# CHAPTER 3
# RESEARCH METHODOLOGY

## 3.1 Chapter Overview

This chapter is presented in two parts. The first details the theoretical and conceptual overview of the method, including the strengths of the knowledge management approach and other central theories to the thesis, including personal mastery, CMMI, and aspects of German and Thai culture. The second part of this chapter then details the methodological steps in selecting sample groups, gathering data, designing and implementing the model, and evaluating its effectiveness. Figure 3.1 illustrates the broad conceptual platform on which this research is built. The components shown in Figure 3.1 are detailed throughout the first part of this chapter, while more specific methodological steps undertaken at the case study are shown in the second half of the chapter.

Figure 3.1 indicates that the main knowledge sources in this work (German managers, German developers, Thai knowledge workers) contribute to understanding and building a critical incidents model of issues affecting the work performance and quality at the case study firm. The German owned firm and the Thai employees create a German-Thai culture, which also affects the work quality and performance at the case study. The central focus of the work is on the probationary employment period, where local German management, senior Thai developers and new Thai developers are the key sample groups contributing to the creation of an improved probationary period. The final part of the conceptual framework in Figure 3.1 shows how personal mastery is utilized to underpin a new probationary model, which the case study firm can follow to enhance work performance and reduce quality issues. The work is undertaken from the perspective of knowledge management (KM) and before the methodological steps are described in detail, the key concepts and theories, as well as the rationale behind a KM approach are discussed.

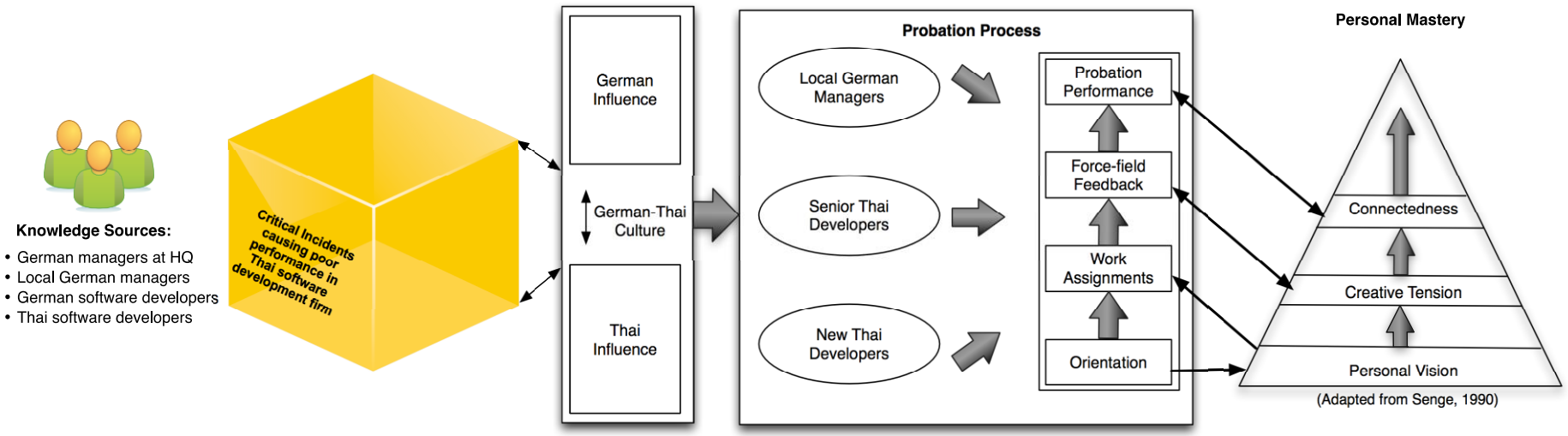


**Figure 3.1 The conceptual overview of the research**

### 3.2 Conceptual/Theoretical Overview: A Knowledge Management Approach

A universal definition of knowledge management (KM) typically includes the notion that KM is the theory and practice of developing, sharing, and applying knowledge within an organisation in order to gain competitive advantage (Petersen and Poulfelt, 2002). Two key paradigms exist within the field of KM (Gloet and Berrell, 2003), each with distinct differences in their philosophy regarding the best way to achieve effective KM, but both with similarities and overlaps. One paradigm emphasizes the use of ICT to codify, store, and disseminate knowledge with the aim of achieving effective KM. The second paradigm argues that people must be the central tenet of KM, by utilising organisational learning as a key driver of effective KM (Gloet, and Berrell, 2003). In reality, these two paradigms exist in a state of duality rather than antagonistic dualism, with each paradigm necessary to achieve full and effective KM.

In this thesis, the KM focus is firmly on organisational learning to effectively address the issue of knowledge worker performance at the case study firm. Effectively tackling knowledge worker performance during employees' probationary period could also be sensibly addressed from the standpoint of human resources management (HRM), but there are a variety of key aspects justifying why the theories and perspective of KM are more suited to the research problem faced by the case study firm, and more generally appropriate for the knowledge intensive industries in Thailand. Table 3.1 illustrates the key differences and strategies of a KM vs. HRM philosophy. For a more detailed discussion on the differences between KM and HRM, see Chapter Two, section 2.5.

**Table 3.1 The differences between KM and HRM philosophies (adapted from Oltra, 2005; Edvardsson, 2002)**

| Strategy | KM | HRM |
|---|---|---|
| **General Strategy** | **Codification:** Leverage ICT to codify, store, disseminate, share, and reuse knowledge **Personalization:** Develop networks and strategies for people to share tacit knowledge | Aims to create human resources that are employed cost effectively, a workforce that is fully utilized and matches organisational needs and that there are good employer/employee relations |
| **Recruitment** | Social and cultural fit with knowledge sharing/networking | Psychometric testing, individual qualifications |
| **Training** | Ongoing training and development and mentoring | Specific skills for a particular job on an ad hoc basis |
| **Performance Management** | Considers knowledge components | Short-term measurable objectives related to volume/profitability |

The key advantages of the KM approach followed in this thesis can be summarised within four key headings, as follows:

- KM provides a holistic approach to the problem of knowledge worker performance rather than an *ad hoc*, piecemeal and short-term solution to specific issues.

- KM theories and methodologies aim to achieve true and effective KM within the organisation, which is especially important considering the knowledge intensive nature of the case study firm (software development).

- KM emphasizes the importance of the social and cultural fit of individual knowledge workers with the overall knowledge approach of the organisation.

- KM considers knowledge a critical aspect of organisational effectiveness and is well matched with the wider aims of Thailand's knowledge economy, including the current challenges and future opportunities.

Each one of these key factors is now discussed in turn to comprehensively address the knowledge management perspective adopted in this research, and in particular provides comparison (where appropriate), with some of the more traditional HRM perspectives.

### 3.2.1 KM's Holistic Approach to Problem Solving

A common characteristic of human resources management (HRM) is that it often addresses problems with work performance or quality by adopting a reactive rather than proactive approach (Huselid, 1995). In other words, HRM responds to issues when they arise, but does not necessarily adopt effective solutions over longer timescales. In contrast, KM is about more than addressing specific siloed problems, and comprises an integrated perspective from which to codify, store, share, and disseminate knowledge, which in turn will solve organisational issues and increase competitive advantage (Al-Hawamdeh, 2002). According to Ims and Zsolnai (2009) managers often make mistakes by reducing every problem to its technical dimension, which results in solving the wrong problem, in a precise way. Rather than solving organisational problems in a technical way, and with abstract theories and principles, people should be engaged, and their real needs addressed. This illustrates the critical difference between HRM and KM when problem solving: KM adopts an integrated and holistic approach, and follows a paradigm of personalization. In this thesis, the problem of recruiting, training and retaining knowledge workers to achieve effective work performance is therefore not treated as a purely technical or epistemological issue. Instead, the knowledge management perspective acts as a glue to hold individual aspects of the research problem together in order to provide an effective and long-term solution. An effective and long-term solution to the research problem is also in alignment with the achievement of true and effective KM in the organisation.

### 3.2.2 Achieving Effective KM in a Knowledge Intensive Industry

In this research, the primary business activity of the case study firm is software development. Software development is quintessentially a knowledge-based industry (see Chapter Two), where competitive advantage is determined not by traditional economies of scale, but by the effective use of knowledge and knowledge

workers (Kulkarni *et al.*, 2006). The need for effective knowledge management is therefore critical to the success of the case study firm, and any issues associated with managing people and increasing the performance of knowledge workers should be from the perspective of KM, which affords the advantage of specialist tools and approaches tailored to address knowledge workers and related knowledge problems. The knowledge management approach in this thesis is thus in keeping with the predominantly knowledge related activities the case study company is engaged in, and with managing knowledge workers to ensure sustained competitive advantage.

### 3.2.3 KM to Address the Social and Cultural Fit of Individuals with the Knowledge Approach of the Organisation

The focus of the work in this research is predominantly on recruitment, and the training of knowledge workers during their probationary employment period. Table 3.1 has already indicated that traditional HRM focuses on psychometric tests and individuals' qualifications when recruiting staff. Training is also commonly job specific. In contrast, KM assesses individuals on the basis of their cultural and social fit with an organisation and its knowledge strategies (Edvardsson, 2003). This is critical to solving the issues that knowledge intensive firms face in Thailand, particularly those investing from abroad, where the culture and knowledge environment may be significantly different to expectations of Thai staff. The knowledge intensive software industry therefore requires knowledge workers who can fit the organisation, culturally, socially, and in terms of the organisation's knowledge strategy. The KM perspective in this thesis is therefore wider in scope than a traditional HRM approach and considers aspects specific to the knowledge intensive nature of the firm, as well as the need for effective KM to retain competitive advantage.

### 3.2.4 KM to Solve Wider Issues in Thailand's Knowledge Economy

While HRM management is generally associated with managing specific problems and creating a workforce that is cost effectively engaged, the KM approach in this thesis seeks to draw a wider perspective of the issues faced by firms when employing locally recruited knowledge workers in Thailand. The challenges and

opportunities facing Thailand's knowledge economy were outlined in Chapters One and Two, and if Thailand is to continue to develop its knowledge economy, there is a critical need to understand the problems that firms face when employing Thai knowledge workers, and just as importantly, how these problems can be solved in an effective and sustainable way. The KM perspective in this study is therefore in alignment with the wider aims of Thailand's knowledge economy, and not based on principles of parsimony often practiced in HRM or other disciplines. Instead, rather than relying on incomplete viewpoints or explanations, KM provides an in depth insight into the research problem at the case study firm, while also maintaining breadth to assess the impacts on the firm, and the wider knowledge economy.

As well as the four aspects contributing to the KM approach, a set of four key concepts/theories were utilized in the methodology to create the critical incidents personal mastery model (CPM). These are shown in Table 3.2 and described in the corresponding sections.

**Table 3.2 The theories, concepts and tools used to respond to the research problem and create the CPM to improve knowledge worker performance**

| Tools/Theory | Objective/Background | Rationale |
|---|---|---|
| **Critical Thinking** | A type of reasoned and reflective thinking, which provides information about what to think or do (Ennis, 1987). Often used to stimulate critical thought to solve problems. | To stimulate employees critical thought to improve work processes and performance. |
| **Personal Mastery** | The discipline of personal growth and learning (Senge, 1990) to generate creative tension. | To improve software developers' performance. |
| **Force Field Analysis** | A framework for studying the factors that influence a situation (Lewin, 1951). A strategic change framework. | To change the working behavior of employees when negative behavior is noticed. |
| **CMMI** | A process improvement approach (SEI, 2011) providing an international standard to control the quality of software. | To create a focus on software development to understand processes where workers fail to perform. |

While Table 3.2 illustrates the four key concepts, theories and tools used in this methodology, Figure 3.2 illustrates pictorially how these theories fit together to create the CPM. Knowledge management acts as a conceptual umbrella, and represents the overall approach taken in this work. The theories/tools within this overall KM approach include personal mastery, CMMI, and force field analysis, while the work is supported throughout by the concept of critical thinking. Together, these aspects allow for the creation of the CPM, which in turn solves the research problem set out in Chapter One and elucidated by Chapter Two.

