Chapter 4

Experimental Results

In the previous chapters, the background and significant of the research was given. It indicates that although the rates of registration for the SMEs has been on the rise, the closure rate of the SMEs has been even more evident. Then, the reviews on the relevant literatures was provided and it showed that financial accounting was one of the reasons for this SME closure. Chapter 3 then presented the development of the good financial ladder of inference and the financial system based on the knowledge management. Moreover, the explanation on the population and data gathering used in this research were also given.

This chapter then provides the results of this research. The analysis of the difficulties faced by the SME and the rationale behind the financial accounting of the SMEs are presented in Section 4.1 and support the first research objective. Section 4.2 provides the results of the proposed financial system based on the knowledge management and support the second research objective.

4.1 Investigation and analysis of the difficulties of SMEs, especially from the financial perspective.

4.1.1 Model of the investigation of the difficulties faced by SMEs, especially from the financial perspective.

The methods of Knowledge Management will be adopted as solution methodology. CommonKADS was used to identify knowledge, left hand column to design questionnaires, ladder of inference to analyze thinking patterns, balance inquiry & advocacy to support the creation of effective tools, and computing architecture to create the tool. All tools for such purposes are shown in figure 4.1.

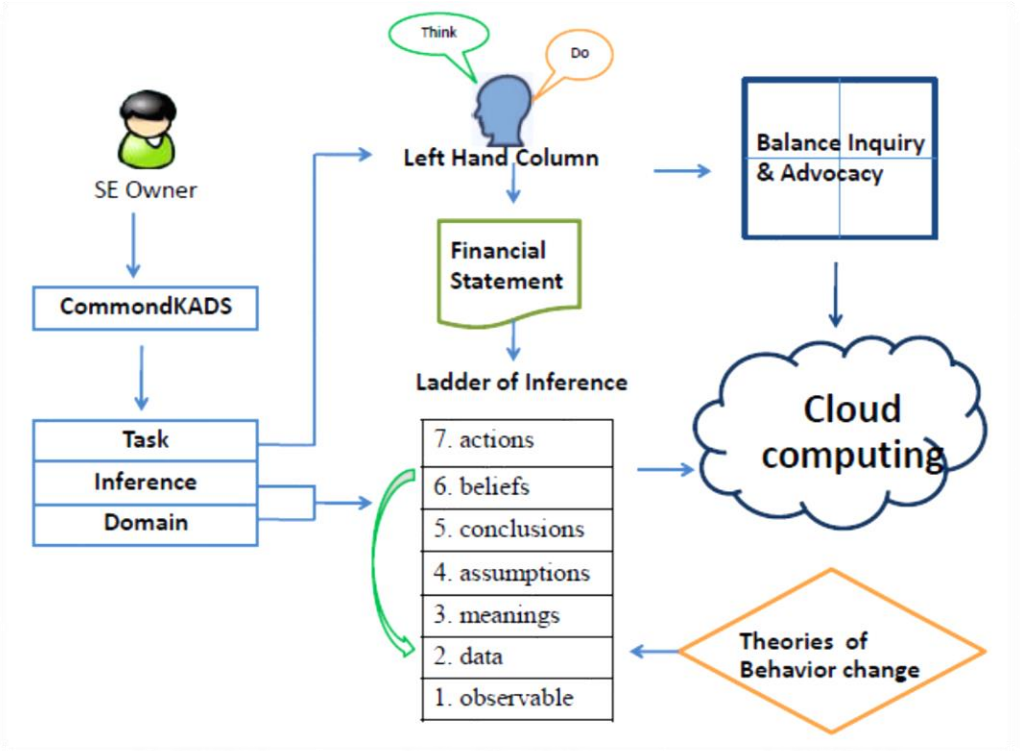

Figure 4.1 Tools for analysis and change of mental model.

According to figure 4.1, CommonKads captures knowledge in the categories of task, inference, and domain. For task, the captured knowledge involves the goals and main missions of the task. For inference and domain, the captured knowledge will be synthesized. Different tools are employed in the knowledge structure of task, inference, and domain.

The task employed left hand column as a tool to design questions about how the financial information was used in the decision process of SEs. Left hand column is regarded as an important component in the construction of interview questions to find out the implementation of a particular task and the perceived requirements in terms of financial document appropriate for SEs. The questions generated by the left hand column had the capability of finding out the underlying concepts and actual practices of SEs. In order to obtain the answers regarding financial statement suitable for SEs, questions were formulated to cover the concepts and practices that affected financial information. It was found that the concepts were not really consistent with the practices. Left hand column directly reflected the mental model of SEs. Left hand column also

provided answers in the form of desirable tools, which could then be analyzed by balance inquiry & advocacy. The results would be applied in the process of building efficient cloud computing architecture for SEs. Ideal balance inquiry & advocacy should be able to explain thinking, give examples, seek others' views, probe thinking, and encourage challenge. In this view, balance inquiry & advocacy was a significant tool that supported the creation of effective and appropriate cloud computing finance.

The 'Inference' and 'Domain' used ladder of inference to analyze data. Ladder of inference is the tool used to construct the interview questions to identify the aspects of financial information in each step that relate to mental model. Ladder of inference is also used to analyze the answers obtained from each step of the interview questions. Ladder of inference comprised of 7 steps; the 1st to 6th steps were called observable, data, meaning, assumptions, conclusions, and beliefs, which were all involved in behaviors leading to the 7th step, actions. Additionally, in the 6th step, beliefs, SEs were asked to look back to the 2nd step as repetition of actions caused familiarity and thus beliefs to continue same actions. Ladder of inference was used to create the prototype to modify mental model of SEs as it was able to explain each stage of mental model; from personal experiences, learning, dispositions, and circumstances that occurred at that time. Ladder of inference, which was the prototype of financial model, was adopted to create application software required in cloud computing architecture, which was crucially served as a tool for changing and building financial behaviors of SEs.

The tool used to analyze and alter mental model of SEs was Ladder of Inference. It was the tool that resulted in desirable model and even the improved mental model. The role of ladder of inference in creating the model was illustrated in figure 4.2

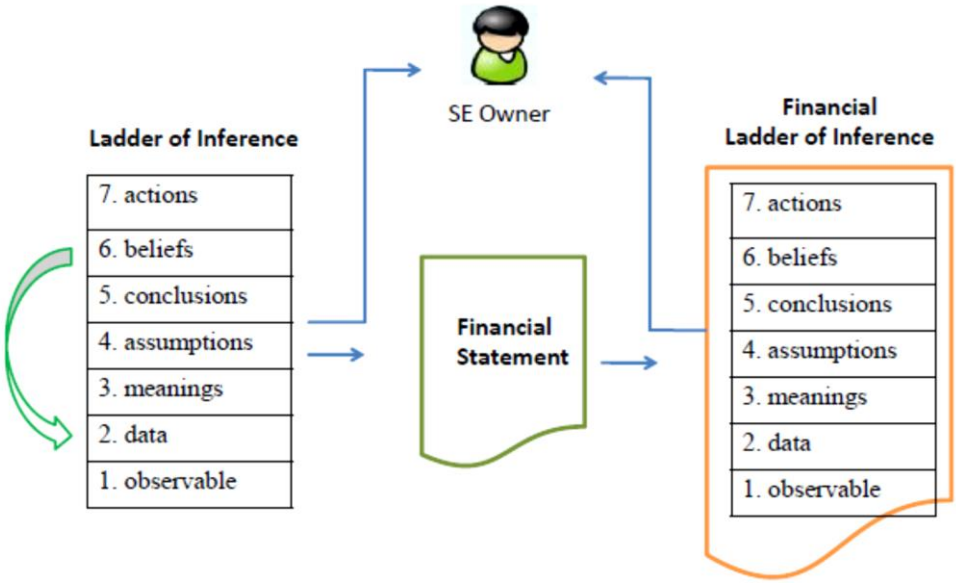

Figure 4.2 Use of the ladder of inference as a tool to create financial model

Figure 4.2 exhibited that the ladder of inference was able to explain mental model of SEs using various aspects of financial statement. According to the answers obtained from the questionnaire, the aspects of financial statement that entrepreneurs considered essential and necessary for decision analysis were the income-expenditure statements, profit and loss statement, and balance sheets.

4.1.1.1 Results of the investigation of the difficulties faced by SMEs, especially from the financial perspective.

Reviewing the background related to SMEs in Thailand, it was found that SMEs have played crucial roles in Thailand's economy in terms of the number of SMEs and employment. There were new operating SMEs nowadays and certain number of SMEs faced their closure. All this affected the economic system and became crucial problems today.

It was vital that this research began with the analysis using knowledge management on balance problems faced by many SMEs, which affected the administration of the enterprises and the accessibility to fund sources. Currently, there were various kinds of supports which provided by government sector, private sector, and financial institutions to assist the entrepreneurs with knowledge, tools, and monetary programs. So SMEs could utilize these resources for analyzing and making

decisions. This research decided to select SMEs in Thailand to be the samples and explored the processes in which financial data were used or analyzed to make decisions.

The theory of knowledge management was used as the basis of questionnaires, which mainly focused on "knowing" paradigm including Know-What, Know-Why, and Know-Who so that the answers obtained were related to the learning process of SMEs entrepreneurs.

The samples were 20 SMEs located in Bangkok and the vicinity, whose data were collected by questionnaires. The main emphasis was how these SMEs utilized financial data in their decision making process. It was found that, out of 20 samples, 4 samples that were medium enterprises actually used the financial data in their decision making process whereas16 samples; all were SEs, did not use the financial data when making decisions. It was also found that most of the owners of the enterprises were the successors in the second or third generation, acquired MBA degree with technological knowledge. Most of them were not over 40 years old. According the questionnaires results, the entrepreneurs of SEs mostly operated their works based on their experiences and familiarity.

Using the framework of knowledge management to analyze the samples, it was found that the reasons why the entrepreneurs of SEs did not use the financial data in their decision making process were actually the Mental Model of the entrepreneurs even though they were well aware that financial data were crucial components in decision making process such as daily income-expenses, profit or loss, solvency of the enterprises, and financial status of the enterprises. This research study, therefore, proposed the patterns and tools that could be used to adjust the behaviors and mental model of the entrepreneurs of SEs so that they decided to use financial data in their decision making process.

In essence, one of the major problems which found in this research was the fact that the entrepreneurs of SEs failed to use the financial data in their decision making process and that largely depended on their mental model. This problem resulted in negative behaviors that led to beliefs and familiarity in behaviors

4.1.2 Model of the analysis of the difficulties faced by SMEs, especially from the financial perspective.

Development of the good example mental model of SMEs on financial aspect by applying the ladder of inference technique.

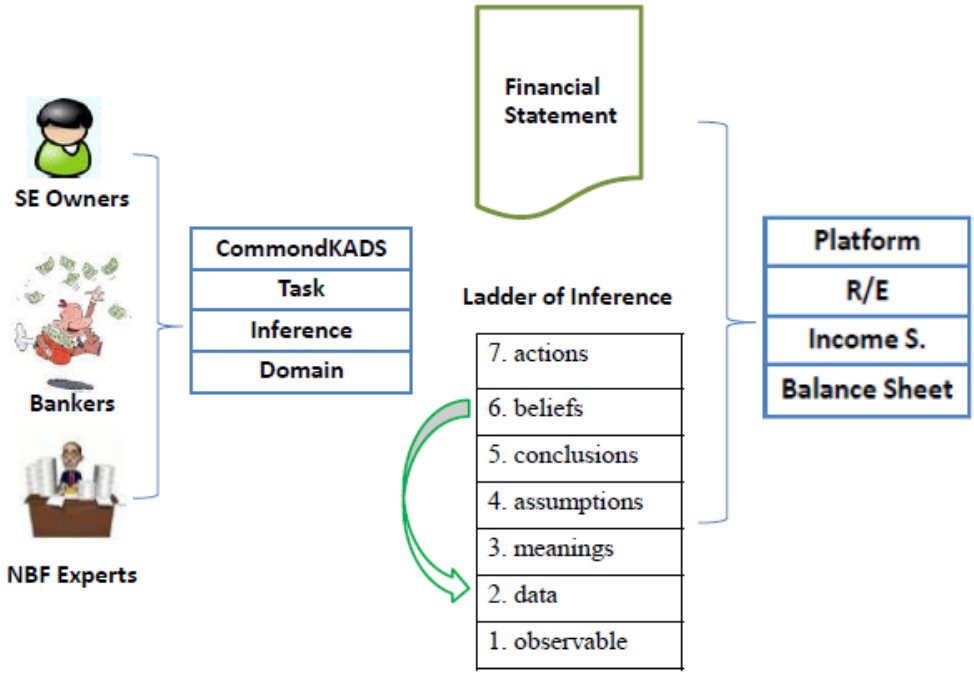

Figure 4.3 Creation of effective financial ladder of inference

Figure 4.3 shows the data collected from three groups were later analyzed and developed to be the prototype model of the effective financial ladder of inference. The three groups consist of owners, bankers, and new business fund experts.

