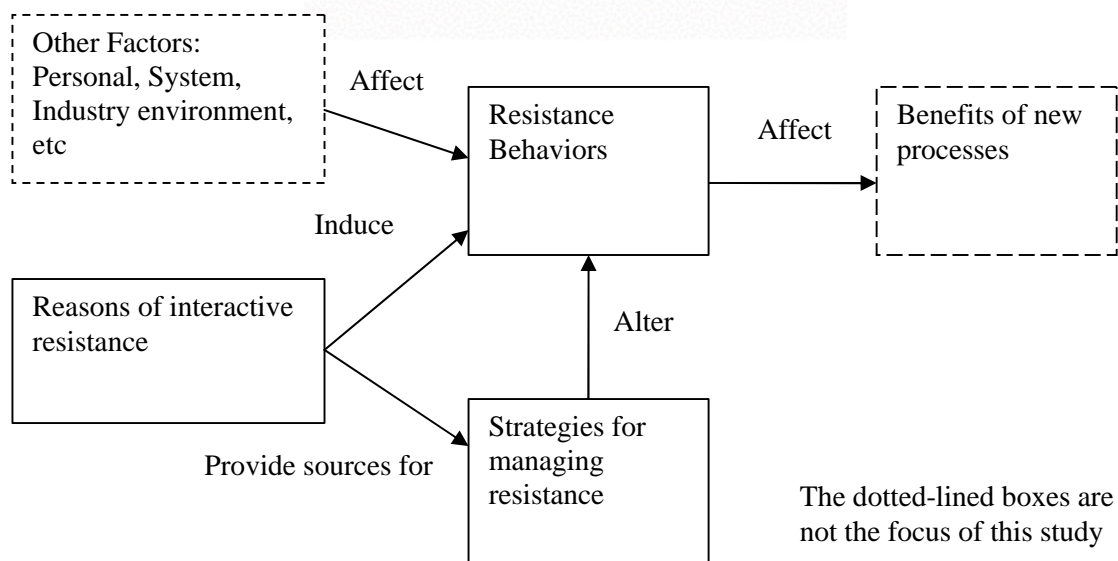


CHAPTER 3: METHOD

3.1 Research Framework

This study tries to build an understanding of user resistance to the change brought by Enterprise Systems. The research framework is illustrated in figure 3-1. In addition to concerns about the interaction with the systems (shown in left-bottom box) there are several causes for resistance behavior such as personal characters, system itself, or industry environment (shown in left –up dotted-lined box) that will affect resistance behaviors. Some of the behaviors would sabotage the work process while some resistance behaviors. As shown in the top-middle box, some of the behaviors would sabotage the work process while some resistance behaviors such as: complaint, absent from training, careless mistakes, etc., may not affect the work immediately. However, the willingness to use the system to upgrade current work and coworker with others could be affected by the organizational climates and consequently create difficulties in system use and benefit realization (the dotted-lined box in the right). Identifying key reasons of resistance could provide clear sources for managing the effects. As shown in the middle-bottom box of figure 3-1 effective strategies are expected to mitigate the negative feelings and behaviors, and some even could be adopted to prevent resistance in advance. The focus of this study is on effective ways of dealing with resistance, preventive strategies are not the emphasis.

Figure 3-1: Framework of User Resistance to Enterprise Systems



3.2 Research Design

Seeking direct links between ES use and the ES user resistance requires broad and in-depth data collection and analysis. A broad range of data collection builds a generalized foundation; a broad business scope analysis covers the multi-faceted nature of Enterprise Systems, while the in-depth formulation of ES user resistance sets up a practical instrument for understanding user resistance in enterprise systems implementation. There are two general ways of enhancing and verifying the proposed ES benefit framework: survey and case study. A user survey may be the most common way of collecting broad information across industries. However, it is not possible to build a complete questionnaire without sufficient understanding of characteristics of user resistance in ES. In-depth data on organizations may reveal detailed levels of information, and open questions may assist the exploratory nature of data collection, but it is difficult to contact sufficient ES users from which to build a general framework with sufficient insights. To accomplish the goal of collecting data broadly and deeply this study adapted Delphi method (Lindstone et al. 1975) to form emerging understanding of the research topic by collecting broad range information from experienced ES managers and thoroughly verifying findings from various participants.