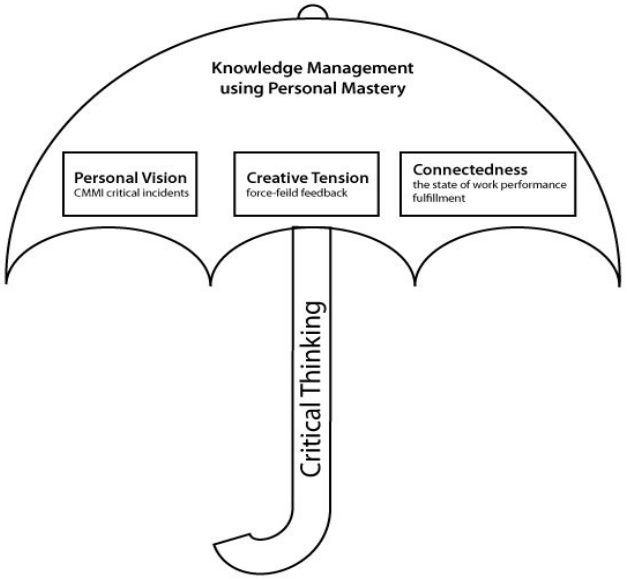


**Figure 3.2 The relationship between the holistic knowledge management perspective in this thesis and the other key theories and tools used in the methodology**

### 3.3 Personal Mastery

As Figure 3.2 shows, personal mastery is one of the key theories applied within the KM approach proposed in this thesis. Personal mastery was introduced by Senge (1990), and is the foundation upon which organisational learning is built. Senge goes on to define personal mastery as the discipline of personal growth and learning. Personal mastery can be elucidated, and this definition refined, to show that personal mastery is more than simply developing competencies, skills and spiritual growth, but is about creating a personal vision, and assessing an individual's current reality

against this vision in order to continually move forward to achieve these goals and visions. There are three main components of the personal mastery concept, including personal vision, creative tension, and connectedness. Figure 3.3 illustrates the principles, essences and practices associated with personal mastery, which together form the basis of achieving personal mastery. Practices relate to what an individual does, principles can be defined as guiding principles and ideas, while essences are considered a state of being, which is reached when people achieve a high level of personal mastery (Senge, 1990).

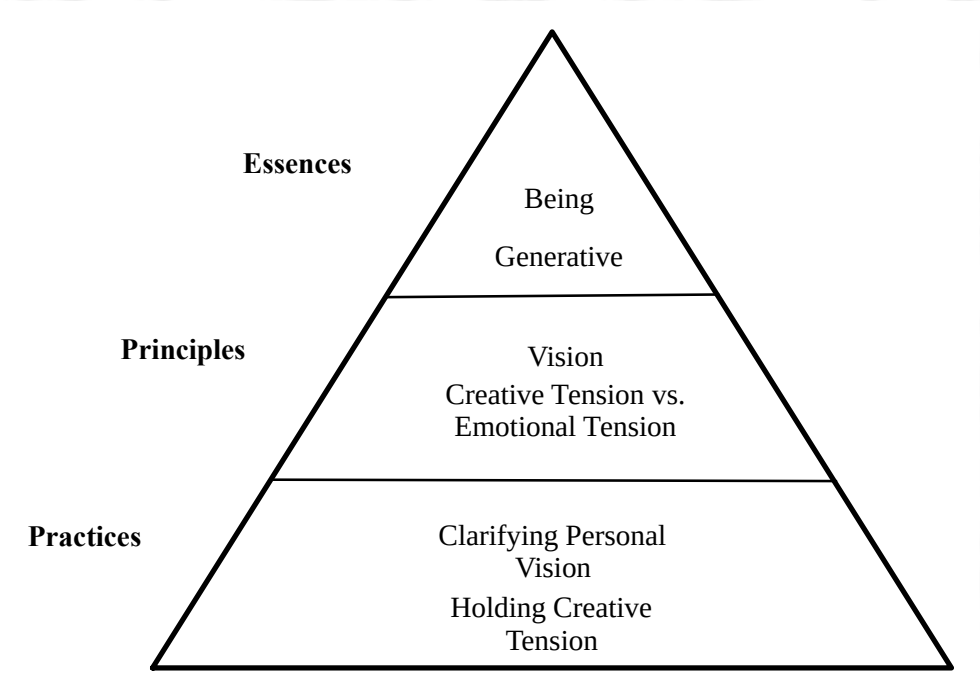


**Figure 3.3 The practices, principles and essences of personal mastery**

Figure 3.3 indicates that the first step in achieving personal mastery is to clarify a personal vision of what an individual wants to achieve, versus their current reality. The next step is associated with generating tension within an individual in order to move toward achieving the personal vision. The final step of being generative is considered as reaching connectedness, which is a fundamental capacity that exists in everyone.

Individuals with high levels of personal mastery can be characterized by the following traits (Senge, 1990):

- A sense of purpose
- Are able to accurately assess their current reality and adjust inadequate presumptions
- Generate and use creative tension to drive forward towards their goals/visions
- See change as an opportunity
- Are deeply inquisitive
- Give high priority to personal connections, but retain a sense of individuality
- Are systemic in their thinking and can thus see themselves as part of a larger system

In this thesis, the application of personal mastery was to increase employees' work performance during their probationary employment period, and potentially beyond. Personal mastery forms the basis of the critical incidents personal mastery model (CPM), which is the central component of this research in terms of enhancing new knowledge workers (software developers) during their probationary employment period. The use of personal mastery aims to ensure that new employees develop a personal vision of what they want to achieve, generate creative tension so that they can achieve this vision, and finally, become connected and achieve true personal mastery. Personal mastery can increase employee awareness, develop responsiveness, and eliminate mindless and impaired thinking. By adopting personal mastery when developing the CPM, the new knowledge workers at the case study firm will be more open and aware of their environment and objectives, and should be able to develop software which meets the needs of their employer without some of the issues that currently affect the German-Thai work environment. The utilization of personal mastery in this research follows the key aspects of personal vision, creative tension and connectedness.

Personal vision is the foundation of personal mastery and acts as a guiding philosophy. By developing employees' personal vision, they will understand how they should be operating and what they wish to achieve, which will in turn create employees' who are more closely matched with the needs of the case study firm.

Creating an effective personal vision will develop knowledge workers who perform in line with their own and others' expectations.

Creative tension can be considered as the gap between where an individual currently sees themselves, and where they wish to be. This gap then generates the appropriate tension to drive an individual forward to achievement. By promoting creative tension, the knowledge workers at the case study will understand their current position as newly recruited probationary employees, and can see where they should aim in order to become effective software developers at the firm. It should be noted that creative tension must not be confused with emotional tension or stress, as this may result in lowering of goals and motivation due to fear or stress. The importance of work-life balance for knowledge workers is thus considered as a central part of this research, especially when identifying issues in the workplace that affect performance and quality. Work-life balance is therefore a grounding mechanism to ensure that the knowledge workers at the case study are attempting to achieve true personal mastery rather than generating tension through stress or fear.

The final step in achieving personal mastery is connectedness. Connectedness relates to individual employees who are able to see their connection to the organisation, their individual learning, and the learning of the organisation in order to achieve organisational success (Giesecke and McNeil, 2004).

The most critical aspect of personal mastery is generating creative tension. To achieve this at the case study, the process of force field analysis was utilized to help employees understand their current position and desired goal in the context of the software development process. As described in Chapter Two (section 2.10.1), force field analysis is a widely used decision support tool, which helps organisations understand the factors which influence change, and enables them to drive changes throughout the organisation.

### 3.4 Force Field Analysis

Force field analysis was originally conceived by Lewin (1943) in the social sciences (more specifically, psychology) as a concept to understand the forces affecting a situation. Both individuals and organisations have since used force field analysis as a tool to understand requirements for change. Force field analysis has been

used extensively by organisations to plan, implement, and develop corporate strategies by considering internal and external forces for change (Thomas, 1985). Figure 3.4 demonstrates the concept of force field analysis and illustrates that in a situation (whether it be the current or desired situation) there are two opposing forces. On the one side, driving forces represent the positive impacts influencing a situation, while on the opposing side, restraining forces represent the negative impacts restricting change. If these opposing forces are in a state of equilibrium, then the situation or state remains the same. If either the restraining or driving forces change, then the equilibrium shifts, which results in changes to the situation. To create successful and positive change, either the driving forces must become stronger, or the restraining forces weaker.

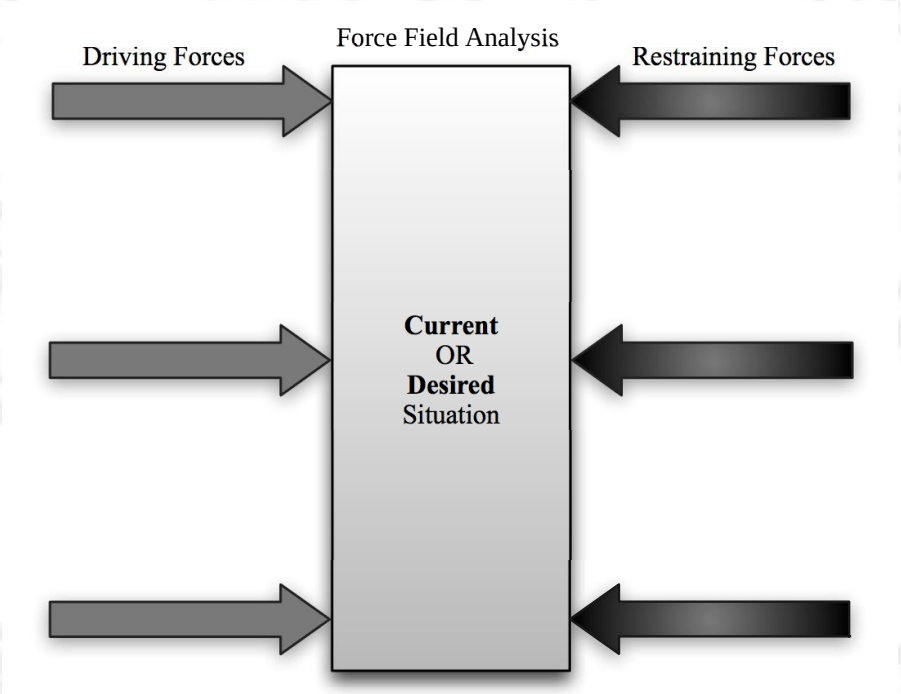


**Figure 3.4 Lewin's force field analysis, including driving (positive) forces for change and restraining (negative) forces for change**

In this work, force field analysis was used to determine which factors guide knowledge workers either towards, or away from a particular state or scenario. Force field analysis was utilized in conjunction with the provision of employee feedback, and the concept of personal mastery, in order to develop the newly employed

knowledge workers during their probationary period and eliminate issues affecting work performance or quality.

In this research, the concept of force field analysis is used in synergy with personal mastery. Senge (1990) notes that personal mastery cannot be taught in traditional ways, and that the generation of creative tension cannot take place from personal vision alone. Therefore, for new employees who have recently graduated, and are not familiar with work practices at the case study, a difficulty arises in creating an employee vision. For example, a newly graduated employee, who has just been recruited to the company is unlikely to be able to generate an effective and suitable vision related to work. By utilizing force field analysis, employees can be given feedback directly relating to their performance at work, and specifically where their performance falls short or requires improvement. By providing this force field analysis feedback, an employee will be able to understand their current situation in terms of performance, and subsequently relate this to the desired performance of the firm. Ultimately, this will enable the generation of creative tension.