To have an effective cloud computing architecture, the holistic view of finance must be known. This requires the links among the financial components. Consequently, all financial data must be analyzed to benefit the decision-making process. As a result, all the three aspects of financial statement is linked, i.e. revenue-expense (cash flow), income statement (profit / loss), and balance sheet so that the mental model of SEs was complete.

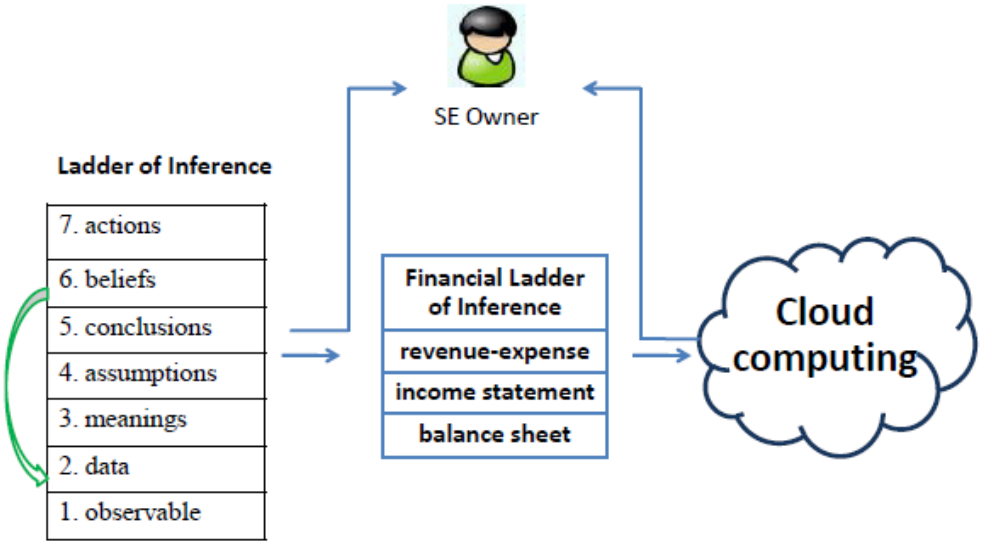

Figure 4.4 The synthesis of cloud computing architecture based on financial ladder of inferences

Figure 4.4 showed the creation of cloud computing architecture, which was based on the financial ladder of inferences. The financial ladder of inferences is analyzed through the linkage of the revenue-expense (cash flow), income statement (profit / loss), and balance sheet. From the financial analysis, it was found that all three components were crucial for SEs. If one component was absent, the decision-making process would be ineffective. Cloud computing architecture, then, had to connect all three components together to show the SEs that the financial analysis required all three components as each component tended to provide specific direction of solution. In short, cloud computing architecture expedited the decision-making process. It was obvious that once the entrepreneurs were able to access to one of the components of financial data, it was also possible that other components were available for access. With consistent and coherent financial data, the entrepreneurs of the SEs were supported to adjust their mental model in regards to the financial information. The proposed mental model of SE entrepreneurs thus positively adjusts the behavior of the SE entrepreneurs.

4.1.2.1 Results of the analysis of the difficulties faced by SMEs, especially from the financial perspective.

The finance ladder of inference be utilized and applied to analyze and explain the mental model of the SMEs on financial aspect.

The data collection of the 3 sample group.

The first group is comprised of good SEs entrepreneurs who use financial information in their decision making, together with the financial theoretical information to develop the effective financial ladder of inference.

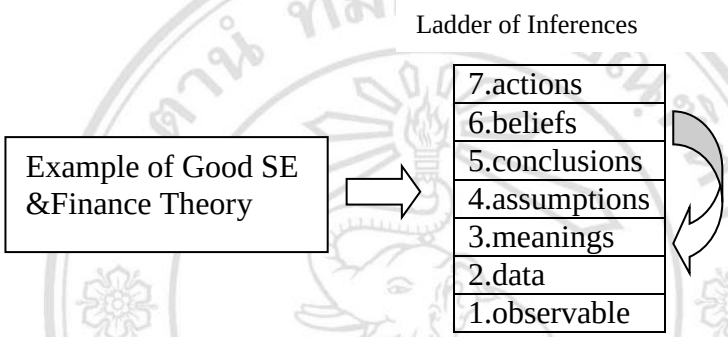

Figure 4.5 The first group for analysis

Figure 4.5 shows the data collection of the first sample group.

The data collection of the second sample group was from the credit department of the financial institutions. This is a robustness test.

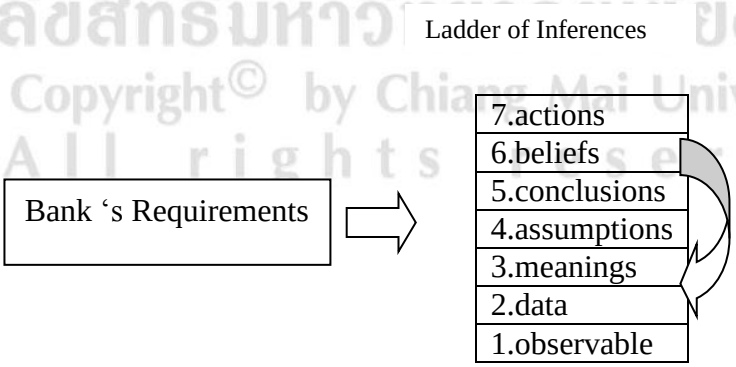

Figure 4.6 The second group for analysis.

Figure 4.6 shows the effective financial ladder of inference was then collected from the perspectives of the people from the financial institutions, credit approval and requirements from the financial institutions.

The data collection of the third sample group was from the credit department of the new business fund. This is also another robustness test.

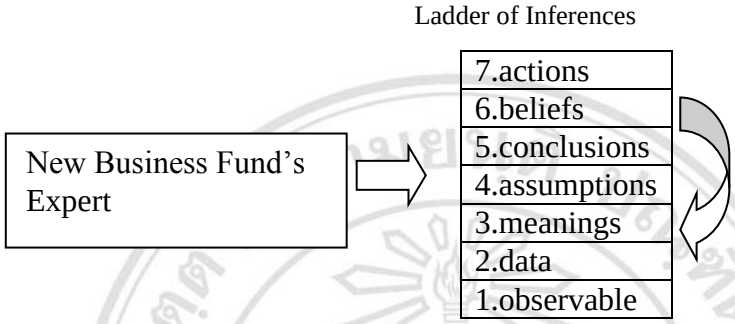

Figure 4.7 The third group for analysis.

Figure 4.7 shows the effective financial ladder of inference was then collected from the perspectives of the people from the financial institutions, credit approval and requirements from the new business fund.

The data collected from sample groups were later analyzed and developed to be the prototype model of the effective financial ladder of inference.

CommonKads captures knowledge in the categories of task, inference, and domain. For task, the captured knowledge involves the goals and main missions of the task. This research incorporates left hand column as a tool to construct the interview questions so that appropriate answers regarding financial document necessary for good SEs, banker and new business fund experts can be effectively obtained. For inference and domain, the captured knowledge will be synthesized. The tool used to analyze and alter mental model of SEs was ladder of inference.

As for inference and domain, the ladder of inference was used to analyze data. The components in the financial ladder of inferences were obtained and shown in table 4.1

Table 4.1 Financial ladder of inferences and its components

Financial Ladder of Inference	**Platform**
Observable	Financial documents
Select data	Selecting important data
Add meaning	Statistical data (number, tables, graphs, and pictures)
Make assumption	Accounting equation (add minus multiply divide)
Develop conclusion	Conclusion from the assumption
Create/Support beliefs	Beliefs derived from the conclusion
Take action	Actions derived from the beliefs

Table 4.1 showed a model of financial ladder of inferences explaining the conceptual framework of SEs owners in each stage of which the detail is as follows:

1. 'Observable' step perceived huge volumes of data which could be retrieved. The operators would specify or determine the conditions of access to the relevant financial documents so that related personnel were given a channel of access to financial information and knowledge directly.

2. 'Select data' was the step in which personnel can select or access to important financial documents. The selected data were specifically important information that had impact on the enterprises.

3. 'Add meaning' was the step that meanings of data were inputted in the form of statistical data (figures, tables, graphs, and pictures).

4. 'Make assumptions' step processed the details on the accounting equation of the selected data.

5. 'Develop conclusion' step captured and concluded the results from the assumption of the accounting equation.

6. 'Create / support beliefs' step formulated beliefs from the financial conclusions.

7. The last step was ‘Take action.’ financial actions occurred from these financial beliefs.

The financial ladder of inferences for each financial document had been considered in details, particularly for Task part including revenue-expense (cash flow), income statement (profit/loss) and balance sheet.

Table 4.2 The effective financial ladder of inference for revenue-expense documents (cash flow)

Financial Ladder of Inference	**Platform**	**Revenue-Expense (Cash Flow)**
Observable	Financial documents	Statement, Receipt-payment voucher
Select data	Selecting important data	Revenue, Expense, Account Balance
Add meaning	Statistical Data (number, tables, graphs, and pictures)	number, tables
Make assumptions	Accounting equation (add minus multiply divide)	Revenue – Expense = Account Balance
Develop conclusions	Conclusion from the Assumption	Revenue > Expense
Create/Support beliefs	Beliefs derived from the Conclusion	Able to make payment
Take action	Actions derived from the beliefs	Make payment, cheque deducted from account

Table 4.2 illustrated that revenue – expense (cash flow) could generate effective financial ladder of inference. The details of each step were explained below.

1. In ‘observable’ step, the operators monitored the revenue and expense from revenue-expense documents, statement, and daily accounts.

2. In ‘select data’ step, the operators can select or browse the lists of revenue and expense through Statement and balance. Doing this allowed them to acknowledge the transactions as well as the amount available in the accounts.

3. ‘Add meaning’ step gave meanings to the financial understandings through statistical data such as figures and tables.

4. ‘Make assumptions’ step formulated assumptions from the accounting equations: revenues - expenses = balance.

5. ‘Develop conclusion’ step made conclusions from the assumptions: revenues> expenses.

6. ‘Create / support beliefs’ step generated beliefs based on the conclusion that payments can be available.

7. ‘Take action’ was the last step. It translated beliefs into practices by allowing payments or checks processed through the accounts.

Table 4.3 The effective financial ladder of inference for income statement.

Financial Ladder of Inference	**Platform**	**Income Statement**
Observable	Financial documents	Income statement report
Select data	Selecting important data	Sales volume, Cost, Expense and profit
Add meaning	Statistical data (number, tables, graphs, and pictures)	tables, graphs, and pictures
Make assumptions	Accounting equation (add minus multiply divide)	Sales volume –(Cost+Expense) = Profit/Loss
Develop conclusions	Conclusion from the assumption	Sales volume > (Cost+Expense) = Profit
Create/Support beliefs	Beliefs derived from the conclusion	Enterprises have profits
Take action	Actions derived from the beliefs	Enterprises pay dividend, bonus and welfare.

Table 4.3 illustrated a good pattern of financial ladder of inference of income statement (profit-loss). The details of each process were as follows:

1. 'Observable' step perceived information from income statement.

2. 'Select data' step allowed users to browse information about the sales, the cost, and the expense, which constituted as details of the statement.

3. 'Add meaning' step gave the meanings of data in the form of statistical data including tables, graphs and pictures.

4. 'Make assumptions' step formulated assumptions based on the accounting equation: that was, the sales - (cost + expense) = profit / loss.

5. 'Develop conclusion' step made conclusions from the assumption: sales> (cost + expense) = profit.

6. 'Create / support beliefs' step formulated beliefs from the conclusions that the business was profitable.

7. 'Take action' was the last step. It translated beliefs into practices by paying dividends, bonus, and other remunerations.