3.2.1 The Delphi Method

The Delphi technique was first applied in the early 1960s at RAND, the Santa Monica, California, “think tank”. The questions of Rand thinkers at that time primarily dealt with the military potential of future technology and potential political issues and their resolution (Gordon, 1994/2000). The Delphi method was developed by Olaf Helmer, Nicholas Rescher, Norman Dalkey, and others at RAND to remove conference room impediments to a true expert consensus.

The Delphi method was designed to encourage a true debate, independent of personalities. Anonymity was required for that no one knew who else was participating. Further, to eliminate the force of oratory and pedagogy, the reasons given for extreme opinions were synthesized by the researcher to give them all equal “weight” and then fed back to the group as a whole for further analysis. This general approach has been used thousands of times since the first published Delphi study, Report on a Long-Range Forecast by Gordon and Helmer, in 1964.

Several rounds are conducted with refinement of each questionnaire modified by researchers at the end of each round and synthesized as the basis for questionnaires of next round. Each member would be asked to reassess his position in view of the reasons presented. In the final

round, the argument will be presented, along with evolving group consensus, and a reassessment requested. In a sense, the Delphi method is a controlled debate. The reasons for extreme opinions are made explicit, fed back coolly and without anger or rancor.

Because the number of respondents is usually small, Delphi do not produce statistically significant results, and the results provided by any panel do not predict the response of a larger or even a different Delphi panel. They represent the synthesis of opinion of the particular group, no more, no less. The value of the Delphi method rests with the ideas it generates, both those evoke consensus and those that do not. The arguments for the extreme positions also represent a useful product.