While the discussion of personal mastery and force field analysis has so far been limited to its general impact on employees, there is also a need to consider the specific domain of the firm's activities, namely, software development. To effectively consider work performance issues specific to software development, the CMMI (Capability Maturity Model Integration) process improvement tool was used.

### 3.5 CMMI to Understand Domain Specific Work Performance Issues

According to the SEI (2012), CMMI represents a process improvement approach which provides organisations with opportunities to turn their weaknesses into strengths. While personal mastery and force field analysis give an opportunity to address the personal and individual aspects affecting knowledge workers, CMMI was utilized to provide a more focused, work specific orientation when developing the CPM.

CMMI was developed by the Software Engineering Institute (SEI) at Carnegie Mellon University, and thus has domain specific aspects which particularly suit software engineering organisations. The CMMI framework allows organisations to track and improve the central aspects of their work processes. CMMI has five

maturity levels, with each representing an evolutionary step toward a mature software production process.

Currently, the case study firm has no CMMI framework in place. With this in mind, the methodology in this research leveraged maturity level 2 of the CMMI framework. There are a variety of justifications behind the selection of this maturity level. Firstly, CMMI recognizes and rates only CMMI maturity levels from 2 – 5. The first level of CMMI represents processes that are poorly controlled, unpredictable and reactive rather than proactive. The case study firm is clearly above this basic CMMI level, and the rating system provided by CMMI levels 2-5 suggest that CMMI level 2 represents the ideal maturity level from which to begin software specific process improvement.

The CMMI framework allowed the general factors causing work performance and quality issues to be analyzed from a more domain specific viewpoint. The focus of personal mastery and force field analysis is firmly on individual learning, whereas the CMMI framework allows for an organisational perspective to be taken via the critical analysis of organisational work processes.

The theories of personal mastery, and force field analysis were combined with CMMI under the umbrella of a KM perspective in order to build a CPM to improve the work performance and quality of newly recruited employees in their probationary period. The probationary employment period was considered the most appropriate focal point for the research for a variety or reasons, as highlighted below.

### 3.6 The Probationary Employment Period

All workers are hired for two distinct periods: training and work. A probationary employment period is common when firms recruit staff, and according to Loh (1994a), employment probation refers to a fixed length training, monitoring and testing period for newly hired employees. This period allows firms to gather knowledge on workers' productivity. The research focus on the probationary employment period is justified by a number of interrelated factors. Firstly, there is a requirement for companies to separate suitable from unsuitable workers as quickly as possible (Riphahn and Thalmaier, 1999), and an understanding of worker productivity and quality issues (as well as the development of effective personal mastery) is

therefore critical during the probationary period in order to assess knowledge workers' ability. Ultimately, the probationary period affects the firm's competitive advantage, and represents a useful basis for setting the tone for the rest of the knowledge workers' career, by setting out quality and productivity requirements (Loh, 1994b). Setting the tone is particularly important when considering the additional factors of cultural differences between Thai workers and German management at the case study. In addition, the case study firm is classified as an SME, with a relatively limited budget for training and assessment, and therefore the more rapidly workers can understand quality and productivity requirements and complete their probationary period, the more cost effective for the SME. SMEs must use their probationary period wisely as it represents a real opportunity to recruit the right staff and set the tone for the work ahead. SMEs have limited resources to fund protracted recruitment processes and must therefore rely on the probationary period to ensure they do not end up with high attrition of knowledge workers (Kar et al., 2011). Lastly, the probationary employment period represents a useful three month experimental time period in which to design, implement and evaluate the CPM proposed in this research.

### 3.7 The Case Study: A German Software Development Firm Operating in Northern Thailand

The case study approach in this thesis was based at a German software development company in the north of Thailand. The company is headquartered in Germany and was founded in 2002 to provide secretarial services and create software products. The firm has 400 employees, of which 20 are based in the software development department. The subsidiary in Chiang Mai forms the basis of the case study and was established in northern Thailand in 2005 to expand the secretarial services of the company and deliver made to order software products to the German headquarters. The subsidiary employs a total of approximately 200, with 12 employees in software development, including nine web developers, two web designers and one software tester. The decision to locate in northern Thailand (Chiang Mai) was for a variety of reasons, including:

- The presence of an existing and successful IT industry cluster. Such business clusters are reported to increase the productivity and competitiveness of companies, both nationally and internationally (Porter, 2000).

- The cost of labour in Chiang Mai is significantly lower compared to hiring knowledge workers in Germany. According to the International Labour Office (ILO, 2012), the average wage rate of a new software developer in Thailand was approximately $400 USD per month. In comparison, the average wage rate in Germany is approximately $4400 USD per month.

- There is a sufficient supply of skilled knowledge workers in Chiang Mai, which is being developed as a creative city (UNESCO, 2011). In addition to development as a creative city, Chiang Mai has pioneered initiatives such as Software Park Thailand (Mongkolnam, 2009), which have led to the development of the aforementioned IT industry cluster. There are also a number of universities in Chiang Mai contributing to the industrial growth in these regions (Glassman and Sneddon, 2003), particularly through the supply of skilled knowledge workers.

- The infrastructure in Chiang Mai is effective for international business and includes high quality Internet connectivity and convenient air links. According to the CIA (2012), Thailand ranks above some of its neighbours (including Indonesia and the Philippines) in terms of the number of Internet hosts.

The primary activities of the case study firm are related to software development and web design, and can be separated into four main business areas. Table 3.3 illustrates the firm's key activities according to these particular business areas.

**Table 3.3 The primary business areas in which the case study firm operates**

| Business/Web Applications | Directory Services | Mobile Applications | Design |
|---|---|---|---|
| • Super office<br>• Research interface<br>• Lead list interface<br>• Domain admin tool<br>• Designer backend<br>• DCIA (Diamond connection interface Agent)<br>• Accounting<br>• CCB<br>• SEM Tool (Search Engine Marketing) | • Office Finder | • Day Planner | • Websites<br>• Flyers<br>• Logos<br>• Banners |

To achieve its business objectives, the case study firm employs three levels of software developer, with newly recruited developers expected to progress through these levels. The three levels of software developer can be categorized according to the skills and experience of the employees. These three levels are shown in Table 3.4, along with the main distinguishing features of software developers at the particular level.

**Table 3.4 The three levels of software developer in the case study firm, along with their key characteristics**

| Junior Developers | Mid-level Developers | Senior Developers |
|---|---|---|
| • No previous work experience<br>• Work on small development projects, but require supervision and guidance<br>• Must develop company's products by adhering to codes of practice and standards | • Work independently on small projects or as part of a bigger team<br>• Creates concepts and designs small parts of larger developments<br>• Writes efficient, reliable and secure code<br>• Creates test plans<br>• Ability to handle multiple, changing priorities simultaneously<br>• Deliver accurate work and meet deadlines<br>• Excellent analytical, problem solving and multi-task skills<br>• Strong verbal and written communication skills in English<br>• Document new features and functionality to specifications<br>• Must develop company's products by adhering to codes of practice and standards | • More than three years of work experience<br>• Independently interpret detailed functional specifications and develop software that functions exactly as specified<br>• Identify risks in a timely way and manage their mitigation with team leader<br>• Ability to explain and breakdown functional specifications and requirements to developers<br>• Design, development and maintenance of company's products adhering to coding and other standards<br>• Ensure architectural standards are followed<br>• Document new features and functionality to specification<br>• Test product releases and unit tests as part of quality assurance procedures<br>• Ability to communicate with junior and senior members of the development team and project office<br>• Research and adopt new skills/technologies in a short time<br>• Provide feedback to team leaders on any risks or problems identified |

Table 3.4 indicates the key responsibilities of the different seniority levels of software developer at the case study firm. The senior and mid-level developers can be described as being advisors and consultants who are responsible for planning, interfacing with other teams, providing technical direction, and conducting team reviews. In contrast, junior developers are responsible mainly for planning and implementation of tasks.

The work processes at the case study can be split into five main areas: planning, project kick-off, implementation, test, and finally, delivery. These key work processes are shown in Table 3.5.

**Table 3.5 The work process and associated activities at the case study firm**

| Work Process | Activities |
|---|---|
| **Planning** | 1. Choose team leaders<br>2. Choose team members<br>3. Create statement of work<br>4. Define project size and duration<br>5. Create project roadmap (milestones, deadline)<br>6. Approve roadmap and statement of work<br>7. Create product backlog in PM tool<br>8. Agree on versioning |
| **Project kick-off** | 1. Kick-off meeting and presentation poster |
| **Implementation** | 2. Create sprint tasks<br>3. Create code (with inline documentation)<br>4. Present weekly status report/milestones |
| **Test** | 1. Developer test<br>2. Team review<br>3. Department review |
| **Delivery** | 1. Customer review<br>2. Manual and documentation |

The tabular work process data shown above in Table 3.5 is presented graphically, and with more detail in Figure 3.5. It is important to understand the work process at the case study, as this has a direct influence on work performance and quality, and therefore influences the selection of sample groups and design of the CPM.

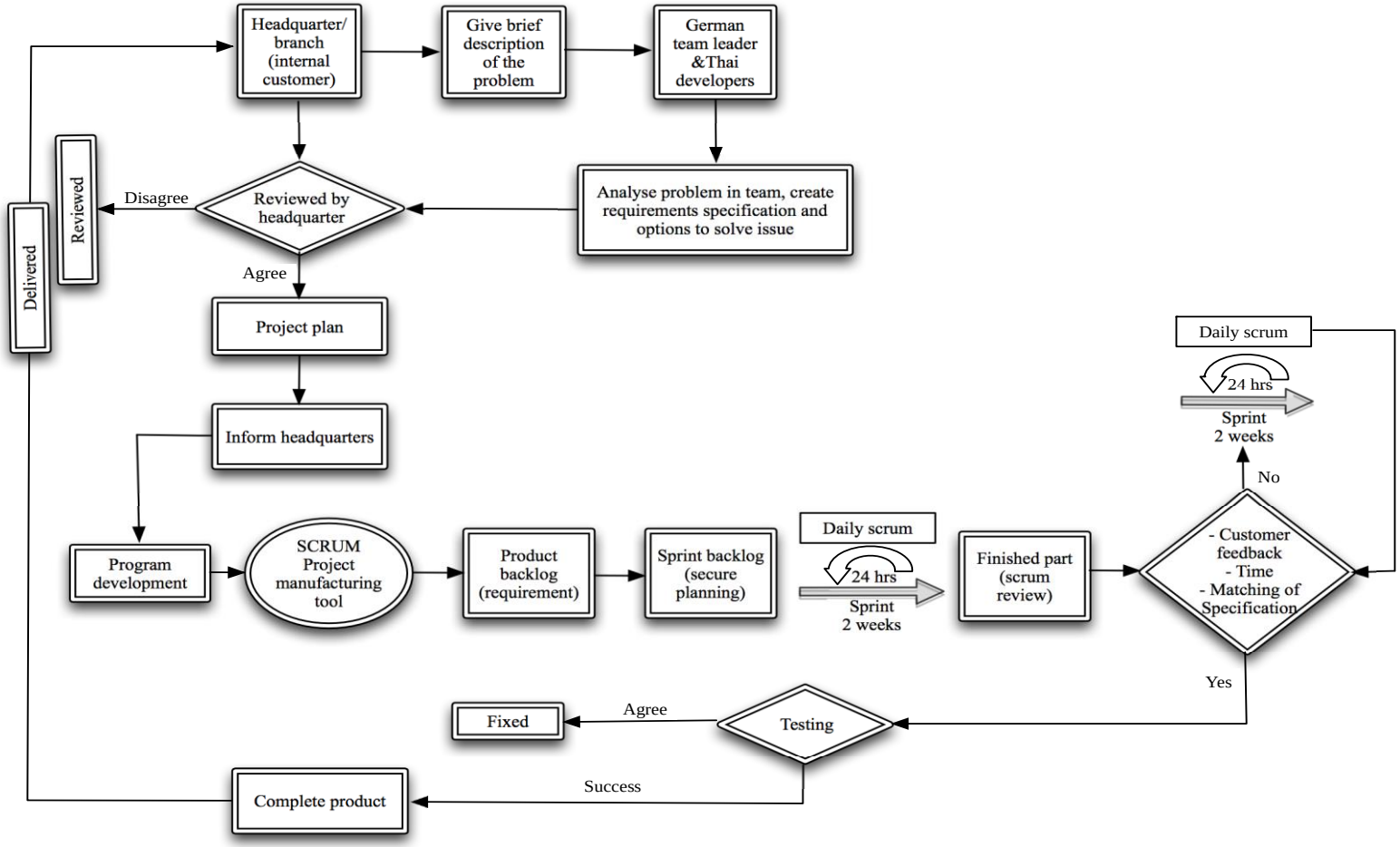


**Figure 3.5 Detailed graphical representation of the work process at the case study firm**

The sample groups at the case study are described in a general sense below, while the detailed methodological process described later in this chapter provides more specific detail about the sample groups in terms of the particular data collection and analysis techniques employed.