Table 4.4 The effective financial ladder of inference for balance sheet.

Financial Ladder of Inference	**Platform**	**Balance Sheet**
Observable	Financial documents	Balance Sheet report
Select data	Selecting important data	Asset, Liability and Equity
Add meaning	Statistical data (number, tables, graphs, and pictures)	tables, graphs, and pictures
Make assumptions	Accounting equation (add minus multiply divide)	Asset = Liability + Owner's Equity
Develop conclusions	Conclusion from the assumption	Owner's Equity > Liability
Create/Support beliefs	Beliefs derived from the conclusion	Ability to pay for liability
Take action	Actions derived from the beliefs	Investment, Pay for liability

Table 4.4 illustrated a good pattern of financial ladder of inference of balance sheet. The details of each step were explained as follows:

1. ‘Observable’ step acknowledged the information from balance sheet.

2. ‘Select data’ step allowed the users to view data regarding assets, liabilities, and other information that presented the details of the statement.

3. ‘Add meaning’ step gave the meanings to the data in statistical forms such as tables, graphs, and pictures.

4. ‘Make assumptions’ step set the assumptions based on the accounting equation: assets = liabilities + capital.

5. ‘Develop conclusion’ step draw conclusions from the assumption: the enterprise invested in equity > liabilities.

6. ‘Create / support beliefs’ step created the beliefs derived from the conclusion that the enterprises had the ability to pay the liabilities.

7. ‘Take action’ step was the last step that put beliefs into practice. The beliefs were used in the decision-making process to invest and confirmed that the enterprises had the ability to pay the liabilities.

If SEs were able to adjust their financial practices based on an effective financial ladder of inference, the results related to various aspects of finance of SEs would show better performance in each of the following aspect.

1. Revenue – expenses - the enterprises had sufficient funds for payments and good cash flow.

2. The income statement – the enterprises were capable of making profits from operations and thus were able to pay dividends as well as good benefits to employees.

3. Balance sheet– the enterprises maintained good financial status with strong financial structure, and were capable of paying the liabilities (equity exceeded debt).

4.2 Exploration and proposal an alternative knowledge management-based solution for SMEs to solve the financial perspective.

4.2.1 Model of the Exploration an alternative knowledge management-based solution for SMEs to solve the financial perspective.

Theory of behavior as a method to change the behavior of SMEs from the financial perspective and to design the appropriate contents.

To modify the behaviors of individuals based on the theories of behavior change, the key elements capable of behavior adjustment in a deeper level needs to be incorporated into the cloud computing finance. The strategies to correct the key elements in each component were shown figure 4.8.

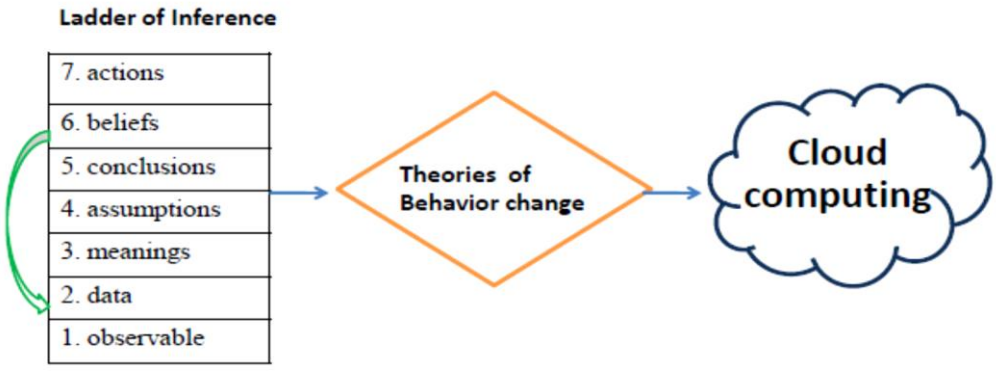

Figure 4.8 Strategies for behavior change that were used to develop cloud computing finance.

As shown in figure 4.8, all key elements had the capability to modify individuals' behaviors. The present research thus develops the mental model that resulted in the effectiveness and covered all key elements.

To achieve positive behaviors regarding the mental model, theories of behavior change was adopted to adjust the financial behaviors of the entrepreneurs of SEs. Financial ladder of inference is used to analyze and explain the reasons of the owners of SEs for using the financial information in the operation of their enterprises. Comparison is drawn with strategies for behavior change to identify the pattern of mental model adjustment, which is subsequently utilized in creating cloud computing

architecture for the entrepreneurs of SMEs. To obtain the cloud computing architecture as such, the financial statement links need to be analyzed first.

4.2.1.1 Result of the Exploration an alternative knowledge management-based solution for SMEs to solve the financial perspective.

The samples of Small Enterprises (SEs) in Bangkok and Metropolitan area involves in the interview 50 entrepreneurs who graduated with a Master degree and not over 40 years old

From the interview data, the enterprises can be classified into different categories as shown in table 4.5

Table 4.5 Categories of SEs

type	Manufacturing	Wholesale	Retail	Service	total
number	17	8	15	10	50
%	34	16	30	20	100

From Table 4.5, it was found that most entrepreneurs (34%) were categorized as manufacturing type, followed by retail (30%), and service (20%), respectively. The application of the financial software/program among 50 entrepreneurs are surveyed and given in table 4.6.

Table 4.6 The SEs that use the financial software/program for their enterprises.

type	Manufacturing	Wholesale	Retail	Service	total
number	9	4	2	2	19
%	52.94	50	13.33	40	38

From Table 4.6, SEs who utilize the financial program can be categorized by their types of businesses as follow: 9 out of 17 manufacturing businesses (52.94%), 4 out of 8 wholesalers (50%), 2 out of 15 retailers (13.33%), and 4 out of 10 service businesses (40%). In total, 19 enterprises utilized the financial software (38%). They used the program mainly to issue sales invoices. Additionally, the manufacturing business generally used the financial accounting programmes such Express, Formula

and Impress. The wholesale business used point of sale programmes . The service business also chose point of sale programmes.

Table 4.7 Types of financial information used by SEs.

type	Manufacturing	Wholesale	Retail	Service	total
revenue-expense (cash flow)	17	8	15	10	50
Income statements	10	2	0	2	14
Balance sheets	0	0	0	0	0
Financial ratio	0	0	0	0	0
Break even point	0	0	0	0	0

Table 4.7 shows the type of financial information as used by 50 SEs. All 50 enterprises check their revenue-expense in cash flow. Amongst these 50, 14 enterprises also check the income statements.

When collecting data through the interviews with the entrepreneurs of SEs regarding the application of financial information to benefit the decision making process, it was found that:

1. All enterprises considered revenues-expenses data as there were updates all the time.

2. Fourteen enterprises considered that the income statements were critical for procuring loans from financial institutions. Interestingly, manufacturing category tended to consult with this data the most as it was necessary to conclude whether the enterprises had profits or loss. The enterprises also had access to the financial program that facilitated the access to the information.

3. All enterprises did not consult with balance sheets as they were not knowledgeable about balance sheets and the data shown in balance sheets were quite complicated.

Table 4.8 shows the attitude of 50 SEs towards the importance of each kind of financial information. 50 SEs think that financial information emphasizes the revenue-expense in cash flow and income statement. 25 enterprises consider also about their balance sheets. 8 enterprises analyze their financial ratio. Only 6 enterprises consider about their break-even point.

Table 4.8 Attitudes of importance of financial information by SEs.

type	Manufacturing	Wholesale	Retail	Service	total
revenue-expense (cash flow)	17	8	15	10	50
Income statements	17	8	15	10	50
Balance sheets	12	6	5	2	25
Financial ratio	4	2	0	2	8
Break-even point	4	2	0	0	6

Table 4.7 and table 4.8 showed differences in terms of practices and attitudes of the entrepreneurs. Most entrepreneurs were aware that financial information was crucial and beneficial for making decision in their business. Yet, in practice, the enterprises were not well equipped in terms of personnel, programs, or ability to apply the data with the decision making process.

Based on the financial information of the SE owners who think that financial information is important to the enterprises, it is consistent with the data collected from the SEs who utilize financial information, in terms of such critical tasks as revenue-expense document related to cash flow, income statement and balance sheet, in their decision making and from the credit line officers from the financial institutes.

The data were collected from the interviews with 50 entrepreneurs of SEs and were analyzed and presented in the forms of data as shown below.

- Financial ladder of inference of SEs owners with actual practice.
- Strategies for behavior change that were used to develop cloud computing finance for SEs.

CommonKads captures knowledge in the categories of task, inference, and domain. The task employed left hand column as a tool to design questions about how the financial information was used in the decision process of SEs. Left hand column is regarded as an important component in the construction of interview questions to find out the implementation of a particular task and the perceived requirements in terms of financial document appropriate for SEs. The questions generated by the left hand column had the capability of finding out the underlying concepts and actual practices of SEs. In order to obtain the answers regarding Financial Statement suitable for SEs,

questions were formulated to cover the concepts and practices that affected financial information.

The ‘Inference’ and ‘Domain’ used ladder of inference to analyze data. Ladder of inference is the tool used to construct the interview questions to identify the aspects of financial information in each step that relate to Mental Model. Ladder of inference is also used to analyze the answers obtained from each step of the interview questions. Ladder of inference comprised of 7 steps; the 1st to 6th steps were called observable, data, meaning, assumptions, conclusions, and beliefs, which were all involved in behaviors leading to the 7th step, actions. Additionally, in the 6th step, beliefs, SEs were asked to look back to the 2nd step as repetition of actions caused familiarity and thus beliefs to continue same actions.

From the data collected from the interviews with 50 entrepreneurs of SEs, the analysis in the form of financial ladder of inference of SEs owners with actual practice can be presented as follows.

1. Financial ladder of inference can be used as a tool to explain the financial behaviors of SEs owners.

2. Financial ladder of inference can be used to analyze each side of the problems according to the financial documents.

From the above findings, the three categories of financial information which are revenue-expense in cash flow, income statement, and balance sheet are analyzed by the prototype of the financial ladder of inference. 50 SEs and their reviews on revenue-expense in cash flow can be separated into three groups: 30 of them do not use bank transfer, 9 of them use bank transfer and 11 of them do not check information in every step.

Therefore, the first group or 30 SEs owners who do not use bank transfer have their patterns in the financial ladder of inference for revenue-expense in cash flow as shown below:

Table 4.9 Analysis of financial ladder of inference for revenue-expense (did not keep records of money transfers)

Financial Information : Revenue-Expense (Cash Flow)	**Practice**	**Reason to and not to do when paying cash or cheque.**
Observable	Statement, book bank	Convenient channel
Select data	Account balance	Know the amount
Add meaning	Number	Convenient
Make assumption(+ - x /)	Remaining amount in the account	Experience and habit
Develop conclusion	None	Lack of knowledge
Create/Support beliefs	Are there any available amount left enough to make a payment?	Conclude for results
Take action	Make payment by cheque deducted from the account	Data evaluation and decision making

Based on the analysis, 30 SEs who do not use bank transfer normally observe the information from statement because it is a convenient channel. They check only the remaining amount because they just would like to know that. For add meaning step, they do number because of their convenience . When they make assumptions, they do not set any financial equation but rather value on remaining account figures. This is because of their experience and habit. In develop conclusion step, it seems there is no assumption because they do not have any knowledge. For create/support beliefs step, they check only if they have enough money to pay in order to pay cash or cheque deducted from the account (take action step) based on their evaluation and decision making. If the SEs apply the effective financial ladder of inference for revenue – expense (cash flow) in the data selection step by viewing the payment through bank account statement, and account balance, they are able to know more about the account transactions. They can make assumption by giving the definition of the financial equation which is revenue - expense = remaining balance. For develop conclusion step, they can capture the financial equation of revenues > expenses. Based on these findings, 90% (27 SEs) of SEs that do not use bank transfer tend to be affected because they do not conduct the add make assumptions and develop conclusion

steps, as suggested by the effective prototype of the financial ladder of inference. However, they seem to experience problems in create/support beliefs, and take action steps that they do not have enough money in the account, have insufficient fund to pay, are unable to pay debts so they seek for solutions from other source of funds. With the mental model analysis, SEs owners who do not have bank transfer for their revenue – expense (cash flow) and only follow some steps as mentioned above tend to think that knowing only account balance is acceptable as it is a common practice based on their recognition and habit. They understand that this information is sufficient, or they think that only such knowledge and understanding are enough for their practice of revenue - expense (cash flow).