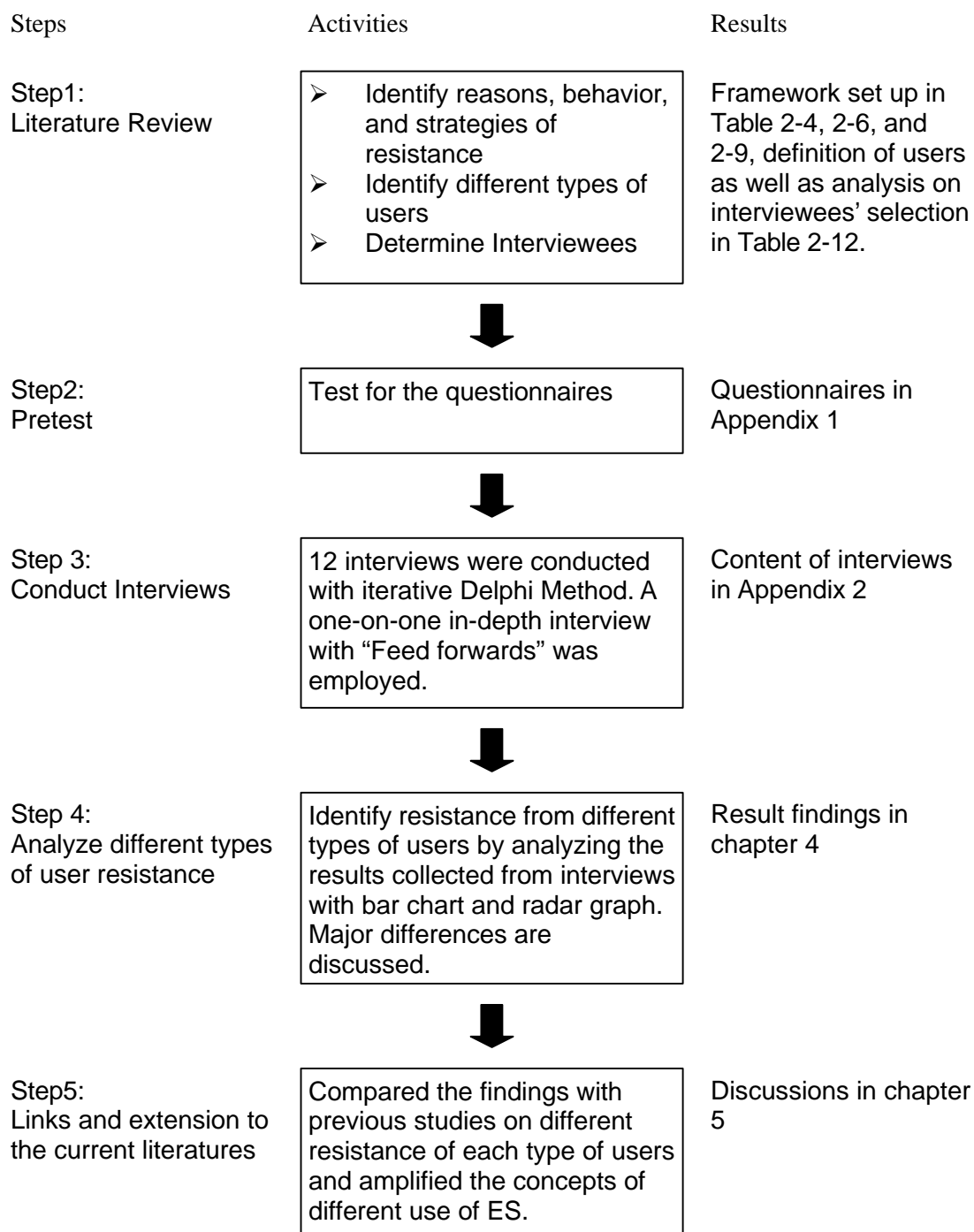
In some modern applications of Delphi, in-depth interviews with experts have been used with great success as an alternative to questionnaires. The same kinds of experts are first identified, invited to participate, assured of their anonymity, and promised a report based on the interview sequence. Appointments are made at their convenience of the interviewees. Interview protocols are prepared and tested to elicit judgments. Feedback can be introduced if two rounds of interviews are employed; however, single round studies are used more frequently. In these, “feed-forward” is often employed, presenting to respondents information about emerging consensus derived from the prior interviews. This process introduces differences among the various interviews, but the exercise is not designed to be statically significant but rather to elicit ideas that can be important to subsequent analyses, and in-depth interviews are an excellent means of obtaining such ideas.

To overcome the difficulty of the time consuming process and the time constraints as well as constantly moving around characteristics of our interviewees, the feed-forward approach (Gordon, 1994), one of modern Delphi data analysis techniques, was used to form thorough understanding with various participants by presenting emerging consensus derived from the prior interviewees.

3.2.2 Research process

There are five steps to conduct the results of this research. The steps are explained and illustrated in figure 3-2.

Figure 3-2: The five steps of research process



Step 1: Literature Review

The first step of this research is to review literatures of resistance to change and to general information systems. Resistance reasons were classified into 5 categories, behaviors into 3 categories, and strategies into 4 categories. Possible reasons, behaviors, and strategies of resistance in ES implementation are organized into 3 tables respectively, forming the basic

guide of interview instrument for later verification. Basis on the nature of the Enterprise Systems, two major types of users: managerial users and operational users were identified with clear definition of their roles in the ES environment. Finally, compared to the direct users, project managers were selected to be our interviewees for their experienced knowledge of dealing with resistance in ES implementation and holistic view of enterprise-wide change.

Step 2: Pretest

Two interviews were conducted for pretest in this step, and each construct is discussed to form the final questionnaires in Appendix 1.

Step 3: Conduct interview

This step applies modern Delphi technique with iterative in-depth interview by “feed-forwards” strategy, presenting emerging consensus derived from the prior interviewees. Three tables of scoring with tape-recorded files were collected. Content of the interviews is organized in Appendix 2.

