ระบบการบริหารจัดการอพาร์ทเมนต์แบบลีน

นางสาววีรัศมิ์ จิระวารี

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต
สาขาวิชาการจัดการทางวิศวกรรม ศูนย์ระดับภูมิภาคทางวิศวกรรมระบบการผลิต
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2554

LEAN APARTMENT MANAGEMENT SYSTEM

Ms.Raweerus Jirawaree

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering Program in Engineering Management
The Regional Centre for Manufacturing Systems Engineering
Faculty of Engineering
Chulalongkorn University
Academic Year 2011

Thesis Title	LEAN APARTMENT MANAGEMENT SYSTEM
By	Ms. Raweerus Jirawaree
Field of Study	Engineering Management
Thesis Advisor	Associate Professor Parames Chutima, Ph.D.

Accepted by the Faculty of Engineering, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

…… Dean of the Faculty of Engineering
(Associate Professor Boonsom Lerdhirunwong, Dr.Ing.)

THESIS COMMITTEE

…… Chairman
(Professor Sirichan Thongprasert, Ph.D.)

…… Thesis Advisor
(Associate Professor Parames Chutima, Ph.D.)

…… Examiner
(Associate Professor Jeerapat Ngaoprasertwong)

…… External Examiner
(James Wallbank, Ph.D.)

รวีรัศมิ์ จิระวารี : ระบบการจัดการอพาร์ทเมนท์แบบลีน. (LEAN APARTMENT MANAGEMENT SYSTEM) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : รศ. ดร. ปารเมศ ชุติมา, 263หน้า.

วัตถุประสงค์ของการทำวิจัยคือเพื่อกำจัดความสูญเสียในกระบวนการบริหารจัดการเซอร์วิสอพาร์เมนท์ เซอร์วิสอพาร์ทเมนท์ที่ถูกเลือกมาเป็นตัวอย่างในการทำวิจัยตั้งอยู่ที่ใจกลางเมืองกรุงเทพ ประเทศไทย อพาร์ทเมนท์เป็นธุรกิจครอบครัว ที่ให้บริการห้องพักรายวันและรายเดือน จากการดำเนินธุรกิจมาเป็นเวลาหลายปี กระบวนการบริหารงานเริ่มมีความซับซ้อนยุ่งยากมากกว่าที่คาดการณ์ไว้ จึงนำหลักการลีนมากำจัดความสูญเสีย ทำกระบวนการให้ง่าย และเพิ่มความสามารถในการบริหารงาน รวมถึงเพิ่มความพึงพอใจของลูกค้า

เริ่มแรก ศึกษา เอกสาร งานวิจัยที่เกี่ยวข้อง จากนั้น เพื่อระบุความสูญเสียในระบบการบริหารงานส่วนหน้า และแม่บ้าน จึงทำการสังเกตุการณ์ และศึกษาในกระบวนการของอพาร์ทเมนท์ ได้แก่ การบริหารทรัพยากร กิจกรรมการทำงาน และการไหลของของข้อมูล จากนั้นทำการเปรียบเทียบการโรงแรมสี่ดาว และรีสอร์ตสี่ดาว จากนั้น ระบบการจัดการอพาร์ทเมนท์แบบลีนถูกออกแบบ และนำมาใช้ในอพาร์ทเมนท์ ด้วยการนำแผนการเปลี่ยนการปฏิบัติการทางการผลิตไปสู่ลีน (Production Operations Transition-To-Lean Roadmap) ของ สถาบันเทคโนโลยีแมสซาชูเซตส์มาใช้ ยิ่งไปกว่านั้นเครื่องมือและเทคนิคทางลีนได้ถูกนำมาใช้ในงานวิจัยนี้ด้วย

