

A Development of Family Continuity Management for Medical Staffs Based on  
Business Continuity Management

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A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Engineering in Industrial Engineering

Department of Industrial Engineering

FACULTY OF ENGINEERING

Chulalongkorn University

Academic Year 2019

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การบริหารความต่อเนื่องทางธุรกิจ



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต  
สาขาวิชาวิศวกรรมอุตสาหการ ภาควิชาวิศวกรรมอุตสาหการ  
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย  
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คณณัฐ เจริญธรรมโชค : การพัฒนาการบริหารความต่อเนื่องในชีวิตและครอบครัวสำหรับบุคลากร  
 ทางการแพทย์ตามกรอบการบริหารความต่อเนื่องทางธุรกิจ. ( A Development of Family  
 Continuity Management for Medical Staffs Based on Business Continuity  
 Management) อ.ที่ปรึกษาหลัก : ผศ. ดร.ณัฐ ลีละวัฒน์

ทุกวันนี้ การบริหารความต่อเนื่องทางธุรกิจเป็นหนึ่งในโปรแกรมที่สำคัญที่สุดผลมากที่สุดสำหรับการลด  
 ผลกระทบจากอุบัติเหตุ เหตุการณ์ไม่คาดฝัน หรือภัยพิบัติต่างๆสำหรับองค์กรที่มุ่งเน้นการปฏิบัติงานอย่าง  
 ต่อเนื่อง นอกจากการรับมือกับการหยุดชะงักหรือการแทรกแซงทางธุรกิจ การบริหารความต่อเนื่องทางธุรกิจยัง  
 ได้ถูกพัฒนาขึ้นเพื่อกลยุทธ์ใหม่ๆอย่าง "ความยืดหยุ่น" โดยงานวิจัยชิ้นนี้มีจุดมุ่งหมายเพื่อพัฒนาและประยุกต์  
 กรอบความคิดการบริหารความต่อเนื่องทางธุรกิจสำหรับครอบครัวผ่านการนำเสนอโครงการฝึกอบรม "การ  
 บริหารความต่อเนื่องในระดับครอบครัว" ให้แก่กลุ่มตัวอย่างที่เป็นบุคลากรทางการแพทย์ผู้เข้าร่วมจำนวน 51 คน  
 ซึ่งในโครงการโครงการฝึกอบรมครั้งนี้ประกอบไปด้วย 10 ช่วง กลุ่มตัวอย่างได้ให้ข้อคิดเห็นเกี่ยวกับงานวิจัยชิ้นนี้  
 เอาไว้สำหรับพัฒนาโครงการในอนาคตผ่านการสัมภาษณ์แบบพบหน้ากันหลังจากเสร็จสิ้นโครงการฝึกอบรมการ  
 บริหารความต่อเนื่องในระดับครอบครัว ท้ายที่สุดแล้ว งานวิจัยชิ้นนี้ได้ให้คำแนะนำและแนวทางสำหรับการ  
 ปรับปรุงและพัฒนาโครงการบริหารความต่อเนื่องในระดับครอบครัวในอนาคต



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 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

# # 6070132321 : MAJOR INDUSTRIAL ENGINEERING

KEYWORD: Business continuity management, Family continuity management, Family, Plan, Analytic Hierarchy Process, Family plan

Kananut Charoenthammachoke : A Development of Family Continuity Management for Medical Staffs Based on Business Continuity Management. Advisor: Asst. Prof. Natt Leelawat, D.Eng.

Nowadays, the Business Continuity Management (BCM) is one of the most effective programs to reduce impact from crisis, incident, or any disaster for organizations focusing on their continuity operations. In addition to handling the incident which disrupts or interferes the business processes, the BCM has been developed into a new term of strategy like “resilience.” The purpose of this research is to develop and implement the BCM framework program for family. In this study, the proposed “Family Continuity Management” (FCM) program training was conducted for 51 medical staffs. There are 10 phases in the FCM training program experiment. The samples gave their opinions to this study for future program improvement through face-to-face interview after FCM training program. Finally this study establish guides and suggestions for the FCM program future improvement.



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CHULALONGKORN UNIVERSITY

Field of Study: Industrial Engineering

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Academic Year: 2019

Advisor's Signature .....

## ACKNOWLEDGEMENTS

This study has been supported by the Science and Technology Research Partnership for Sustainable Development (SATREPS) in collaboration between Japan Science and Technology Agency (JST, JPMJSA1708) and Japan International Cooperation Agency (JICA). The authors would like to acknowledge the support of all the samples who participated in our study. And I would like to offer my special thanks to Dr. Jing Tang, Asst. Prof. and Dr. Akira Kodaka (Keio University)

Kananut Charoenthammacheke



## TABLE OF CONTENTS

	Page
.....	iii
ABSTRACT (THAI).....	iii
.....	iv
ABSTRACT (ENGLISH).....	iv
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vi
LIST OF TABLES.....	x
LIST OF FIGURES.....	xii
Chapter 1 Introduction.....	1
1.1 Background the study.....	1
1.2 Research objectives.....	3
1.3 Scope of the study.....	3
1.4 Thesis outcomes.....	3
1.5 Research process.....	4
Chapter 2 Literature Review.....	5
2.2 Family as organization.....	5
2.3 BCM.....	5
2.3.1 BCM Program initiation.....	6
2.3.1.1 BCM program charter.....	6
2.3.1.2 BCM program plan.....	7
2.3.2 BCM project initiation.....	8

2.3.3 BCM risk analysis.....	9
2.3.4 BCM selecting risk mitigation strategies .....	10
2.3.5 BCM monitoring and control.....	11
2.3.6 BCM implementation.....	12
2.3.7 BCM testing .....	12
2.3.8 BCM education and training.....	14
2.3.9 BCM review.....	14
2.4 The concept of risk.....	15
2.5 Risk management .....	15
2.6 The processes of risk management.....	16
2.6.1 Risk assessment .....	16
2.6.1.1 Identify risk.....	16
2.6.1.2 Risk evaluation.....	17
2.6.1.3 Risk treatment.....	21
2.7 Business Impact Analysis .....	21
Chapter 3 Methodology and Data collection.....	23
3.1 Thesis workflow.....	23
3.2 Process diagram.....	24
3.3 Data collection .....	25
3.4 Research Experiment.....	25
3.5 FCM training program .....	26
3.5.1 FCM program initiation phase in FCM training program .....	26
3.5.2 FCM project initiation phase in FCM training program .....	26
3.5.3 FCM family risk analysis phase in FCM training program .....	26



3.5.3.1 Family risk analysis .....	26
3.5.3.2 Family Impact Analysis .....	27
3.5.4 FCM selecting risk mitigation strategies phase in FCM training program ..	27
3.5.5 FCM monitoring and control phase in FCM training program .....	28
3.5.6 FCM implementation phase in FCM training program .....	28
3.5.7 FCM testing phase in FCM training program .....	28
3.5.8 FCM education and training phase in FCM training program.....	28
3.5.9 FCM review phase in FCM training program.....	28
3.6 Differences of BCM and FCM .....	29
3.7 Methodology .....	31
Chapter 4 Result .....	36
4.1 Cooperation and problems.....	36
4.2 AHP Results.....	36
4.2.1 Criteria weigh scores .....	36
4.2.1 Effective criteria (Cr1) weight score.....	37
4.2.2 Usefulness criteria (Cr2) weight score.....	38
4.2.3 Less number of steps criteria (Cr3) weight score.....	38
4.2.4 Easy to understand criteria (Cr4) weight score .....	39
4.2.5 Less time-consuming criteria (Cr5) weight score .....	40
4.2.6 No cost criteria (Cr6) weight score .....	40
4.2.7 Popularity criteria (Cr6) weight score .....	41
4.3 Interesting issue from FCM training program experiment .....	42
Chapter 5 Discussion.....	43
5.1 Modified FCM framework.....	43

5.1.1 FCM modified program initiation .....	43
5.1.1.1 The program charter .....	44
5.1.1.2 The program plan .....	45
5.1.2 FCM modified Project initiation .....	46
5.1.3 Family risk analysis .....	47
5.1.4 FCM modified selecting risk mitigation strategies .....	48
5.1.5 FCM modified monitoring and control .....	49
5.1.6 FCM modified implementation .....	50
5.1.7 FCM modified testing .....	51
5.1.8 FCM modified education and training .....	52
5.1.9 FCM modified review .....	53
Chapter 6 Conclusion .....	56
6.1 Research conclusion .....	56
6.2 Limitation .....	58
6.3 Future research .....	58
Appendix A .....	59
Appendix B .....	69
REFERENCES .....	71
VITA .....	77

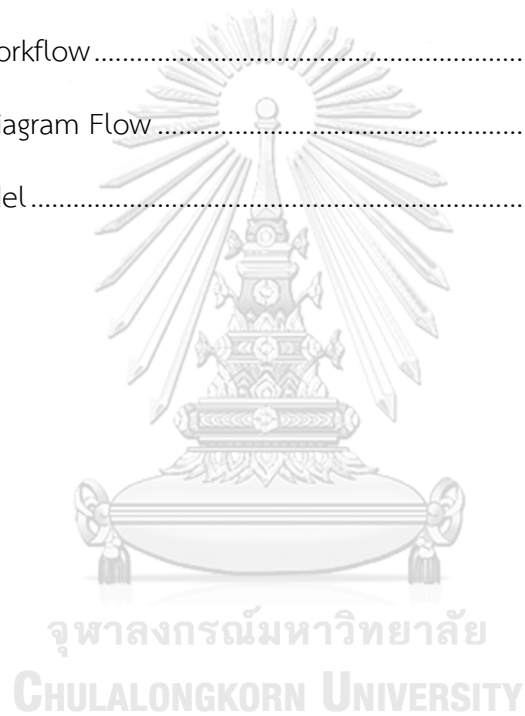
## LIST OF TABLES

	<b>Page</b>
Table 1 Research schedule .....	4
Table 2 Inputs and outputs of BCM program charter .....	7
Table 3 Inputs and outputs of BCM program plan .....	8
Table 4 Inputs and outputs of BCM project initiation .....	9
Table 5 Inputs and outputs of BCM risk analysis. ....	10
Table 6 Inputs and outputs of BCM selecting risk mitigation strategies .....	11
Table 7 Inputs and outputs of BCM monitoring and control .....	12
Table 8 Inputs and outputs of BCM implementation .....	13
Table 9 Inputs and outputs of BCM testing.....	13
Table 10 Inputs and outputs of BCM education and training.....	14
Table 11 Inputs and outputs of BCM review.....	15
Table 12 Three-level definition for severity example .....	17
Table 13 Three-level definitions for severity example .....	18
Table 14 Five-level-five definitions for severity example.....	19
Table 15 Five-level-five definitions for severity example.....	19
Table 16 Comparing between BCM and FCM .....	30
Table 17 Saaty's scale .....	32
Table 18 AHP factors. ....	33
Table 19 AHP Alternatives.....	33
Table 20 Alonso-Lamata RI values .....	34
Table 21 Result the criteria weight score.....	37

Table 22 Summarized effective (Cr1) criteria data .....	37
Table 23 Summarized usefulness (Cr2) criteria data .....	38
Table 24 Summarized less number of steps (Cr3) criteria data .....	39
Table 25 Summarized easy to understand (Cr3) criteria data .....	39
Table 26 Summarized Less time consuming (Cr4) criteria data .....	40
Table 27 Summarized no cost (Cr5) criteria data .....	41
Table 28 Summarized popularity (Cr6) criteria data .....	42
Table 29 Inputs and outputs of Family as an organization structure .....	44
Table 30 Inputs and outputs of The FCM program charter .....	45
Table 31 Inputs and outputs of The FCM program plan .....	46
Table 32 Inputs and outputs of family risk analysis .....	48
Table 33 Inputs and outputs of FCM modified selecting risk mitigation strategies.....	49
Table 34 Inputs and outputs of FCM modified monitoring and control .....	50
Table 35 Inputs and outputs of FCM modified implementation .....	51
Table 36 Inputs and outputs of FCM modified testing .....	52
Table 37 Inputs and outputs of FCM modified education and training .....	53
Table 38 Inputs and outputs of FCM modified review .....	54
Table 39 FCM suggestion .....	55
Table 40 Conclusion of FCM training program .....	56

## LIST OF FIGURES

	Page
Figure 1 Mitigation of Risk .....	11
Figure 2 3x3 qualitative risk matrix example .....	18
Figure 3 5x5 Semi-quantitative Risk matrix Example .....	19
Figure 4 Quantification of risk .....	20
Figure 5 Thesis Workflow .....	23
Figure 6 Process Diagram Flow .....	24
Figure 7 AHP model .....	32



## Chapter 1 Introduction

Chapter 1 is going to describe problems' background of nearby risks in these days. It is contained issues of natural disaster perspective, nearby risks, strengthen of Business Continuity Management (BCM), and meaning of family. After that, the concept of Family Continuity Management (FCM) is mentioned. In addition, there are objectives, scopes and expectations of this study in this chapter. Finally, the research schedule processing of work is shown.

### 1.1 Background the study

Since 1968, there have been increasing dramatically of the number of people who facing disasters. It is true that human destroyed the nature and ecosystems through deforestation, industrial waste, trash in the rivers, greenhouse gas emission, etc. But Wahlstrom and Guha-Sapir (2015) said, the actual cause of the increasing numbers is not the frequency of disaster, but it is the exposure. For example, people choose to live in high-risk area (e.g., flood plains, earthquakes zones) more than the past. Although the number have been increasing, but the data of the world deaths record (GBD 2016 Risk Factors Collaborators, 2017) gave a question to us whether there are other risks that people must worry about.