Step 4: Analyze different types of user resistance

Average scores were computed for each item from the 6 tables in this step. Some statistical graphs are demonstrated with the support of “Quotes” from those interviews in major items. Key findings are identified from reasons, behaviors, and strategies respectively.

Step 5: Links and extension to the current literatures

This step re-examined current literatures and compares our results with previous studies. Similarities and differences are compared, and listed.

3.3 Data Collection and Analysis

The in-depth Delphi interviews were conducted with 12 ES implementation project managers, described in Table 3-1, who had experiences of ES implementation with SAP, Oracle, DSN (the largest ES vender in Taiwan) and other ES software. The number of ES projects ranged from four to one hundred to per project manager (60 percent of the implemented projects were small and medium enterprises).

In the in-person interviews emergent consensus derived from the prior interviews was presented. Differences among the various interviews were consolidated during each interview and verified with prior interviewees if needed. The main focus is not to seek statistically significance but to elicit ideas that can be important to subsequent analyses.

Table 3-1: Description of interviewed experts

No	Current Position	Current Company Types	ES Experiences	ES Projects	Country	Industry Sector
1	Project Manager	Implementation	5 years SAP	4	Taiwan	Manufacturing Logistics
2	Consultant	ERP Consultancy	6 years SAP	5	Taiwan Singapore	Manufacturing Logistics
3	Project Manager	ERP Consultancy	8 years Oracle	20+	Taiwan	IC manufacturing High Tech assembling Traditional industry
4	MIS manager	Implementation	8 years Data Systems, Tip Top and BI	4	Taiwan China	Tele Communication Manufacturing Services
5	Consultant	ERP/CRM Consultancy	8 years SAP & Oracle (ERP, CRM, PLM, PDM, etc.)	15	Taiwan China USA	Manufacturing Public services Financial
6	General Manager	ERP/SCM consultancy	6 years on Data System	100+ (SM Es)	Taiwan	Distribution Industry
7	Vice President of Consulting Service	ERP consultancy	5 years SAP, i2, and QAD	14+	Taiwan	High Tech Manufacturing Pharmaceuticals/Chemical Consumer Packaged Goods
8	Director of Consulting Group	Banking Solution, CRM consultancy	4 years SAP ERP and CRM	2+	Taiwan	Banking Manufacturing
9	Consultant	ERP consultancy	4 years Oracle ERP	10	Taiwan China	Manufacturing
10	Consultant	ERP consultancy	4 years ieERP	11+	Taiwan China	IC design, Manufacturing, IC Trading
11	Consultant	ERP consultancy	9 years SAP, ieERP	10+	Taiwan China	Manufacturing IC Trading
12	Consultant	ERP consultancy	5 years SAP	5	Taiwan	High-tech Traditional industry (food) Distribution

The reason for using in-person interviews was for the researchers to control the effectiveness of

data collection and maintain flexibility in developing and testing evolving factors.

Although first line users are an alternative for data collection, these individuals rarely express resistance attitudes without considering the potential negative consequences for themselves (Piderit 2000). It was also noted that under some situations users don't consciously understand why they resist the systems (Kotter, 1970). Project managers are selected as our experts for their holistic view of system adoption and based on their accumulated experience and observations to verify and enhance our understanding of user resistance.

Table 3-2 shows the advantages and disadvantages of interviewing first line users and project managers.

Table 3-2: Advantages and disadvantages of selection on different interviewees

	Experienced Project managers	Users
Advantages	<ul style="list-style-type: none"> ➤ have overview of the entire project implementation ➤ are sensitive to resistance across different business sectors and industries ➤ have much experiences in dealing with ES resistance 	<ul style="list-style-type: none"> ➤ directly affected by the change ➤ are the target of our research
Disadvantages	<ul style="list-style-type: none"> ➤ are not directly affected by the change ➤ are more subjective ➤ often leaves the company after implementation, thus unable to trace the usefulness of those strategies in long-term 	<ul style="list-style-type: none"> ➤ may have concerns of negative impact of expressing their negative feelings (Peditit, 2000) ➤ are lacking of overview in the implementation ➤ users who quit their job are not easily be interviewed, thus unable to discover relative behaviors ➤ 4. under some situations they don't consciously understand why they resist the systems (Kotter, 1970)

Before the actual data collection, two ES project managers were consulted to validate and modify the questionnaire, which was based on Tables 2-4, 2-6, and 2-9. Interviewees were chosen to reflect implementation experiences in different industry sectors. Due to the complexity of the data collected and some need for exploration in the data collection process, as well as the fact that managers are often constantly moving around in their jobs, single round in-depth interview with “feed-forward” method are conducted.

