. Allowing insufficient time for a positive effect to be realized in evaluating the progress of a project and prematurely terminating the project could lead to a situation where a proposal for such a project having promise of generating a positive effect will no longer be presented. Accordingly, for evaluation of highly uncertain investment projects at an early stage as well as after some time elapses, it is necessary to set a time frame and establish evaluation standards that take into account the characteristics of each project.

3 Management of a project that produces positive effects

The management of a project to implement a reform is also different from that for ordinary projects to improve work efficiency. Many projects that produce positive effects involve repeated trials and errors. This repetition enables participants to gradually define requirements and to learn more about a project. Therefore, traditional project management, in which all requirements are set at the initial stage and work is executed mechanically as planned at subsequent stages, is not necessarily suitable for projects that produce positive effects.

The method known as "agile project management (APM)" is advocated by software experts including Jim Highsmith for projects that involve considerable trials and errors. He describes APM as follows.

> Agile project management (APM) complements traditional project management (TPM) in many ways. Project managers should understand the basics of setting up project organizations, budgeting, critical path scheduling, and myriad other established project management practices. However,

project managers should also know when and how to apply agile practices. There are three broad situations in which APM should be considered over TPM:

- High exploration-factor projects
- Projects in which customer responsiveness is paramount
- Organizations with innovative cultures

The APM lifecycle framework includes five phases:

- Envision—determine the product vision, who is going to do the work, and how the team will work together.
- Speculate—develop a feature-based release, milestone, and iteration plan.
- Iteratively deliver features—deliver tested features in short time frames.
- Monitor and adapt—review the delivered results, the current business environment, and the team's performance – and adapt as necessary.
- Close—conclude the project, wrap up loose ends, and celebrate.

(Omitted) APM practices thrive in projects that are exploratory in nature, ones that push the envelope of schedule, risk and rewards. As such, these projects don't conform to the traditional plan-build mode of operation, but progress by exploring and adapting. The speculate phase generates a hypothesis about the future, not a detailed deterministic plan. Agile project teams "expect" the plan to be wrong; they expect changes—often very large ones. Therefore, the monitor and adapt phase names what happens when variations are found.

(Omitted) APM is decidedly short-cycle, iterative, and feature-driven. Agile teams deliver in short iterations—weeks for software projects, longer periods for industrial products. For industrial products, teams get as close to actual features as possible, using simulations or models to give the customer something tangible to review.

(*Adventures of an IT Leader* written by Robert D. Austin, Richard L. Nolan and Shannon O'Donnell)

4 Developing personnel who contribute to the creation of positive effects

Reform projects that can bring about positive effects always involve trials and errors, and there are not a few such projects that result in failure. Unless a company makes particular efforts to develop personnel who are brave enough to attempt such trials and errors, the company is unlikely to reap benefits from the efforts made by such personnel.

Within a company, the product development and marketing departments whose mission is to give rise to positive effects have traditionally been supported by star performers who went by the monikers of "*meijin* (master)," "*tatsujin* (expert)" or "*kamisama* (deity)." These people are capable of using their own senses to develop hypotheses and, by undertaking many challenging projects, have accumulated considerable experience as creators. However, problems for such a company emerge from the fact that it has become impossible to attain significant results only through the products, services and plans that depend on the sensibilities of these star performers.

To deal with this situation, a company should increase the opportunities for trials and errors by means of prototyping and hypothesis verification marketing and listen to the opinions and views of consumers and customers from an early stage in order to increase its chances of success. In addition, the company will face the need for increasing the number of personnel capable of performing this trial and error work. Projects that rely on hypothesis verification need a different type of personnel from the creator-type personnel of the past. These projects need analysts that can create a hypothesis model and then improve that model through data verification. Such analytic work requires people with more of a science than liberal arts background. The analytic work is that which can be facilitated by the use of IT.

Furthermore, in the future, companies will have to shift their reliance away from star performers for creative work, and instead rely more and more on their regular employees. Chances to participate in trial and error activities and to contribute to creating positive effects should be given to those personnel who are in close contact with customers, such as those in the sales and service departments, as well as those who act as points of contact with outside transacting parties, such as those in the production and procurement departments.