### 3.8 Knowledge Resources: The Sample Groups

There were four main sample groups in the research: locally recruited Thai software developers who have passed probation, expatriate German managers in Chiang Mai, Thailand, German managers at the German headquarters in Berlin, Germany as well as their employees: the German software developers who have passed probation. Table 3.6 illustrates the four sample groups used in this work to generate results for steps 1-3 of the research methodology (Figure 3.7), while the text below adds further detail.

**Table 3.6 The four sample groups which acted as knowledge resources**

| Thai Employees | German Employees |
|---|---|
| **Group 1.** Ten locally recruited Thai software developers who have passed probation in Chiang Mai, Thailand **(Total Sample Group Size = 10)** | **Group 2.** One expatriate German manager working in Chiang Mai, Thailand **(Total Sample Group Size = 1)** |
| | **Group 3.** Three German managers located at German Headquarters in Berlin, Germany **(Total Sample Group Size = 3)** |
| | **Group 4.** Six German software developers located at German Headquarters in Berlin, Germany **(Total Sample Group Size = 6)** |

### 3.8.1 Sample Group One: Locally Recruited Software Developers who Have Passed Probation in Chiang Mai, Thailand

Sample group one consists of ten locally recruited experienced software developers, defined as employees who have successfully completed their probationary period and now work as software developers at the case study firm. Their ages range from 20-35 years old, and their experience from just three months (the end of the probationary period) to over two years. The wide range of experience was important during the design of the CPM and enabled input from staff who had only just completed their probationary period, as well as those with significant experience of working as successful software developers. The wide experience in this sample group provided a range of useful perspectives. Samples with less experience were able to provide data nuanced toward the problems they faced as new employees in the probation period, while employees with more experience could provide the data necessary to define what is required from effective software developers. This sample group was key to extracting appropriate data to create the CPM, and are thus designated the control group. The biodata for this group is shown in Table 3.7.

**Table 3.7 The biodata of Thai software developers (the knowledge resource group) who passed probation**

| Sample | Age | Sex | Education | Experience |
|---|---|---|---|---|
| **1** | 20-25 | F | Bachelors degree in software engineering from Mae Fah Luang University | 8 months |
| **2** | 20-25 | F | Bachelors degree in graphic design from Chiang Mai University | 2 years 1 month |
| **3** | 20-25 | M | Bachelors degree in software engineering from Mae Fah Luang University | 5 months |
| **4** | 20-25 | M | Bachelors degree in design from Ratchapat University | 2 years 3 months |
| **5** | 20-25 | M | Bachelors degree in software engineering from Chiang Mai University | 3 months |

**Table 3.7 The biodata of Thai software developers (the knowledge resource group) who passed probation (Continued)**

| Sample | Age | Sex | Education | Experience |
|---|---|---|---|---|
| **6** | 20-25 | M | Bachelors degree in computer engineering from Chiang Mai University | 10.5 months |
| **7** | 26-30 | M | Bachelors degree in electronic engineering from Rachamangala Lanna University | 2 years |
| **8** | 31-35 | F | Bachelors degree in computer science/information technology and management | 3 months |
| **9** | 31-35 | M | Bachelors degree in computer engineering from King Mongkut University | 1 year |
| **10** | 31-35 | M | Bachelors degree in computer science from Mae Jo University | 10.5 months |

### 3.8.2 Sample Group Two: German Expatriate Manager in Chiang Mai, Thailand

This sample group corresponds to the German expatriate manager who works and manages operations at the case study in Chiang Mai. This sample group was necessary in order to gather perspectives from the German manager working with the Thai staff, particularly those perspectives relating to the key problems faced by the Thai employees. Responding to these problems then became a central aim of the CPM.

### 3.8.3 Sample Group Three: The German Management Team in Berlin, Germany

The third sample group consisted of German managers who work at the parent company in Berlin. These managers act as an interface between the subsidiary in Chiang Mai and the parent company in Germany. It was important to gain the perspective from these staff about what is required from the Thai employees, and the problems with the output provided by the knowledge workers in Thailand. The managers at the parent company in Germany can be considered customers of the Thai subsidiary, and thus provide a good indication of what is required from effective Thai software developers. The biodata for this sample group is given in Table 3.8.

**Table 3.8 The biodata for the German management team in Berlin, Germany**

| Sample | Age | Sex | Education | Work Positions | Experience |
|---|---|---|---|---|---|
| **1** | 35-40 | M | Architecture, Master of Arts, Freie Universität Berlin | Financial management (CFO) & Customer service | 4 years |
| **2** | 31-35 | M | Master of Business Administration, Freie Universität Berlin | Chief operation officer, responsible for operations units IT and sales | 10 years |
| **3** | 35-40 | M | Master of Business Administration, Entrepreneurship, Freie Universität Berlin | Chief executive officer, strategic planning and business development | 12 years |

### 3.8.4 Sample Group Four: German Software Developers who have Passed Probation in Berlin, Germany

The final sample group was made up of German software developers employed at headquarters in Germany. This sample group consisted of six employees who were questioned by way of a focus group. The developers in this sample group provided detailed information about the work of the Thai software developers, as this group works closely with the Thai employees on a regular basis. The German developers in this sample group also have wide insight into software development, and are able to perceive issues specific to the software development process, which managers often lack. Table 3.9 shows the biodata for this sample group.

**Table 3.9 The biodata for the German software developers who have passed probation**

| Sample | Age | Sex | Education | Experience |
|---|---|---|---|---|
| **1** | 35-40 | M | Master Degree of Computer Science HS Zittau-Görlitz | 6 months |
| **2** | 31-35 | M | Master of Computer Science FH Nürnberg | 1 year 3 months |

**Table 3.9 The biodata for the German software developers who have passed probation (Continued)**

| Sample | Age | Sex | Education | Experience |
|---|---|---|---|---|
| **3** | 35-40 | M | Master degree, Software Engineering FH/HAW Hamburg | 1 year |
| **4** | 26-30 | M | Master degree of Computer Science, Freie Universität Berlin | 10 months |
| **5** | 26-30 | F | Master of Basic Media, SAE Institute Berlin | 1 year 2 months |
| **6** | 35-40 | F | Master of Business Administration, Freie Universität Berlin | 1 year 1 month |

### 3.8.5 The Experimental Group

The locally recruited software developers are defined as Thai employees who have been adopted in preparation for work, but have not yet begun their full employment period. The samples in this group were about to embark on their probationary employment period, and formed the basis of the testing and validation of the critical incidents personal mastery model (CPM). This sample group was thus termed the experiment group. There were a total of three employees in this group, which represented the entire population of new employees recruited to the case study firm in 2010. All three of these newly recruited employees had recently graduated from university in the field of software engineering. The biodata of this sample group is shown in Table 3.10.

**Table 3.10 The biodata for the experiment sample group**

| Sample | Age | Sex | Education | Experience |
|---|---|---|---|---|
| **Mr. P** | 22 | M | Bachelors degree in software engineering from College of Media, Arts and Technology, Chiang Mai University | None |
| **Mr. A** | 22 | M | Bachelors degree in software engineering from School of Information Technology, Mae Fah Luang University | None |
| **Mr. B** | 22 | M | Bachelors degree in software engineering from College of Media, Arts and Technology, Chiang Mai University | None |

The biodata in Table 3.10 indicates that sample group three represents generation Y. According to Spiro (2006) each generation has a unique and distinctive set of values, view of authority, world orientation and expectation towards their superiors and ideal work environment. Becoming a software developer requires more creativity and innovation than traditional types of work, and a continuous response to changing technology. Generation Y has the characteristics that most appropriately fit the nature of the software development job description. They are familiar with technology advancement, and have an enthusiasm for new skills development. It is however challenging for top management to understand this group of workers. The most successful method for retaining generation Y is coaching, because it provides an opportunity for new employees to learn. Coaching and learning from experienced employees challenges new graduates to take on more challenging work (Spiro, 2006). Sample group three therefore represents generation Y employees, and their need to be understood by management and responded to in a way that is different from traditional types of work and employee.

### 3.9 A Qualitative Case Study Approach: Sample Size Justification

The development of the CPM was based on input from the knowledge resource groups (sample groups) shown earlier in Table 3.6. The methods to gather the information included interviews with German managers at the company headquarters in Berlin, Germany, and the expatriate German manager in Chiang Mai, Thailand. There were also focus groups with German employees at the Berlin headquarters and with existing Thai employees in Chiang Mai, Thailand (for a detailed explanation of sample groups, refer to sections 3.7, 3.8 and 3.9). It is important to state that the sample sizes during development and implementation of the CPM could be construed as being relatively small. Table 3.11 now summarises the sample groups and sizes in the research.

**Table 3.11 Summary of sample groups and sizes**

| **1. Knowledge Resource Group** | **Sample Sizes** |
|---|---|
| **Group One:** locally recruited Thai software developers who have passed probation in Chiang Mai, Thailand (current employees) | 10 |
| **Group Two:** German Expatriate Manager in Chiang Mai, Thailand | 1 |
| **Group Three:** The German Management Team in Berlin, Germany | 3 |
| **Group Four:** German Software Developers who have passed probation in Berlin Germany | 6 |
| **2. The Experimental Group** | **Sample Sizes** |
| **Locally and newly recruited Thai software developers** (new Thai employees for the CPM model implementation) | 3 |

While sample size could potentially be increased for some sample groups, Mason (2010) argues that in qualitative studies, there is a point of diminishing return as sample size increases, and that the frequency of samples is rarely important. Similarly, Crouch and McKenzie (2006) illustrate that in qualitative studies, the

objective is to provide meaning rather than propagate wide-ranging or general hypothesis statements. Figure 3.6 graphically outlines the differences in the overall objectives between research studies which aim to generate a wide range of samples (high frequency) versus research focusing on a small number of in depth samples (low frequency).