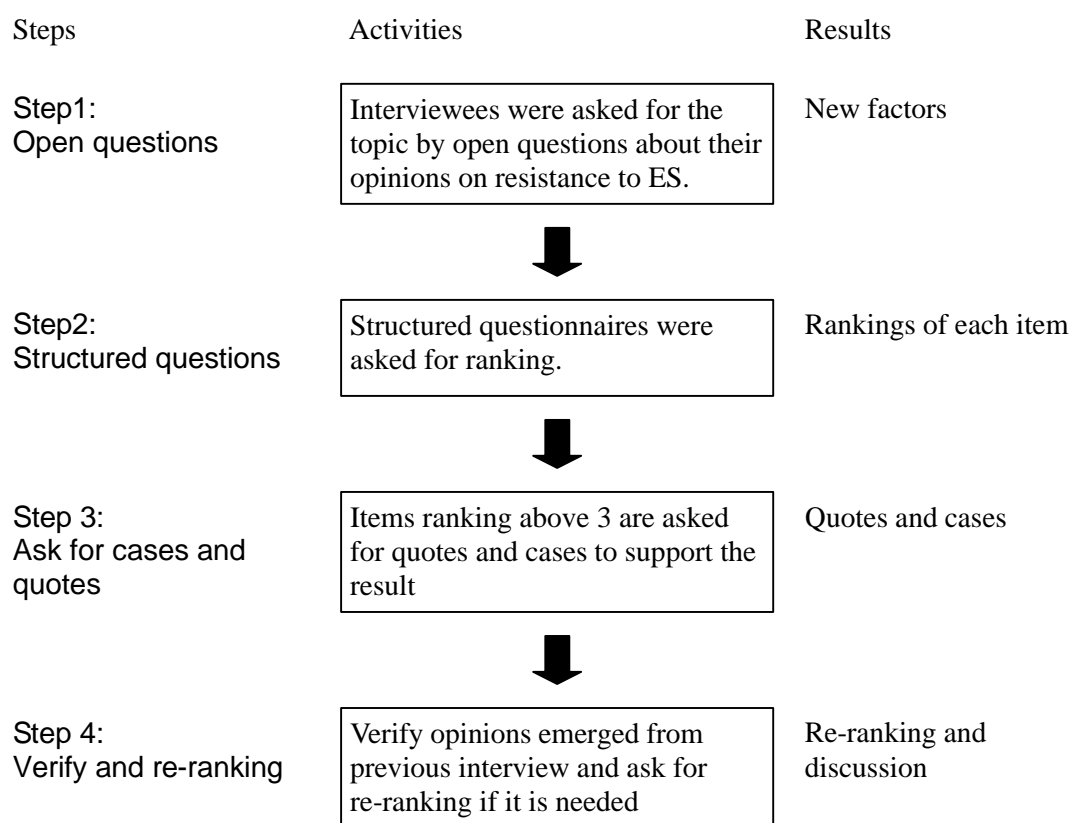
The key to successful Delphi study lies in the selection of participants. Project managers has

been identified as our experts in this study, and single round of in-depth interviews were conducted for their constantly moving around job characteristics, with the advantage of one-on-one interviews that provide flexibility, which is absent in questionnaires.

