Chapter 5   Research Discussion

5.1 Rank of IT Capital Performance Indicators

5.1.1   Indicators for IT Input

Table 5.1 shows the average applicability of each indicator and the total average (4.831) in the dimension of IT input of five cases. In this table, the indicators have been ranked in order according the mean and standard deviation. The finding indicates that the most applicable indicators in the financial service industry are "IT application level", "CEO background", "Problem handling", and "IT personnel expenditure" where all of the scores are greater than the mean. Conversely, the most inapplicable indicators are "The size of IT department" and "Certification items."

➢ *The most applicable performance indicators*

According to the case study, we find that financial service industry puts high emphasis on IT application capability, especially *IT application level* and *the ability of handling problems*. Because the content of most financial products has no obvious difference, it is very possible to lose the original customers when the competitors provide better conditions. Therefore, the firms in the financial service industry are very dependent on IT to promote new products or improve transaction processes to satisfy the needs of customers. IT not only can reduce the completion time of jobs but also can create new financial products and channels, such as e-banking and e-ATM. If the degree of IT application is getting better, the relationship between customers and firms will definitely be improved and the firm performance also can be enhanced efficiently.

The firms in the financial service industry also emphasize the ability of handling problems. Owing to the variety of financial products and the complexity of business processes, most daily operation needs to be dependent on the assistance of IT. When systems are broken down or end users encounter great difficulties in the operation of systems, if IT staff can solve problems with the most efficient approach as soon as possible, they will certainly create new competitive advantage for the firms.

In addition, we find that "*CEO Background*" also is a very important indicator. In general, most CEOs in the financial service industry have the background of finance or marketing. Therefore, they understand the characteristics of financial service industry better than anyone. In order to improve firm performance and enhance competitive advantages, they must be willing to support IT department and provide suggestions about IT investment upon his background and experience. Besides, "*IT personnel expenditure*" also is a very important indicator. Because the firms in the

financial service industry are always dependent on IT to maintain the daily operation, make strategies, and create new opportunities, they need sufficient and well-trained IT staff to solve problems efficiently and create new opportunity to earn profits.

➢ *The most inapplicable performance indicators*

In the dimension of IT output, the most inapplicable indicators are "The size of IT department" and "Certification items." For financial service industry, the cultivation of IT staff and their IT application capability are more important than the number of IT department or the age and professional tenure of IT department staff. Thus, it is not significant to put emphasis on the indicator of "*the size of IT department*". In addition, the main purpose of IS and IT in the financial service industry is to satisfy the needs of customers and help employees do the daily tasks or make decisions. Therefore, the indicator of "*Certification items*", also is of relatively little significance.

Overall, the finding indicates that the things that financial service industry attaches great importance to is IT application capability, such as the degree of IT application and the problem-solving efficiency. The next is organizational structure and culture, such as the CEO's background, the position of the IT department within the organization, and the business model. All of these might exert an influence on the assessment of IT input.

5.1.2 Indicators for IT Output

Table 5.2 shows the average applicability of each indicator and the total average (5.020) in the dimension of IT output of five cases. The finding indicates that the most applicable indicators in the financial service industry are "The contribution to cost reduction", "The contribution to business process", "innovation capability", and "the contribution to innovation." All of these indicators' score are greater than the mean. Conversely, the most inapplicable indicators are "The contribution to business strategy and revenue" and "The quality and quantity of intellectual property."

➢ *The most applicable performance indicators*

According to the result of the indicator applicability evaluation, we find that the indicators that financial service industry cares most about in the dimension of IT output are *contribution to cost reduction* and *contribution to business process*. Because the financial service industry is a customer-oriented and transaction-intensive industry, it is very important to reduce the transaction processes and improve the customer services. If IT can not contribute to the improvement of process efficiency on daily operation, delivery of goods, and customer services, or to the cost reduction

of transaction processes and customer services, IT investment will need to be re-evaluated. Thus, it is important for financial service industry to use the indicator of "The contribution to cost reduction" and "The contribution to business process."