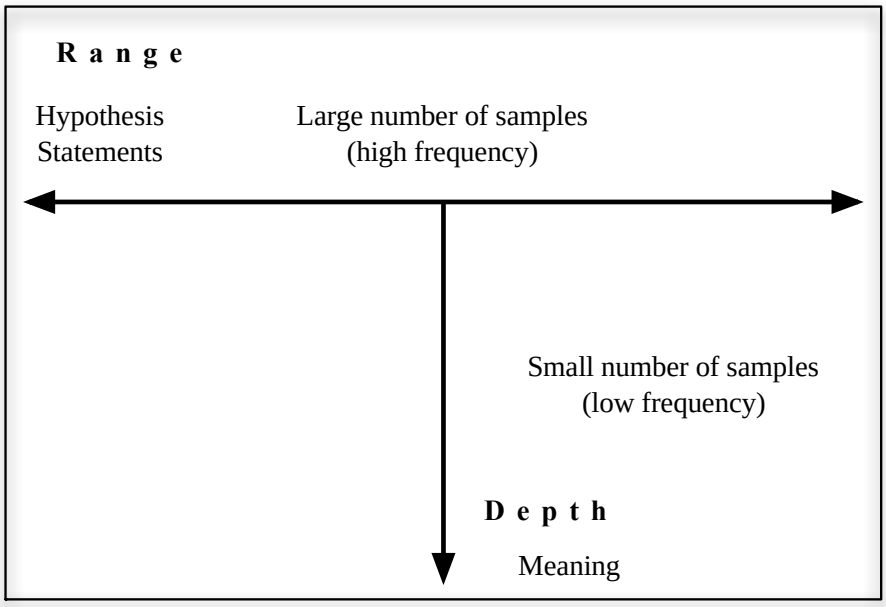


**Figure 3.6 Range versus depth when deciding on sampling strategies**

As shown in Figure 3.6, a small number of samples relates to an in depth understanding of a research problem, and ascribing meaning to those samples. In this research study, the aim is to create a process, and an associated model suitable for the case study firm to utilise when recruiting and developing new knowledge workers during their probationary period. As such, the focus remains on in depth understanding, where one sample is potentially as useful as many. There is significant debate in the literature regarding the appropriate sample size (e.g. Guest, 2006; Cresswell, 1998; Morse, 1994), but the focus in this thesis is the process used to develop knowledge workers, rather than the knowledge workers themselves. Thus the sample size in this research meets the objectives and principles associated with qualitative research, and provides an in depth understanding of issues faced by the case study firm rather than an ill-defined and sweeping investigation interested in a wide range of samples, and creation of general hypothesis statements.

### 3.10 The Methodological Steps

The first part of this chapter has outlined the key concepts and theories used in the research, as well as detailing the case study and sample groups. The second part of this chapter now details the practical methodological steps undertaken in the research, including problem identification, solution design, and the implementation and evaluation of the CPM. Figure 3.7 illustrates the methodological process and associated steps, while the corresponding text details the practical steps taken in the methodology and the relationship with the key theories and concepts already outlined in the first half of this chapter.

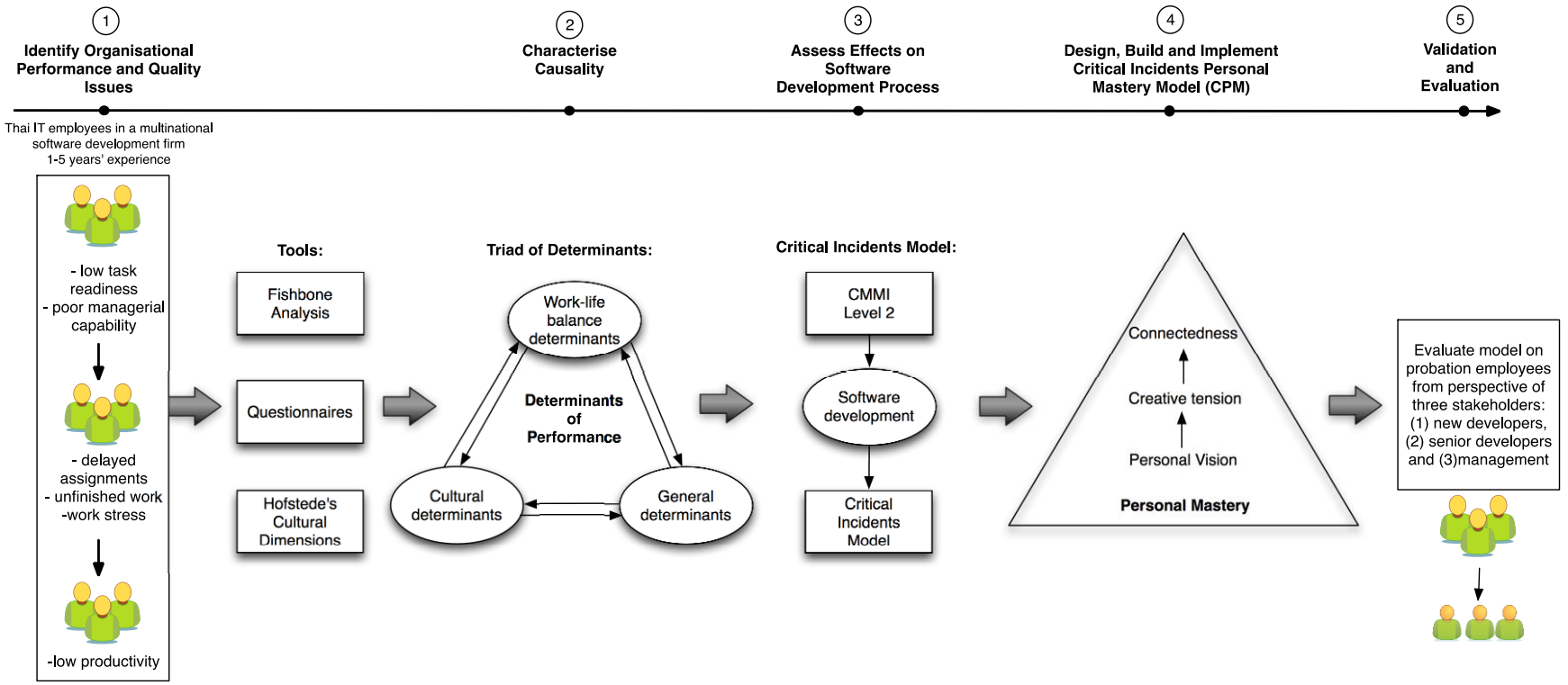


**Figure 3.7 The five key steps followed in the methodology to create the CPM**

### 3.10.1 Step One: Identification of Organisational Performance and Quality Issues

The first key step in the methodology was to identify the research problem in terms of ascertaining the organisational performance and quality issues faced by German management when employing Thai software developers. The main tool in this step involved questioning both the expatriate German managers working in Thailand, and the German management working at the parent firm in Germany. Interviews with management were conducted to gain a managerial perspective of the problems occurring when employing Thai software developers, with a particular focus on the issues during the initial employment period.

The interviews centered on the identification and characterisation of the problems affecting software developers' work performance during their probationary period, with a particular focus on differences in national and organisational culture between German management and Thai workers. At this stage, it is important to explain the concept of work performance, which in this research is defined as employees who understand and undertake work tasks, and deliver outputs according to time and quality requirements.

To identify the issues related to work performance and quality, informal in-depth interviews took place with three German managers from headquarters, and one German expatriate manager working in Thailand. They were asked to describe the difficulties encountered when working with Thai employees, particularly during the probationary period. Managers were the sole focus of data collection at this stage as they were considered as having a holistic view of what they require from their Thai staff, and the issues preventing these requirements being met.

Characterising the relationship between national and organisational culture, and its subsequent effect on employees, was an important component of this research. According to Kroeber and Kluckholm (1952) there are over 150 definitions of culture, but in this thesis culture is taken to mean the continually shifting and dynamic negotiations about values and meanings between people and their environment. Cultural difference is considered a major barrier in an international business environment and a management style suited to one organisation or country may not fit another (Miroshnik, 2002). Culture has at least three main aspects including national

culture, professional culture, and organisational culture (Koester, 2010), with each of these aspects having an impact on a company's operation. Based on the organisational dimension, a well-established organisational culture is significant for a company's success, as it provides both an identity and sense of security to employees. Furthermore, newer employees can often learn what is expected of them via the organisational culture (Newstrom and Davis, 2002).

In response to the importance of cultural issues, when questioning German managers, close attention was paid to the cultural aspects affecting the Thai staff and the performance at the case study firm. When attempting to characterize the causality behind work performance and quality issues, culture was analysed further through the application of Hofstede's (1984) cultural dimensions theory.

### 3.10.2 Step Two: Characterizing and Understanding Causality of Work Performance and Quality Issues

Following interviews with German management including German managers from the headquarter and the German expatriate leading the subsidiary in Chiang Mai, Thailand. The results gained was to determine the work problems at the case study, the next step of the methodology was designed to understand the causes behind management's perceived problems. This was undertaken mainly via questioning of the employees, and using a predetermined framework including three main dimensions affecting work performance, which was designated the triad of determinants.

#### 3.10.2.1 The Triad of Determinants

Based on initial interviews with management and the focus groups with Thais and German employees, three determinants of employee performance were identified. These included work-life balance determinants, cultural determinants and general day-to-day work determinants. Together, these form the triad of determinants, with each individual determinant inextricably linked to the others. Figure 3.8 illustrates the triad of determinants affecting work performance, as well as the relationship between each determinant. To design an effective solution to work performance issues, the three determinants of performance must be understood both individually and

holistically. Therefore to fully understand each aspect in the triad of determinants, suitable tools were selected.

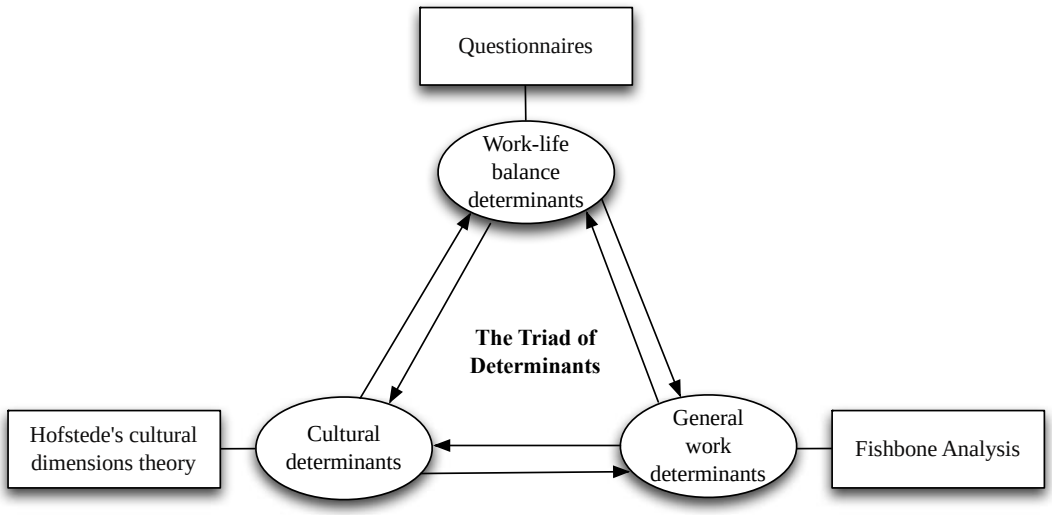


**Figure 3.8 The triad of determinants affecting work performance of Thai employees at the case study firm including the associated tools to characterise and understand these determinants**

### 3.10.2.2 Work-life Balance Determinants

To address issues of work-life balance, questionnaires were distributed to Thai employees in the experimental sample group (experienced Thai developers). Prior to this distribution, German managers introduced the issue of work-life balance so that the Thai employees were aware of the meaning of work-life balance, and all employees had the same background information on the issue before answering the questions. The study of work-life balance in a Thai context is relatively new, so it was important that the issue was introduced to the Thai employees working in an international context so they understood the concept they were being questioned about.