3.3.1 Data Collection

The data collection took place under the control of the researchers. Each interview was conducted in 60~90 minutes with appointment according to their schedules. Questionnaires and research questions were explained in the interviews to make sure the interviewees comprehend the statements completely. The statements in the six tables (Table 1-2, 1-3, and 1-5 of two different types of users) were rated on a Likert scale ranging from 0 (the factor is not important at all in ES-enabled change) to 5 (the factor is essential to ES-enabled change).

Figure 3-3: The steps of interviews



Open questions were asked to enhance the list, iterative verification was made, and detailed case descriptions were requested to support the selected statements. To avoid the interviewees' misunderstanding of "what or why users really did" instead of "what or why users will do", that to answer based on their experiences of previous project was emphasized beforehand. All our 12 interviewees were not mind of the interview process being recorded for further verification

(Figure3-3).

3.3.2 Data analysis

Data analysis procedures are conducted in 6 steps as shown in Figure 3-4. Iterative steps from 1 to 6 for each interview were done.

Step 1: Interview

In this step, interviews were made for the convenience of interviewees. Objectives and privacy of the collected data were explained for research use only. Tape-recorded assistance was asked beforehand. Further questions were asked for their experiences to support their favors of the answers. Difference assessments from previous interviews were identified with further discussion. Interviewees are allowed to rethink their scores and rescored them after discussion.

Step 2: Transcribe

In this step, recorded content of interviews are transcribed into statements, and organized as Tables in Appendix 2.

Step 3: Tablet

In the third step, scores of the questionnaires and demographics of interviewees were organized as tables in Appendix 4 and Table 3-1. Scores are loaded in Excel file.

Step 4: Compare

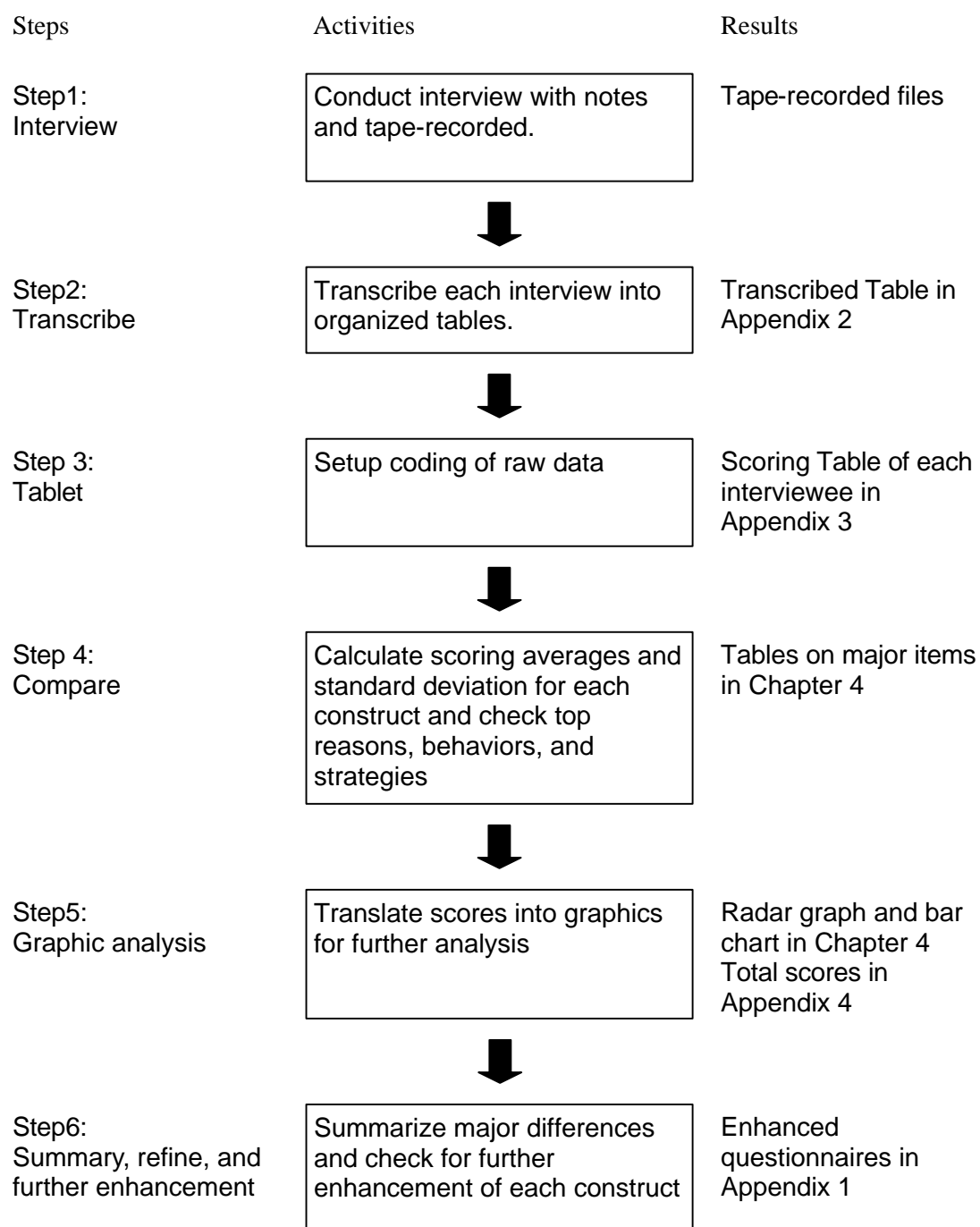
In this step, average scores were calculated after each interview, so were standards deviation of each construct to check the variation of each interviewee's answers. Major items were identified in chapter 4.