BCM is the framework program for cope disruption from disaster or any incident. There were implemented and adopted BCM widely among companies world-wide. This program has proven itself through incidents, disasters and potential disasters. For example, the 'Millennium Bug'; Terrorist attacks in the United States of America (11 September 2001); in Madrid, Spain (March 2004); in London, United Kingdom (7 July 2005) and in Mumbai, India (July 2006), the Buncefield industrial disaster (December 2005), Hurricanes Katrina and Rita during the 2005 Atlantic Hurricane Season, The wide-area East Coast US, London and European power outages in 2003, the SARS communicable disease outbreak in 2003 (Hiles, 1994). The BCM program has been implemented so far from the beginning. It has been guided by the Business Continuity Initiation (BCI) (Hiles, 1994). The examples of high level auditable BCM standard include BS25999-1:2006 (British), BS25999-2:2007 (British), ISO/PAS22399:2007, SS540 (Singapore), AS/NZS 5050:2010 (Australia, New Zealand), ISO 22301:2012, and ISO 22301:2019 (The British standards Institution, 2006), (The british standards Institution, 2007), (The Internation Organization for Standatdization, 2007), (The Singapore Standard, 2008), (Standards Australia, 2010), (The internation Organization for Standatdization, 2012), (The internation Organization for Standatdization, 2019).

Moreover, the strength of BCM is its high flexibility. At the beginning, the concept of BCM only concerned about the IT area. But nowadays, BCM became worldwide management standards for all industry fields and also for local government around the world (Hiles, 1994). On a condition that the aim of business or organization is to find the method for continuity against interrupting. It can fit in anyway, no matter what the threat is. Now, not only big company, huge enterprise and government organization but BCM is also receiving the increasing of attention from the Small and Medium Enterprises (SMEs) and they are trying to implement it (Kato & Charoenrat, 2018).

Meaning of family has been evolved from the past. Now in the twentieth century, Waite (2000) defined 'family' as a 'social organization'. Family has their own goals, work specializations, structure, chain of command, responsibility and unity of command. However, it has never been defined clearly. Family has many things that can be lost and interrupted by threats (e.g., financial, information, activity, operation, goal, purpose). Risk may have ways to be mitigated, but in mostly present plans just focus on considering about transferring risks such as buying some insurance programs and/or accepting it through a financial plan.

When disaster occurred, the hospitals in the disaster area were extremely busy. For over the years, healthcare industrials try to learn about disaster resilience. It has been purposed that healthcare staffs were required to attend and training about disaster resilience (Lakbala, 2016). But in the actual situation, medical staffs themselves were also affected (damaged road, family members be affected by disaster). Ukai (1996) concluded that when disaster came, there were less than 50% of medical staffs could attend to their hospital. According to this issue, this research focuses on medical staffs who must bring their life back to normal as soon as possible for doing their job efficiency.

To continue business when being interrupted by disaster, there is a concept of BCM to manage continuity process. In personal life, there are also some risks to create an interruption because of some incident, too. It is obvious that mainly risks impact in these days that most people worry about are financial, health, and safety. And mainly risk impact can be mitigated by financial plan, insurance plan, and emergency plan. But there are still impact from risk in other angle, which is ethic impact, legal impact, recreation impact, and social impact (Weber, Blais, & Betz, 2002). It is undeniable that the other impacts are ignored but they are also still affected. Maybe people do not intend to ignore the other impacts from risk around them but maybe they have no tools for cope with them. That is the reason why this research chooses to propose FCM

model for family, give them the other choice in their life to deal with the other impacts from risks around them.

Due to the mentioned interesting issues, this study would like to pay attention to the concept of the BCM in the dimension of family. As a result, the main question of this study is “Can the BCM be applied into a family level as a social organization and provide people more options to manage any risk?”

### **1.2 Research objectives**

To find out the weak points of each phase and improve the suggestion after analyzing the proposed family continuity management framework based on the BCM according to the samples' opinion through AHP and discussion.

### **1.3 Scope of the study**

There are 51 samples in this study. They are from a hospital in Chonburi province, Thailand. The AHP is used to analyze their opinions after finishing the FCM training program.

This study focuses on FCM model framework analyzing by AHP to find out the weak points of each phase in FCM and suggestion for future improve.

The duration of the FCM is relied on the consideration of the samples.

### **1.4 Thesis outcomes**

Outcomes of this thesis are weak points in each phase of the FCM framework and the suggestions according to the samples' opinions. These weak points can be considered to improve and develop FCM framework in future research. The suggestion can be taken into account to develop the further FCM training program and FCM model framework.





## Chapter 2 Literature Review

This chapter provides an overview of previous researches on BCM subject and associated papers. It is going to tell why this thesis interested to implement BCM into family life. According to the ScienceDirect data base from January 1, 1999, to December 31, 2018, the finding shows that there is no paper related to business continuity management and family together (Charoenthammachoke, Leelawat, Tang, & Kodaka, 2020).

### 2.2 Family as organization

Family has many definitions. In the main concept, it is a group of people who reproduce, raise children, share resources, and manage consumption together (Waite, 2000). Waite (2000) also concluded a family as a social organization by evaluating social institutions from example of evaluating marriage as a social institution focus on cost and benefits of marriage (e.g., physical health, emotional well-being, sexual activity and sexual satisfaction, well-being of children, career attainments, wealth and assets, and domestic violence) to the men, women, and children involved.

### 2.3 BCM

The beginning of BCM is the business continuity institute (BCI) in 1994. This institute started from giving guidance by professional. There were more than 4,000 members in 85+ country. Then develop to BCM and now become to world-wide consistent standard (Hiles, 1994).

After reviewed ISO 22301:2012, ISO 22301:2019, and F. Gibb and S. Buchanan (2006) framework, this research decided to choose F. Gibb and S. Buchanan (2006) to establish guideline for improving and develop FCM framework. According to F. Gibb and S. Buchanan (2006) framework was establish in the beginning of BCM like FCM in this research, and had business technical term less than ISO 22301: 2012 and ISO 22301: 2019 (The international Organization for Standardization, 2012), (The international Organization for Standardization, 2019).

F. Gibb and S. Buchanan (2006) said “Business continuity management (BCM) is a tool that can be employed to provide greater confidence that the outputs of processes and services can be delivered in the face of risks”(p. 129), They categorized the BCM into 9 phases:

1. Program initiation.
2. Project initiation.
3. Risk analysis.
4. Selecting risk mitigation strategies.

5. Monitoring and control.
6. Implementation.
7. Testing.
8. Education and training.
9. Review.

### **2.3.1 BCM Program initiation**

There were two important things in BCM program initiation phase, the program charter and the program plan.

#### **2.3.1.1 BCM program charter**

The program charter was established for draw scope of clearly budgets, authority, and mechanisms. It has to explain flow of the budgets and define clearly explaining reports. And also had to provide the systems to handle it. Authority of BCM team needed to spend in terms of individuals, but the charter needed to define limit of their power too. This charter also must have mechanism for the team in the event. Because this BCM program needed to credible, relevant, and cost effective.

Leader of this team needed able to significantly provide information. So, the team leader should be the who could access a top-level, strategic. The outputs of this charter should provide confidence to investors toward the enterprise's attitude and risk preparation. And it also had to tell establishing BCM needed. The finally key steps to establishing this program charter was mapping business processes and associated resources, developing guidelines, and establishing appropriate monitoring and control mechanisms.

From **Table 2**, the charter requires inputs from many departments of organization. That is the reason why the charter should be responsibility of a senior manager. This program charter needed background information like business strategy, information strategy, policies and procedures, regulatory regimes, organizational structure, processes and workflows, and accounting standards (see in **Table2**). And the outputs of this program charter (see in **Table 2**) was inputs in the program plan and the next phases to ensure whether BCM program could be established.

Table 2 Inputs and outputs of BCM program charter

Inputs	Key activities	Outputs
- Business strategy	- Define and agree program scope,	- Agreed key processes
- Information strategy	roles, responsibilities, and	- Checklist of external regulatory
- Policies and	processes	issues
procedures	- Identify and specify guidelines	- Agreed ownership and
- Regulatory regimes	for conducting BCM	accountability matrices
- Organizational	- Establish monitoring and control	- Business assumptions and
structure	mechanisms	expectations
- Processes and		- Risk analysis toolkit
workflows		- Resource allocation and
- Accounting standards		accounting procedures
		- Testing cycles and procedures
		- Review cycles and procedures
		- Training and induction policy
		- Documentation and reporting
		policy
		- Compliance auditing
		procedures
		- Change control procedures

Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, *International Journal of Information Management*, 26, p.130. Copyright 2005 by Elsevier Ltd.

### 2.3.1.2 BCM program plan

The program plan was contained about detailing of what, how and when specific BCM projects were initiated. It had to tell whether the group who ran the initiate, and how they financed. In this phase, the needed information for initiate were gathered. It had able to tell, how many people they wanted, what data do they wanted, how many budgets they needed to prepare the presentation.

To be established the program plan, its needed background information and program charter (see in **Table 3**). And after the program plan established, it delivered the outputs (see in **Table 3**) to tell detail of BCM program process and to find the appropriate BCM program team.

Table 3 Inputs and outputs of BCM program plan

Inputs	Key activities	Outputs
- Business strategy	- Collect stakeholder input	- Agreed prioritized initiatives
- Information strategy	- Collect, merge and	- Project leaders
- Financial plans	assess business priorities	- Project sponsors
- Program charter	- Scope program plan	- Terms of reference for initiatives
- Business expectations		- Cost-estimates
- Business priorities		- Timetable
- Customer and stakeholder maps		- Dependency matrix
		- Documentation templates and standards
		- Communication plan

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, International Journal of Information Management, 26, p.130. Copyright 2005 by Elsevier Ltd.*

### 2.3.2 BCM project initiation

In the second phase, the background information data was gathered by the team as much as possible for project initiation. In initiating must tell the managers, what were they going to do, what were the processes of this program, what were the project scopes, what were this project goals and objectives, what were they need to establish BCM program (team, budget, resource allocation, instruments), and what were their timeline and when did this program finish.

After established the program charter and the program plan, there are showing required information of this phase in **Table 4**. The outputs of this phase (see in **Table 4**) will be describe the all of details in this BCM project to the stakeholders.

Table 4 Inputs and outputs of BCM project initiation

Inputs	Key activities	Outputs
- Business strategy	- Develop survey instruments	- Process/service knowledge base
- Information strategy	- Gather background data and information	- Project scope
- Program charter	- Create knowledge base	- Goals and objectives
- Program plan	- Identify business needs and benefits	- Team
- Existing plans and procedures	- Evaluate existing plans	- Budget and resource allocation
- Vendors and service providers	- Develop project plan	- Survey instruments
- Staff lists		- Work package descriptions
- Organizational chart and locations		- Timetable and milestones
- Insurance coverage and policies		- Deliverables
- Annual reports		
- Regulators' codes of practice		
- Stakeholder expectations		
- Off-site facilities		
- Key customers		
- Infrastructure descriptions (architectures, configurations floorplans, inventory, etc.)		
- Maps		
- Event list (action and impact)		
- Contracts (suppliers and customers)		
- Vital records schedule		

Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, *International Journal of Information Management*, 26, p.131. Copyright 2005 by Elsevier Ltd.

### 2.3.3 BCM risk analysis

F. Gibb and S. Buchanan (2006) broke this phase down into three subphases that were risk identification, risk evaluation and business impact analysis (BIA). In this phase also needed lots of background information, many instruments and expert team take care of it succinctly.

This phase required information of the organization to calculate in three subphases (see in **Table 5**). To be selected risk mitigation strategies in the next phase, it needed prioritized risks which needed risk register, probability and impact scales, and probability-impact scores.

Table 5 Inputs and outputs of BCM risk analysis.

Inputs	Key activities	Outputs
- Program charter	- Identify risks	- Risk register
- Program definition	- Evaluate risk impacts	- Probability and impact scales
- Project specification	- Estimate probability of risk	- Probability-impact scores
- Technology architecture	- Estimate frequency of risk	- Prioritized risks
- Application architecture	- Calculate risk scores	
- Process map and workflows		
- Building plans		
- Maps of localities		
- Generic risk checklist		
- Statistics on risk		
- Interview		

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, International Journal of Information Management, 26, p.132. Copyright 2005 by Elsevier Ltd.*

#### **2.3.4 BCM selecting risk mitigation strategies**

In the fourth phase, there were many ways to deal with the risks and for each risk, there may be one or more solutions to deal with it (see in **Figure 1**). There was no one be right or wrong. All of every option for managed the identified risks depended on the strategies.

As mentioned in previous phase, this phase required information from the previous phase and more to select risk mitigation strategies (see in **Table 6**). After finished this phase, the organization got risk mitigation strategies, disaster recovery plans, emergency response teams, and command and control structure (see in **Table 6**).

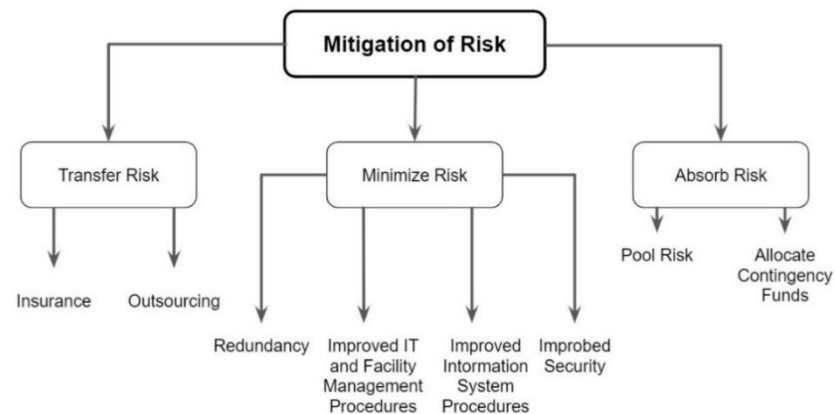


Figure 1 Mitigation of Risk

Note. Adopted from "A framework for business continuity management," by F. Gibb and S.Buchanan, 2006, *International Journal of Information Management*, 26, p.135. Copyright 2005 by Elsevier Ltd.

Table 6 Inputs and outputs of BCM selecting risk mitigation strategies

Inputs	Key activities	Outputs
- Program charter	- Option identification	- Risk mitigation strategies
- Program definition	- Option appraisal	- Disaster recovery plans
- Project specification		- Emergency response teams
- Information strategy		- Command and control structure
- Technology architecture		
- Application architecture		
- Process map		
- Building plans		
- Map of localities		
- Prioritized risks		
- Incident reports		

Note. Adopted from "A framework for business continuity management," by F. Gibb and S.Buchanan, 2006, *International Journal of Information Management*, 26, p.134. Copyright 2005 by Elsevier Ltd.