The key finding is that SEs owners who do not normally use a bank transfer tend not to care about the revenue and expense in their cash flow, and they only look if they have enough balance in their account to pay debts or cheque for each time. They do not make any financial assumptions, so they will have problems in their real practice which can result in the insufficient money. So they have to seek for money to pay back their debts.

Below is the analysis on the findings of the second group. The other 9 SEs owners who use bank transfer and check revenue-expense (cash flow) have a different pattern of the financial ladder of inference from previously discussed 30 SEs owners.

Table 4.10 Analysis of financial ladder of inference for revenue-expense (kept records of money transfers)

Financial Information: Revenue-Expense (Cash Flow)	**Practice**	**Reason to and not to do when having revenue and expense**
Observable	Statement, book bank	Convenient channel
Select data	Revenue, expense, account balance	Know the money in-out from the account
Add meaning	Number	Convenient
Make assumption(+ - x /)	Remaining amount in the account	Experience or habit
Develop conclusion	None	Lack of knowledge
Create/Support beliefs	Are there any available amount left enough to make a payment?	Conclude for results
Take action	Make payment by cheque deducted from the account	Data evaluation and decision making

From the analysis, it is found that entrepreneurs will observe financial information by checking the statement. In the select data step, they look at revenue-expense transferred through the account as well as the remaining balance to know the money in and out from the account. From the analysis, it is found that entrepreneurs will observe financial information by checking the statement. In the select data step, they look at revenue-expense with transferred through the account as well as the remaining balance to know the money in and out from the account. For add meaning step, they do number because of their convenience. When they make assumptions, they do not set any financial equation but rather value on remaining account figures because of their experience and habit. In develop conclusion step, it seems there is no assumption because they do not have knowledge. For create/support beliefs step, they check only if they have enough money to pay in order to pay cash or cheque deducted from the account (take action step) based on their evaluation and decision making.

In addition, it is also found that all 9 companies having transfer transactions without any financial equation and making any assumptions. 77.78% (7 SEs) of the affected enterprises does not make any assumptions according to the effective prototype of the financial ladder of inference. As a result, they experience problems in developing their conclusion, creating/supporting their beliefs and taking actions. They conclude that they do not have enough money in the account, have insufficient fund to pay, are unable to pay debts so they seek for solutions from other source of funds. If the SEs apply the effective financial ladder of inference for the steps that they do not follow, by making assumptions from the equation of revenue - expense = remaining balance, and develop conclusion that revenues need to be higher than expenses resulting positively to the business. They can check the figures from the financial equation since the beginning and can be ensured that their enterprises have enough account balance to make payments. Therefore, if the SEs follow the effective prototype of the financial ladder of inference, the enterprises will have a positive result, but if they do not follow every step, the enterprises may face the difficulties and problems.

With the mental model analysis, SE owners who use bank transfer for their revenue – expense (cash flow) and only follow some steps as mentioned above (only add meaning and make assumptions steps of the effective prototype) tend to think that knowing only account balance is acceptable without any need to think about financial

equation or financial assumption. As it is a common practice based on their recognition and habit. They do not give any value to other parts of the process because they think that they do not have knowledge that is enough for their practice of revenue - expense (cash flow). Therefore, if the enterprises apply the effective prototype of the financial ladder of inference for revenue-expense (cash flow) side, their problems in the revenue/expense operation which affect the liquidity can be solved, and they can gain a loan support from financial institutions.

The key finding is that SEs owners who do use a bank transfer tend to check each individual client transfer, account balance and check if the money is enough to pay debts or cheque for each time, but they do not make any financial assumptions, so they will have problems in their real practice which can result in insufficient money to pay, so they have to seek for money from external sources to pay back their debts. The difference between those who use and do not use bank transfer is that those who use the transfer know their figures, frequencies and amounts paid in and out the account, and have regular statement checking which can support their loan request from the financial institutions.

Moreover, from the data collection according to the financial ladder of inference in terms of revenue-expense (cash flow), 11 SEs do not check information in every step. The key finding is that SE owners mostly from micro enterprises do not take any consideration on revenue and expense in their cash flow. Micro enterprises generally buy and sell in cash, so depositing into account is complicated. They then do not know the exact revenue and expense, resulting in low business liquidity, not knowing the exact information, and lack of information supporting the loan request. These three cases occur with financial documents in revenue-expense in cash flow. Not checking and creating revenue and expense information can create the most negative effect to the business.

Based on the 50 SEs' findings, only 14 of them check financial information from their income statements (profit and loss) because these 14 enterprises have direct contact with the bank for a loan. These 14 SEs owners check financial information in the patterns as shown in the following financial ladder of inference.

Table 4.11 Analysis of financial ladder of inference for income statement

Financial information: Income statement	**Practice**	**Reasons to do and not to do**
Observable	Income Statement	Convenient channel
Select data	Profit, Loss	Would like to know the results
Add meaning	Number	Convenient
Make assumption(+ - x /)	The importance of profit and loss	Experience
Develop conclusion	None	Lack of knowledge
Create/Support beliefs	Have profit/loss	Conclude for results
Take action	Pay dividend and welfare	Data evaluation and decision making

It can be summarized from this analysis based on the financial ladder of inference as follow: SEs owners choose to read information from their income statements owing to the convenience. They select profit or loss data to know the business result. However, because of their experience, they do not apply any financial equation but consider mainly about the profit or loss. They do not also make any conclusion because they do not have sufficient knowledge. As a result, they create/support their beliefs whether the business has profit or loss. Accordingly, they take action by paying the dividends or welfare to employees from their data evaluation and decision making. SE owners do not check details and information of income statement at the 'select data' step, as they only see whether the business has profit or loss regardless of sales volumes, expenses and costs which are considered as important factors affecting the loss of the business, and they do not follow up for the results and data analysis.

Based on the findings related to income statement, 85.71% (12 SEs) of the enterprises are affected from not following the select data step (not checking sales volumes, expenses and cost), the make assumptions steps according to the effective prototype of the financial ladder of inference. If these steps are practiced, i.e. using the financial equation as sales volumes - (cost + expense) = profit/loss, and making an assumption that if sales volumes > (cost + expense) = profit, this will create a positive

result for the company and their problems can be solved from these figures based on financial equation. Also, they can be certain that they have profit and able to pay for dividend and good welfare for their employees. Therefore, if the SEs owners follow this good prototype, positive results can benefit the company, but if they do not follow all steps, the enterprises can be negatively affected.

Based on the mental model analysis, SEs owners check their income statements only in the above mentioned steps just to know if the business has a profit or loss. This is because they think that it is sufficient to know only that the business is profitable and not loss, without considering any financial equation or making any financial assumptions. These practices are based on their recognition and habit regardless of any other significant parts of the process, because they think they do not know and do not give any value to other information that could affect the business performance and think that what is being practiced is sufficient for their action towards such financial information as income statement.

The key finding is that SEs owners take their operating results into consideration whether they gain profit or loss, but they do not give any financial meanings and make financial assumptions, so they have the problems with their operating results or loss and they cannot pay dividends or employee welfare.

Moreover, from the data collection according to the financial ladder of inference in terms of income statement, 36 SEs do not check information in every step. 88.89% of them are affected from not checking income statement. Some enterprises experience such problems as lower sales volumes, higher costs and higher expenses. Some business even experiences a loss. If the enterprises apply the effective prototype of the financial ladder of inference by using financial information from the income statement to their decision making and improvement for their sales volumes, costs and expenses continuously, this may create a profitable result for the operations. The income statement report can be used to support for their loan request to financial institutions.

From the above analysis, SEs owners think that checking financial information from their income statements is complicated, a waste of time and require a lot of knowledge to understand the data despite the fact that income statement review in details will help them receiving the correct information and help them to solve their

business problems. With the mental model analysis, SEs owners think that they do not have knowledge and understanding, the information is too difficult, or sometimes they know it is useful but do not have time to look in details. From these reasons, SEs owners choose to practice because they do not want to know or they think it is too difficult. This is all because of their mental model of choosing to understand and accept for some certain things only

The key finding is that SEs owners who do not check their income statement will not know the business operating results in terms of sales, costs and expenses, and will not know whether the business has profit or loss, especially for micro business owners, which normally do not look at their income statement because they lack of knowledge to do. The difference between SEs owners who check their income statement and those that do not check is that checking income statement helps them to know how to solve the problems and know exactly the real figures of the business. Moreover, income statement is required for the loan request from financial institutions.

The results of 50 SEs owners who do not check financial information on balance sheet collected according to the financial ladder of inference are listed below:

Table 4.12 Analysis of financial ladder of inference for balance sheet

Financial Information : Balance Sheet	**Practice**	**Reason to do and not to do**
Observable	None	Lack of knowledge
Select data	None	Lack of knowledge
Add meaning (+ - x /)	None	Lack of knowledge
Make assumption	None	Lack of Knowledge
Develop conclusion	None	Lack of knowledge
Create/Support beliefs	None	Lack of knowledge
Take action	None	No data evaluation

From all steps of the financial ladder of inference, all 50 SEs owners do not consider checking financial information from the balance sheet document. However, once the SEs owners adapt themselves to the effective financial ladder of inference by following the steps. During an observable step, balance sheet report is considered to be

an appropriate, easy and convenient channel to observe. In select data step, they are able to check asset, liability and owner's equity details. In make assumptions step, they can give assumptions by using such financial equation as asset = liability + owner's equity. In develop conclusion step, they can seek for critical points from the financial equation which is owner's equity > liability. In the create/support beliefs step, they conclude that they are able to pay debts. Finally, in the take action step, they can apply their beliefs into practice by asking for loan from financial institutions and able to pay debts, or use information on balance sheet for their decision making and improving their investment. 60% of SEs owners that do not check information from the balance sheet experience problems in their financial liquidity and investment. Balance sheet indicates basic infrastructure and the financial stability of the enterprises. Therefore, balance sheet is necessary for a loan request. SEs owners should also consider about their ability to pay debts that they need to create sufficient revenue. If they are able to adjust the ratio, debt:equity 1:1, then they will be able to ask for a credit line from the financial institution. Therefore, the implementation of the effective prototype of the financial ladder of inference in terms of balance sheet document will help improving the financial status of the enterprises, and ease the credit loan request process with the financial institutions. Based on the mental model analysis, SEs owners do not follow all steps of the financial ladder of inference for balance sheet, because they do not give any value and consideration about it, and think that it is too difficult, and they do not have knowledge or know how to utilize it. As a result, they think that it is not necessary for the business to check for such information. This directly affects to the financial status of the enterprises.

The key finding is that SEs owners do not check their balance sheet. Some only know their balance sheet from the accounting firm but not using it for their decision making. Some just have it for their loan request. Balance sheet information will influence the decision in investment, business liquidity and ability to pay debt. Most entrepreneurs do not know the importance of balance sheet. In addition, balance sheet also indicates the financial fundamental structure and prosperity of the business.

The research findings and analysis for the SEs owners that analyze the three financial documents, revenue-expense (cash flow), income statement and balance sheet from their existing ineffective financial ladder of inference can be summarized as

follow. For revenue-expense (cash flow), there are two groups. The first group is 14 SEs owners who contact with financial institutions for loan. They consider following some steps of the financial ladder of inference but not giving any importance for the make assumption step. The second group of 36 SEs owners does not have any analysis on any step of the income statement and balance sheet. All 50 SEs owners do not follow any steps to analyze financial information from the balance sheet. It is found that the enterprises follow some steps but not making any assumptions based on the information told by the financial institutions' officers that the enterprises require having at least 1 year account transactions when requesting for a loan, and the enterprises require having profit and need to have balance sheet along with the loan request. Since they do not go into details in this make assumption step, they are unable to request for the loan. Accordingly, the mental model is that they receive information from their experience, learning and listening from the financial institutions' officers or credit professionals, and transfer all happening stories into such practices that they are used to do.

From the data collection and comparative analysis of the effective financial ladder of inference of each aspect and the financial ladder of inference being used now by SEs, there are certain differences and the details are shown in table 4.13.