In addition, financial service industry also emphasizes *the contribution of IT to innovation* and *the innovative capability of IT staff*. Owing to the fierce competition of the financial market, IT departments often need to make new IT proposals for helping companies attract new customers or keep their advantages. Take Company D as an example, the IT manager indicated that the securities industry needs lots of innovative ideas, such as new approaches, designs, or new IT application. Through the innovation of IT, it will not only help the companies to create new business models but also bring new value for their customers. Thus it can be seen why the contribution of IT to innovation is important.

➢ *The most inapplicable performance indicators*

According to the results of the indicator applicability evaluation, we find that the most inapplicable indicators in the dimension of IT output are "The contribution to business strategy and revenue" and "The quality and quantity of intellectual property." In fact, the two indicators still are important to the financial service industry. However, compared with other indicators, they are relatively less significant. In other words, the top priority in the financial service industry is cost reduction and process efficiency but not business strategy or the number of intellectual property.

Overall, the finding indicates that the financial service industry puts great emphasis on IT output for reducing costs, such as the contribution of IT to cost reductions in processes and customer service, and process efficiency, such as the contribution of IT to the process efficiency of daily operations, customer service, and delivery of goods. The next are supplier/customer relationships as well as knowledge management and organizational learning. The last are strategy contribution and decision quality and intellectual property.

Table 5.1 The Degree of Indicators Applicability – IT Input

IT Input			(Significance/Applicability)	
Rank	**Indicators**	**Dimensions**	**mean**	**Std.**
1	IT application level	IT Application Capability	5.400	0.490
1	CEO background	Organizational Structure and Culture	5.400	0.490
2	Problem handling	IT Application Capability	5.200	0.748
3	IT personnel expenditures	IT Human Resources	5.000	0.632
4	IT budget	IT Infrastructure	4.800	0.748
4	Business model	Organizational Structure and Culture	4.800	0.748
5	PC/NB per person	IT Infrastructure	4.800	0.980
5	IT department position	Organizational Structure and Culture	4.800	0.980
6	R&D budget	IT R&D Capability	4.600	1.855
6	The number of R&D employees	IT R&D Capability	4.600	1.855
7	Personnel turnover rate	IT Human Resources	4.400	1.625
8	The size of IT department	IT Human Resources	4.000	0.632
9	Certification items	IT Application Capability	4.000	1.673
		Mean	**4.831**	**0.813**

Source: This research

* The indicators are ranked in order according to mean and standard deviation.

** The score of "Significance/Applicability" is shown as the Likert scale, which ranges from 1 to 6.

(1 = "very low", 2 = "low", 3 = "little low", 4 = "little high", 5 = "high", and 6 = "very high")

Table 5.2 The Degree of Indicators Applicability – IT Output

IT Output			(Significance/Applicability)	
Rank	**Indictors**	**Dimensions**	**mean**	**Std.**
1	The contribution of cost reduction	Reducing Cost	5.400	0.800
1	The contribution to business process	Process Efficiency	5.400	0.800
2	The innovation capability	Innovative Products and Services	5.200	0748
2	The contribution to innovation	Innovative Products and Services	5.200	0.748
3	The contribution of supplier/customer relationship	Supplier/Customer Relationship	5.000	0.632
3	Knowledge management execution	Knowledge Management and Organizational Learning	5.000	0.632
3	The contribution to knowledge management	Knowledge Management and Organizational Learning	5.000	0.632
4	The requirements of supplier/customer relationship	Supplier/Customer Relationship	4.800	0.748
5	The contribution to business strategy and revenue	Strategy Contribution and Decision Quality	4.600	0.800
6	The quality and quantity of intellectual property	Intellectual Property	4.600	1.020
		Mean	**5.020**	**0.685**

Source: This research

* The indicators are ranked in order according to mean and standard deviation.

** The score of "Significance/Applicability" is shown as the Likert scale, which ranges from 1 to 6.

(1 = "very low", 2 = "low", 3 = "little low", 4 = "little high", 5 = "high", and 6 = "very high")

5.2 Analysis results of Performance Indicators

5.2.1   Performance indicators in the dimension of IT Input

➢ *IT Human Resource*

In the dimension of "IT Human Resource", case 1, 4, and 5 were similar and case 2 and 3 were also alike, especially the average professional tenure and age of IT department and the score of indicator applicability. The detailed indicators analysis between these five cases is described as shown in Table 5.3.