Before completing the questionnaires, the room layout and environment were arranged to facilitate a critical discussion on work-life balance between the employees. The room layout was adjusted to encourage critical thinking and discussion about work-life balance from the employees' own perspectives. Following

this, the questionnaires were distributed to the ten experienced Thai employees for completion.

The first part of the questionnaire captured personal information from the respondents, while the second contained two main questions focused on definitions and perceptions of work-life balance. The two main questions asked to the Thai employees were as follows:

***Question1:*** *What does work-life balance mean to you?*
***Question 2:*** *How would it affect your future plan working at the company and why?*

These two main questions specifically focused on work-life balance definitions in the minds of respondents, and the probability of making decisions about leaving or remaining with the company based on these perceptions of work-life balance. The questionnaires were then analyzed to understand Thai employees' perceptions toward work-life balance when working in a multinational software firm, as well as how these perceptions affected their decision making to stay or leave the company. Following this analysis of work-life balance, cultural determinants were assessed at the case study.

**3.10.2.3 Cultural Determinants: Hofstede's Cultural Dimensions**

Gathering data regarding the cultural determinants was conducting mainly through the process of focus groups with three individual sample groups. The sample groups included German expatriate managers, experienced Thai software developers, and German software developers. Focus groups were conducted separately with each one of these sample groups and used to provide an informal and relaxed discussion about issues of culture. Morgan (1998) suggests that focus groups provide an ideal platform from which to listen, communicate and learn, without any constraints, and without an intimidating atmosphere that can often plague other data collection techniques. For this reason, and in dealing with the sensitive issue of culture, focus groups were considered to be the most appropriate tool.

Focus groups with each of the sample groups lasted for approximately one hour. A set of predetermined discussion topics were also used within the focus group to ensure the appropriate topics were covered and as a way to encourage conversation and communication if the participants dried up during the session.

After completion of the focus groups, the data was analysed to assess issues of German and Thai culture at the case study, and particularly how this impacted upon work, including the performance of knowledge workers, and the quality of the work itself.

As noted previously, the cultural dimensions theory of Hofstede (1984) was then applied to the results from the focus group to further understand the differences between German and Thai cultures and how this impacted the work environment. Figure 3.9 illustrates the five key cultural dimensions of Hofestede's theory, each of which has a significant impact on the way individuals act in terms of their everyday life and work

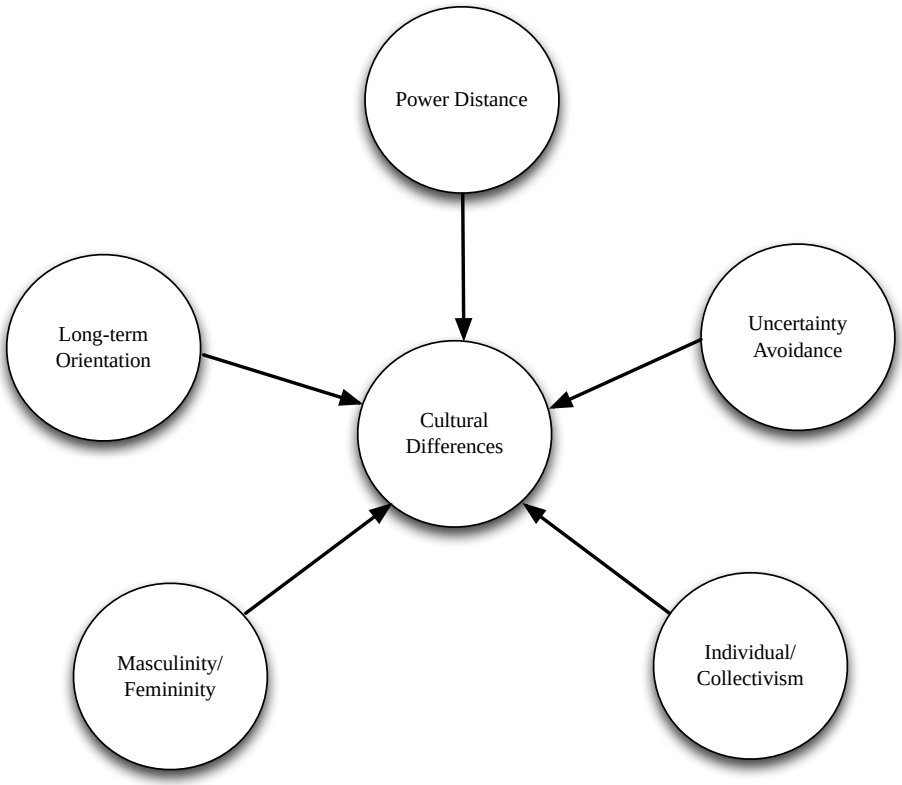


**Figure 3.9 Hofstede's five cultural dimensions**

Hofstede et al. (2012) show that Hofstede's cultural dimensions are effective at understanding the behavior of different individuals in a cross-cultural business environment. Figure 3.10 goes further by illustrating the five cultural dimensions proposed by Hofstede, but plotted on an area graph specific to Thailand and Germany. This illustrates how culturally different the two national cultures are. These cultural differences are expected to translate into cultural discontinuities in the workplace, and the analysis using Hofstede's cultural dimensions thus interprets the cultural issues mentioned in the focus groups according to the five cultural dimensions pioneered by Hoftstede.

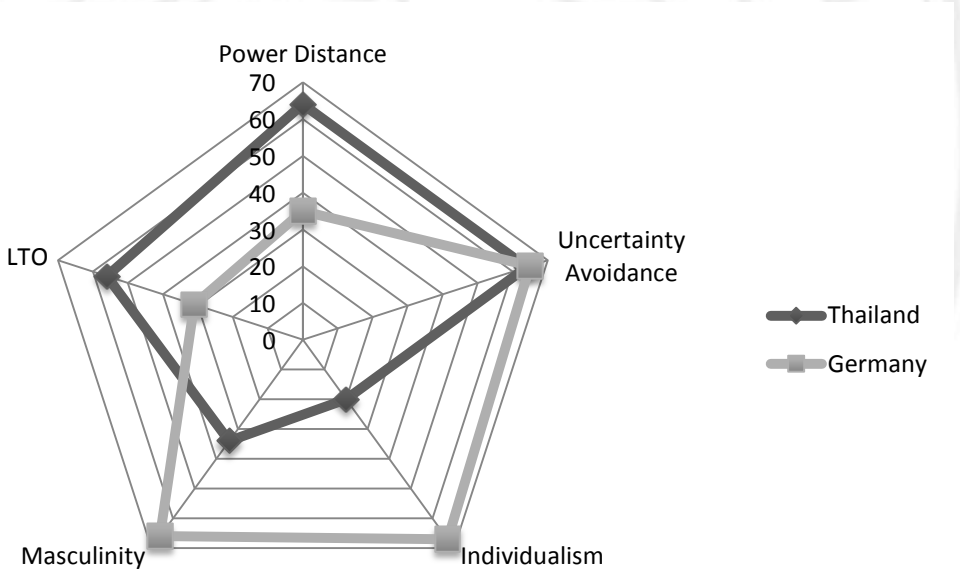


**Figure 3.10 The difference in Hofstede's five cultural dimensions between Thailand and Germany**

### 3.10.2.4 General Day-to-day Work Determinants: Fishbone Analysis

Once the specific aspects of culture and work-life balance had been investigated, the research assessed how the general day-to-day work determinants affect work performance and quality of the Thai software developers. This was an important step in the research, and within the overall triad of determinants. Although many of the identified work issues relate to cultural, or work-life balance issues, a sizeable number of issues are general day-to-day issues, which might be present in

any workplace. Identifying and analyzing these general day-to-day issues enabled an isolation of the more specific cultural and work-life balance issues so that they could be focused on when designing the CPM. The identification of general day-to-day issues was also important so that where possible, these too could be eliminated through the design of the CPM. Gathering the general day-to-day issues was undertaken via a focus group with the ten experienced Thai employees. The focus group lasted for approximately one hour, and was setup to encourage free flowing conversation about the problems affecting employees at the firm. After the focus group was complete, analysis focused on structuring the identified issues via the fishbone analysis technique. The fishbone diagram technique (Ishikawa, 1986) was used to structure the general problems responsible for these work performance issues and identify root causes. The fishbone analysis technique is detailed as a reliable and useful method for diagnosing business problems (e.g. Kettinger et al., 1997). Figure 3.11 illustrates an example pro forma for a fishbone diagram, indicating how it analyses causes and sub causes of issues leading to a particular effect.

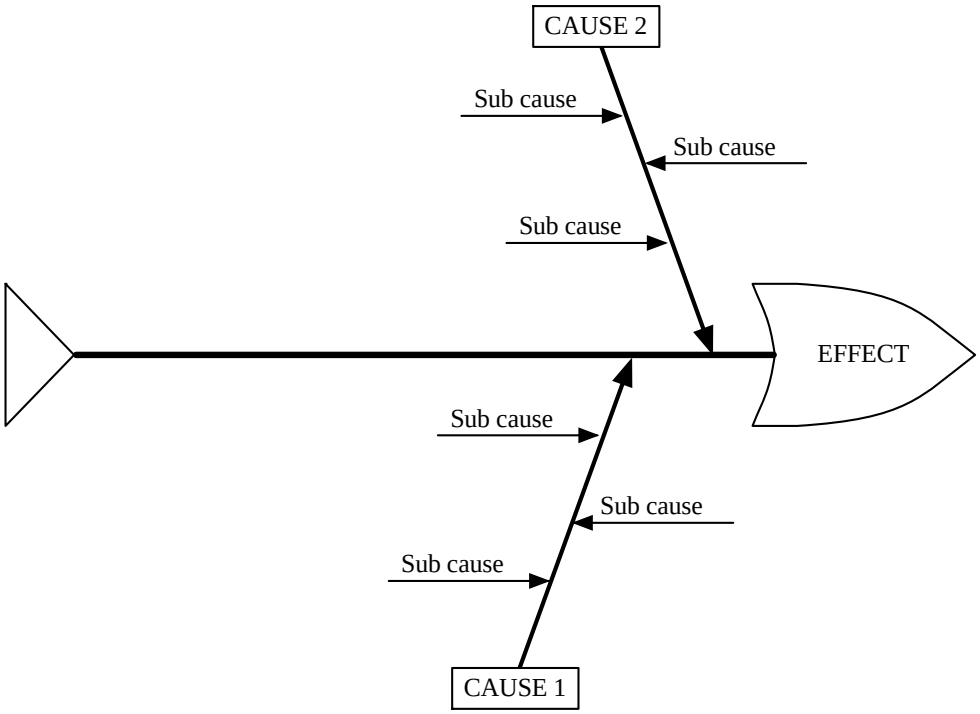


**Figure 3.11 An example fishbone diagram, also known as a cause and effect diagram or Ishikawa diagram**

The fishbone analysis provided a useful way to structure the causes and effects of general issues affecting the German-Thai workplace, but did not allow for a consideration of how the issues affected quality and performance specifically related to software. The next step of the methodology thus investigated work performance issues specifically related to the software development process. This was conducted using the Capability Maturity Model Integration (CMMI) level 2 standard, to structure and analyse performance problems with a specific focus on software development.