ผลที่ได้คือ องค์กรกำจัดความสูญเสียได้ 195 อย่างจาก 196 อย่าง ลดเวลานำจาก 207 นาที เป็น 47 นาที ด้วยแท็คไทม์ 24 นาที ลดงบประมาณด้านพนักงานลงได้ 232,200 บาทต่อปี เพิ่มทักษะและความเชี่ยวชาญให้พนักงาน ประกันคุณภาพการบริการ เสริมสร้างวัฒนธรรมลีน และ เพิ่มความพึงพอใจของลูกค้าภายในและภายนอกขึ้นอย่างมาก ความพึงพอใจของลูกค้าต่องานบริการส่วนหน้าเพิ่มขึ้น 27.1% และ 39.9% ในงานแม่บ้าน

ภาควิชา ศูนย์ระดับภูมิภาคทางวิศวกรรมระบบการผลิต ลายมือชื่อนิสิต .....

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

สาขาวิชา การจัดการทางวิศวกรรม

ปีการศึกษา 2554

5171612221 : MAJOR ENGINEERING MANAGEMENT
KEYWORDS : LEAN SERVICE / LEAN APARTMENT MANAGEMENT SYSTEM

RAWEERUS JIRAWAREE: LEAN APARTMENT MANAGEMENT SYSTEM.

ADVISOR : ASSOC. PROF. PARAMES CHUTIMA, 263 pp.

The objective of this study is to eliminate wastes in serviced apartment management process. The serviced apartment chosen as a case study is located in metropolis area of Bangkok. The apartment is run as a family business providing daily and monthly rental. After running apartment for years, the management process is more complicated than expectation. The Lean Principle is adopted to eliminate wastes, simplify process, increase management performance and customer satisfaction.

Firstly, literature, research, and relevant study are review. Next, to identify wastes in front office and housekeeping, observation and investigation are applied in 3 fields of the apartment process; resource allocation, working activities, and information flow. Then, a 4-star hotel and a 4-star resort are benchmarking. Next, the Lean Apartment Management System is designed and implemented in the apartment by adopting the Production Operations Transition-To-Lean Roadmap introduced by Massachusetts Institute of Technology. Furthermore, lean tools and techniques are implemented in the study.

As a result, the organization has eliminated 195 wastes in process from 196 waste; reduced leadtime from 207 minutes to 47 minutes with 24 minutes takt time; saved workforce budget 232,200 baht per year; empowered customer skills; guaranteed service quality assurance; created lean culture; and dramatically increased internal and external customer satisfaction. The customer satisfaction increases in overall front office service 27.1%; and 39.9% in housekeeping service.

Department : The Regional Centre for Manufacturing Systems Engineering
Field of Study : Engineering Management
Academic Year : 2011

Student's Signature .....
Advisor's Signature .....

Acknowledgements

I would like to express my gratitude to my thesis advisor, Associate Professor Parames Chutima who advices and encourages me along the research period. Without his support, the thesis could not be accomplished. I would like to express my thankfulness to Professor Sirichan Thongprasert, the chairman, and Associate Professor Jeerapat Ngaoprasertwong, the examiner of the thesis for their recommendations to strengthen this research.

My family is the crucial key for the success; all the supports I earned are invaluable both physically and mentally; my parents who educate and advice me with their 20 years of experience in apartment business; my father who provides me the connection; my mother who dedicates her endless love and supports to her children; my sisters who share ideas and facilitate me in the moment that the highest degree of attempt is required.

I would like to thank for the opportunities that my uncle, Mr. Pongkij, gave me to do the research on his apartment business, not to mention the kindness of Uncle Theera, Uncle Pook, Sister Noon, and Sister Prince who gave me the great opportunities to explore the essential knowledge to fulfill the research.

I would like to express my appreciation to my supervisors and senior officers at Phuket Aerodrome Control Tower, Phuket Approach Control Unit, and especially, Briefing Room, who always support my work. To my friends at RCMSE and my colleagues at Aerothai who are on my side in the most difficult time, I feel very thankful for their warm supports. Last but not least, I would like to express my special thanks to Mr. Chaiwat who always makes me laugh in the uncomfortable atmosphere.