Table 4.13 Analysis of financial statement prospects of SEs according to ladder of inference

Observable	Mental model	Select data	Add meaning	Make assumption (+ - x /)	Develop conclusion	Create/ Support beliefs	Take action
revenue-expense	Good	Balance of income-expense	Figures, Tables	Income-expense= balance	Income > Expense	Money available in accounts	Payable
	Not good	Balance	Figures	Not taken	Not taken	Money available in accounts?	Payable?
Income Statement	Good	Sales, costs, expenses, profit/loss	Tables, graphs, illustra-tion	sales-(capital+expense) =profit/loss	Sales > (capital+expense) =profit	profitable	Pay welfare and dividends
	Not good	Profit/loss	Figures	Not taken	Not taken	Profit or loss?	Payable?
Balance Sheet	Good	assets, debts, capital	Tables, graphs, illustra-tion	assets= debt + equity	equity > debt	Capability to invest or loss?	Capability to invest or pay debts
	Not good	Not taken	Not taken	Not taken	Not taken	Not taken	Not taken

According to table 4.13, it is found that the SEs choose to practice in certain fields of financial information of the Ladder of Inference. When classifying the practices according to the types of document, the details are as follows:

a) Revenue-expense. SEs did not complete ‘make assumption’ and ‘develop conclusion’ steps. In certain steps that are practiced, all the necessary details were not thoroughly considered. The SEs then could not benefit from these steps with a maximum result as they did in ‘select data’ and ‘add meaning’ steps.

b) Income Statement. SEs did not complete ‘make assumption’ and ‘develop conclusion’ steps. In certain steps that are practiced, all the

necessary details were not thoroughly considered. This problematic issue was found similar to the finding in revenue-expense category.

c) Balance sheet. No steps were taken.

To adjust the mental model of SEs in regards to the financial information, the entrepreneurs of SMEs should be reminded and encouraged to complete the steps being ignored.

Ineffective financial ladder of inference that is being adopted and practiced by SMEs could impact negatively on the operation as there are certain problems that are required to be solved urgently at all times. The design of effective financial ladder of inference can help adjusting the mental model of SMEs and provides them an access to financial data more easily. It also enhances the decision-making process and prevents problems that SMEs are now experiencing.

3. The analysis on the financial ladder of inference model in different business types can identify the difference in each type of business with each type of financial documents as followings:

The result conclusion was classified by different business types of 50 sampled SEs whose owners make decisions based on three types of financial information including revenue-expense in cash flow, profit and loss statement and balance sheet. First of all, findings based on financial information in terms of revenue-expense are described below.

Table 4.14 Checking of financial information from the revenue-expense statements

type	Manufacturing	Wholesale	Retail	Service	total
do not have transfer	10	6	6	8	30
%	33.33	20	20	26.67	100
use bank transfer	7	2	-	-	9
%	77.78	22.22	-	-	100
do not check information	-	-	9	2	11
%	-	-	81.82	18.18	100
total	17	8	15	10	50

Based on the analysis, of 50 samples SEs, 30 enterprises look at their revenue-expense in cash flow documents for their activities which do not have account transfer. If these enterprises are classified by business types, 33.33% is reported to be manufacturing business, 26.67% is service business, 20% is retailing business, and 20% is wholesaling business. From 9 SEs that transfer money through their accounts, 77.78% is reported to be manufacturing business and 22.22% is retailing business. From 11 SEs that do not check their revenue-expense in cash flow, if these enterprises are classified by business types, 81.82% is reported to be retailing business and 18.18% is service business. Interestingly, all 11 enterprises are micro business having less than 5 employees. Since the sample enterprises which are retailers do not have many employees, the owners tend to play an important role in every part of the business from sourcing, selling and finance. In terms of collecting money, mostly it is done in cash and the businesses tend to have cash in and out at all times so they do not consider much about depositing money in the bank as they tend to think that depositing money is a waste of time. The important issue from not checking revenue-expense or not using revenue-expense in decision making is that it may affect business illiquidity owing to not knowing in details of their real revenue and expenses, and using business money for personal purposes. Most micro businesses tend to behave this way, as a result, spending money for a wrong purpose, e.g. for personal use instead, and then when the revenue is

not enough to pay the expense, they tend to request for loan and use their personal money; consequently, their businesses are lack of liquidity.

The results of enterprises whose owners check financial information from their income statement can be described as follows.

Table 4.15 Checking of financial information from the income statement

type	Manufacturing	Wholesale	Retail	Service	total
check information	10	2	-	2	14
%	71.43	14.28	-	14.28	100
do not check information	7	6	15	8	36
%	19.44	16.67	41.67	22.22	100
total	17	8	15	10	50

Based on the analysis, out of 50 SEs samples, 14 enterprises check their income statements. If these enterprises are classified by business types, 71.43% is reported to be manufacturing business, 14.28% is wholesaling business and 14.28% is service business. Most enterprises whose owners check the income statement tend to be manufacturing business. Owners of manufacturing enterprises also check their revenue-expense via account transfer and 89.47% of these enterprises use financial software. From 36 SEs that do not check their profit and loss statement, 41.67% is reported to be retailing business, 22.22% is service business, 19.44% is manufacturing business and 16.67% is wholesaling business. The important issue from not checking income statement or not using income statement in decision making is that it may affect businesses to experience financial losses. The owners of some enterprises especially micro businesses with less than 5 employees are unlikely to know whether their businesses gain profits or losses; consequently, their businesses have accumulated losses and have to close down. The results of enterprises whose owners check financial information from their balance sheet can be described as follows.

Table 4.16 Checking of financial information from the balance sheet

type	Manufacturing	Wholesale	Retail	Service	total
do not check information	17	8	15	10	50
%	34	16	30	20	100

Based on the analysis, all 50 SEs do not check their balance sheet and do not use their balance sheet in their decision making. Balance sheet is a tool to help entrepreneurs to monitor basic financial structure and stability of the companies. If the structure is not strong or stable enough, the business may fail and experience financial problems (Williams and others, 2001) such as illiquidity, insufficient working capital and no ability to pay debts, etc.

From the problems and effects caused by the behaviors of SEs entrepreneurs that do not use financial information in their decision making, many enterprises, consequently, have close down every year (OSMEP,2010). By the use of financial ladder of inference model, it can help solving these problems as entrepreneurs are able to easily and directly apply financial information in their decision making. This would help maintain the businesses. In addition, the prototype of the Financial Ladder of Inference in three issues would effectively assist entrepreneurs in their decision making and can serve well to all types of businesses. According to the financial ladder of inference, the mental model of SEs' entrepreneurs is not only important for decision making based on recognition, but also creating affects to the actions (William and Brandt, 2013)

From the research findings and analysis, the comparison between effective and ineffective (existing) financial ladder of inference will use cloud computing architecture as an instrument in the next step of the research.

4. The solutions for SMEs' financial problems offered from various sectors including government, private and financial institutions are external solutions only and cannot truly solve the problems.

The existing types of support from government sector, private sector and financial institutions for SE are listed as below.

Table 4.17 The list of from government sector, private sector and financial institutions for SE

Types of Support	Sector	Objective
Credit line	Financial institutions and government	Liquidity
Policy	Government	Facilitate/ provide convenience
ICT	Government and private	Create tools
Training	Government and private	Give knowledge

a) The support from financial institutions and government in terms of credit line in order to create better liquidity is to some extent helpful but not to the right solution. Therefore, those enterprises that ask for loan to solve their liquidity still have not enough cash flow and some has to close down. Therefore, the effective prototype of the financial ladder of inference shall be applied such as in terms of revenue-expense (cash flow), not just by making assumption that the credit request is just one of the available solutions, but they need to realize that they have higher revenue than expense first then they are able to survive and self-sustainable. Likewise, making assumption in terms of profit and loss, SEs needs to know that their sales volumes are higher than costs + expenses, i.e. their business can continue without any loss. In terms of balance sheet, not all steps in the effective prototype of the Financial Ladder of Inference are practiced; as a result, SEs owners do not know their financial structure and investment which may lead to bad investment or spending money without creating any income. These supports are only a mechanism to help SE owners to have a better financial decision making behaviors.

b) From the help in policy for SEs by government sector with the aim to facilitate SEs, the examples of the policies are tax rate for SMEs, reduction of the social security fund rate, tax reduction by the training expense, etc. These supports are only at a policy level, which may be beneficial to some certain level, but not yet solve the right cause of the problems. These supports may help reducing the expenses of the SEs

owners. Nevertheless, if they are able to make assumptions from the income statement, it will be the right solution.

c) From the help in ICT and Software led by the collaboration between government and private sectors, it aims to create a tool for financial and accounting purposes, but the tool could not yet be used in real practice. Some enterprises receive the tool and never use it, because the tool is not suitable for SEs. However, if these ICT and Software system are created based on the effective prototype of the Financial Ladder of Inference, it will help adapting behaviors of SEs owners for their real use and practice.

d) From the help in training with the collaboration between government and private sectors, it only aims to give knowledge to entrepreneurs. For instance, the project for new entrepreneur development gives out theoretical knowledge within a limited of time but SEs owners are not able to apply such knowledge in real practice.

The current assistances and supports in solving SEs' financial problems are good but not helping to completely solve all problems as these are short-term, not to the point and unable to answer the questions of SEs' financial problems. It is important to point out that once the prototype of financial ladder of inference was used to analyze the financial information, SEs still lack of the 4th step, make assumption, both in revenue-expense; therefore, assistances and supports must be able to answer the questions, and emphasize on the balance sheet, income statement and cash flow, and correctly solve the problems in the step of make assumption. Based on the research's findings and analysis, SEs will use financial information to analyze and make decision depending on each individual mental model. The mental model adjustment shall start from adapting inner thought, learning to accept truth to check for facts, accept the truth and finally utilize it (Senge, 1990).

4.2.2 Model of the proposal an alternative knowledge management-based solution for SMEs to solve the financial perspective.

Development of the knowledge management based financial system as a tool to assist the SMEs under cloud computing context.

The data from the interview is analyzed by the balance inquiry and advocacy, and then is used in constructing the knowledge management system (KMS), which is suitable for the entrepreneurs of small business. The balance inquiry and advocacy is applied via application software that contains the following features:

1) It explains thinking in form of table, graph, chart, and information.
2) It gives examples that explain what are good and bad, and how to do good things.
3) It seeks the other viewpoints. Knowledge and interesting subjects are provided in the knowledge base.
4) It probes thinking from the received data from which the users can make use of and thus improve their activities.
5) It encourages challenges by using notification agent, color warning, sound and picture. The KMS based on the answers from the questionnaires are used for constructing the application software with the following features.
6) It must be simple and provides problem aspects, solutions, and explanations.
7) It must be convenient and applicable to any device, e.g. PC, notebooks, tablets, and mobiles.
8) Cloud computing stores data and KMS process it.
9) It must be useful and correct in decision analysis.
10) It must support investment, e.g. loan making from banks, seeking new shareholders, etc.
11) The requirements are summarized.

The requirements are composed of two parts. In the first part, it is the requirement of the financial data for analysis of business decision. The second part is the requirement of the financial data in view of financial institutions. The last part is the requirement of other functions in the application software, e.g. webboard, chat, PR

news, knowledge base, and links to financial units. The constructed KMS is the cloud computing finance and it is an application software which is applicable to PC, notebooks, tablets, and mobiles. The application software can present data in form of notification agent, digital, information, graph, chart, note, color warning, sound and picture. KMS provides the financial models of incomes, expenses, costs, profit and loss account, financial status account, and cash flow account, as well as financial analysis. The constructed KMS is the cloud computing finance and it is an application software which is applicable to PC, notebooks, tablets, and mobiles. The application software can present data in form of notification agent, digital, information, graph, chart, note, color warning, sound and picture. KMS provides the financial models of incomes, expenses, costs, profit and loss account, financial status account, and cash flow account, as well as financial analysis.

From the analysis and presentation of the relationship between perceptions of financial information and the development of the mental model, it was found that the entrepreneurs of the SEs tended to consult with financial information on a particular component when that component showed difficulties or problems that needed to be solved. To draw the entrepreneurs' attention on financial information, stimulation was, therefore, critical so that the actual practices were improved.

To solve the afore-mentioned problem, a concept of cloud computing finance is proposed. The synthesis of the cloud computing finance depended largely on the mental model that was derived from the financial information of three components including revenue-expense (cash flow), income statement (profit / loss), and balance sheet. The cloud computing finance can solve the problem because of the following reasons:

1. The access to cloud computing architecture employed information notification and data update distributed through different channels such as inbox, message and email so that the users were reminded through repetitions in various channels.