### 3.10.3 Step Three: Assessing Effects on the Software Development Process: CMMI

CMMI was developed by the Software Engineering Institute and chosen in this research in order to model problems and causality specific to the software development process. CMMI is commonly used worldwide to improve software processes that result in high quality software, on time, and at low cost (Al Yahya, et al., 2010). CMMI consists of five levels, with Level 5 guaranteeing the quality of software and being the most desired stage. In Thailand however, very few software companies achieve CMMI certification at level 5, as this requires significant testing (Stevens, 2007). Galorath (2006) discovered that most software projects fail due to several key reasons, all related to the employees involved, such as a lack of effective project management, insufficient time to properly plan the project, and a loss of focus when the project is under way. To solve this, CMMI provides objective insight into issues and processes, along with the ability to objectively identify and manage risks and provide early detection and resolution of problems (Goldenson and Gibson, 2003). To analyse the quality of employees' work in the probationary period, and understand causes of specific issues affecting their productivity, CMMI level 2 was adopted as a framework to explain incidents and difficulties encountered by Thai software developers. The five CMMI levels are shown in Figure 3.12.

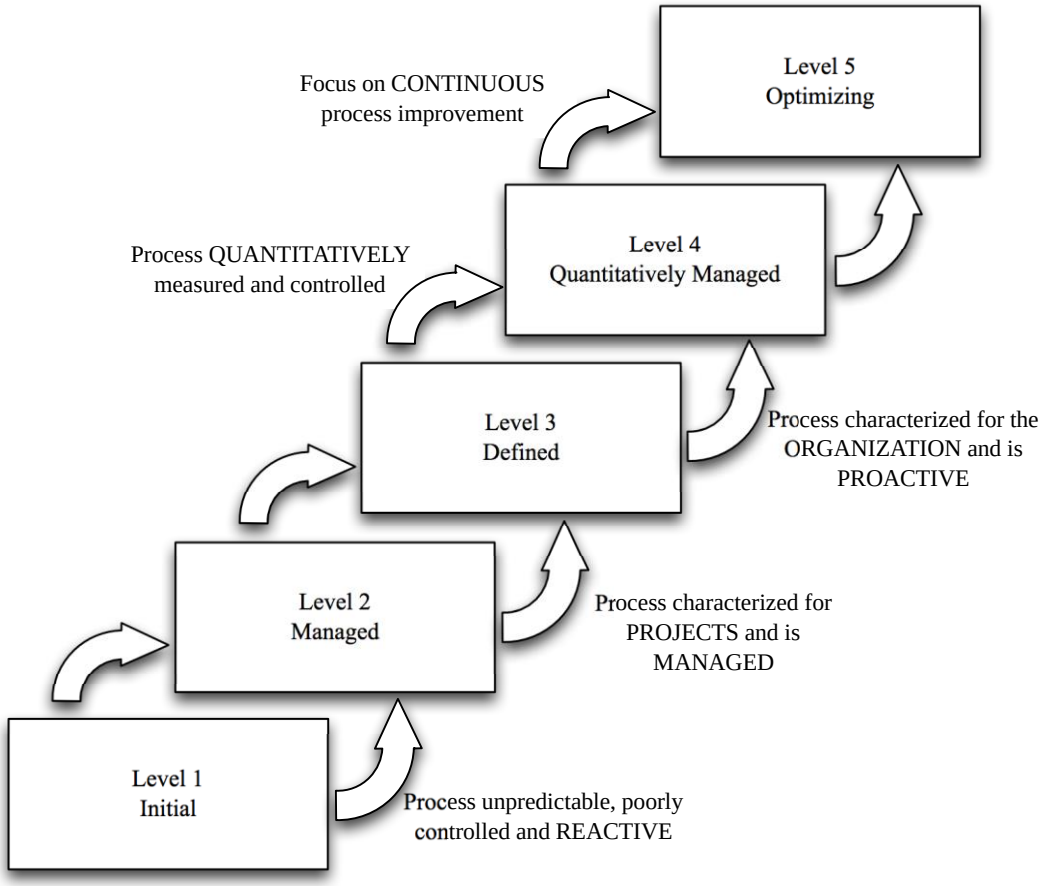


**Figure 3.12 The five CMMI levels**

The CMMI level 2, critical incident technique (Flanagan, 1954) was adopted to clarify the results from the triad of determinants and assess the affect more specifically on the software development process. The problematic events specific to Thai software developers could then be addressed in the development of the CPM. CMMI level 2 was used to identify and categorise 13 critical incidents at work, based on the data collected from the ten experienced Thai employees. This formed the basis of the critical incidents model. These critical incidents, along with the data from the triad of determinants was then used to design the critical incidents personal mastery model (CPM).

### 3.10.4 Step Four: Design, Build and Implement the Critical Incidents Personal Mastery Model (CPM)

The penultimate step in the research methodology included the design, creation, and implementation of the CPM. The CPM was designed based on all knowledge collected in steps one to three, including the work issues identified by management, the causes based on the triad of determinants, and the critical incidents model based on CMMI level 2. The concept behind the CPM is that it is used during newly recruited employees' probationary period to develop their personal mastery. The CPM will thus reduce issues related to work quality and performance, and improve the newly recruited knowledge workers during the probationary period as well as set the appropriate tone for the rest of their career. Figure 3.13 outlines the main methodological process in designing and implementing the CPM at the case study.

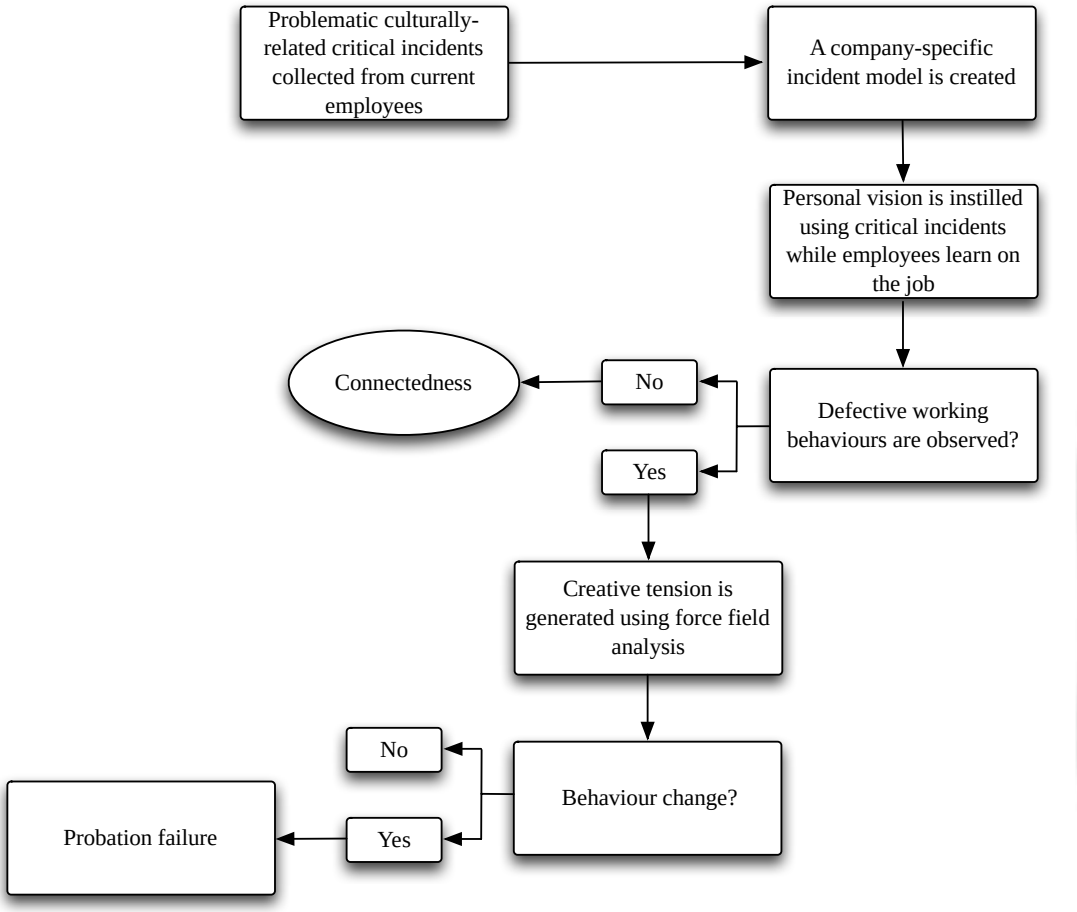


**Figure 3.13 The process of the CPM design and creation**

Figure 3.13 indicates the general process of the CPM, which begins with the critical incident model described in step three of the methodology. The specific critical incidents identified at the case study form the critical incidents model, which is then used to teach the newly recruited employees about the potential issues they will face in their work during the probationary period. The critical incidents model is thus used to create a personal vision for the newly recruited knowledge workers. The personal vision allows employees' to aim for something during their probationary period by way of avoiding the critical incidents shown to them in the CMMI critical incidents model.

Following the creation of personal vision using the critical incidents, the newly recruited employees work for a period of six weeks and their behaviour is observed. Any defective working behaviours are then addressed via force field

analysis to generate creative tension between their current work behavior and the personal vision created at the beginning of the probationary period through the critical incidents model. The employees then continue to work for the remainder of the probationary period. At the end of the probationary period, employees are evaluated to assess their performance and ascertain whether they have achieved the three key components of personal mastery: an effective personal vision, generation of creative tension and connectedness.

Each methodological component of the overall framework within the CPM is described in Table 3.12, along with the rationale for that particular part of the framework and the practical effects in terms of how the theoretical components translate into real effects on the newly recruited employees at the case study firm.

**Table 3.12 The Components of the CPM along with the rationale and expected practical effects on the newly employed knowledge workers**

| Component of Framework | Rationale | Expected Practical Effects |
|---|---|---|
| • Problematic critical incidents collected from previous employees | To create a learning organisation through experiential learning of current employees | Previous critical incidents are taken as organisational culture for newcomers to learn and prepare themselves for future work problems |
| • Critical incident model | Allow new staff to achieve personal vision through experiential learning | Teaching new employees general problems and their causes based on past critical incidents |
| • Personal vision of new employees | To foster personal vision of new employees about work tasks they are in charge of and allow new employees to perform software developer tasks | New employees realize the difficulties that may occur in their work responsibilities. New employees begin work on real company tasks |

**Table 3.12 The Components of the CPM along with the rationale and expected practical effects on the newly employed knowledge workers (Continued)**

| Component of Framework | Rationale | Expected Practical Effects |
|---|---|---|
| • Defective working behaviours in critical incident model | To observe a pattern of defective behaviours that affect performance and quality of work | Defective working behaviours matching critical incidents are used as probation feedback for new employees |
| • Creative tension using force field analysis | Employees' realisation of the difference between their own capacity and company expectations | Stimulates better working practice and increased work quality |
| • Connectedness | To improve work behaviour in alignment with personal and company goals | Perform job with minimal mistakes and to time, quality and cost targets<br><br>Feel themselves as part of the company |

The implementation of the CPM took place within the three-month probationary period. There were five main steps during the implementation of the CPM. These were as follows:

**1. Orientation**

The orientation session begins after employees have been recruited, and starts when employees enter their probationary period. It includes a company and general business introduction, and aims to establish a relationship between the new employees and other colleagues. In terms of the CPM, the aim is to allow new knowledge workers to achieve personal vision through experiential learning of previous employees (the critical incidents). The personal vision is generated via an informational approach; new employees are taught the critical incidents and encouraged to develop critical thinking and personal vision.

**2. Work and Observation**

During this part of the probationary period, employees perform their job and are observed.

**3. Feedback and Force Field Analysis**

This stage of the CPM includes a process of reflection and review, where employees are given feedback. The employees review their own working behaviours and are provided with feedback. The force field analysis provides feedback consistent with the generation of creative tension. This feedback session provides employees with the chance to reflect on how they feel toward work, and how they can solve work problems. The feedback provided aims to be straightforward and inoffensive, and fosters creative tension for the new employees by facilitating the realization of the difference between their own capacity and company expectations.