### 2.3.5 BCM monitoring and control

To monitoring and control the outcomes of evaluating and identifying in previous phase, this phase needed effective communication, command and control structure to make sure that the requirements of the plan are translated into action.



So, there are requiring outputs from previous phase to be inputs in this phase (see in **Table 7**). The organization got education and training program, testing regime, incident reports, and review regime after finished this phase.

Table 7 Inputs and outputs of BCM monitoring and control

Inputs	Key activities	Outputs
- Program charter	- Ensure governance of BCM	- Education and training
	- Assure BCM requirements are met	program
- Program definition		- Testing regime
- Project specification		- Incident reports
- Information strategy		- Review regime
- Risk mitigation strategies		
- Disaster recovery plans		
- Emergency response teams		

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, International Journal of Information Management, 26, p.137. Copyright 2005 by Elsevier Ltd.*

### 2.3.6 BCM implementation

In the sixth phase, the plans implemented on every departments in organization by helpful from staff managers who had special knowledge to specify, select, procure and monitor implementation of additional technologies and services. Made sure that BCM concept were integrated into all of systems, always be tested and updated. To be implement, this phase required all of outcomes from previous phase (see in **Table 8**). And made the reports after implementing (see in **Table 8**).

### 2.3.7 BCM testing

The seventh phase is ensuring that risk mitigation strategies and disaster recovery plans are still relevant and deliverable. At least the plans should have testing in three months after implementation and should not more than one year. F. Gibb and S. Buchanan (2006) suggested three testing method that were desk-based, technology oriented, and process or service oriented. And recommend that after testing should be assess the effectiveness of the tested components of plan all of testing, wrote the comment for action and published in report form.

The required information was shown in **Table 9**. Outputs of this phase were testing report of assumption, scope, objectives, schedule, procedure, and targets (see in **Table 9**).

Table 8 Inputs and outputs of BCM implementation

Inputs	Key activities	Outputs
- Program charter	- Track costs and resource utilization	- Financial reports
- Program definition	- Issue RTF/RFP	- Contracts with suppliers
- Project specification	- Select suppliers	- Insurance policies
- Risk mitigation strategies	- Implement risk management strategies	- Disaster recovery plan
- Disaster recovery plans	- Implement disaster recovery plans	implements logs
	- Co-ordinate with project managers for new systems	- Risk mitigation strategy implementation logs
	- Arrange insurance cover	- Variance reports
	- Document implementation	- Progress reports

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S.Buchanan, 2006, International Journal of Information Management, 26, p.138. Copyright 2005 by Elsevier Ltd.*

Table 9 Inputs and outputs of BCM testing

Inputs	Key activities	Outputs
- Program charter	- Establish business expectations	- Testing assumptions
- Program definition		- Testing scope
- Project specification	- Develop measurement criteria	- Testing objectives
- Risk mitigation strategies	- Develop testing plan	- Testing schedule
- Disaster recovery plans	- Negotiate availability of staff and material resources for test	- Testing procedures
- Training materials		- Testing targets
- Interviews	- Brief staff in affected areas	- Test report
	- Conduct test	
	- Debrief staff	

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S.Buchanan, 2006, International Journal of Information Management, 26, p.138. Copyright 2005 by Elsevier Ltd.*

### 2.3.8 BCM education and training

BCM program team had to make sure that all staffs in their organization were understood the benefits and objectives of the BCM strategy. If they did not, the BCM team needed to provide the appropriate education and training to ensures that the objectives could and were achieved. The staffs needed to know about the purpose of, nature of, and their involvement in BCM.

To educate and train all of the staffs in organization, this phase required risk mitigation strategies, and disaster recovery plans. To ensure this phase effective, it was necessary to put program charter, program definition, and project specification in this process (see in **Table 10**). So, outputs of this phase were needed resource of education and training program (see in **Table 10**).

Table 10 Inputs and outputs of BCM education and training

Inputs	Key activities	Outputs
- Program charter	- Structure training	- Training materials
- Program definition	- Develop instructional and	- Training presentation
- Project specification	assessment material	- Assessment materials
- Risk mitigation strategies	- Identify staff for training events	- Training events
- Disaster recovery plans		- Attendance and certification logs

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, International Journal of Information Management, 26, p.139. Copyright 2005 by Elsevier Ltd.*

### 2.3.9 BCM review

After the BCM program was established, the organization might have new processes, applications, technologies, and personnel come into them. They needed to realize whether all of new things brought new risks and requirements. Then, in this phase ensured whether the organization did not fail to update its BCM procedures. Forbes Gibb and Steven Buchanan (2006) suggested that the review phase could feed back to the program and project managers as well as managers responsible for the day-to-day running of services.

For improving the BCM program in the future, there were putting business strategies, information strategies, program charter, program definition, project specification, risk mitigation strategies, disaster recovery plans, education and training programs, and incident reports in reviewing (see in **Table 11**). After finished reviewing, there were feedback outputs for program and project managers show in **Table 11**.

Table 11 Inputs and outputs of BCM review

Inputs	Key activities	Outputs
- Business strategy	- Identify changes in processes and services	- New or altered risk list
- Information strategy		Priority areas for action
- Program charter	- Identify new business requirements	- Cost estimates
- Program definition		- Timetable
- Project specification	- Identify changes in business environment	- Balanced scorecard or similar benefits analysis
- Risk mitigation strategies		
- Disaster recovery plans	- Highlight successful handling of risk events	
- Testing regimes		
- Education and training program	- Highlight failure to handle risk events	
- Incident reports		

*Note. Adopted from "A framework for business continuity management," by F. Gibb and S. Buchanan, 2006, International Journal of Information Management, 26, p.140. Copyright 2005 by Elsevier Ltd.*

## 2.4 The concept of risk

Concept of risk and risk assessments have history more than 2,400 years (Bernstein, 1996). But risk assessment and risk management in scientific are new, lower than 30-40 years old. In these days, there is no final definition of the concept of risk. Someone defines as probability, chance or expected values, but some definitions base on undesirable events or danger or uncertainties (Aven, 2012).

In this thesis, risk is defined as "effect of uncertainty on objectives" after ISO 31000:2009 (International Organization for Standardization, 2018).

## 2.5 Risk management

ISO 31000 defines risk management as "Coordinated activities to direct and control an organization with regard to risk" (International Organization for Standardization, 2018). There are 11 principles of risk management of ISO 31000 that are required to effective: (1.) Risk management establishes and sustains value (2.) Risk management is an integral part of all organizational processes (3.) Risk management is part of decision-making (4.) Risk management explicitly addresses uncertainty (5.) Risk management is systematic, structured, and timely (6.) Risk management is based on the best available information (7.) Risk management is tailored (8.) Risk management takes human and cultural factors into account (9.) Risk management is transparent and inclusive (10.) Risk management is dynamic, iterative, and responsive to change (11.) Risk

management facilitates continual improvement of the organization (International Organization for Standardization, 2018).

## 2.6 The processes of risk management

Risk management processes in this study base on ISO 31000 (International Organization for Standardization, 2018). This thesis only focusses on risk assessment, and risk treatment or response.

### 2.6.1 Risk assessment

Risk assessment consists of risk identification, risk analysis, and risk evaluation (International Organization for Standardization, 2018).

#### 2.6.1.1 Identify risk

The Risk Identification process is the initial first step of risk management (R. J. Chapman, 1998). Williams and Heins (1964) defined risk identification as “the process by which a business systematically and continuously identifies property, liability and personal exposures as soon as or before they emerge.” Effective common tools and techniques are documentation reviews, expert judgment, information gathering, and checklists (R. J. Chapman, 1998). Brainstorming is the most popular technique of identify risks in large organizations (R. J. Chapman, 1998). But in the results of *Rostami (2016)*, the most SMEs due to their limited resources, knowledge and skills have less capability to implement group-based techniques such as brainstorming

**Documentation reviews** - This technique identifies the risks through reviewing the gathered data (previous business plans, strategies, activities, contracts and other stored information in either hard copy or electronic formats) (Witkin & Altschuld, 1995).

**Expert judgment** - After gathered the data, for organization which lack of experiment, this technique need the person who has specialized knowledge of the technical system to analyze (Otway & Winterfeldt, 1992).

**Information gathering technique** - This technique includes interviewing, brainstorming, Delphi technique and root cause analysis. This technique need a lot of resources and time (Rostami, 2016).The risk identification process through the interviewing technique can be an individual assessment or involve a group of people (R. J. Chapman, 2001). The collected information through this technique is used to provide a ground for further risk identification.

**Checklists technique** - This technique is common technique and be like a basic one to identify anything. It ensures that high probability incident items are founded. And it is possible to an appropriate checklist (Borek, Parlikad, & Woodall, 2013). Listing items should be responsibility of the person who can access high level information (Hey, 2017). But in organization field, the checklists are developed over time through functional experts' contributions and collective experiences (Ward, 1999).

#### 2.6.1.2 Risk evaluation

Risk evaluation is making the risks easily to understand and make it easy to prioritize (Collier, 2009). There are three common method to use estimate the risk: Qualitative, Semi-quantitative, and Quantitative.

**The qualitative method** - This method estimates even likelihood and impact in qualitative form. It suits for unvalued data or unavailable, or the data that have low confidential. This method is easy to understand but it should be made sure whether definition for each probability and severity level is appropriate. See the example in **Table 12**, **Table 13**, and **Figure 2**.

Table 12 Three-level definition for severity example

Term	Definition
Significant	Death or permanent impairment/injury
Moderate	Reversible or minor injury
Negligible	Discomfort inconvenience

*Note. Adopted from Safety Risk Management for Medical Devices (p.158), by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.*

Table 13 Three-level definitions for severity example

Term	Definition
High	Likely to happen   often   frequent
Medium	Can happen, but not frequently
Low	Unlikely to happen   rare   remote

Note. Adopted from *Safety Risk Management for Medical Devices (p.158)*, by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.

		Qualitative severity		
		Negligible	Moderate	Significant
Quantitative probability	High			
	Medium			
	Low			

Figure 2 3x3 qualitative risk matrix example

Note. Adopted from *Safety Risk Management for Medical Devices (p.158)*, by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.

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**The Semiquantitative method** - The Semiquantitative method is a cognate method with the qualitative method. The difference between these methods is probability data. Probability data in the semiquantitative method are in quantitative form. ISO 14971 offers a 5x5 risk matrix for scoring and ranking the risks see in **Table 14**, **Table 15** and **Figure 3**.

Table 14 Five-level-five definitions for severity example

Rank	Term	Definition
5	Catastrophic	Death
4	Critical	Permanent impairment or life-threatening injury
3	Serious	Injury or impairment requiring professional medical intervention
2	Minor	Temporary Injury or impairment not requiring professional medical intervention
1	Negligible	Discomfort or inconvenience or no harm

Note. Adopted from *Safety Risk Management for Medical Devices* (p.158), by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.

Table 15 Five-level-five definitions for severity example

Rank	Term	Definition
5	Frequent	$\geq 10^{-3}$
4	Probable	$< 10^{-3}$ and $\geq 10^{-4}$
3	Occasional	$< 10^{-4}$ and $\geq 10^{-5}$
2	Remote	$< 10^{-5}$ and $\geq 10^{-6}$
1	Improbable	$< 10^{-6}$ and $\geq$

Note. Adopted from *Safety Risk Management for Medical Devices* (p.159), by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.



Figure 3 5x5 Semi-quantitative Risk matrix Example

Note. Adopted from *Safety Risk Management for Medical Devices* (p.159), by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.

**The Quantitative method** - The concept of this method is presented in Figure 4 that define risk is product of P1, the probability of Hazardous Situation occurs, and P2, the probability



of Harm occurs ISO14971. Which mean Hazard lead to probability of Hazardous situation occur, Hazardous situation lead to Harm, and Harm lead to severity of the harm, then risk is product of  $P_1 \times P_2$ . At last, use the BXM method to compute risk in five classes of harm severity: catastrophic, critical, serious, minor and negligible.

The results are in:

$$\text{Risk of catastrophic Harm (death)} = P_1 \times P_{2(\text{CATASTROPHIC})} \quad (2.1)$$

$$\text{Risk of critical Harm} = P_1 \times P_{2(\text{CRITICAL})} \quad (2.2)$$

$$\text{Risk of serious Harm} = P_1 \times P_{2(\text{SERIOUS})} \quad (2.3)$$

$$\text{Risk of minor Harm} = P_1 \times P_{2(\text{MINOR})} \quad (2.4)$$

$$\text{Risk of negligible Harm} = P_1 \times P_{2(\text{NEGLIGIBLE})} \quad (2.5)$$

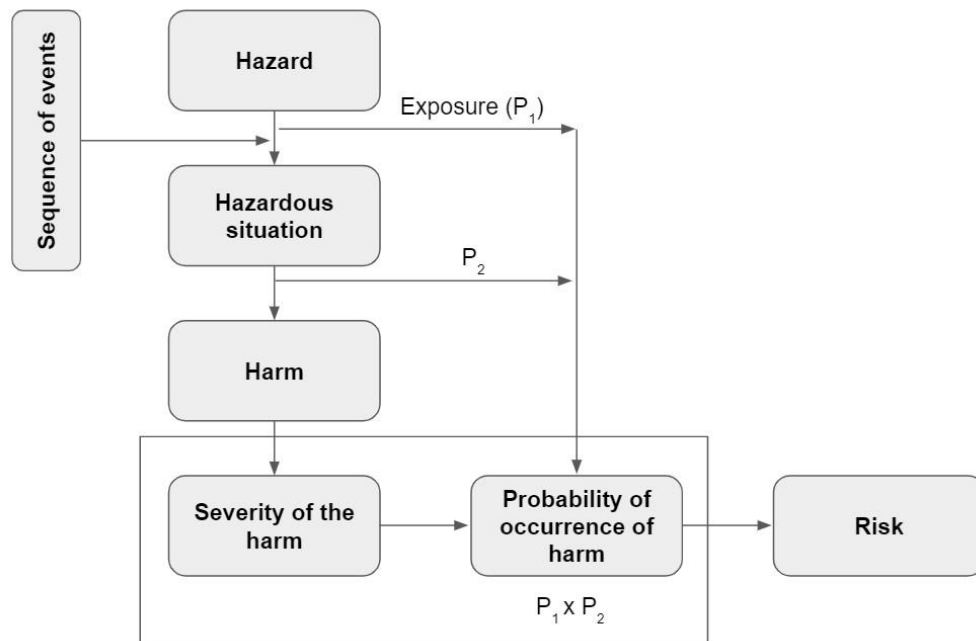


Figure 4 Quantification of risk

*Note. Adopted from Safety Risk Management for Medical Devices (p.160), by B. Elahi, 2018, Academic Press. Copyright 2018 by Elsevier Ltd.*

### 2.6.1.3 Risk treatment

After risks have been identified, evaluated, and prioritized. This subject is the step for finding the ways to deal with the risks. The important thing is all of risk treatments after this step must be cost-effective. There are many ways to treat risk, but the primary methods for our purposes are:

**Risk Avoidance** is the most powerful choice to cope the risks because the source of pure risk is eliminated. Assume that, your assets are next to a river that floods every year. Moving your location to higher ground is the way that call risk avoidance. However, there are trades off in this moving. You may lose some advantages such as ease of receiving raw materials, shipping finished product, water to cool production machinery, etc. (Tucker, 2015).