We are now past the era where product development and marketing departments can stand aloof from other departments. Instead, companies must embrace the concept of looking to the ideas that regular employees have who are in contact with customers, assimilating their knowledge and skills and collaborating with them to create positive effects. Moreover, to conduct hypothesis verification marketing on the spot, it is essential for the sales and production departments to work closely together. What makes such close work possible is IT-enabled hypothesis verification and a collaboration environment facilitated by IT.

5 Management that directs all employees towards the creation of value

However, such collaboration cannot simply be achieved by having an IT network. We also need human networks that are based on both weak ties and strong ties. These

human networks will be created through meeting and talking with people having different cultures and in different fields, who will eventually form a virtual team that goes beyond the boundaries of an organization and that will share information and knowledge.

Such a virtual team cannot be formed if there are walls impeding the flow of information within an organization. However, there are many companies where any more than the minimum amount of information needed to achieve an assigned task is not allowed to flow outside the organization. On the one side, control is imposed on the flow of information, and on the other side, employees are encouraged to freely create communities on an in-house SNS. It is difficult to pursue both of these seemingly contradictory directions. This situation calls for a new in-house strategy regarding the control of information and the promotion of communication.

In ordinary companies, unlike creators, many employees who are engaged in everyday work or analytical work tend to avoid taking risks. To maintain peace of mind, they adopt a direction whereby they can live their company lives safely by simply doing what they are told to do. As far as possible, they avoid carrying any burden that exceeds what they are told to do. When assigned tasks that have to be done, they choose to do those tasks for which there is a good chance of success and whose achievements are likely to reflect on them in a positive light. They choose to avoid those tasks that present risks of failure. Even though this way of behavior might be criticized as "don't-rock-the-boat principles, simply waiting for instructions," in the past, this was a wise way of living a company life.

In an unusual case of an individual willing to take on a challenging task, he or she will be made aware of the extent of risk involved and told that "it is not something that you should take on" by colleagues or superiors, and will ultimately be persuaded to give up the idea within a "wave dissipative" organization. Even in the face of this opposition, if he or she goes ahead anyway, he or she will receive neither cooperation nor support, and the idea will eventually be brought to a standstill. Any effort that results in failure tends not to be evaluated positively. Eventually, most people do not take on anything that will not lead to some sort of reward. This "the nail that sticks up gets hammered down" phenomenon is often seen.

In order to change such a mindset of ordinary employees, a style of management that rewards employees who "talk the talk and walk the walk" is important. Specifically, employees having a positive stance who propose an idea and actually implement it will be most rewarded and will earn the respect of those around them. A person who volunteers to take on a task but fails will gain greater recognition than will a person who does not volunteer. Likewise, a person who assists the person taking on a challenge will gain greater recognition than will a person who does nothing. Both the initiator and the persons who helped him/her will be recognized when the project is a success. If the project fails, employees are recognized as having learned from the experience and will be given the chance to take on another challenge that arises. Only when this style of management is pervasive, can a culture emerge that not only allows failure but also encourages employees to take on challenges and not fear the possibility of failure.

In addition, participating in any collaborative work by a regular employee that goes beyond organizational boundaries in a company should be allowed and evaluated in the same way as doing work assigned within the organization to which he/she belongs. The sponsor of a collaborative project should first be clarified, and the sponsor should be responsible for protecting, supporting and evaluating participating employees. Otherwise, there is a possibility that an organization leader might issue an instruction such as "do your own organization's work first" or "for the moment, confine your activities to those within your own organization," thus thwarting the realization of open collaboration.

6 Now, the improvement of organizational capabilities is a pressing issue

Since before the widespread use of IT among individuals, as we see today, trial and error activities, the formation of collaborative teams that go beyond organizational boundaries and weak-tie communication have been said to improve the creativity of knowledge workers. However, these activities have been limited to very creative roles within a company.

These days, significant progress has been made in IT for trial and error activities in digital format, collaboration and communication, reaching the stage where these IT tools are widely available for ordinary companies and their employees and where anyone is able to use these tools. By making optimum use of these IT tools, the way in which governance is applied and human resources are utilized should be changed so that all employees can be directed toward creative work that generates positive effects and value.

The optimum use of IT as a means of improving organizational capabilities as well as driving the creation of positive effects that help overcome the current crises facing Japan is a pressing issue that must be addressed by company-wide efforts.

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