Table 5.3 Analysis in Dimension of IT Human Resource

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
IT Human Resource	◯	▲	▲	◯	◯

➢ Case 1, 4, and 5
- Similar
  - ✓ The average professional tenure of IT department: 3-5 years
  - ✓ The average age of IT department: 32-34
  - ✓ All of these three cases had a very high score on the indicator applicability.
- Different
  - ✓ In the case 1, the ratio of IT department staff to total employees was the double of the ratio of the other two cases. Owing to the goal of 3C (cost down, capital efficiency, and cross selling), which was set up for finance holding company in recent years, this company put emphasis on the integration of IT. Thus, the companies needed more sufficient IT staff.
  - ✓ The number of IT department staff in the case 4 was less than that in the case 5, but the ratio of IT department staff to total employees in the two cases was similar.

➢ Case 2 and 3
- Similar
  - ✓ The average professional tenure of IT department: 6-8 years
  - ✓ The average age of IT department: 32-34
  - ✓ The indicator of "Personnel turnover rate" was inapplicable in the two cases.
- Different
  - ✓ Case 3 is 3 times the number of IT department staff of case 2.

> *IT Infrastructure*

In the dimension of "IT Infrastructure", case 1 and 3 are more similar, especially the annual budget of IT department and the ratio of NB and PC to IT staff. The detailed analysis between these five cases is described as shown in Table 5.4.

Table 5.4 Analysis in Dimension of IT Infrastructure

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
IT Infrastructure	◯	▲	◯	◆	☆

> Case 1 and 3
  - Similar
    - ✓ The annual budget of IT department
    - ✓ The ratio of NB and PC to IT staff
    - ✓ The score of the indicator applicability.
  - Different
    - ✓ The ratio of IT budget to annual sales in the case 1 was much higher than the ratio in the case 3. Owing to the establishment of the financial holding company, the firm in the case 1 had to integrate the original systems and introduce data warehouse and business intelligence into the organization. Therefore, the company needed more budget for IT spending. Conversely, the firm in the case 3 focused on business performance. It spent a large percent of the revenue on business unit. Compare to its sales, the percentage of IT budget was much less.

> Case 2
  - The annual budget of IT department was less than the firms in case 1, 3 and 5.
  - The firm is the only one that the ratio of NB and PC to IT staff was less than 1.0. That meant some IT staffs did not need to use NB and PC in the IT department. Their mission probably was to support the business unit and solve the problems about the operation.
  - The score of the indicator applicability in the case2 was lower than that in the other cases.

> Case 4
  - The firm had least IT budget of all of cases.

> Case 5
  - The firm had the largest IT budget.
  - The firm had the highest score on the indicator applicability.

➢ *IT Application Capability*

In the dimension of "IT Application Capability", case 1 and 5 were similar and case 2 and 3 were also alike. In these five cases, there were not many IT quality certification items. The firm in the case 3 was the one which had the most items but it had the lowest score on the applicability of indicator of "Certification items." In addition, the purpose of information systems in the firms of these five cases was to support the daily operation and business requirements. The detailed indicators analysis between these five cases is described as shown in Table 5.5.

Table 5.5 Analysis in Dimension of IT Application Capability

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
IT Application Capability	☆	▲	▲	◯	☆

➢ Case 1 and 5
  ▫ Similar
    ✓ The average completion time of IT project: 1-3 months
    ✓ The time of handling problem by IT department was less than 24 hours. Because banks had to deal with the requirement of customers immediately, it was very important to ensure that the systems could work all the time. Thus, the capability of handling problems in a short time was needed.
    ✓ The information systems were similar, such as CRM & Data Warehouse.
    ✓ The two cases had the highest score on the indicator applicability.
  ▫ Different
    ✓ The ratio of jobs completed through the Intranet in the case 5 was much higher than that in the case 1. It perhaps was due to that the firm in the case 5 had a more strong IT infrastructure. Conversely, the firm in the case 1 still focused on the IT integration at present.