Step 5: Graphic analysis

In this step, numbers were translated into graphs to display the data for further analysis. Radar graph and bar chart in chapter 4 are used to illustrate the results. Radar graph can help us compare the patterns of each type of use with each other, and the bar chart based on the deviation can provide some information on how consistent the individual item is scored by different interviewees.

Step 6: Summary, refine, and further enhancement

Figure 3-4: The steps of Data Analysis process



In this step, summary was made and questionnaires were refined for further interview. After all the data collection, differences by categories of each constructs were analyzed to link with previous studies in chapter 5.

3.4 Quality of Research

The research quality ensures the validity and reliability of this study. Such validity and reliability are described as followings:

Table 3-3: Tests of Research Quality

Test of research quality	Tactics applied in this study
Construct validity	<ul style="list-style-type: none"> ➤ Reviewed with literature reported in the main management and IS journals ➤ Establish a chain of evidence by building tables linking and consolidating existing knowledge of user resistance
Internal validity	<ul style="list-style-type: none"> ➤ Feed-forwards verification with interviewees ➤ Single level iterative Delphi method of in-depth interview
External validity	<ul style="list-style-type: none"> ➤ Interviewees are experienced experts from different industries ➤ The results are compared with current studies to amplify the concepts
Reliability	<ul style="list-style-type: none"> ➤ Protocol applied during data collection ➤ Collected data are preserved for further verification

3.4.1 Construct validity

To establish construct validity, correct operational measures for data collection and analysis must be established (Yin, 1994). In this study, constructs of reasons, behaviors, and strategies are reviewed from previous literatures on resistance of general IS and change management. Different types of user resistance are verified from previous literatures. Constructs are from the common or most important issues reported in the management and IS journals, including Harvard Business Review, Sloan Management Review, MISQ, and JMIS, etc.

3.4.2 Internal validity

Internal validity is usually important for explanatory or causal study to establish a valid causal relationship, as distinct from spurious relationships (Yin, 1994). Single level of iterative Delphi method of in-depth interview was applied to verify the consensus of each expert's opinions, with the flexibility of feedbacks transferred to the next experts.

3.4.3 External validity

External validity establishes the domain to which a study's findings can be generalized (Yin, 1994). Interviewees are chosen from experienced project managers with four to 100+ implementations across different industries, compared with current literatures to amplify or enhance concepts of the ES environment.

3.4.4 Reliability

Different protocols were used to collect data, including telephone, emails, and one-on-one interview. Voice-data were recorded, and documents were preserved for further verification.