2. The length of time in notifications depended on financial information of that particular document. It was necessary that the information was acquired or used in compatible with the required period of time that financial data were analyzed to benefit decision-making process. The revenue-expense documents received notifications once

there were changes in the documents. The income statements and balance sheets received notifications on a monthly basis when the monthly balance was concluded.

3. Certain symbols were used to represent the financial performance to attract the users' attentions and to acknowledge the current circumstances. They users would notice the symbols before accessing to the detailed information on cloud computing architecture. Each notification presented a symbol showing the nature of that particular financial component. Each type of financial document was presented with fixed symbols that would be used in every notification as well as the title of that document to remind the users of the financial performance of that financial information. The details were as follows.

a) Revenue-expense. The setting of symbol depended on the nature of the enterprise and the appropriateness of available balance in the account, which should be related to the actual details of revenues and expenses occurred during that period. For example, a small retail shop can be set up and use the following symbols.
   - The enterprise had balance over 100,000 baht = very good.
   - The enterprise had balance of 10,000 -10,000 baht = fair.
   - The enterprise had balance of less than 10,000 baht = poor.

b) Income statement. The setup of symbols depended on the nature of that enterprise and the profit or loss of the enterprise.
   The enterprise had profit of over 1,000,000 THB = very good.
   The enterprise had profit of less than 1,000,000 baht = fair.
   The enterprise had loss = poor.
   - Balance sheet. The setup of symbols depended on the nature of that enterprise and that proportion of investment in equities in comparison with the liabilities.
   - The proportion of equities compared to the liabilities of 2: 1 = very good.
   - The proportion of equities compared to the liabilities of 1: 1 = fair.
   - The proportion of equities compared to the liabilities of 1: 2 = poor.

4. Financial information was presented with different forms of statistical data to facilitate the use of that financial information and making-decision process.

a) Revenues and expenses were presented in the form of tables and the figures, which were indicated by colors; figures in red for negative and blue for positive outcomes.
b) Income statements were reported in the form of tables, graphs, and pictures that illustrated the ratio of performance in each section; sales, costs, and expenses, and profit / loss.
c) Balance sheets were reported in the form of tables, graphs, and pictures that illustrated the ratio of the operating results of each segment; the revolving assets, fixed assets, liabilities, and equity.

The configuration of the cloud computing Architecture can thus meet the demands of the entrepreneurs of SEs in a way that financial information was used in the decision-making process.

4.2.2.1 Result of the proposal an alternative knowledge management-based solution for SMEs to solve the financial perspective.

Theory of behavior as a method to change the behavior of SMEs from the financial perspective and to design the appropriate contents.

The development of cloud computing finance for SEs wants to adjust mental model of the entrepreneurs in regards to the financial information. Consequently, the strategies for the behavior change needs to be determined.

To achieve positive behaviors regarding the mental model, theories of behavior change was adopted to adjust the financial behaviors of the entrepreneurs of SEs. Financial ladder of inference is used to analyze and explain the reasons of the owners of SEs for using the financial information in the operation of their enterprises. Comparison is drawn with strategies for behavior change to identify the pattern of mental model adjustment, which is subsequently utilized in creating cloud computing architecture for the entrepreneurs of SMEs. To obtain the cloud computing architecture as such, the financial statement links need to be analyzed first.

The data are collected from the interviews with the entrepreneurs to find out their reasons for taking financial information in the decision-making process. The reasons for implementing or not implementing the requirement in terms of revenue - expenses of the entrepreneurs of SEs, in each step of the ladder of inference are first

investigated. These reasons were then used to analyze each key element in tandem with the consideration of strategies for behavior change. According to the processes, the key elements based on the theories of behavior change are determined first. Table 4.18 shows such a description. The cloud computing architecture for each type of document namely; revenues-expenses, income statement, and balance sheet, can be determined through the following procedures:

1. Creation of effective financial model using ladder of inference.
2. Synthesis the cloud computing architecture using the model for behavior changes.

Table 4.18 Comparison between the ladder of inference and key elements based on theories of behavior change regarding the revenue-expenses

Ladder of Inference Revenues-Expenses (Cash Flow)	**Reasons for doing or not doing when making decision**	**Key Element**	**Strategies for Behavior Change**
Observable	Convenient channel	Subjective norms	Understand with whom individuals are likely to comply.
Select data	Need to know the balance	Barriers	Be aware of physical or cultural barriers that might exist, attempt to remove barriers.
Add meaning	Convenient	Threat	Raise awareness that the threat exists, focusing on severity and susceptibility.
Make assumption	Experience or familiarity	Threat	Raise awareness that the threat exists, focusing on severity and susceptibility.
Develop conclusion	Find conclusion	Benefits	Communicate the benefits of performing the recommended response.
Create/Support beliefs	Conclude	Attitudes	Measure existing attitudes before attempting to change them.

Table 4.18 Comparison between the ladder of inference and key elements based on theories of behavior change regarding the revenue-expenses (Continued)

Ladder of Inference Revenues-Expenses (Cash Flow)	**Reasons for doing or not doing when making decision**	**Key Element**	**Strategies for Behavior Change**
Take action	Data assessment and making decisions	Cues to action	Provide communication that might trigger individuals to make decisions.

Table 4.18 presented the linkage of reasons of decisions made in each step of ladder of inference with key element. The results were concluded based on strategies for behavior change of each key element in order to obtain appropriate strategies for behavior change applicable with each step of ladder of inference.

All stages of the ladder of inference affected the users' beliefs and, consequently, led to certain patterns of practices. In other words, if users were able to adjust the ladder of inference in some stages, they would obtain new patterns of beliefs and practices. Yet, some users may require drastic adjustments in many different stages of ladder of inference so that they were able to fully benefit from the changes in the desired beliefs and practices (Brown, 2002).

Table 4.19 Comparison between strategies for behavior change and the model used for creating cloud computing architecture.

Strategies for Behavior Change	**Model**	**Cloud Computing Architecture**
Understand with whom individuals are likely to comply.	Communicate to stimulate the decisions	Use various channels such as Inbox, message, emails, with auto-timing for sending data
Be aware of physical or cultural barriers that might exist, attempt to remove barriers.	Show the responses	Use symbols to indicate current status

Table 4.19 Comparison between strategies for behavior change and the model used for creating cloud computing architecture. (Continued)

Strategies for Behavior Change	**Model**	**Cloud Computing Architecture**
Raise awareness that the threat exists, focusing on severity and susceptibility.	Focus on the severe and sensitive elements	Use colors or icons
Raise awareness that the threat exists, focusing on severity and susceptibility.	Focus on the severe and sensitive elements	Emphasize crucial data
Communicate the benefits of performing the recommended response.	Determine data from reality	Presents data for actual practices
Measure existing attitudes before attempting to change them.	Build individual confidence in the works	Build credibility for function (accurate, convenient, and fast)
Provide communication that might trigger individuals to make decisions.	Communicate the benefits from responses	Presents benefits from the practices

Table 4.19 illustrated the next procedure when appropriate strategies for behavior change were obtained for each step of ladder of inference. The results were used to construct a model (Feigenbaum and others, 1983). Appropriate Content was constructed for cloud computing architecture.

After the strategies for behavior change were applied to adjust each step of the financial ladder of inference, 'content' of cloud computing architecture at each step of the financial ladder of inference can vary.

Table 4.20 Suitable contents of each type of financial documents

Ladder of Inference	**Contents of Revenues-Expenses (Cash Flow)**	**Contents of Income Statement**	**Contents of balance Sheet**
Observable	The data were transmitted through channels and presented in the inbox, message emails when revenues-expenses information was notified on a daily basis.	The data were transmitted through channels and presented in the inbox, message, and emails once a month after closing the income statement.	The data were transmitted through channels and presented in the inbox, message, and emails once a year after closing the balance sheet.
Select data	Symbols indicating whether the status was considered good, fair, or bad.	Symbols indicating whether the status was considered good, fair, or bad.	Symbols indicating whether the status was considered good, fair, or bad.
Add meaning	Figures and tables were used with specific colors to indicate the status of those numbers.	The results were presented in the formats of tables and graphs.	The results were presented in the formats of tables, graphs, and charts.
Make assumption	The figures were explained as narrative data.	The tables and graphs were explained as narrative data.	The tables, graphs, and charts were explained as narrative data.
Develop conclusion	The summary of the status was given with the verification of results in the future.	The summary of the status was given with the verification of results in the future.	The summary of the status was given with the verification of results in the future.
Create/Support beliefs	Communication was carried out in a simple, fast, and constant way.	Communication was carried out in a simple, fast, and constant way.	Communication was carried out in a simple, fast, and constant way.
Take action	The benefits from implementing this data	The benefits from implementing this data	The benefits from implementing this data

The contents of revenues-expenses, when compared with each stage of the ladder of inference, can be discussed as follows:

a) Observable. The data were transmitted through channels and presented in the inbox, message, and emails when revenues-expenses information was notified on a daily basis.

b) Select data. The information received was shown in the form of symbols indicating whether the status of revenues-expenses was considered good, fair, or bad.

c) Add meaning. Figures and tables were used with specific colors to indicate the status of those numbers.

d) Make assumption. The figures were explained as narrative data.

e) Develop conclusion. The summary of the status was given with the verification of results in the future.

f) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way.

g) Take action. The benefits from the practice of analyzing revenues-expenses when making decision were reminded.

The 'contents' of the income statement, when compared with each stage of the ladder of inference, can be discussed as follows:

a) Observable. The data were transmitted through channels and presented in the inbox, message, and emails once a month after closing the income statement.

b) Select data. The information received was shown in the form of symbols indicating whether the enterprises had the profitability at a good, fair, or bad rate.

c) Add meaning. The results were presented in the formats of tables, graphs, and charts.

d) Make assumption. The tables, graphs, and charts were discussed in narrative data.

e) Develop conclusion. The summary of the status was given with verification of the results in the future as well as the analysis accompanying the decision-making process.

f) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way.

g) Take action. The benefits from the practice of analyzing income statement when making decision were reinforced.

The ‘contents’ of balance sheet, when compared with each stage of the ladder of inference, can be discussed as follows:

a) Observable. The data were transmitted through channels and presented in the inbox, message, and emails once a year after closing the balance sheet.
b) Select data. The information received was shown in the form of symbols indicating whether the enterprises had the investment structure that was considered good, fair, or bad.
c) Add meaning. The results were presented as tables and graphs.
d) Make assumption. The tables and graphs were discussed in narrative data.
e) Develop conclusion. The summary of the status was given, with verification of the results in the future as well as the analysis accompanying the decision-making process.
f) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way.
g) Take action. The benefits from the practice of analyzing balance sheet when making decision were reminded.

The ladder of inference of the three types of financial documents namely; revenues-expenses, income statement, and balance sheet, are similar in certain stages but different in other ones.

Apart from the contents, it is necessary to determine the platform of each statement in order to be able to design the cloud computing architecture for the cloud computing finance. The ladder of inference is used to determine the platforms. Table 4.21 presented the platform and the contents required for the revenues-expenses statement in the financial ladder of inference. Table 4.22 presented the platform and the contents required for the income statement in the financial ladder of inference. Table 4.23 presented the platform and the contents required for the balance sheet in the financial ladder of inference.

Table 4.21 The platform and the contents required for the revenues-expenses statement in the financial ladder of inference.

Ladder of inference	**Platform of revenue-expense (cash flow)**	**Contents of revenues-expenses (cash flow)**
Observable	Statement, Receipt-payment voucher	The data were transmitted through channels and presented in Inbox, Message emails when revenues-expenses information was notified on a daily basis
Select data	Revenue, Expense, Account balance	Symbols indicating whether the status of was considered good, fair, or bad.
Add meaning	number, tables	Figures and Tables were used with specific colors to indicate the status of those numbers.
Make assumptions	Revenue – Expense = Account balance	The figures were explained as narrative data.
Develop conclusions	Revenue > Expense	The summary of the status was given with the verification of results in the future.
Create/Support beliefs	Able to make payment	Communication was carried out in a simple, fast, and constant way.
Take action	Make payment, cheque deducted from account	The benefits from implementing this data

Table 4.22 The platform and the contents required for the income statement in the financial ladder of inference.