**Risk Control** is reducing and managing the risks in acceptable levels. Prevention, preparedness, mitigation, response, and continuity strategies are included in risk control (Tucker, 2015).

**Risk Transfer** is passing the risks to third parties. Insurance are the best example. However, you have to remember that insurance does not reduce or eliminate cause of the risk, it is only reducing the. Reminding yourself that (1.) not all risks are covered, reimbursement can be delayed, cash flow can be disturbed, and you cannot claim if you cannot prove the loss. Risk transfer is include contracts, outsourcing, joint ventures, or partnerships (Tucker, 2015).

**Risk Acceptance or Risk Assumption** means the organization has estimated that effect from the risks are not worth for cost of control or impossible to avoid them at that time. The organization should list this risks that you decide to accepted them at that time for future monitoring (Tucker, 2015).

## 2.7 Business Impact Analysis

The purpose of BIA is to compare components of business specific system with the critical function based on business information to define the consequences of a disruption to the system components (National Institute of Standard and Technology Special Publication, 2010). BIA breaks down to two parts: the first is understanding mission-critical business processes and the second is correlating those to IT systems. BIA is the process of figuring out which processes are critical to the company's ongoing success and understanding the impact of a disruption to those processes. BIA includes the steps listed earlier, but also can break them out into 7 steps:

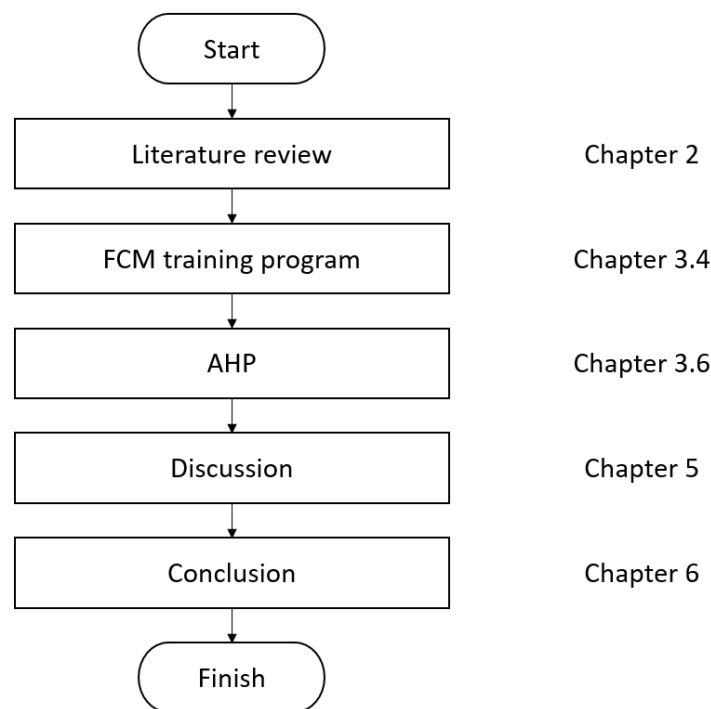
1. Identify key business processes and functions.
2. Establish requirements for business recovery.
3. Determine resource interdependencies.
4. Determine impact on operations.
5. Develop priorities and classification of business processes and functions.
6. Develop recovery time requirements.
7. Determine financial, operational, and legal impact of disruption

There are two primary impacts of any business disruption, the operational impact, and the financial impact. The operational impact such as how people, processes, and technology are impacted by a business disruption and how best to address that impact. And the financial impact addresses the monetary impacts and how a business disruption will impact the company's revenues. And before start the 7 steps, the knowledge that should be known are upstream and downstream loss, human impact, human needs, impact criticality, and recovery time requirements (Tucker, 2015).

## Chapter 3 Methodology and Data collection

This chapter mentioned the thesis workflow, the processes diagram, data collection, research experiment developing proposed FCM model concept, differences of BCM and FCM, and methodology.

### 3.1 Thesis workflow



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Figure 5 Thesis Workflow

This thesis started from did the literature review. Then did the research about BCM and BCM training program. After that, this research adopted BCM training program into FCM training program and adopted BCM model framework into FCM model framework. Then did the FCM training program with the samples from a hospital in Chonburi province, Thailand. After the samples finished the FCM training program, this research collected data for AHP only opinion for FCM model framework. And after researcher finished FCM model framework analyzing, there was discussing and collecting the samples' opinion again about their weighting scores. And conclude the thesis in the final.

## 3.2 Process diagram

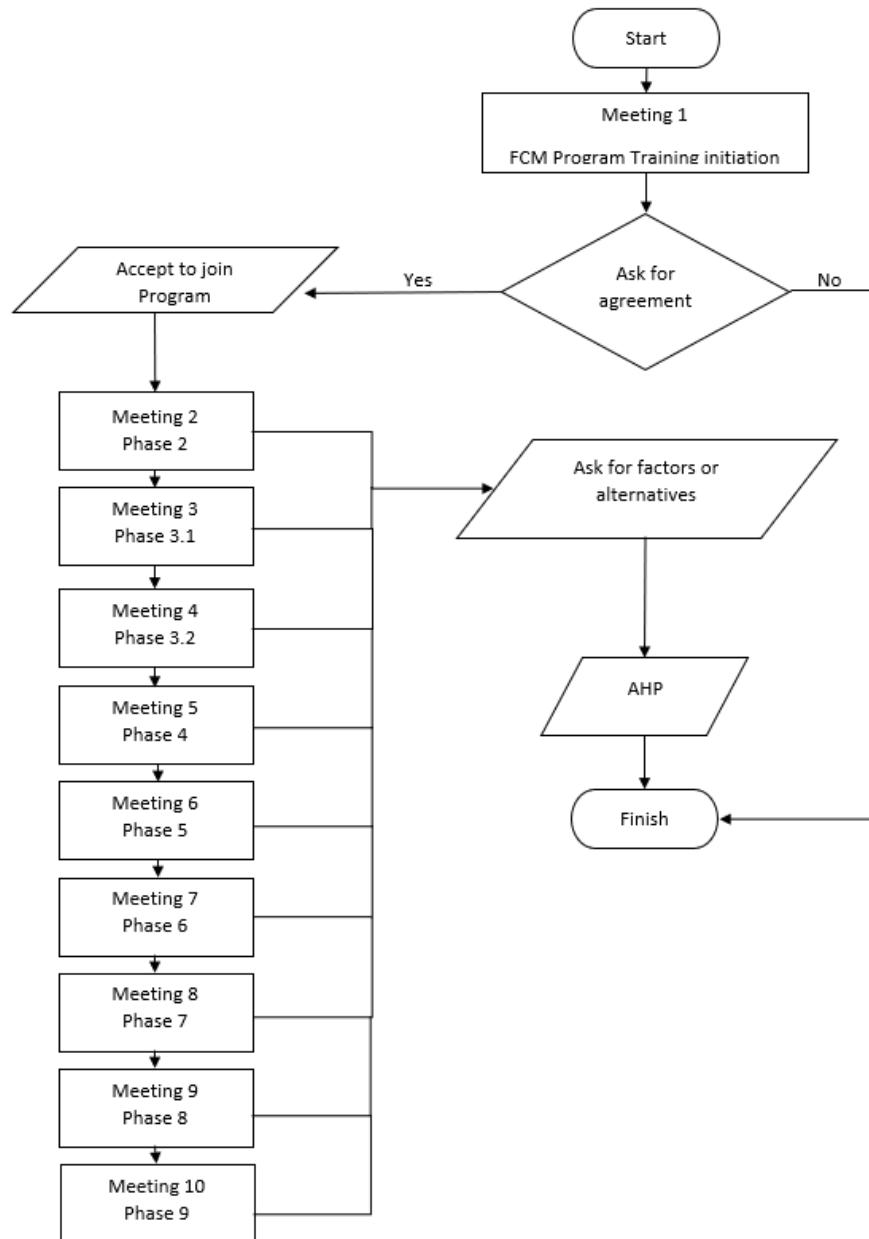


Figure 6 Process Diagram Flow

Before collected data, this research began with asking participants to be the samples from department A of Hospital B in the Eastern Thailand after they joined meeting 1 (FCM training

program initiation). Then, ask them for agreement and sign the contract. After that, the samples joined the FCM training program and fill up the factors for AHP. They could quit the training program in any phase as they wished. Finally, the samples did pairwise factors in each alternative for AHP and gave their opinions see in **Figure 5**.

### 3.3 Data collection

From the preliminary survey conducted in April 2019, this research found that medical staffs at Department A of Hospital B in the Eastern Thailand had a number of jobs every day. The medical staffs had to provide services to 1,000 – 1,500 patients per day. If more than 5 staffs had not shown up on the same day, it increased the duration time process. Some patients only waited for the outcome of this department processes, while some patients waited for the complicated treatment processes. The increased duration time affected to many departments in this Hospital B. The patients had to wait for treatment longer or they need to get treatment on the next day.

In addition, this Department B had recently certified the ISO 15189 and ISO 15190. Thus, the samples were familiar with risk management system, had some basic background about risk and already concerned and alerted about risks around them (International Organization for Standardization, 2012a), (International Organization for Standardization, 2012b).

From 51 samples, 43 samples are female and 8 are male. There are 33 samples with education background higher than bachelor's degree and 20 samples are married. There are 18 samples with age between 20-30 years old, 19 samples with age between 30-40 years old, and 14 samples over 40 years old.

According to the previous problems, this research decided to seek the voluntary participants from this Department B to be the samples in this study. The samples had co-specific job responsibility and workplace. Moreover, the samples also had different background. Then, after designing the FCM training program and implementing the FCM in the samples' life, this study queried the samples for their opinions to prioritize the potential factors of the FCM training through the Analytic Hierarchy Process (AHP). This research has got through the ethic evaluation at Keio University committee. The registered number is "SDM-2020-E015".

### 3.4 Research Experiment

This research was broken down into three phases, started with (1) designing and scoping the FCM training program based on F. Gibb and S. Buchanan (2006)'s BCM framework and ISO

22301 (The International Organization for Standardization, 2019). Then, (2) established FCM training program, collected the samples' opinions data. And Finally, (3) analyzed the samples' opinion data by using the AHP and face to face interview.

### **3.5 FCM training program**

FCM training program was developed based on F. Gibb and S. Buchanan (2006)'s BCM framework and ISO 22301, and broken down into 10 phases: (1) Program initiation, (2) Project initiation, (3) Family risk analysis, (4) Family impact analysis, (5) Selecting risks mitigation strategy, (6) Monitoring and control, (7) Implementation, (8) Testing, (9) Education and training, (10) Review.

#### ***3.5.1 FCM program initiation phase in FCM training program***

This study assumed that a researcher was one of the members in each sample's family. The researcher realized that his family needed some plans to cope with their risks. So, he searched and found whether FCM was the program that could be fit within his family, effective, and sustainable. He established the draft program charter and the draft program plan to present it to his family members. In this phase, expected time was 30 minutes.

#### ***3.5.2 FCM project initiation phase in FCM training program***

After the researcher presented the draft program charter and the draft program plan to the samples in previous phase. He asked them for acceptance to join the proposed FCM training program experiment. Then, the FCM training program started from clearly defining the sample's family goal, work specialization, functional departmentalization structure, chain of command, unity of command. The samples chose what their family decision making style was (e.g., centralization, decentralization, and employee empowerment). Then, the samples defined how formalization in their family was, and chose what their family structure style was (i.e., mechanistic structure or organic structure). In this phase, expected time was 30 minutes too.

#### ***3.5.3 FCM family risk analysis phase in FCM training program***

This phase was separated into 2 sub-phases: (1) 'Family Risk Analysis' (FRA); and (2) 'Family Impact Analysis' (FIA).

##### ***3.5.3.1 Family risk analysis***

The FRA was started by using brainstorming method to identify their family risks and then rechecked with 'DOSPERT' checklist (Weber et al., 2002). In addition, this FCM training program

experiment also allowed them to find the environment of their risks and rechecked the root causes or dependency linked risks. After identifying, the samples got their identified risks list. Next, they established their own 3-level table score for six tables: (1) Likelihood scoring scale table, (2) Financial impact scoring scale, (3) Health and safety impact scale, (4) Ethics impact scoring scale, (5) Recreational impact scoring scale, and (6) Social impact scoring scale. Finally, the risks scores and risks prioritization were the outcome of this sub-phase. Expected time was 60 minutes.

### *3.5.3.2 Family Impact Analysis*

The FIA was started with listing the samples' normal activities and finding out their 'FIA Prioritized Activities' (FPAs) through the FPAs impact level comparison chart. After the samples got their FPAs, they would find out the 'FIA Recovery Time Objective' (FRTTO) and the 'FIA Maximum Tolerable Period of Disruption' (FMTPD) for each of their FPAs. The samples then wrote down the details of the necessary resources for each FPA. In the end, they were expected to have enough background information for checking their prioritized risks. If it showed significant effect, the mitigate strategy would be recommended. Expected time was 60 minutes.