Eventually, with the highest respect, I would like to thank my merit teachers namely Laung Mae, Phra Arjarn Tham, Phra Arjarn Amnuay, Phra Ajarn Sane, Phra Ajarn Kob, Uncle Pakasit, Aunt Yong, and my mother, for their precious mental supports.

CONTENTS

Page

Page

Page

Page

Page

Page

LIST OF TABLES

LIST OF FIGURES

Page

Page

Page

Page

Page

Page

Page

Page

Chapter I

Introduction

1. Rationale of the Study

Thai countrymen have the social value of migration to metropolis such as Bangkok to study and work. These people are the majority of working people in Bangkok. There are more than 10 million people live in Bangkok; approximately 50% of them are from countryside; whereas the others are registered population of Bangkok.

The non-townspeople usually live in apartments, then apartment business has been expanding widely around education area, business area, and industry area. With the nature of adventives, they would rather rent an apartment in metropolis and relocate to a new apartment when they change their jobs.

Therefore, landlords and real estate companies who notice in this potential market would invest and develop in apartment business to serve this demand as monthly rental service. Moreover, they also expand the business to the daily rental service as well.

With the different in investors' capability, there are various types of apartments to serve each particular market segment.

1) Small apartment business: is operated by a landlord himself, normally there is only one small building (less than 60 rooms).

2) Medium apartment business: is the expanded business from a small apartment to be a few apartments either small buildings, medium buildings (60-149 rooms), or large building (more than 150 rooms) in different locations.

3) Large apartment business: is a chain of apartments invested by a potential real estate development company.

To operate an apartment is not complicated; Figure I-1 shows all processes of running an apartment. An owner has to welcome customers, reserve a room for the customer, calculate rental fee of each room at the end of every month, maintenance rooms and building, and keep the building clean. However, the simple management process would turn to be the complex process when the business is expanded to be a medium or large business.

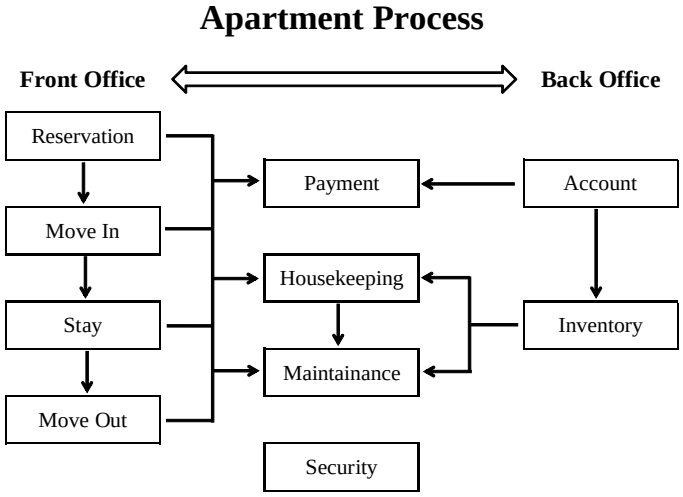


Figure I-1: Apartment Process

2. Statement of Problem

"Business process is almost always in need of improvement and redesign since process evolves over their life time," by Adair, Charlene B., and Murray, Bruce A., Breakthrough Process Redesign, AMACOM, New York, 1994. Although a process was designed to be simple and practical when it initially created and implemented, after time goes by, the simple process would evolve itself to be more complex and difficult to continue. Just like apartment process, not only process evolving over time cause complexity and difficulty of management, but also the number of apartments under the same management team.

A case study, the apartment company has 2 apartment buildings that belong to the same owner. The first one is 300-room apartment; the other is 60-room apartment. Those apartments provide daily and monthly rental service. The owner has

been continuing managing 4 apartment buildings by himself for years. He has started a new apartment construction project and planned for another 2 projects in the future. To manage all apartments, the owner has his own management team he can trust, his family members. Moreover, he also implemented software and hardware helping in management process in some buildings as well.