➢ Case 2 and 3

  ▫ Similar
    ✓ The average completion time of IT project: 5-6 months
    ✓ The time of handling problem by IT department was between 2 and 3 days.
    ✓ The score of the indicator applicability in the two cases was similar.
  ▫ Different
    ✓ The information systems in the firm of case 3 were diversified but the firm of case 2 focused on the property & liability insurance information system.

➢ Case 4
  ▫ The average time of handling problem by IT department was 10 days.

➢ *IT R&D Capability*

In the dimension of "IT R&D Capability", case 3, 4, and 5 were more similar. The detailed indicator analysis between these five cases is described as shown in Table 5.6.

Table 5.6 Analysis in Dimension of IT R&D Capability

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
IT R&D Capability	☆	▲	○	○	○

➢ Case 3, 4, and 5
  ▫ Similar
    ✓ The number of R&D employees in the three firms were much more than that in the other two cases
    ✓ The three cases had a very high score on the indicator applicability.

➢ Case 1
  ▫ There was no investment, such as R&D budget and employees, in IT R&D. It probably was due to that the top priority of IT department is to implement IT integration, and therefore the firm had no time to invest in IT R&D. However, this firm still considered that the indicators in this dimension were applicable.

➢ Case 2
  ▫ The number of R&D employees was less
  ▫ The firm had the lowest score on the indicator applicability. In other words, the firm did not think that the indicators in this dimension were applicable.

➢ *Organizational Structure & Culture*

In the dimension of "Organization Structure & Culture", case 1, 3, 4, and 5 were more similar. The firm in the case 2 had a lower score on the indicator applicability, especially the indicator of "IT department position." Overall, the top priority of IT department in the five cases was always to support the daily operation. However, when the firms attempted to integrate IT with business vision and requirements, IT department would become an important role for value creation and the execution of strategy. Take the firm in the case 2 as an example; the IT department was not only a strong supporter but also a role of creating strategic benefits, when the firm decided to develop a specific property & liability insurance information system, which could bring long-term benefits for the firm. The detailed indicators analysis between these five cases is described as shown in Table 5.7.

Table 5.7 Analysis in Dimension of Organizational Structure & Culture

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Organizational Structure & Culture	○	▲	○	○	○

- ➢ Case 1, 3, 4, and 5
  - ▫ One centralized IT department existed within the firms of these four cases and all belonged to first division.
  - ▫ The CEOs were about 40 to 60 years old and had the background of finance or marketing.
  - ▫ The main business models were B2C and B2C.
  - ▫ The firms in these cases had a very high score on the indicator applicability.

- ➢ Case 2
  - ▫ The firm had a lower score on the indicator applicability.

5.2.2 Performance indicators in the dimension of IT Output

- ➢ *Strategy Contribution & Decision Quality*

In the dimension of "Strategy Contribution & Decision Quality", case 1, 2, 4, and 5 were more similar. They considered IT made a significant contribution to strategy-making. Conversely, the firm of case 3 thought IT was of little contribution to strategy-making. The detailed indicators analysis between these five cases is described as shown in Table 5.8.

Table 5.8 Analysis in Dimension of Strategy Contribution & Decision Quality

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Strategy Contribution & Decision Quality	○	○	▲	○	○

- ➢ Case 1, 2, 4, and 5
  - ▫ Similar
    - ✓ The firms in these four cases believed IT had a significant contribution to strategy-making. It could improve the processes, create new products and services, and provide new business model. In addition, IT also could provide cost analysis and other relevant statistic information about products. Firms could have a good understanding of the current market trend and then make the best strategies and decisions. IT would not only help firms create strategic benefits but also achieve competitive differentiation.

Table 5.8 Analysis in Dimension of Strategy Contribution & Decision Quality (Cont.)

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Strategy Contribution & Decision Quality	◯	◯	▲	◯	◯

- ➢ Case 1, 2, 4, and 5
  - ❑ Different
    - ✓ The firm in the case 2 had the lowest score on the indicator applicability.