### *3.5.4 FCM selecting risk mitigation strategies phase in FCM training program*

This phase was categorized into 3 sub-phases (1) Preparedness, (2) Response, and (3) Recovery. All sub-phases had the same process. However, they had different focusing way to mitigate the risk. The brainstorming method was used at the first place.

First, the samples started with choosing the risk during the first sub-phase (preparedness). They focused on preparing mitigation strategy for their prioritized risks. Then, they assumed the damage of the worst-case scenario. They were requested to write down the objective in order to remind their family members the focus point on this process. After that, they conducted brainstorming and listed the work specialized, the necessary resources, timeline plan, and the person-in-charge to achieve the mitigation strategy. Next, they repeated and moved on to the next scenario, the next risk and the next phase again until no more scenario left. Expected time in this phase was 90 minutes.



### ***3.5.5 FCM monitoring and control phase in FCM training program***

After getting many plans from the previous phase, to ensure that all family members could keep following their plans, all family members had to join the meeting and discuss about monitoring and control strategy.

After this phase, the samples gathered some opinions from their family members. There were remaining 30 samples joining this study until the end of the experiment. Expected time were 60 minutes.

### ***3.5.6 FCM implementation phase in FCM training program***

This phase was to implement all developed plans, strategies, and tools into their life. And joined the meeting to discuss about implemented. This meeting phase should spend about 30 minutes.

### ***3.5.7 FCM testing phase in FCM training program***

In this phase, not all plans could be fit. The samples found some issues when they did implement the plans. Therefore, after the implementation, the family members had to come back and recheck their plans, their strategies, and their tools that they designed in the previous phase. Then came to join the meeting and discussed. Duration time of this meeting was expected in 30 minutes.

### ***3.5.8 FCM education and training phase in FCM training program***

In many developed plans, some samples might not understand the whole or some contents of the plan. This phase required all samples (family members) to know and understand the entire plans. Then, the plan training was designed for each scenario to all family members by the family members. After educated and trained, the sample came back to join the meeting and discussed. This training program meeting expected time was 30 minutes.

### ***3.5.9 FCM review phase in FCM training program***

Lastly, the family meeting was set to review the entire experiment, discuss, and give suggestions for improving the proposed FCM. After reviewed and discussed with their family, they joined the training program meeting and discussed about reviewing. This meeting phase was about 30 minutes.

BCM is based on 'Plan-Do-Check-Act' framework. Thus, it cannot be completed just in single round. Nevertheless, in this research, the samples were requested to do the proposed FCM training just for 1 round because of the time limitation.

### 3.6 Differences of BCM and FCM

Mainly of FCM are similar with BCM (i.e. goal, key methodology, key process). So, the differences are in detail see conclude in **Table 16**. Pictured it, family is an organization that smaller than SMEs and has no component of business or revenue. Then, why BCM can implement into family that has no business component? It is because of BCM is focus on business process or organization's core process or prioritized activities. Same as family, it has prioritized activities too. As long as group of people who have same goals, have work specialization, have responsibility, and have prioritized activities for achieve their goals. Researcher believed whether in ideal, BCM flexible enough to implement into.

In the beginning of this research, there are no major differences between BCM and FCM. FCM have no business component and big organization component like competitive issues, departments managing issues, stakeholder confidence, or communication channel. So, every detail or documents in term of business or management concern issues of big organization, from limited of family as an organization, FCM have to cut these issues out. And in the audit, regulator, reputation, and credibility issues are not in present research FCM program.

This FCM program topic is quite new. Hence, in the first program training, all of processes to establish FCM are same as BCM. After this research, researcher expect to see future improve guideline that can tell whether what part of BCM process should be cut out or reduce some step, what process or new method should be added into FCM, and which one should be remain.

Though FCM and BCM are share the same words in both programs. But in the meaning of the words from difference perspective (business perspective and family perspective) are difference. For an example, scope of concerning events in both programs are black swan events which disturb prioritized activities. In business or organization perspective black swan event, be like Covid-19. Absolutely that is an event which in family as an organization have to take care of it too. But car crash event in family perspective is their black swan event. That has no need to be black swan event in business perspective.

Table 16 Comparing between BCM and FCM

Component	BCM	FCM
Key method	BIA	FIA
Key parameters	Availability and Impact	Availability and Impact
Type of incident	Significant events that cause <b>business</b> disruption	Significant events that cause <b>prioritized activities</b> disruption
Size of events	Threats which interfere <b>organization's core processes</b>	Threats which interfere <b>family's prioritized activities</b>
Scope	Focus on system management and recovery of <b>critical business process</b> following an incident	Focus system management and recovery of <b>critical prioritized activities</b> following an incident
Stakeholder	<b>Employees, Stake holders, Regulators, and Customers</b>	<b>Family members, and surrounding people</b>
Benefits	<p>From a business perspective:</p> <ol style="list-style-type: none"> <li>1.) <b>supporting business or organization strategic objectives.</b></li> <li>2.) <b>establishing competitive advantages.</b></li> <li>3.) <b>defending and increasing its reputation and credibility.</b></li> <li>4.) supporting to organizational resilience</li> </ol> <p>From a financial perspective:</p> <ol style="list-style-type: none"> <li>1.) reducing legal and financial exposure.</li> <li>2.) reducing direct and indirect disruption costs.</li> </ol> <p>From the perspective of interested parties:</p> <ol style="list-style-type: none"> <li>1.) protecting life, asset, and the environment.</li> <li>2.) <b>concerning the expectations of interested parties.</b></li> <li>3.) <b>supplying confidence.</b></li> </ol>	<p>From a family as an organization perspective:</p> <ol style="list-style-type: none"> <li>1.) <b>contributing to family as an organizational resilience</b></li> <li>2.) reducing legal and financial exposure</li> <li>3.) reducing direct and indirect costs of disruptions</li> <li>4.) protecting life, property and the environment</li> <li>5.) considering the expectations of interested parties</li> <li>6.) providing confidence in the <b>family as an organization's members ability</b> to succeed</li> <li>7.) remaining <b>prioritized activities'</b> effective during disruptions</li> <li>8.) <b>learning about family as an organization better and learning about risk in family life.</b></li> <li>9.) realizing no value and</li> </ol>

	From an internal processes' perspective:	<b>vulnerable activities.</b>
	1.) improving <b>its capability</b> to remain effective during disruptions.	
	<b>2.) demonstrating proactive control of risks effectively and efficiently.</b>	
	<b>3.) addressing operational vulnerabilities.</b>	
<b>The Emphasizes issue</b>	1.) Understanding the <b>organization's needs</b> and the necessity for establishing <b>business continuity policies and objectives.</b>	1.) Understanding <b>family as an organization needs</b> and the necessity for establishing <b>family continuity policies and objectives.</b>
	2.) Operating and maintaining processes, capabilities and response structures for ensuring <b>the organization</b> will survive disruptions.	2.) Operating and maintaining processes, capabilities and response structures for ensuring <b>the family as an organization</b> will survive disruptions.
	Monitoring and reviewing the performance and effectiveness of <b>the BCMS.</b>	Monitoring and reviewing the performance and effectiveness of <b>the FCMS.</b>
	3.) Continual improvement based on <b>qualitative and quantitative measures.</b>	3.) Continual improvement based on <b>qualitative measures</b>

*Note. Adapted from Risk and Crisis Management in the public Sector by , Routledge.*

### 3.7 Methodology

AHP is one of the simple decision-making process support methods for ranking of the decision variants (Saaty, 2008). It is based on pairwise comparison matrix (PCM) measurement concept weigh from 1 to 9 (see **Table 17**).

Table 17 Saaty's scale

Value	Importance	Value	Importance
1	Same	7	Very significant
3	Slight	8	Absolute
5	Significant	9	Intermediate
values			

*Note.* Adopted from "Decision making with the analytic hierarchy process," by T. L. Saaty, 2008, *International Journal of Services Sciences*, Vol.1, p.86.

For improving the proposed FCM, this research decided to use AHP to prioritize the potential decision-making variables from the samples' brainstorming opinions to get know rank of each FCM phase. The AHP's goal, criteria, and alternatives are shown in **Figure 6**, **Table 18**, and **Table 19**. After pairwise between the potential decision-making variables, this research got know weight of the variables for each sample. After that, this research conducted a pairwise comparison between phase by phase for each criterion (the potential decision-making variable).

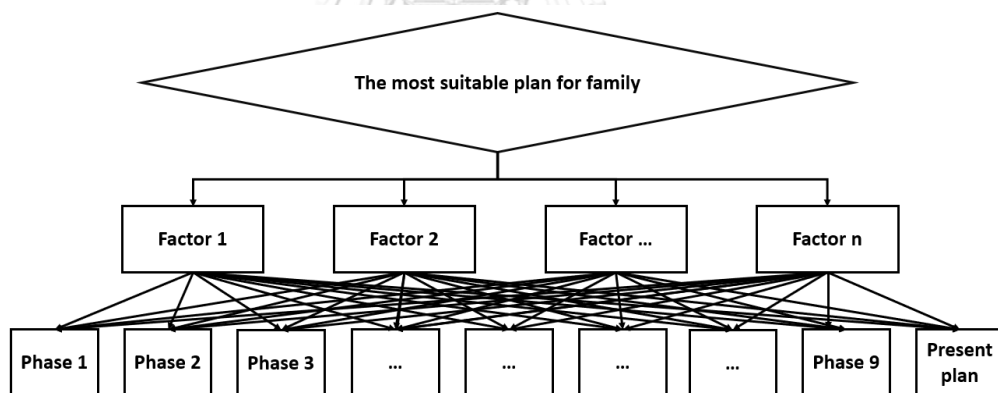


Figure 7 AHP model

Table 18 AHP factors.

Hierarchy	Factor	Definition
Goal	The most suitable plan for family	The plan that the samples are interested in doing it, after the training program ends.
Criteria 1 (Cr1)	Effectiveness	The plan is practical in real life. The samples can see the clear result after using it.
Criteria 2 (Cr2)	Usefulness	There are evidences confirming the plan is useful in an ideal situation.
Criteria 3 (Cr3)	Less number of steps	The samples do just a few steps.
Criteria 4 (Cr4)	Easy to understand	The samples do not or take only a little effort to understand the plan.
Criteria 5 (Cr5)	Less time consuming	The samples do not have to spend much time in each step.
Criteria 6 (Cr6)	No cost	The samples spend small amount of money or does not have to spend money at all.
Criteria 7 (Cr7)	Popularity	In the samples' opinion, the plan would be widely used by the people in their society.

Table 19 AHP Alternatives.

Hierarchy	Phase	Hierarchy	Phase
Alternative 1 (A1)	FCM Program initiation	Alternative 7 (A7)	FCM Implementation
Alternative 2 (A2)	FCM Project initiation	Alternative 8 (A8)	FCM Testing
Alternative 3 (A3)	Family risk analysis	Alternative 9 (A9)	FCM Education and training
Alternative 4 (A4)	Family impact analysis	Alternative 10 (A10)	FCM Review
Alternative 5 (A5)	FCM Selecting risk mitigation strategy	Alternative 11 (A11)	Present plan
Alternative 6 (A6)	FCM Monitoring and control		

The results of this model were transformed into matrix  $A = [a_{ij}]$ , criteria matrix had the dimensions  $7 \times 7$ , and alternatives matrix had the dimensions  $11 \times 11$  as shown in Eq. (3.1.).

$$A = \begin{matrix} 1 & a_{12} & \dots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ \frac{1}{a_{1n}} & \frac{1}{a_{2n}} & \dots & 1 \end{matrix} \quad (3.1.)$$

The weights were given to the matrixes with 9-scale scoring, then the matrixes were normalized, and the Eigenvectors were calculated. Next, the results were rechecked with the Consistency Ratio (CR) as shown in Eqs. (3.2.), (3.3.), and (3.4.).

$$CR = \frac{CI}{RI} \quad (3.2.)$$

Then:



$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (3.3.)$$

Then:



$$\lambda_{max} = \frac{1}{n} \sum_j^n \alpha_j \quad (3.4.)$$



The RI (Random index) was calculated from the number of matrix elements based on Alonso and Lamata (2004)'s RI values as shown in **Table 20**. CR is a consistency ratio, the values in PCM is considered consistent when it is less than 0.1.

Table 20 Alonso-Lamata RI values

n	RI	n	RI
3	0.5247	8	1.4057
4	0.8816	9	1.4499
5	1.1086	10	1.4854
6	1.2479	11	1.5140
7	1.3417	12	1.5365

*Note. Adopted from "Consistency in the Analytic Hierarchy Process: A New Approach," by J. A. Alonso and M. T. Lanata, 2006, International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, Vol. 14, p.450. Copyright by World Scientific Publishing Company*

This research did not search for the most suitable plan for family. But this research aimed to find out the phases that needed to improve first. Started from finding the criteria of selection plans in the samples' opinion. Calculated criteria weight scores, then calculated alternatives (phases) weight scores. And finally discussed with the samples for opinion to improve each phase in each criteria on FCM.





## Chapter 4 Result

### 4.1 Cooperation and problems

In the research, the samples were medical staffs at Department A of Hospital B in the Eastern Thailand. There were 51 samples (medical staffs) joined in this study's experiment. In 9 phases of this experiment, there were 51 samples joined in phases 1 and 2. There were 46 samples joined until phase 4. There were 40 samples joined until phase 5 and 30 of them joined in full program. After that, the opinions and feedbacks were received from the samples.

There were two mainly problems. That is (1.) duration in each phase and (2.) one program training guider. The durations are too long. The samples did not have enough time to join this program. And the researcher had to explain to everyone by himself that lead to chance of mistaken. But the samples had good corporate. Thus, there were 30 samples finished this training program.

### 4.2 AHP Results

The results (see in **Table 21**) found that although the samples work in the same department at the same hospital, have almost the same responsibility in their job, and live in the same area, it did not mean they had to weigh the same criteria equally. So, this research received the opinion for future program improvement in various aspects.