Although the owner has both management team and supplementary tools, like a management programme and a key card system, he faces complexity and difficulty of multi-apartments management. For example, each apartment building implements different management system; the implemented hardware and software are not perfectly integrated. This management problem is resulting from 2 factors; evolution of management process over times and expansion size of business.

The management problem introduces operation issues such as more redundant work, extra paperwork, extra employees to get job done, exceed budget of expense, and more time and effort spent to deliver services. All these effects of management problem increase business cost while decrease customer satisfaction.

On the other hand, those operation issues are the trouble of management as well. After analysing in detail, the root of these problems is not management problem nor business issues, but the wastefulness in business process. Waste in apartment process does not add value to customers, but it forces customers pay for what they are not willing to pay. Therefore, customers are not satisfied; this impacts the service business directly. Figure I-2 shows cause and effects of the study.

To operate a service business, what the organisation highly concerns is customer satisfaction. Therefore, the organisation would do their best to maximize customer satisfaction. In the study, waste in apartment process is the root-cause of customer dissatisfaction. Therefore, the study will apply Lean principles to redesign apartment process by eliminating waste in process; as well as to introduce Lean Apartment Management System.

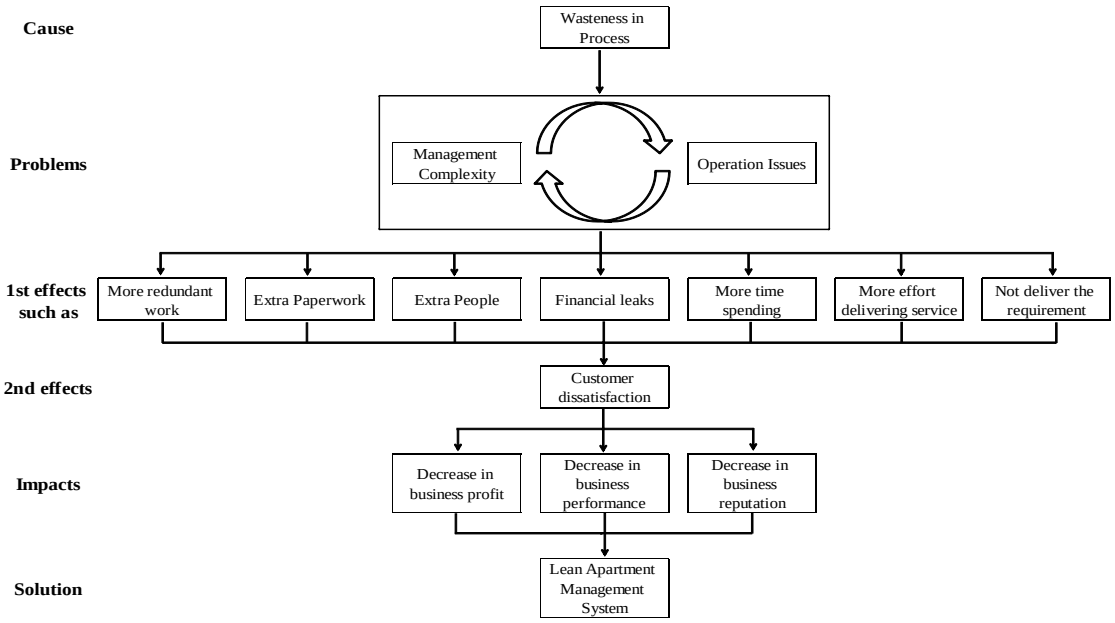


Figure I-2: Cause-and-Effect Diagram of the Study

3. Objective of the Study

To develop Lean Apartment Management System by applying Lean principles in appropriate way of managing apartment business

4. Scope and Limitation of the Study

1) 2 apartment buildings of 300-room and 60-room building
2) Provide Daily and monthly rental service
3) Daily rental service is managed as serviced-apartment, while monthly rental service is not.
4) Same manager but different management system
5) The apartment process including work flows, information flows, and resource allocation
6) To apply Lean principle to redesign the new apartment process
7) To implement the suitable process to the case study

8) To evaluate the implemented process by the proper method that might include customer, employee, and owner perspectives.