Ladder of inference	**Platform of income statement**	**Contents of income statement**
Observable	Income statement report	The data were transmitted through channels and presented in the inbox, message, and emails once a month after closing the income statement.
Select data	Sales volume, cost, expense and profit	Symbols indicating whether the status of was considered good, fair, or bad.
Add meaning	tables, graphs, and pictures	The results were presented as tables and graphs.
Make assumptions	Sales volume –(cost+expense) = profit/loss	The tables and graphs were explained as narrative data.
Develop conclusions	Sales volume > (cost+expense) = profit	The summary of the status was given with the verification of results in the future.
Create/Support beliefs	Enterprises have profits	Communication was carried out in a simple, fast, and constant way.
Take action	Enterprises pay dividend, bonus and welfare.	The benefits from implementing this data

Table 4.23 The platform and the contents required for the balance sheet in the financial ladder of inference.

Ladder of inference	**Platform of balance sheet**	**Contents of balance sheet**
Observable	Balance sheet report	The data were transmitted through channels and presented in the inbox, message, and emails once a year after closing the balance sheet.
Select data	Asset, Liability and Equity	Symbols indicating whether the status of was considered good, fair, or bad.
Add meaning	tables, graphs, and pictures	The results were presented as tables, graphs, and charts.

Table 4.23 The platform and the contents required for the balance sheet in the financial ladder of inference. (Continued)

Ladder of inference	**Platform of balance sheet**	**Contents of balance sheet**
Make assumptions	Asset = Liability + Owner's Equity	The tables, graphs, and charts were explained as narrative data.
Develop conclusions	Owner's Equity > Liability	The summary of the status was given with the verification of results in the future.
Create/Support beliefs	Ability to pay for liability	Communication was carried out in a simple, fast, and constant way.
Take action	Investment, Pay for liability	The benefits from implementing this data

The relationship and relevancy of case study 1, 2, and 3 could be explained as follows:

Result 1 was the collection of data which was used to construct an effective financial model using ladder of inference (Senge, 1994). The next process was analysis and presentation.

Result 2 was the collection of data from SEs entrepreneurs who actually utilized financial data in the decision-making process.

Result 3 presented the application of theories of behavior change (Witte, 1997). in constructing cloud computing architecture. Problems from mental model of SEs entrepreneurs were resolved.

The relationship and relevancy of result 1, 2, and 3 could be showed in figure 4.9

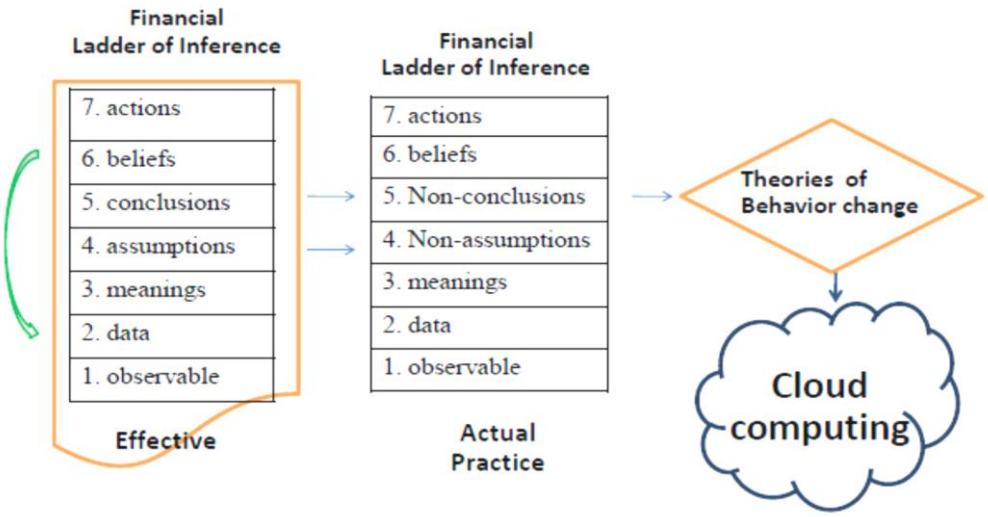

Figure 4.9 The relationship and relevancy of case study 1, 2, and 3

Development of the knowledge management based financial system as a tool to assist the SMEs under cloud computing context.

The effective cloud computing finance is implemented according to the synthesized cloud computing architecture in the foregoing sections as shown in figure 4.10.

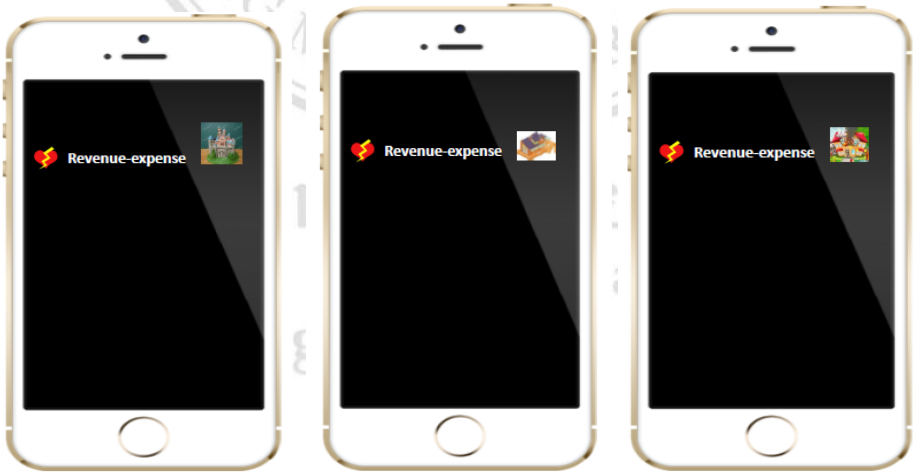

Figure 4.10 Access to effective cloud computing finance.

As shown in figure 4.10, the access to cloud computing finance employed information notification and data update distributed through different channels such as

inbox, message and email so that the users were reminded through repetitions in various channels. The length of time in notifications depended on financial information of that particular document. It was necessary that the information was acquired or used in compatible with the required period of time that financial data were analyzed to benefit decision-making process. Certain symbols were used to represent the financial performance to attract the users' attentions and to acknowledge the current circumstances. They users would notice the symbols before accessing to the detailed information on cloud computing architecture. Each notification presented a symbol showing the nature of that particular financial component. Each type of financial document was presented with fixed symbols that would be used in every notification as well as the title of that document to remind the users of the financial performance of that financial information.

The platform of ladder of inference and the contents of financial document, when compared with each stage of the ladder of inference, can be discussed as follows:

a) Observable. The data were transmitted through channels and presented in the inbox, message, and emails when revenues-expenses information was notified on time.

b) Select data. The information received was shown in the form of symbols indicating whether the enterprises had the investment structure that was considered good, fair, or bad.

The format of the cloud computing architecture for the revenues-expenses component is shown in figure 4.11.

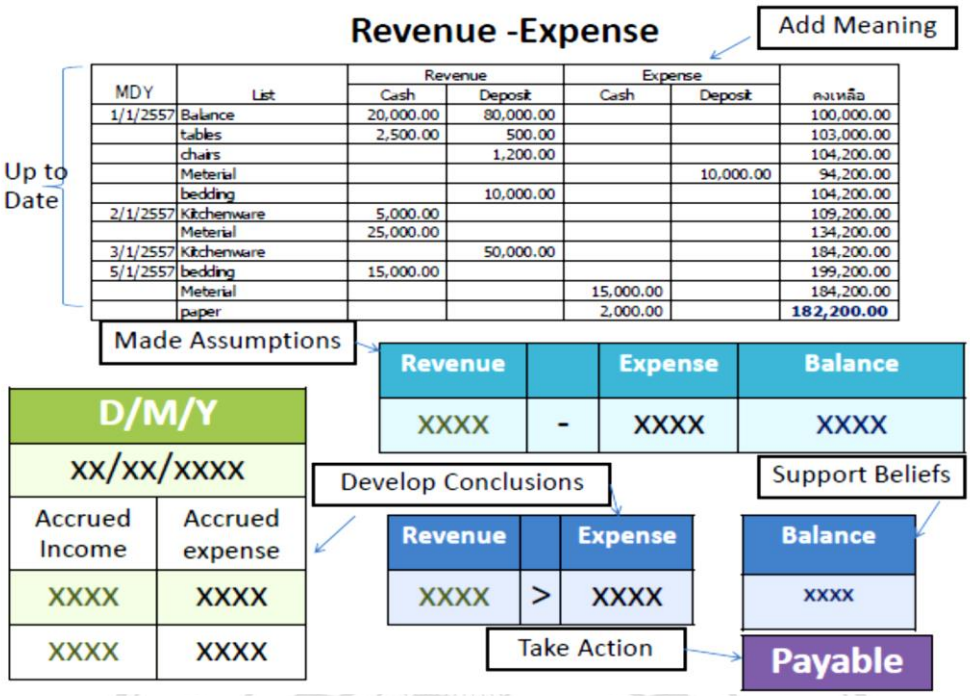

Figure 4.11 The implementation of the cloud computing architecture for the revenues-expenses statement.

As shown in figure 4.11, the platform and the contents of the revenues-expenses statement according to the financial ladder of inference are given as follows:

a) Add meaning. Figures and tables were used with specific colors to indicate the status of those numbers.

b) Make assumption. The figures were explained as narrative data. The step formulated assumptions from the accounting equations: revenues - expenses = balance.

c) Develop conclusion. The summary of the status was given with the verification of results in the future. The step made conclusions from the assumptions: revenues> expenses.

d) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way. The step generated beliefs based on the conclusion that payments can be available.

e) Take action. The benefits from the practice of analyzing revenues-expenses when making decision were reminded. It translated beliefs into

practices by allowing payments or checks processed through the accounts.

The format of the Cloud Computing Architecture for the income statement is given in figure 4.7.

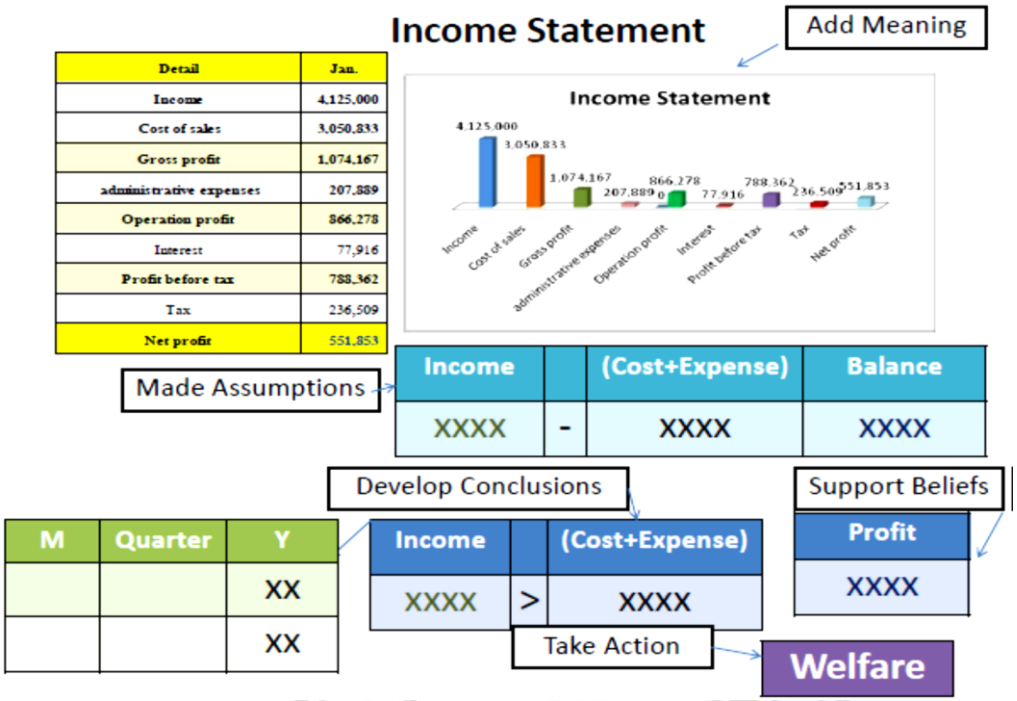

Figure 4.12 The implementation of the cloud computing architecture for the income statement.