#### 4.2.1 Criteria weigh scores

**Table 21** show whether sample 1 focus on time criteria most. That is mean, when sample 1 decide to do something, less time is good for sample 1. Samples 2, 3, 5 and 6 give their weight score on Cr2 most, which mean they usually prioritize something that have the most usefulness for them in their life. And sample 2 still concerns about what the other people do. If that things are not regular enough sample 2 will not do it. Sample 4 and sample 7 prioritized effectiveness first. And finally, this table show whether although samples 1, 2, 3, 5, and 6 did not give their weight score on effectiveness most but still on the second one or the third one. So, in the average of the samples criteria weight scores, the effectiveness is the factor which got highest weight score.

Table 21 Result the criteria weight score

Criteria (Cr)	S1	S2	S3	S4	S5	S6	S7	Avg. /Sample(S)
Cr1	15.0	2.2	25.4	<b>44.6</b>	24.0	13.5	<b>40.6</b>	<b>23.6</b>
Cr2	10.5	<b>24.5</b>	<b>36.8</b>	16.9	<b>42.9</b>	32.6	18.4	26.1
Cr3	5.8	8.8	13.2	2.9	13.2	7.7	6.4	8.3
Cr4	3.6	17.8	6.5	4.6	8.6	4.6	4.3	7.2
Cr5	<b>38.3</b>	15.2	3.2	13.7	4.9	3.1	2.6	11.6
Cr6	3.0	<b>24.5</b>	11.8	12.9	2.9	3.1	24.4	11.8
Cr7	23.8	6.9	3.0	4.5	3.5	<b>35.3</b>	3.3	11.5

#### 4.2.1 Effective criteria (Cr1) weight score

In effective criteria, samples 1,6 and 7 give their opinion whether **A1** (FCM program initiation phase) is the weakest see in **Table 22**. Sample 2 thought the weakest one are **A3** and **A4** (FRA phase and FIA phase). **Table 22** show that sample 3 and sample 4 thought their current plans (**A11**) are not effective. Lastly, sample 5 thought **A2** (FCM project initiation phase) is the weakest phase in effective criteria. In average effective weight score, **A1** (FCM program initiation phase) is the weakest phase see in **Table 22**.

Table 22 Summarized effective (Cr1) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
<b>A1</b>	<b>1.7</b>	3.9	1.7	2.0	3.6	<b>2.2</b>	<b>1.9</b>	<b>2.4</b>
<b>A2</b>	2.2	3.3	2.1	2.9	<b>2.1</b>	3.1	2.6	2.6
<b>A3</b>	2.6	<b>2.5</b>	2.7	3.9	2.2	5.0	6.3	3.6
<b>A4</b>	4.0	<b>2.5</b>	4.6	4.2	3.0	8.0	11.5	5.4
<b>A5</b>	7.3	2.9	6.6	6.9	5.1	6.1	2.8	4.5
<b>A6</b>	7.9	15.1	11.8	5.7	5.5	8.0	4.0	8.3
<b>A7</b>	14.8	15.1	13.0	13.0	8.1	30.3	8.0	14.6
<b>A8</b>	11.2	14.0	17.8	14.2	11.1	12.0	5.6	12.3
<b>A9</b>	18.8	4.1	23.0	16.3	30.3	2.9	9.4	15.0
<b>A10</b>	27.4	11.2	15.3	29.0	14.6	17.8	22.0	19.6
<b>A11</b>	2.1	25.2	<b>1.4</b>	<b>1.8</b>	14.3	4.7	25.9	10.8

#### 4.2.2 Usefulness criteria (Cr2) weight score

Table 23 tell that **A1** (FCM program initiation phase) is the weakest phase, on the samples 1, 2, 3, 5, 6, 7, and average opinion, in usefulness criteria weight score. And sample 3 and sample 4 still though whether **A11** (present plan) is the one that need to improve in usefulness criteria too. Lastly, sample 5 and sample 7 prioritized **A2** (FCM project initiation) at the last one like **A1**.

Table 23 Summarized usefulness (Cr2) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
<b>A1</b>	<b>1.8</b>	<b>1.7</b>	<b>1.6</b>	2.4	<b>2.0</b>	<b>1.8</b>	<b>1.9</b>	<b>1.9</b>
<b>A2</b>	1.9	2.6	2.5	2.5	<b>2.0</b>	2.5	<b>1.9</b>	2.3
<b>A3</b>	4.3	2.9	4.5	3.1	3.2	3.6	12.3	4.9
<b>A4</b>	5.2	2.8	5.8	4.6	4.0	4.2	17.5	6.3
<b>A5</b>	6.7	3.0	9.6	8.0	5.1	5.5	4.1	6.0
<b>A6</b>	7.9	6.6	10.2	5.3	7.1	12.4	8.6	8.3
<b>A7</b>	11.2	13.3	25.8	8.9	9.1	28.4	4.0	14.4
<b>A8</b>	12.1	10.7	14.5	14.3	11.5	16.1	5.5	12.1
<b>A9</b>	23.8	18.0	20.4	20.5	30.5	2.1	10.3	17.9
<b>A10</b>	22.1	11.9	3.4	28.1	22.5	10.5	26.5	17.8
<b>A11</b>	3.1	26.7	<b>1.6</b>	<b>2.3</b>	2.8	13.0	7.5	8.1

#### 4.2.3 Less number of steps criteria (Cr3) weight score

From sample 2 and sample 6 opinions, **A1** (FCM program initiation) has the most steps. Sample 5 and 7 give their opinions whether **A5** (FCM selecting risk mitigation strategy phase) is the weakest phase in **Cr3** (stepless criteria) see in **Table 24**. Samples 3, 4 and average thought the weakest phase is **A6** (FCM monitoring and control phase). And **Table 24** still shows that sample 3 weighted his or her score on **A10** (FCM review phase) as same as **A6** (FCM monitoring and control phase). Finally, sample 1 though **A9** (Education and training) is the weakest phase in **Cr3** (stepless criteria).

Table 24 Summarized less number of steps (Cr3) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
A1	30.6	<b>1.6</b>	27.6	27.7	29.4	<b>2.1</b>	30.6	21.4
A2	7.8	25.1	18.1	13.3	19.1	3.0	17.7	14.9
A3	18.3	19.3	6.3	8.0	12.3	25.7	10.7	14.4
A4	13.5	13.2	2.7	2.1	2.6	6.7	3.8	6.4
A5	11.0	7.9	2.5	2.8	<b>2.1</b>	5.6	<b>2.1</b>	4.8
A6	4.1	5.8	<b>2.0</b>	<b>2.0</b>	1.6	4.0	2.2	<b>3.1</b>
A7	4.6	4.3	4.8	3.3	3.2	9.0	3.3	4.7
A8	3.7	4.0	13.1	12.3	9.2	7.9	7.6	8.3
A9	<b>1.7</b>	2.1	6.3	7.3	6.4	1.8	2.7	4.0
A10	2.6	2.1	<b>2.0</b>	4.8	5.3	13.7	4.9	5.1
A11	2.1	14.7	14.5	16.5	8.6	20.4	14.5	13.0

#### 4.2.4 Easy to understand criteria (Cr4) weight score

In easy to understand criteria, sample 2 give his or her opinion whether **A1** (FCM program initiation phase) is the weakest see in **Table 22**. Sample 3 and sample 7 thought the weakest one is **A4** (FIA phase). **Table 22** shows that samples 4, 5 and average all of the samples thought **A6** (FCM monitoring and control phase) is the hardest phase. And sample 6 weights his or her score in the last one on **A9** (FCM Education and training phase), Lastly, sample 1 thought **A10** (FCM review phase) is the weakest phase in easy to understand criteria.

Table 25 Summarized easy to understand (Cr3) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
A1	8.8	<b>1.9</b>	3.1	4.1	7.5	2.8	28.1	8.0
A2	20.9	29.5	21.3	8.8	27.6	14.5	16.5	19.8
A3	25.8	14.4	5.5	13.6	21.7	4.7	5.8	13.1
A4	12.7	11.1	<b>1.9</b>	5.8	3.4	6.6	<b>1.8</b>	6.2
A5	6.9	2.2	2.3	2.7	2.6	3.9	2.5	3.3
A6	4.1	6.9	2.6	<b>2.0</b>	<b>1.8</b>	2.0	2.5	<b>3.1</b>
A7	4.5	4.5	5.9	4.9	6.7	24.5	3.8	7.8
A8	6.2	2.8	19.3	26.1	9.6	9.9	8.0	11.7
A9	3.7	3.2	14.8	18.3	13.1	<b>1.6</b>	4.7	8.5
A10	<b>2.1</b>	7.4	2.4	2.3	3.8	17.5	7.2	6.1
A11	4.4	16.2	20.9	11.3	2.2	12.0	19.3	12.3

#### 4.2.5 Less time-consuming criteria (Cr5) weight score

In samples 2, 3 and 5 opinions, **A1** (FCM program initiation) is the weakest phase in these criteria. Data from samples 5, 7 and average show in **Table 26** whether in their opinions **A4** (FIA phase), and **A5** (FCM selecting risk mitigation strategy phase) spent the longest time. Sample 7 thought the weakest phase is **A7** (FCM implementation phase). And finally, **Table 24** shows that sample 1 weighted his or her score on **A10** (FCM review phase) at the last.

Table 26 Summarized Less time consuming (Cr4) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
<b>A1</b>	16.6	<b>1.9</b>	<b>1.8</b>	5.9	<b>1.9</b>	2.6	16.5	6.8
<b>A2</b>	28.9	32.8	32.7	28.1	33.1	31.8	29.7	31.0
<b>A3</b>	17.1	14.9	14.8	8.8	15.6	15.3	14.1	14.4
<b>A4</b>	3.2	<b>1.9</b>	2.1	<b>2.3</b>	2.8	3.1	5.6	<b>3.0</b>
<b>A5</b>	3.7	<b>1.9</b>	2.1	<b>2.3</b>	3.3	3.9	3.5	<b>3.0</b>
<b>A6</b>	3.9	14.0	14.5	2.4	8.8	13.0	2.7	8.5
<b>A7</b>	6.9	4.4	3.8	5.0	5.2	4.1	<b>1.7</b>	4.4
<b>A8</b>	8.2	4.0	4.1	13.3	7.1	6.5	7.7	7.3
<b>A9</b>	6.0	7.0	7.1	10.5	2.3	<b>2.0</b>	4.8	5.7
<b>A10</b>	<b>2.4</b>	6.3	6.4	2.9	6.2	8.1	2.4	5.0
<b>A11</b>	3.0	11.0	10.8	18.5	13.7	9.4	11.3	11.1

#### 4.2.6 No cost criteria (Cr6) weight score

**Table 27** show whether in sample 2, 3 and 5 opinion, **A1** (FCM program initiation) is the weakest phase in these criteria. Data from sample 1, 4, 6 and average show in **Table 27** whether in their opinion **A7** (FCM implementation phase) spent the most of money. Sample 7 thought the weakest phase is **A7** (FCM implementation phase). And finally, **Table 24** show that sample 1 weighted his or her score on **A10** (FCM review phase) at the last.

Table 27 Summarized no cost (Cr5) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
<b>A1</b>	4.1	<b>1.8</b>	<b>1.8</b>	3.3	<b>2.0</b>	3.2	11.4	3.9
<b>A2</b>	13.6	15.4	16.1	19.8	20.4	15.6	11.4	16.0
<b>A3</b>	13.7	15.4	17.0	9.0	18.8	15.6	11.4	14.4
<b>A4</b>	14.5	15.4	16.8	8.9	19.3	15.6	11.4	14.6
<b>A5</b>	5.6	10.7	11.3	<b>2.1</b>	6.4	11.7	11.4	8.5
<b>A6</b>	2.8	6.5	16.8	<b>2.1</b>	8.5	14.4	11.4	8.9
<b>A7</b>	<b>2.1</b>	3.3	1.9	<b>2.1</b>	2.7	<b>1.8</b>	3.9	<b>2.5</b>
<b>A8</b>	5.0	6.5	1.9	5.7	3.4	2.4	3.5	4.1
<b>A9</b>	13.2	4.6	3.3	7.6	2.4	3.3	<b>2.0</b>	5.2
<b>A10</b>	21.4	15.5	9.4	24.3	12.4	14.4	3.1	14.4
<b>A11</b>	3.9	4.9	3.5	15.0	3.5	1.9	19.3	7.4

#### 4.2.7 Popularity criteria (Cr6) weight score

In popularity criteria (**Cr6**), sample 2 give his or her opinion whether **A1** (FCM program initiation phase) is the most unpopular phase see in **Table 22**. In the meantime, samples 3, 5 and 6 thought the most unpopular one are **A3** and **A4** (FRA phase and FIA phase). Lastly, **Table 22** shows that samples 1, 4, 7 and average score point out **A10** (FCM review phase) is the most unpopular.

Table 28 Summarized popularity (Cr6) criteria data

	S1	S2	S3	S4	S5	S6	S7	Avg.
A1	8.1	<b>1.6</b>	16.0	9.1	7.6	7.9	2.5	7.5
A2	2.7	6.3	16.5	2.3	31.6	18.6	2.5	11.5
A3	3.9	24.3	<b>1.6</b>	2.7	<b>2.2</b>	<b>2.1</b>	2.5	5.6
A4	2.9	4.8	<b>1.6</b>	2.5	<b>2.2</b>	<b>2.1</b>	2.5	2.7
A5	23.0	13.4	14.3	27.1	8.4	9.0	23.7	17.0
A6	16.7	17.5	19.4	12.4	17.2	31.7	18.6	19.1
A7	14.3	11.0	5.1	15.9	6.5	6.1	13.9	10.4
A8	2.6	7.2	3.9	4.4	3.8	3.2	2.5	3.9
A9	2.6	3.0	2.4	3.4	3.3	2.6	2.5	2.8
A10	<b>2.3</b>	2.7	2.0	<b>2.2</b>	2.3	2.6	<b>2.2</b>	<b>2.3</b>
A11	20.8	8.3	17.2	18.0	14.8	14.0	26.6	17.1

#### 4.3 Interesting issue from FCM training program experiment

After did the FCM training program, this study found the differences in process of work and risk concerning perspective between the samples that had difference age, marriage status, and education level. The mostly of samples who younger and the sample who had higher level of education got information from training program and did the training program faster. The mostly of samples who older and have children or grandchildren listed risk more careful than the other. And the samples who had the second job or had their own business, had difference perspective in risk from the other.