5. Expected Results

1) Introducing Lean Apartment Management System.

2) Increasing management performance and customer satisfaction.

6. Research Methodology

1) Study relevant literatures of Lean principle, service business, and performance measurement.

2) Study and investigate apartment processes, behaviours, and natures by interview owner, managers, and employees.

3) Identify value and waste in both owner and customer perspectives.

4) Redesign apartment process by eliminating waste in process.

5) Create the Lean Apartment Management System.

6) Study how to implement the new process in the case study appropriately.

7) Study and select the practical evaluation indicators for the case study.

8) Implement the suitable Lean apartment process in the case study.

9) Evaluate Lean Apartment Management System.

10) Analyse information and discuss results.

11) Summarise the study.

12) Thesis Examination.

7. Research Layout

Chapter 1 Introduction

This chapter describe the introduction of the study including statement of problem, objectives, scope and limitation, expected results, research methodology, and the organisation of the thesis.

Chapter 2 Literature Reviews

The second chapter provides the review of literatures related to the study; including lean principle, lean service, performance measurement, and case studies.

Chapter 3 Apartment Background and Current Situation

This chapter describes the apartment background; general information; current situation including resource allocation, working activities; information flow; and wastes identification.

Chapter 4 Benchmarking

In this chapter, the 4-star hotel and the 4-star resort are benchmarked in resource allocation, working activities, and information flow.

Chapter 5 Lean Apartment Management System Design and Implementation

The Lean Apartment Management System is designed and implemented in this chapter.

Chapter 6 Result Discussion and Conclusion

The final chapter discuss the Lean Apartment Management System, the management performance, and owner, employee, and customer satisfactions.