**4. Work and Observation**

Once again, after the feedback, employees continue to work and be observed.

**5. Employee Evaluation**

The final step of the CPM involves an evaluation of employees based on their probationary performance. During the evaluation, employees are assessed based on the prevalence of CMMI critical incidents. The evaluation acts as a proxy measure of whether the employees have achieved connectedness.

Figure 3.14 illustrates the five stages of the CPM against the three month probationary period timescale.

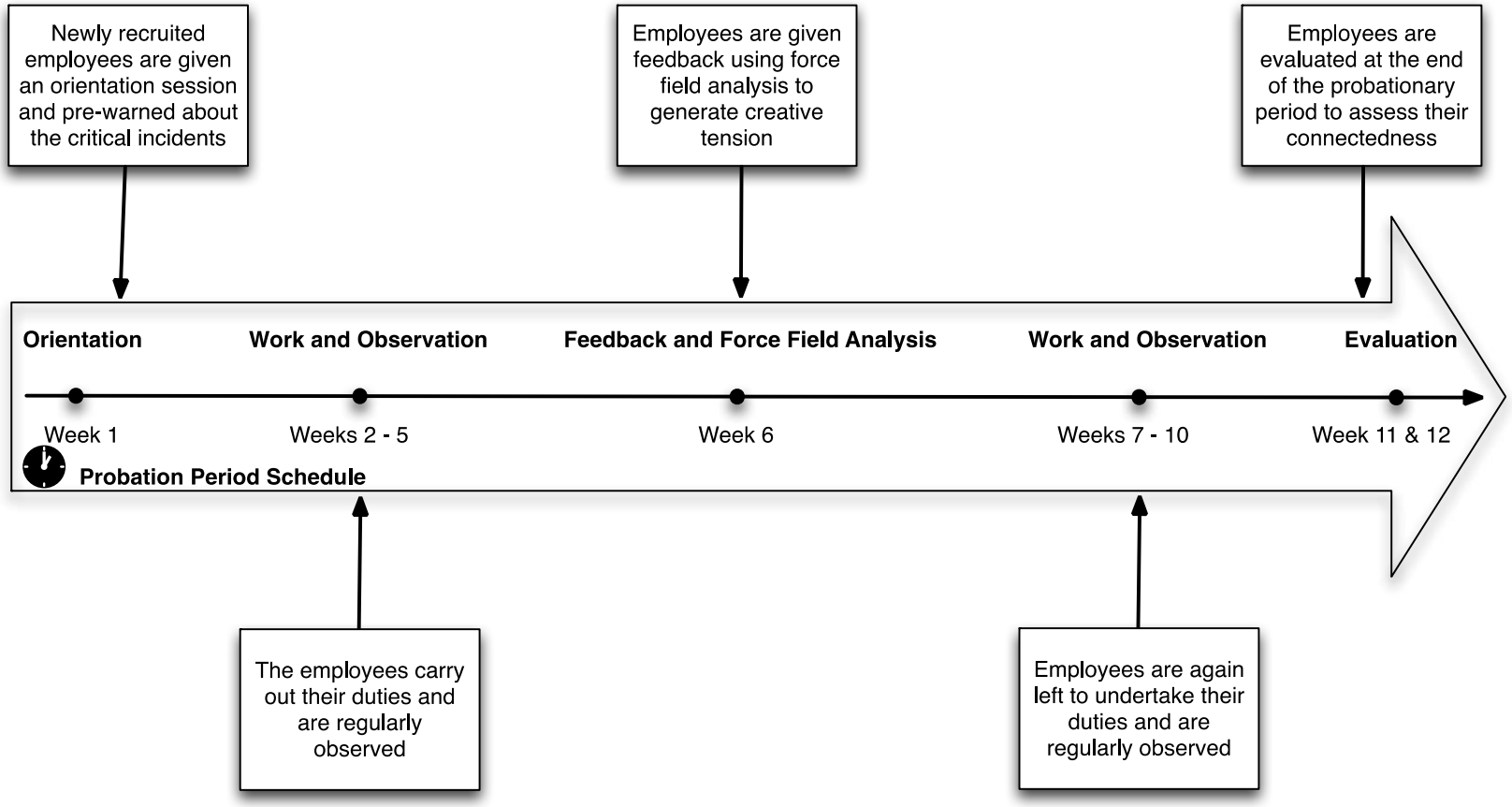


**Figure 3.14 The experimental period of the CPM implementation including the key steps throughout the probationary period**

### 3.10.5 Step Five: Validation and Evaluation

The final step of the methodology related to evaluation of the CPM and revolved around one fundamental question:

*How effective is the CPM compared to doing nothing during employees' probationary period or retaining the current approach to the probationary employment period?*

The evaluation was based around both an individual and organisational perspective. Three main stakeholders were questioned to evaluate the performance of the CPM from both the organisational and individual perspective. The stakeholders and associated methods of assessing their perspective of the CPM were as follows:

1. Newly employed Thai software developers at the end of the CPM probationary period (evaluation based on the number of critical incidents remaining at the end of the probationary period)
2. Senior Thai software developers (evaluation based on informal interviews and a focus group)
3. German managers (evaluation based on an informal interview)

Figure 3.15 indicates the process of the CPM evaluation. Each of the stakeholders was able to contribute to the evaluation process, and when the information was brought together from each one of these stakeholders, an overall evaluation was possible.

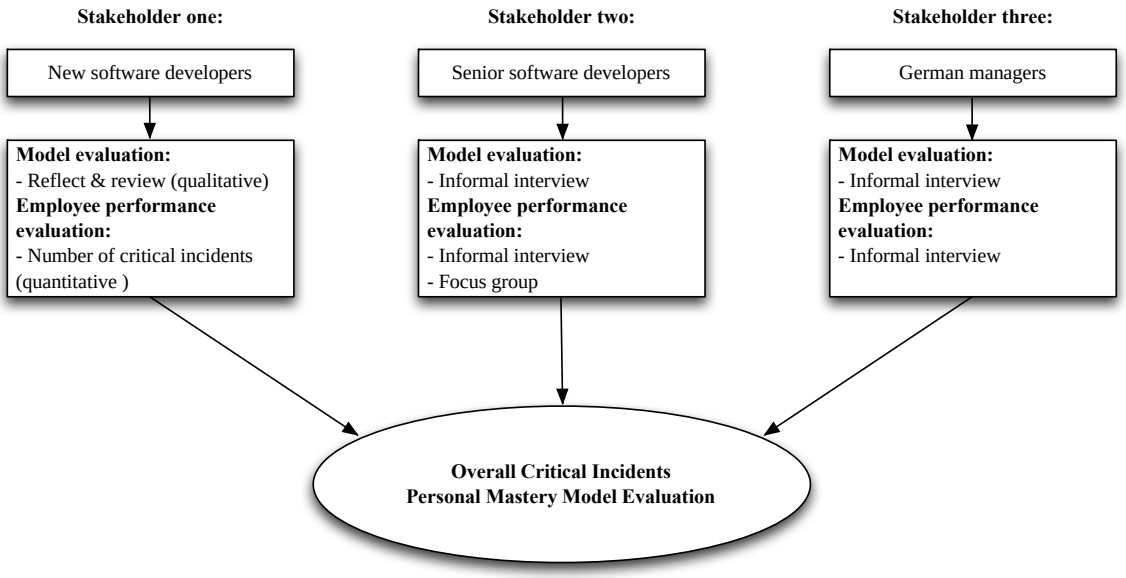


**Figure 3.15 The process of evaluating the CPM**

The new Thai software developers provided evaluation information in the form of the number of critical incidents they made during the probationary period. That is, after the probationary period and implementation of the CPM, how many of the 13 previously identified critical incidents remained? By assessing the number of critical incidents, the success of the CPM from the stance of the new employees could be made. A determination of the ideal characteristics of a new knowledge worker could be achieved through the evaluation with these newly recruited employees and in combination with the data collected from the experienced Thai developers.

The experienced Thai software developers were questioned in via an informal interview, and also discussed the success of the CPM in a focus group. The experienced software developers were questioned about their thoughts on the CPM, the effectiveness of the CPM at reducing critical incidents, and the success of the CPM at addressing the issues identified in the triad of determinants.

Finally, the CPM was assessed from the perspective of German managers working with the Thai employees in Thailand. The German management represent the primary stakeholder, as they determine whether they will continue to employ Thai knowledge workers and whether they deem the CPM valuable or worthwhile enough to implement on a permanent basis. The CPM was evaluated from the German

management perspective through informal interviews, which focused on their opinions about the success of the CPM, their intention to retain the CPM for future knowledge workers, and their thoughts about potential adaptations and updates to the CPM.

### 3.11 Chapter Summary

Figure 3.16 indicates the key experimental steps undertaken to complete this research, including their order and approximate timescales.

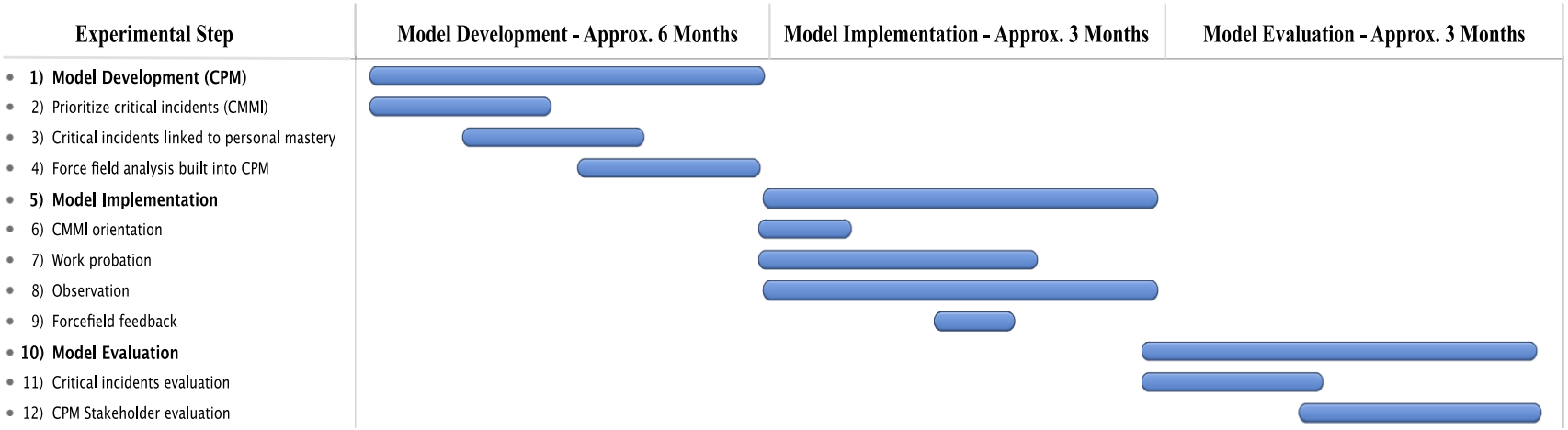


**Figure 3.16 The key experimental steps to develop, implement, and evaluate the CPM presented according to order and timescale**

This chapter has outlined the main theoretical and conceptual approach in this research, particularly by highlighting the knowledge management perspective and the related theories used in the research, including personal mastery, critical thinking, force field analysis, and the need for CMMI in the software specific knowledge work environment. This chapter has also outlined the specific steps and processes in the methodology, which were used to design, create, implement, and test the CPM. Chapter Four now presents the results of these research steps (and the subsequent CPM) according to the order presented in this chapter, and with reference to the concepts and theories from chapters one, two and three.