## Chapter 5 Discussion

After established FCM training program, the researcher many interesting issues for improve FCM.

### 5.1 Modified FCM framework

From **Table 2** to **Table 11**, and the samples' opinions after finished FCM program training, this research can conclude FCM program into FCM framework in **Table 29** to **Table 38**.

FCM is a system management for continuity of family life focusing on normal activities which are defined by the family members. This system pays attention to establish the plan to prepare, response, recovery, and mitigate any of incident that can disturb their normal activities. It is based on PDCA. FCM has many processes to ensure whether the FCP meet the objective and practical when incidents come. FCM also cover ethic impact, recreation impact and social impact that the popular risk management in normal family cannot do.

#### 5.1.1 FCM modified program initiation

There are two important things in this phase that have to be established. First thing is the program charter, and the second one is the program plan. But before starting the FCM program, family who interested this program needs to establish their family as an organization structure (see in **Table 29**).

Family as an organization was defined for the family by their family members. So, any details or any components of this family as an organization structure are depend on the family members opinions. For example, the size of the family in family as an organization structure is depend on the family members opinion (i.e., who is included in the internal boundary and who is not). It depends on the family members' opinion as well. Who has to join this FCM or who has not, it also depends on the family members' opinion. Family as an organization structure require family members' personal goal to define family as an organization goal (see in **Table 29**). There are requiring normal activities, responsibility, and family as an organization goal to define work specialization (see in **Table 29**). Its need responsibility, regulatory regimes, life strategy to define functional departmentalization, chain of command, unity of command, decision-making authority, family as an organization mechanism (see in **Table 29**).



Table 29 Inputs and outputs of Family as an organization structure

Inputs	Key activities	Outputs
- Personal goal	- Define family as an	- Family as an organization goal.
- Normally Activities	organization scope, roles,	- Work specialization
- Responsibility	responsibilities and	- Functional Departmentalization
- Regulatory regimes	processes on each family	- Chain of command
- Life strategy	members	- Responsibility
- Processes and		- Unity of Command
workflows		- Decision-making authority
		- Family as an organization mechanism

#### 5.1.1.1 The program charter

At least, FCM program should be the responsibility of an adult who knows his or her family as well. He or she must have the ability to draw family as an organization structure and access to all family information. To establish the program charter, he or she has to draw out family as an organization follow table 0 in **Appendix A**.

This program charter should guide family members who have responsibility for searching how to implement FCM program in his or her family. This program charter should tell the family member, what information that needs to be gathered and which is needed to convince the other family members to join this program.

To establish the program charter, there are requirements as shown in **Table 30**. And to ensure whether in project initiation phase will be achieved, outputs in **Table 30** are needed.

Table 30 Inputs and outputs of The FCM program charter

Inputs	Key activities	Outputs
- Family as an organization strategy	- Define and agree program scope, roles, responsibilities, and processes	- Agreed key processes
- Information strategy	Identify and specify guidelines for conducting FCM	- Checklist of external regulatory issues
- Policies and procedures	- Establish monitoring and control mechanisms	- Change control procedures
- Regulatory regimes		- Family assumptions and expectations
- Family as an organizational structure		- Risk analysis toolkit
- Processes and workflows		- Resource allocation and accounting procedures
- Financial management		- Testing cycles and procedures
		- Review cycles and procedures
		- Training and induction policy
		- Documentation and reporting policy

#### 5.1.1.2 The program plan

This FCM program plan has no need to be completely one like BCM program plan. Family has members less than business in signification numbers and has not much stakeholder involved.

From the sample opinion after finished FCM program training, they though the structures of this program plan are too much. They only want to know steps, scope, and benefit of this program.

So, this program plan needs to tell the other family members whether to be achieve FCM program implement, who must do what, when, why, and for what. The important thing is this program plan should tell the family members that to implement this program, what do they have to spend?

**Table 31** shows the program plan required, key activities and outcomes. To establish the plan for show the other family members, it requires background information of the family as show in **Table 31**. The outputs of this plan will help the other family members decided to implement FCM program in their family easier in next phase.

Table 31 Inputs and outputs of The FCM program plan

Inputs	Key activities	Outputs
- Family as an organization strategy	- Collect stakeholder input	- Agreed prioritized initiatives
- Information strategy	- Collect, merge and assess expectation priorities	- Project leaders
- Financial plans	- Scope program plan	- Documentation templates and standards
- Program charter		- Terms of reference for initiatives
- Family as an organization expectation		- Cost-estimates
- Family as an organization priority		- Timetable
- External family members and stakeholder maps		- Communication plan

The samples thought this phase is not effective. The samples gave their reasons that it was necessary to concern about the researcher role in the program. In the experiment, there was the researcher acted as the moderator. In practice, it would be difficult to have someone who was able to do this role, unless that person had some training experience. Although some samples considered that was easy because there is someone in their family members who do this role in general. However, the samples also had the same opinion whether they cannot gather FCM program information as well as their expectation from their other family. The samples also gave some suggestions such as financial planning or insurance planning that have strong marketing campaign and have a lot of representatives like financial planners or insurance agents. They might be able to help moderating this kind of program. Moreover, the training institutes, as well as certificate issuing, should be established. Lastly, But the increasing cost after do the marketing is also another concerned.

From the results of this experiment, FCM program phase should be improved in some criteria (effectiveness, usefulness, easy to understand, less time consuming, no cost, and popularity).

### **5.1.2 FCM modified Project initiation**

This phase in business is important, project present team needs to prepare themselves well. For example, in business, there are many forms of proposing project, there are steps of project initiation. But in family, there are many variables for make some decision in many types

of families. This research cannot conclude step for propose this project into family. Member who want to implement this program is the one who know his or her family best.

However, to be achieve the FCM program, the other family members should know the program charter and the program plan.

The samples seem to consider it is hard to do this phase with their family members by themselves without a guidance from the experienced moderator. They did not know how to convince their family members to aware risks around them. And they did not know how to convince their members to join the program that need a lot of effort. This step is considered as the most popular one because they could realize when some family members would like to make any big decision, they needed to find a lot of supporting information about that thing. They also have to prepare themselves before proposing about it to their family members and convincing them.

From the results of this present program, FCM project initiation phase should be improved in some criteria such as effectiveness, and usefulness.

### ***5.1.3 Family risk analysis***

This phase contains a lot of process, identify the risks, evaluate the risks, prioritize the risks, find out the FPAs, FRTO, FMTPD, and the necessary resources for FPA. It requires a lot of information and knowledge. Be careful the mistaken issue in risk analysis and business impact analysis.

FRA phase require inputs to do risk analysis (identify, evaluate, and prioritize), and do FIA see in **Table 32**. And prioritized risks will be used in next phase to select risk mitigation strategies.

The samples gave their feedbacks that they were quite interested in risk analysis since the beginning. Nevertheless, they found it was not as useful as they expected. Probably, it is because they misunderstood about concept of risk at the first place. Risks in their life are closer than they thought. One of the samples mentioned he told that he just did manage that risk without knowing this kind of activity was called risk management. Anyway, this phase can help the sample understand the technical related terms.

From the results of this present program, FRA phase should be improved in some criteria (effectiveness, usefulness, and popularity).

And in FIA subphase, it was very new to all samples. They had learned many things new from this phase. It had a lot of useful lessons. They also mentioned that this phase was similar to course to know about their family life better. They are happy to know their FPAs, MTPD for FPAs, and FRTO as well as the necessary resources for the critical time. Nonetheless, in real life, they considered it was too much to prepare. Interestingly, in COVID-19 situation, they had changed their mind and considered they would like to edit their scores in this phase. By having a huge crisis experience, people could increase their awareness. It is one of the lessons learned from this phase.

From the results of this present program, FIA phase should be improved in some criteria (less time consuming, and popularity).

Table 32 Inputs and outputs of family risk analysis

Inputs	Key activities	Outputs
- Program charter	- Identify risks	- Risk register
- Program definition	- Evaluate risk impacts	- Probability and impact scales
- Project specification	- Estimate probability of risk	- Probability-impact scores
- Technology architecture	- Estimate frequency of risk	- Prioritized risks
- Application architecture	- Calculate risk scores	- FPAs
- Activities map and workflows		- FMTPD
- Future plans		- FRTO
- Generic risk checklist		- Necessary resources for FPAs
- Statistics on risk		
- Interview		

#### ***5.1.4 FCM modified selecting risk mitigation strategies***

There are many processes need to do in this phase. Most members of family are not specialist. They have to do many researches for select the best risk mitigation strategies. In Thailand, there is no family risk mitigation planner. The family members have to spend their time for long in this phase.

However, objective of this phase is to select the most worthwhile risk mitigation strategies. Time is the factor that have to concern. So, if you think it is not worth, you can skip some parts of this phase.

This phase requires many components from previous phases to make to decision (see in **Table 33**). After finished this phase, it provides risk mitigation strategies, disaster recovery plans, emergency response teams, and command and control structure (see in **Table 33**).

This phase consumed long period of time and contained many steps. The samples suggested whether this phase could be improved. Since this phase needs an expert to provide some guidance, the samples considered it was too difficult to complete the tasks by themselves. At least, this phase should provide some guidebooks or checklists, or even the software programs to calculate and choose the risk mitigation strategies after inputting the data (i.e., information background).

From the results of this present program, FCM selecting risk mitigation strategies phase should be improved in some criteria (effectiveness, less number of steps, easy to understand, less time consuming, and no cost).

Table 33 Inputs and outputs of FCM modified selecting risk mitigation strategies

Inputs	Key activities	Outputs
- Program charter	- Option identification	- Risk mitigation strategies
- Program definition	- Option appraisal	- Disaster recovery plans
- Project specification	- Information searching	- Emergency response teams
- Information strategy		- Command and control structure
- Technology architecture		
- Application architecture		
- Activities map		
- Building plans		
- Map of localities		
- Prioritized risks		
- Incident reports		

#### ***5.1.5 FCM modified monitoring and control***

There are many monitoring and control techniques for family. Choose some techniques that effective in your family. And to make sure whether FCM suitable for every family member, this research suggests educating and training every member in family. Every member has to understand every plan in this program. They have to know their responsible in every situation. And they have to do it in actual when incident come. Finally, this research suggests designing testing regime and review regime to improve this program in the future (see in **Table 34**).

Since the actions in this phase were close to their daily actions, they found this phase was not difficult for them. Anyway, in order to create the effective outcome, participation in this phase can be one of the express ways to reach the destination.

From the results of this present program, FCM monitoring and control phase should be improved in some criteria (less number of steps, easy to understand, and less time consuming).

Table 34 Inputs and outputs of FCM modified monitoring and control

Inputs	Key activities	Outputs
- Program charter	- Ensure governance of FCM	- Education and training
- Program definition	- Assure FCM requirements are met	- program
- Project specification		- Testing regime
- Information strategy		- Incident reports
- Risk mitigation strategies		- Review regime
- Disaster recovery plans		
- Emergency response members		

#### 5.1.6 FCM modified implementation

After establishing FCP, the family implements their plan in their life in this phase. In business, there are reasons in law term to do this phase in several documents, but in family there is no that reason. From the samples' opinions, they want to change formal documents into notes and take note in only some important parts.

However, the samples agreed to do detail of this program in documents form (see in **Table 35**) because it is easy to use when its need to and easy to deliver it to their children. This implementation requires instruction from previous phase (see in **Table 35**). The implementation phase sounds practically for the samples when they followed the instruction.

From the results of this present program, FCM implementation phase should be improved in some criteria (less number of steps, less time consuming, and no cost).

Table 35 Inputs and outputs of FCM modified implementation

Inputs	Key activities	Outputs
- Program charter	- Track costs and resource utilization	- Financial reports
- Program definition		- Insurance policies
- Project specification	- Document implementation	- Disaster recovery plan implements logs
- Risk mitigation strategies	- Arrange insurance cover	
- Disaster recovery plans	- Implement risk management strategies	- Risk mitigation strategy implementation logs
	- Implement disaster recovery plans	- Variance reports
		- Progress reports

### 5.1.7 FCM modified testing

In this phase, the family tests their plans after implement to ensure that they are functional and meet the objective of this program. **Table 36** shows the inputs of the testing and show, what are the family members have to test in this phase.

The samples considered the testing phase was simple but more effective. Main activities in this phase were to correct the plans that analyzed, designed, and implemented before, in order to adapt or adjust the plans.

From the results of this present program, FCM testing phase should be improved in some criteria (no cost and popularity).



Table 36 Inputs and outputs of FCM modified testing

Inputs	Key activities	Outputs
- Program charter	- Establish family as an	- Testing assumptions
- Program definition	organization expectation	- Testing scope
- Project specification	- Develop measurement criteria	- Testing objectives
- Risk mitigation strategies	- Develop testing plan	- Testing schedule
- Disaster recovery plans	- Negotiate availability of staff	- Testing procedures
- Training materials	and material resources for test	- Testing targets
- Interviews	- Brief staff in affected areas	- Test report
	- Conduct test	
	- Debrief staff	

#### **5.1.8 FCM modified education and training**

Objective of this phase is to make sure that every member in family has not mistaken in the FCM program and FCP. There are inputs of this phase show in **Table 37** to ensure there is no missing issue. And also show necessary components of education and training program in **Table 37**. The samples give their opinion whether number of family members is small. Because it is small, it will be easy to set a meeting, educate and train, but it also easy to be omitted too.

This FCM program is established especially for families. In an education process for family members who did not know the plans is easier than big organization. Because the family members are intimate. The samples also familiar with evacuation training from workplace, it will be easy to see the benefit of training.

From the results of this present program, FCM education and training phase should be improved in some criteria (less number of steps, less time consuming, no cost, and popularity).