- ➢ Case 3
  - ❑ Although the firm thought IT was of little contribution to its strategy-making at present, it agreed the importance of IT on strategy. In the future, it will begin to implement IT governance, which means putting IT resources and application in the right place. The firm will use institutions and processes to organize and capitalize the IT governance and then earn the management capital. Afterward, IT governance will be integrated with firm governance and then entirely link the investment strategy and financial performance together.

- ➢ *Innovative Products & Services*

In the dimension of "Innovative Products & Services", case 1, 3, and 4 were similar, especially the number of IT innovative proposals and the score of the indicator applicability. The detailed indicators analysis between these five cases is described as shown in Table 5.9.

Table 5.9 Analysis in Dimension of Innovative Products & Services

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Innovative Products & Service	◯	▲	◯	◯	★

- ➢ Case 1, 3, and 4
  - ❑ Despite the fact that the number of IT innovative proposals in these firms was less, they put emphasis on the importance of IT innovation capability. It was due to that they considered IT innovative capability was one of the sources of IT benefit. It would bring the business unit new products, services, processes, and business model, and create new value for their customers. For example, by improving the user interface of systems and providing quick response, it could enhance customers' loyalty to the firms.
  - ❑ The firms in these cases had a very high score on the indicator applicability.

Table 5.9 Analysis in Dimension of Innovative Products & Services (Cont.)

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Innovative Products & Service	◯	▲	◯	◯	★

➢ Case 2

 ▫ The score of the indicator applicability in this case was lower than that in the other four cases.

➢ Case 5
 ▫ The firm placed great importance on the IT innovative capability. It had many IT innovative proposals and most of them related to IT infrastructure, such as the reconstruction of the core banking system. Besides, the firm also focused on IT innovative R&D, which had to cooperate with the business unit, especially the R&D of knowledge management and customer service relationship.
 ▫ The firm had the highest score on the indicator applicability.

➢ *Reducing Cost*

   In the dimension of "Reducing Cost", case 1, 2, 4, and 5 were more similar. They considered IT made a significant contribution to cost reduction. However, the firm of case 3 thought IT was of little contribution to cost reduction. The detailed indicators analysis between these five cases is described as shown in Table 5.10.

Table 5.10 Analysis in Dimension of Reducing Cost

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Reducing Cost	◯	◯	▲	◯	◯

➢ Case 1, 2, 4, and 5
 ▫ Similar
  ✓ All firms in these four cases thought IT made a significant contribution to cost reduction. By using IT to improve the original IT infrastructure and simplify the processes of operations and transactions without affecting the operational efficiency of the business unit, it could not only reduce the IT and operational cost but also enhance the productivity. Take case 5 as an example, the company reconstructed the core banking system in the past three years. Nowadays, it enables itself to be flexible with IT costs and the selection of suppliers without limiting itself to adopt specific brand's servers, software, and hardware.

Table 5.10 Analysis in Dimension of Reducing Cost (Cont.)

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Reducing Cost	○	○	▲	○	○

➢ Case 1, 2, 4, and 5
  ◻ Similar
    ✓ IT also provided cost analysis. It is very important for the property & liability industry. Firms in this industry have to understand all kinds of costs clearly, hence could know where the advantage is and make right decisions.
  ◻ Different
    ✓ The score of the indicator applicability in the case2 was lower than that in the other cases. (The firms in the case 1, 4, and 5 had the highest score on the indicator applicability.)

➢ Case 3
  ◻ The firm considered IT was of little contribution to cost reduction at present. It perhaps was due to that IT had brought a certain degree of economical scale on the cost performance. Therefore, its contribution to further cost reduction was lower. However, it still it agreed the importance of IT on cost reduction.

➢ *Process Efficiency*

   In the dimension of "Process Efficiency", all cases were similar. They thought IT made a significant contribution to process efficiency. The detailed indicators analysis between these five cases is described as shown in Table 5.11.

Table 5.11 Analysis in the Dimension of Process Efficiency

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Process Efficiency	○	○	○	○	○

➢ All firms in these five cases thought IT made a significant contribution to process efficiency. They applied IT to construct new electronic transaction platform, which made transaction processes automatic, and to simplify internal and external operational processes. It not only increased the productivity effectively but also made a good impression on the valued clients. Take case 2 as an example, the firm applied IT to reconstruct the inter-organizational processes in order to reduce the complicated manual operational processes. It not only successfully enhanced customers' satisfaction but also reduced the mistakes and delay time of documents.