8. Research Framework

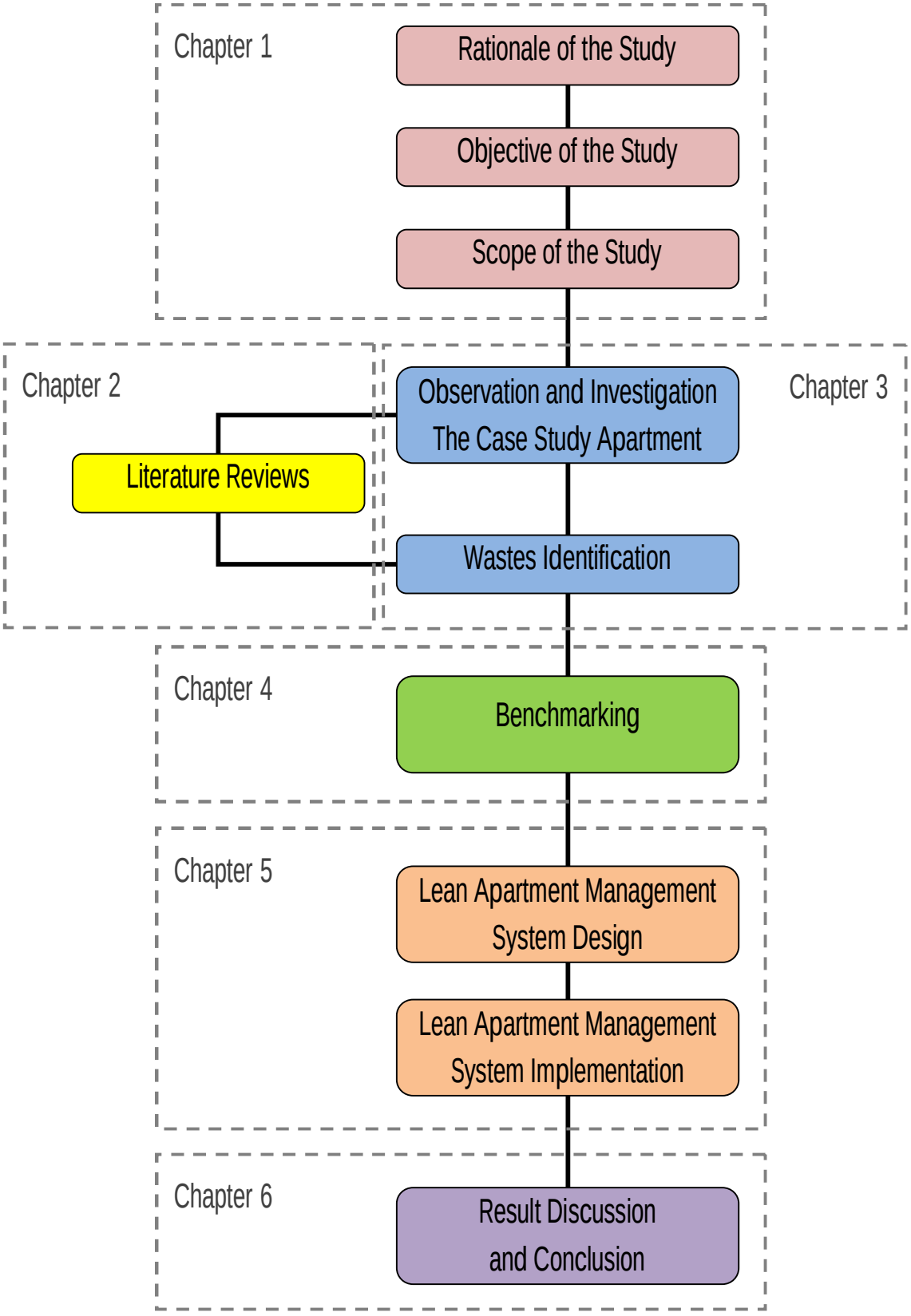


Figure I-3: Research Framework

Chapter II

Literature Review

1. Lean Principle (Lean Manufacturing)

1.1 Original of Lean

1.1.1 The Toyota production system (TPS)

During and after the World War II era, the Japanese industry needed to survive in the global market, including Toyota Motor Company. After study the production system of American automobile industry, Toyota offered the solution of the alternative production system named TPS which reconstructed the company entirely. TPS that developed JIT philosophy aimed to attack waste in production system. After that, TPS was proven and implemented in other companies' production system as well. (Papadopoulou and Ozbayrak, 2005)

1.1.2 The just-in-time (JIT) philosophy

The fundamental element of TPS is JIT philosophy that developed complementary elements such as small lot production and the Kanban system. JIT production system consists of 2 management philosophies; Big JIT, including all production activities aspects; Small JIT, focusing in pull production, Kanban communication and control system. (Papadopoulou and Ozbayrak, 2005)

1.1.3 The lean manufacturing philosophy

Lean Manufacturing is a manufacturing philosophy that can form the roadmap to global manufacturing if carefully adopted and implemented. Lean Manufacturing is an improved version of TPS and JIT philosophy. (Papadopoulou and Ozbayrak, 2005)

1.1.4 Lean production management

The lean management help an organisation obtain the actual demand by using the minimum resources and cost with proper quality and responsiveness. To adjust production to demand and obtain high performance, lean management is based on two main inherent characteristics: (Arbos, 2002)

1) Lean management operates the least possible number of activities, then the non-value-added activities, called waste, will be eliminated. Generally, the waste is defined as 7 kinds of waste namely, defects, overproduction, inventory, overprocessing, movement, transport, and waiting.

2) Flexibility. Lean Management will attune the system all the time to achieve the type and volume of production that is required by demand.

Table II-1 is the proposed features by Arbos to introduce the aspects related to lean production process implementation and management.