Table 37 Inputs and outputs of FCM modified education and training

Inputs	Key activities	Outputs
- Program charter	- Structure training	- Training materials
- Program definition	- Develop instructional and	- Training Presentation
- Project specification	assessment material	- Assessment materials
- Risk mitigation strategies	- Identify staff for training events	- Training events
- Disaster recovery plans		- Attendance and certification logs

#### 5.1.9 FCM modified review

This phase needed to ensure whether FCM is effective. And if it not, which parts are not effective. Reviewing requires core of this program in every phase (see in **Table 38**) and suggest collecting opinion after discussion from all of family members. Outcomes of this phase should guide the family for improve this program to currently and effective when incident come (see in **Table 38**).

Reviewing with the family members is so powerful. They could receive a lot of opinions for many things that they did together in the past. They could see both failure and success cases. They also shared the idea to improve the plans together.

From the results of this present program, FCM review phase should be improved in some criteria (less number of steps, less time consuming, and popularity).

Table 38 Inputs and outputs of FCM modified review

Inputs	Key activities	Outputs
- Family as an organization strategy	- Identify changes in activities	- New or altered risk list
- Information strategy	- Identify new requirements	- Priority areas for action
- Program charter	- Identify changes in family environment	- Cost estimates
- Program definition	- Highlight successful handling of risk events	- Timetable
- Project specification	- Highlight failure to handle risk events	
- Risk mitigation strategies		
- Disaster recovery plans		
- Testing regimes		
- Education and training program		
- Incident reports		

The samples have quite different their present plans. But all of them did not though their plans were perfect. They saw some vulnerabilities in their plans, but they could not edit or adjust them because their plans were established from instant plans. The samples told in the same way that the strengthen of this program is adequacy. This program starts with evaluate, learn about their family, and clearly define the family that they had not done anything like this before, that made the outcome of this program closely suitable with their family more than any plan.

Finally, the suggestions of the samples' opinions are shown in **Table 39**. However, this is the first step of FCM improvement. Though the results gave this research several opinions to improvement for FCM. But the results are collected from some of medical staffs that cannot represent for all of medical staffs' opinions.

Table 39 FCM suggestion

Phase	Suggestion
<b>FCM program initiation</b>	<p>This program should have an agent to promote, suggest, and guide.</p> <p>This program should have certified agent organization.</p> <p>This program should have PR (public relation), marketing, and advertisement.</p> <p>This program should be easy to get known.</p>
<b>FCM project initiation</b>	<p>This program should have platform or tools to clearly define family as an organization</p> <p>This program should be success family example for increased reliability</p>
<b>Family risk analysis</b>	This program should have platform or tools to analysis family risks.
<b>Family impact analysis</b>	This program should have platform or tools to analysis family impact.
<b>FCM selecting mitigation strategies.</b>	This program should have platform or tools to make suitable mitigation strategies, and plans.
<b>FCM monitoring and control</b>	This program should have platform or tools to monitoring and control.
<b>FCM program</b>	This program should have platform, manuscript, or guidebook that can be easy to follow.
<b>FCM Training program</b>	<p>This program should have trainer more than one to answer the questions at the same time.</p> <p>This program should not have program training participants more than 5 at the same time.</p> <p>Participants environment have effect, should be managed group of participants carefully.</p> <p>In each meeting should not spend more than 60 minutes.</p>

The results after establishing this program are satisfactory in researcher perspective. This research show whether BCM can implement into family as an organization. Although, the sample said that it could not possible without guide from researcher. But at least, it could implement. If in the future, FCM program has some platform or some tools to make it easier and popular. It can world-wide and make life better.

## Chapter 6 Conclusion

### 6.1 Research conclusion

This study is a pioneer work proposing the FCM program (i.e., the BCM program for a family as an organization). At this moment, this study did not focus on the comparison between before and after implementing the FCM training program. Although there is no evident of better-life concept after establishing FCP in the samples' family, based on the conducted FCM training program experiment. From the observation of the sample, the FCM concept improve the risk management of the participants that the samples realized the concept of FCM and could deal with risks in their life better than before.

It is not easy to make it fit in at the very beginning. Generally, family has many types, variety goals, and many various structures. First, this study expected to propose the improved guidelines for FCM for medical staffs. It is expected to contribute the outcome as the proposed FCM to help family members to get protective, secured, and sustainable plans for their operations as same as the large companies, industries, or organizations that implemented the BCM.

Table 40 Conclusion of FCM training program

Phase	What did the samples do
1	Joined the meeting to listen the program initiation from researcher.
2	Join the meeting to establish their own family as an organization structure.
3.1	Joined the meeting to identify risk, define likelihood scores and impact scores, score and prioritize the risks.
3.2	Joined the meeting to define FPAs, FRTO, FMTPD, needed resources, and finally confirm the prioritized risks.
4	Join the meeting to select mitigation strategies, and make the FCP.
5	Join the meeting to make monitoring and control system.
6	Implement FCM and join the meeting to discuss
7	Testing FCP and Join the meeting to discuss
8	Educate, Train, and join the meeting to discuss
9	Review Program and join the meeting to discuss

According to the proposed FCM training program experiment from **Table 40**, the risk is found to be mainly a consequence of the uncertainty in daily life. Actually, many parts of this FCM program are what the samples used to do in their family plans. However, they might not prepare the written the detailed documents. For example, some families used to set a family meeting to discuss the risks in their life and purchase some insurance plans as well as financial plans. Some families created a table for monitoring their foods or exercise schedule. Some families set a meeting every year to review the whole past year. Nevertheless, no one used it to analyze their family impact from the identified risks. By having the FCM, everyone can understand their FIA in short time. Based on the evidence found from the conducted experiment, it is likely that the FCM plan can be established by everyone who is interested in.

From the samples' opinion, this training program taught them a lot. The samples got learn about their family as an organization, they learned how to set their own goal and bring it to be the family goal, got know about their family and their family members better, learn how to identify, evaluate their risks, learned how to find their prioritized activities, got know their MTPD, got know what exactly they need to resilience their family when incident come, got know what and how to prepare, got know how to recover their life back as soon as possible, got know how to set up the plan and set their risk treatment strategies, got know benefit of documenting, backup information, evacuation training, and review.

Though this research cannot show the benefit of FCM program. But in the samples' opinion, they realized and concerned about risk around them much more before. They already know that their family life can disturb and know how to cope with, not just in financial term like financial plan or insurance plan that focus especially in financial term.

However, this program is not practical yet. There are many phases that the sample cannot do it by themselves. It is not easily to establish the suitable plan for their family without any tradeoff. There is still a lot of steps that the family members must follow. More preparation could generate high cost. Thus, it is necessary to enhance the concept of cost-benefit clearly when choosing the mitigation strategies. Also, the family members have to clearly understand a lot of things about this program more than the other programs such as financial plans and policy plans

## 6.2 Limitation

This research limits on the samples' and the participants' convenient. Hence, some of them and some of their family members could not finish the FCM training program and could not give their opinion. This research also limits on time. So, the FCM training program could not design the specific time schedule and participants environment.

## 6.3 Future research

Future of this research could be implementing or developing FCM or FCM training program based on this research guideline phase-by-phase. Outputs of this research are weak points of each phase. It is easy to improve each phase when understanding and realizing its weak points. This research found many interesting issues from the conducted FCM training program experiment. The samples can be classified before joining the FCM program and then the study found the significant differences between gender, education level, marriage status, age, size of family, career, etc. Future research also can explore the success factors after establishing and implementing the FCM in the family. Finding the method or tools to ensure the FCM effectiveness, usefulness, less number of steps, easy to understand, less time consuming, having no cost and popular are the potential topics for future research. Moreover, the future study can implement with the consideration of all family types, family sizes and all of regional culture in order to find out the key success factors and the FCM problem issues through survey method.

## Appendix A

In this part, this research will show picture when collected data from the sample. And also have FCM documents form

Appendix A-2 Collected data environment 1



Appendix A-1 Collected data environment 2





Appendix A-3 Collected data environment 3



Appendix A-4 Collected data environment 4




Appendix A-5 Collected data environment 5



Appendix A-6 Collected data environment 6




Appendix A-7 FCM training program document 1



**Table 0: Family as an Organization Structure**

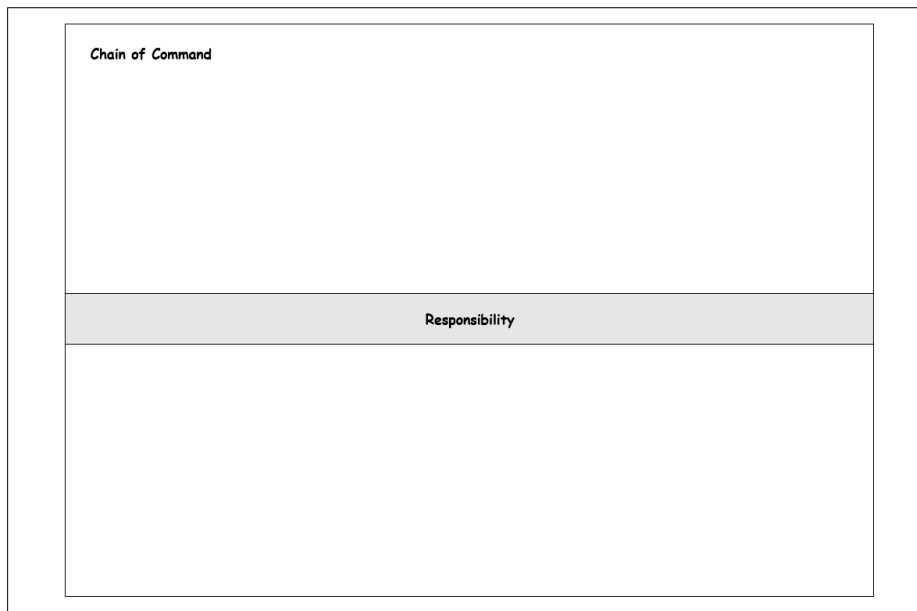
Goal	
Work specialization	



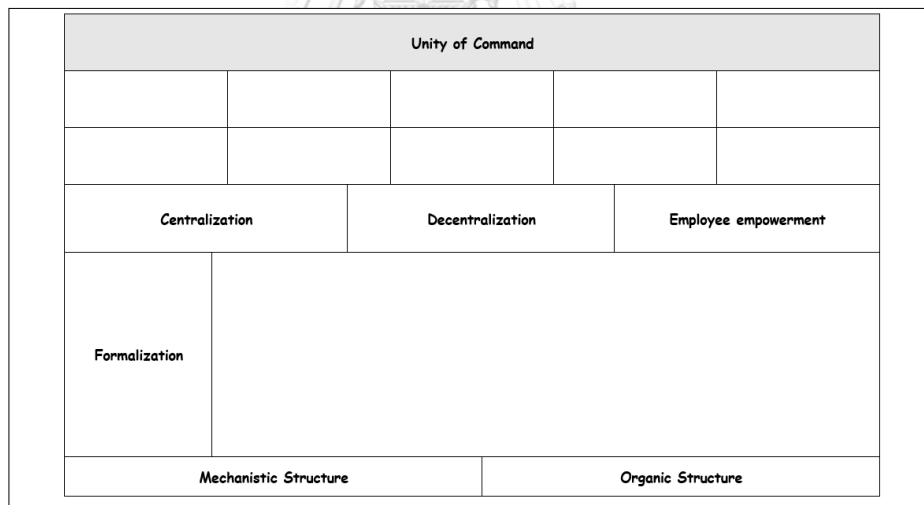
Appendix A-8 FCM training program document 2

<b>Functional Departmentalization</b>
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Appendix A-9 FCM training program document 3



Appendix A-10 FCM training program document 4




Appendix A-11 FCM training program document 5



**Table 1 Risk register**

Number	Risk	Environment	Owner	Dependency Linked Risk
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Appendix A-12 FCM training program document 6



**Table 2.1 Risk - Likelihood Scoring Scale**

Score	Descriptor	Likelihood Over 5 Years
1		
2		
3		


**Table 2.2 Risk - Financial Impact Scoring Scale**

Score	Descriptor	Financial Impact
1		
2		
3		

**Table 2.3 Risk - Health and Safety Impact Scale**

Score	Descriptor	Disturbed days
1		
2		
3		

Appendix A-13 FCM training program document 7



**Table 2.4 Risk - Ethics Impact Scoring Scale**

Score	Descriptor	Legal Impact
1		
2		
3		


**Table 2.5 Risk - Recreational Impact Scoring Scale**

Score	Descriptor	Reputation Impact
1		
2		
3		

**Table 2.6 Risk - Social Impact Scoring Scale**

Score	Descriptor	Safety Impact
1		
2		
3		

Appendix A-14 FCM training program document 8



**Table 3 Risk register with Likelihood and Impact**

Number	Risk	Environment	Owner	Dependency Linked Risks	Impact Scoring	Likelihood Scoring	Total score
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							









## Appendix B

Appendix B is contained results of this research. There are actual timetable in FCM training program, and weight score tables for AHP.

Appendix B-1 Actual time in FCM training program.

Sample no.	Time in each phase (minutes)										
	1	2	3	4	5	6	7	8	9	10	11
1	30	35	40	45	60	30	30	30	30	30	30
2	30	25	40	45	60	30	30	30	30	30	30
3	30	20	40	45	60	30	30	30	30	30	30
4	30	20	40	45	50	30	30	30	30	30	30
5	30	20	45	45	55	30	30	30	30	30	30
6	30	20	45	45	55	30	30	30	30	30	30
7	30	20	40	45	60	30	30	30	30	30	30
8	30	25	60	60	60	30	30	30	30	30	30
9	30	25	60	60	60	30	30	30	30	30	30
10	30	25	60	60	60	30	30	30	30	30	30
11	30	25	60	60	60	30	30	30	30	30	30
12	30	25	60	60	60	30	30	30	30	30	30
13	30	25	60	60	60	30	30	30	30	30	30
14	30	25	60	60	60	30	30	30	30	30	30
15	30	15	35	35	30	30	30	30	30	30	30
16	30	20	45	50	50	30	30	30	30	30	30
17	30	20	40	35	60	30	30	30	30	30	30
18	30	20	40	35	60	30	30	30	30	30	30
19	30	20	35	30	35	30	30	30	30	30	30
20	30	20	35	35	30	30	30	30	30	30	30
21	30	15	35	45	35	30	30	30	30	30	30
22	30	15	40	45	60	30	30	30	30	30	30



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