Table 5.11 Analysis in the Dimension of Process Efficiency (Cont.)

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Process Efficiency	○	○	○	○	○

➢ In addition, the firm in the case 4 also mentioned that IT had to cooperate with business model in the future. It meant that IT would not only be a tool for e-product but also be applied to improve the transaction processes of new products. Through a friendly IT interface, the firm would reduce a lot of manual operational processes, improve the sales volume, and bring the market of new products.

➢ The firms in these cases gave a very high score on the indicator applicability

➢ *Supplier/Customer Relationship*

   In the dimension of "Supplier/Customer Relationship", all cases were similar. They thought IT made a significant contribution to the relationship between themselves and customers. The detailed indicators analysis between these five cases is described as shown in Table 5.12.

Table 5.12 Analysis in the Dimension of Supplier/Customer Relationship

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Supplier/Customer Relationship	○	○	○	○	○

➢ For the reason that the main business model in the financial service industry are B2B and B2C, all firms in these cases put emphasis on the relationship with customers rather than on the relationship with suppliers.

➢ All firms in these five cases considered that IT made a significant contribution to the relationship between themselves and customers, especially maintaining the loyalty of customers. In order to provide high quality service and enhance the satisfaction and loyalty of customers, they constructed the electronic transaction platform and provided a friendly user interface, convenient operational processes, and immediate and correct information to their customers. They also applied IT to improve transaction and operation processes, such as the reconstruction of inter-organizational processes.

➢ The firms in these cases gave a very high score on the indicator applicability.

> *Knowledge Management & Organizational Learning*

In the dimension of "Knowledge Management & Organizational Learning", case 1, 2, and 5 were more similar. They considered IT made a significant contribution to knowledge management. However, case 3 and 4 thought IT was of little contribution to knowledge management. The detailed indicators analysis between these five cases is described as shown in Table 5.13.

Table 5.13 Analysis in the Dimension of KM & Organizational Learning

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
KM & Organizational Learning	◯	◯	▲	▲	◯

> Case 1, 2, and 5
>> ❑ Firms in these three cases considered IT made a significant contribution to KM and organizational learning. IT could not only build the environment of knowledge sharing and improve the communication and cooperation between the departments but also provide the platform to accumulate the knowledge, such as knowledge base. Take case 5 as an example, the firm developed a financial knowledge base. It helped the firm to arrange the financial rules and best investment practice as well as provide timely recommendations and risk management suggestion to investors through the experience accumulated from fund management and customer investment services.
>> ❑ Despite the fact that the time of implementing KM was very short and the contribution of KM to firms still was limited, they agreed the importance and contribution of IT to KM and organizational learning.
>> ❑ The firm in the case 5 gave the highest score on the indicator applicability.

> Case 3 and 4
>> ❑ Although firms in the case 3 and 4 considered that IT was of little contribution to KM at present, they agreed the importance of IT on KM and organizational learning.

> *Intellectual Property*

According to the indicator applicability in the dimension of "Intellectual Property", case 1, 3, 4, and 5 were more similar. They had a very high score on the indicator applicability. Conversely, the firm in the case 2 had a low score on the indicator applicability. The indicators analysis between these five cases is described as shown in Table 5.14.

Table 5.14 Analysis in the Dimension of Intellectual Property

Dimension	Case 1	Case 2	Case 3	Case 4	Case 5
Intellectual Property	◯	▲	◯	◯	◯

> ➢ Despite the fact that firms in the most cases gave a very high score on the indicator applicability and some also had 2 to 5 patents, they still considered the quality and quantity of intellectual property are difficult to present the true value of IT. They preferred to apply IT innovative application on improving the internal and external organizational environment, such as reducing operational processes and enhancing the relationship between themselves and customers.