As shown in figure 4.7, the platform and the contents of the income statement according to the financial ladder of Inference are given as follows:

a) Add meaning. The results were presented in the formats of tables, graphs, and charts.

b) Make assumption. The tables, graphs, and charts were discussed in narrative data. The step formulated assumptions based on the accounting equation: that was, the sales - (cost + expense) = profit / loss.

c) Develop conclusion. The summary of the status was given with verification of the results in the future as well as the analysis

accompanying the decision-making process. The step made conclusions from the assumption: sales> (cost + expense) = profit.

d) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way. The step formulated beliefs from the conclusions that the business was profitable.

e) Take action. The benefits from the practice of income statement when making decision were reinforced. It translated beliefs into practices by paying dividends, bonus, and other remunerations

The format of the cloud computing architecture for the balance sheet is shown figure 4.13.

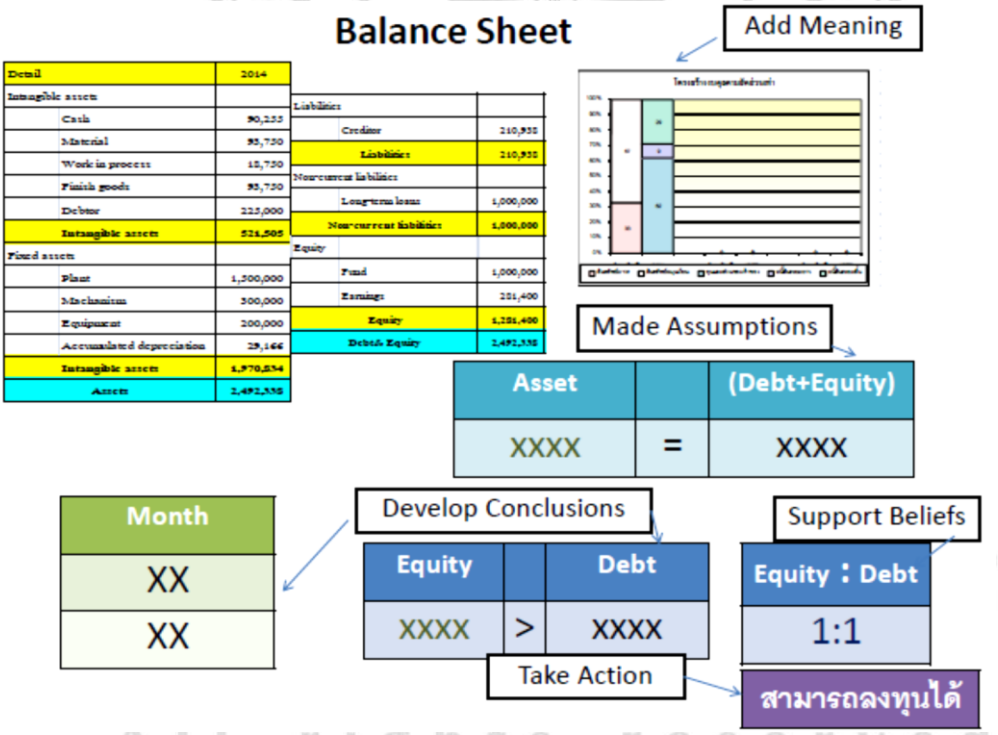

Figure 4.13 The implementation of the cloud computing architecture for the balance sheet.

As shown in figure 4.13, the platform and the contents of the balance sheet according to the financial ladder of inference are given as follows:

a) Add meaning. The results were presented as tables and graphs.

b) Make assumption. The tables and graphs were discussed in narrative data. It set the assumptions based on the accounting equation: assets = liabilities + capital.

c) Develop conclusion. The step draw conclusions from the assumption: the enterprise invested in equity > liabilities. The summary of the status was given, with verification of the results in the future as well as the analysis accompanying the decision-making process.

d) Create / Support beliefs. Communication was carried out in a simple, fast, and constant way. The step created the beliefs derived from the conclusion that the enterprises had the ability to pay the liabilities.

e) Take action. The benefits from the practice of analyzing balance sheet when making decision were reminded. The step was the last step that put beliefs into practice.

The designed cloud computing finance is tested and verified with 10 SEs entrepreneurs. They all utilize the cloud computing finance for their enterprises. The model of cloud computing finance was presented to10 samples of the entrepreneurs who never examined financial data. The result was that the 10 entrepreneurs expressed the need for cloud computing finance. They explained that the model was simple, fast, and convenient for the application. The researcher then collected more data by interviewing and observing the changes in behaviors of the entrepreneurs on a constant basis. The period of data collected was determined and the results were presented in table 4.24.

Table 4.24 Illustrated behaviors of SEs entrepreneurs when dealing financial data when the model of cloud computing finance was presented.

Financial Report	1st Observation of Changes (1day)	2nd Observation of Changes(2 weeks)	3rd Observation of Changes (1 month)
Revenues-Expenses	8 cases	6 cases	6 cases
	80%	60%	50%
Income Statement	-	-	2 cases
	-	-	20%

Table 4.24 showed that SEs entrepreneurs had changing behaviors after receiving the model of cloud computing finance. The changes in behaviors could be discussed as follows:

In the 1st Observation, financial data was collected 1 day after the entrepreneurs received the model of cloud computing finance. It was found that 8 cases of SEs entrepreneurs examined financial data in the aspect of revenue-expense in book bank.

In the 2nd Observation, financial data was collected 2 weeks after the entrepreneurs received the model of cloud computing finance. It was found that 6 cases of SEs entrepreneurs examined the financial data in the aspect of revenue -expense in book bank and bills/invoices.

In the 3rd Observation, financial data was collected 1 month after the entrepreneurs received the model of cloud computing finance. It was found that 5 cases of SE entrepreneurs examined the financial data in the aspect of revenue-expense in book bank and bills/invoices. 2 cases out 5 started examining income statement.

Behavior rating scales were used as the tool to obtain data from the perception or behaviors of individuals. The data was acquired by observation or explanation of patterns of actions (Floyd and Bose, 2003).

Data from the interviews and observation were inputs of behavioral rating scales, the details of which were shown in table 4.25

Table 4.25 5-point rating scale for behavior changing

Change(%)	Rating scale
=>80	Excellent
60-79	Good
40-59	Fair
20-39	Satisfactory
<20	Poor

Table 4.25 illustrated 5-point rating scale for behavior changing, which was widely adopted among SEs entrepreneurs. The data was acquired by the interviews and observation conducted during the period of collecting data.

The interviews and observation was conducted after cloud computing finance was proposed. It was found that the entrepreneurs showed certain changes in using financial information for their decision-making process in terms of revenues-expenses and income statement. Analysis can be presented in graph as follows:

Figure 4.14 Behavioral changes of SEs entrepreneurs in terms of revenues-expenses

Figure 4.14 illustrated behavioral changes of SEs entrepreneurs when dealing with revenues-expenses. The first interview and observation was conducted 1 day after cloud computing finance was proposed. It was found that SEs entrepreneurs were more interested in examining revenues-expenses. 8 out 10 cases (80%) showed excellent scale. The second observation was conducted 2 weeks after cloud computing finance was proposed. It was found that 6 out of 10 entrepreneurs (60%) were more attentive to revenues-expenses, which was indicating a good level. The third observation was done 1 month after cloud computing finance was proposed. 5 out 10 entrepreneurs (50%) paid attention to revenues-expenses, which was considered a good level. The data obtained was analyzed and the details were as follows:

1. Duration of collecting data affected the changes in behaviors. If data was collected right after cloud computing finance was proposed, the entrepreneurs tended to be attentive to revenues-expenses and use them in their decision-making process. The longer intervals of each session of data collection, the SEs entrepreneurs examined revenues-expenses with lesser degree. Yet, it was considered the same standard.

2. When SEs entrepreneurs realized that revenues-expenses were, in fact, beneficial for their businesses, they tended to use the information in their decision-making process.

Figure 4.15 Behavioral changes of SEs entrepreneurs in terms of income statement

Figure 4.15 illustrated behavioral changes of SEs entrepreneurs when dealing with income statement. The first interview and observation was conducted 1 day after cloud computing finance was proposed. It was found that SEs entrepreneurs did not examine income statement, which was regarded as a poor level. The second observation was made 2 weeks cloud computing finance was proposed. Similar finding was found. That was, SEs entrepreneurs did not examine income statement, which was regarded as a poor level. The third observation was conducted 1 month after cloud computing finance was proposed. It was found that 2 out of 10 SEs entrepreneurs (20%) started to pay attention to income statement, which was considered a satisfactory level. The data obtained was analyzed and presented as follows:

1. Duration of collecting data affected the changes in behaviors. If data collection was conducted shortly after cloud computing finance was proposed, the entrepreneurs did not seem to be attentive to income statement and use them in their decision-making process. The finding was different from the results in the aspect of revenues-expenses.

2. When SEs entrepreneurs realized that income statement was, in fact, beneficial for their businesses, they tended to use the information in their decision-making process and began paying attention to income statement.

The behavioral changes of SEs entrepreneurs in terms of financial data were analyzed. The changes occurred from the perception of ladder of inference, which resulted in the changes in certain steps of mental model. Certain steps such as ‘make assumption’ and ‘develop conclusion’ were previously neglected. When financial ladder of inference was presented, the SEs entrepreneurs were aware of these crucial steps and were motivated to adopt positive behaviors accordingly towards financial data.

According to the changing of SEs entrepreneur behavior for financial analysis and decision making, it is caused by financial ladder of inference. Mental model developed the continuous acknowledgement and concept of financial as step by step in practices manner. The principles are created and effected to the essences of development and the mental model transformation

Figure 4.16 showed that the accounting in decision making contributed to economic activities, the data of which were recorded and resulted in accounting process. The output was then transformed into accounting information. In this section, cloud computing architecture contributed to more efficient accounting information, which was used in the accurate analysis of decision making process. As a result, new activities occurred in the economic activities of that enterprise.

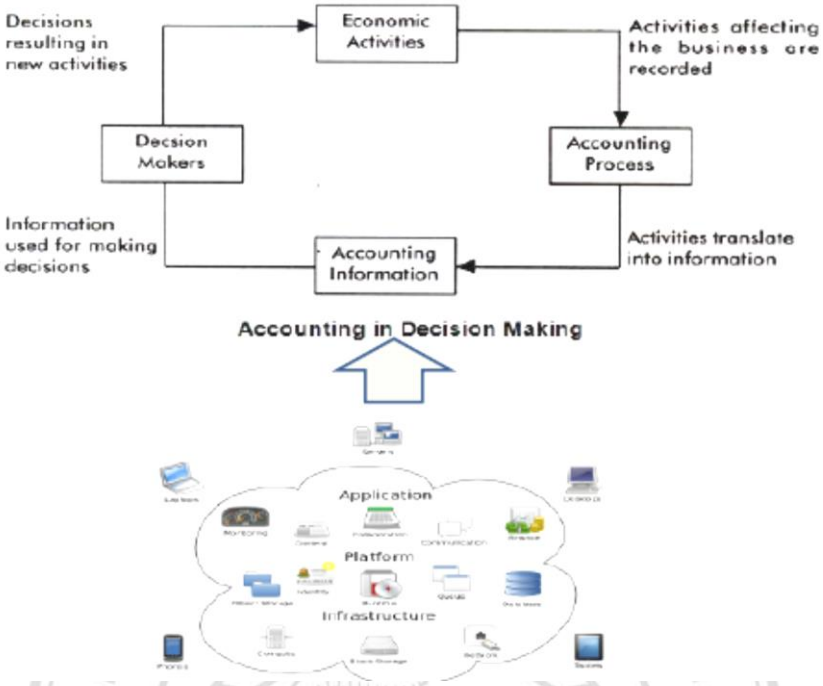

Figure 4.16 Exhibited the relationship between the cloud computing architecture and the accounting in decision making that affected SEs.

Cloud computing architecture, therefore, effectively supported the dynamics of accounting in decision making for SEs and linked with the decision making process. Cloud computing architecture provided benefits for SEs in terms of both economic activities as well as the decision making process required for the operations.

Not only cloud computing finance for SEs can help adjust the mental model of the entrepreneurs of SEs in regards to the financial information. It can also be used to solve problems in the decision-making process of SEs by effectively enhancing accounting in decision making of SEs while connecting all elements required for making decision. As a result, SEs can benefit from cloud computing architecture in terms of economic activities and the decisions for the operation of their enterprises.