5.3 Managerial Implications

In the past, IT was considered as a critical success factor of obtaining the competitive advantage. It not only changed the organizational structure and business model but also enhanced the whole competitiveness. As IT is comprehensively applied, however, the companies begin to doubt of the truthfulness of this statement little by little. Because the budget of IT investment still increases continuously, the firm performance, such as productivity, does not become better. This also is the well-known phenomenon of "productivity paradox" The main reason is probably that the traditional financial statement companies use to evaluate the firm performance can not clearly explain whether IT investment can create a great benefit to the companies or the companies do not understand where the real contribution of IT investment is.

In this condition, they have to know the correct location which IT contributes to first; otherwise, managers in the firms are easy to make wrong decisions and waste time and money on unnecessary IT expenses. In order to solve this problem, a suitable IT assessment approach is needed. Therefore, this research regards the issue of IT assessment as the research question and proposes a new viewpoint to develop the IT assessment approach in order to explain the relationship between IT investment and firm performance. The contributions and implications of this research are described as follows.

> ➢ *The capital-oriented view is proposed to discuss the issue of IT assessment in this research.*

In the capital-oriented view, the true value of IT capital comes from not only tangible but also intangible IT assets, such as IT infrastructure and the capability of IT staffs. It is necessary to take the two kinds of IT assets into account when firms assess IT capital.

In this research, IT assessment is discussed from two points of view, IT input and IT output. It will help more understand the status of IT capital. In the viewpoint of IT input, we integrate three IT assessment views, including resource-, capability-, and contingency-oriented view. It not only takes the input of tangible and intangible IT assets into consideration at the same time but also pays attention to the influence of internal and external environmental variables, such as organizational structure, on the input of IT. In the viewpoint of IT output, we integrate the concept of intellectual capital and the type of information system. It helps us have a good understanding of where IT assets contribute to and know how to plan the IT budget.

➢ *The IT capital dimensions and indicators are developed upon the capital-oriented view and the applicability of indicators also is verified through case study.*

In this research, we developed research dimensions and performance indicators of IT capital based on the capital-oriented view and verified the applicability of indicators by interviewing five case companies. Based the result of indicator applicability evaluation, we find that firms in the financial service industry mainly place importance on the capability of IT application in the dimension of IT input and put emphasis on the contribution of IT capital to cost reduction, process efficiency, and innovative products and services in the dimension of IT output. Overall, IT managers in five financial service companies consider that most performance indicators are suitable to assess IT capital within the organization.

➢ *IT capital has become more and more like a kind of capital and intangible assets; hence it is difficult to find out a direct relationship between it and firm performance.*

According to the performance indicators of IT capital, we find that IT capital has become more and more like a kind of capital and intangible assets. Most indicators belong to the intangible portion of IT assets, such as the capability of "Problem handling" and "The innovation capability." Thus, the traditional financial statement and evaluation methods, which only focus on short-term benefit of tangible IT investment, have been inappropriate to be adopted to assess the value of IT capital.

A new IT assessment approach should be taken capital-oriented view into account and put emphasis on the interaction between IT and other intellectual capitals. This is due to that IT capital is difficult to exert a direct influence on firm performance by itself. It needs to continuously cooperate and interplay with users, processes, and strategies within the organization. In other words, there is an interdependent relationship existing between IT capital and other intellectual capitals, including human, process, innovation, and customer capital. Therefore, if the firms

expect that IT investment become worthy and effective on firm performance, the top priority should be to find out the right place to invest IT in upon the industrial characteristic and business vision. As IT capital has a good interact with intellectual capitals, the effect of IT capital on firm performance would be obvious to be found.

5.4 Research Limitation

There are several limitations in this research due to time and resource constraints, which are described as follows.

➢ This study is an exploratory research. In this preliminary study, we adopt the case study as our research approach. However, the number of cases is limited due to time constraints. We only selected five companies, which have come out top in the financial service industry, to ask for an interview with their IT manager.

➢ Information providers, the respondents in this research, will probably conceal some information due to trade secrets. In addition, a heavy business load could also cause information providers to decrease their inclination to answer the applicability evaluation of performance indicators and probably influence the accuracy of the research results.

➢ Due to time constraints, we have not verified the applicability of performance indicators further through a questionnaire survey or other verification approaches. Thus, the internal validity this research could improve is limited.