Table II-1: Action to Take Towards Lean Management (Arbos, 2002)

Lean Arrangement		ASPECTS OF IMPLEMENTATION AND MANAGEMENT				
		Arrangement	Batch size	Operations	Personnel	Quality-maint.
WASTE	**Excess production**	Functional improvement but convert **to linear flow** for remaining waste	**Production batch: small** and **attuned** to **demand**	**Rapid preparation** necessary for small production batch	**Versatile and re-assignable** when production is sufficient	No excess: **quality and maint. assure** proper production
	Unsuitable process	Linear flow (fewer activities not adding value)	**Transfer batch: one unit**: simplified handling	**Regular flow: balance** of workstations (**single cycle**)	Versatile, trained and qualified for different workstations	Suitable process and equip. maint. assure quality **the first time**
	Stocks	Linear flow (operation with no accumulation of materials at workstations)	Process batch: small Transfer batch: one unit	Regular flow: balance of workstations (single cycle)	**Multi-task versatile** to facilitate balance	No stocks: quality and maintenance prevent **stoppage**
	Waits	Linear flow operation with no waits for materials at workstations	Process batch: small Transfer batch: one unit	Regular flow: balance of workstations (single cycle)	Multi-task versatile to facilitate balance	No stocks: quality and maintenance prevent stoppage
	Transport	Linear flow with operations nearby and short distances between lines	Transfer batch: one unit	Regular flow, in addition to small transfer batch and operations nearby	Multi-task versatile, working standing up	No stocks: quality and maintenance prevent **backlogs**
	Movements	Linear flow with operations nearby and short distances between lines	Transfer batch: small: one unit	Regular flow, with small transfer batch and short distances	Multi-task versatile, working standing up	No stocks: quality and maintenance prevent backlogs
	Quality	Linear flow (errors more predictable and in fewer units)	Transfer batch: one unit: errors in only one unit	**Self-monitoring.** Autonomisation and/or *poka-yoke*	**Trained, qualified and motivated**	Quality and maint. assure **100% quality**
FLEXIBILITY		**Closed linear flow** (U physical arrangement) to facilitate re-assignment	Production batch: small and attuned to demand	Balanced workstations with **single cycle = variable takt time**	Balanced workstations with variable takt time, by **re-assignment**	Quality and maint. assured for **different products and volumes**

1.2 Lean Thinking

1.2.1 The essence of Lean Thinking

Womack and Jones describe lean thinking is “the antidote” to muda, or waste, which is specifically “any human activity that absorbs resources but creates no value”. The essence of lean thinking is to eliminate muda wherever it exists in a firm or along a supply chain. In addition, they argue that lean thinking provides (Kippenberger, 1997)

- A way to re-specify value
- Line up value-creating actions in the best sequence
- Ensure that such activities are conducted without interruption whenever they are requested
- Ensure that all activity is performed more and more effectively

However, The Antidote claims that Womack and Jones had attributed 8 types of waste from the identification of the Seven Waste of Taiichi Ohno, the late Toyota executive. The eighth waste is the design of goods and services which don’t meet the needs of the customer. (Kippenberger, 1997)

1.2.2 Operation Type

Hines and Rich, 1997; and Mohan and Sharma, 2003, claim that Monden proposed three types of operation that are undertaken in an internal manufacturing context are as following (Hines and Rich, 1997)(Mohan and Sharma, 2003)

1) Non-value adding (NVA): is pure waste that involves unnecessary actions which should be eliminated completely such as
    a. Waiting time

b. Stacking intermediate products

c. Double handling

2) Necessary but non-value adding (NNVA): might be wasteful but are necessary under the current operating procedures

a. Walking long distances to pick up parts

b. Unpacking deliveries

c. Transferring a tool from one hand to another

To eliminate NNVA it is necessary to make the major changes in the operating system. These changes are not possible immediately.

a. Creating a new layout

b. Arranging for suppliers to deliver unpacked goods.

3) Value-adding (VA): is the conversion or processing of

a. Raw materials

b. Semi-finished products

c. The use of manual labour

d. Sub-assembly of parts

e. Forging raw materials

f. Painting body work.

In lean production, waste is defined as the actions that do not add value to a product and can be eliminated. Waste is the great limitations and threats of business performance and business prosperity (Emiliani, 1998)

1.2.3 Waste

1.2.3.1 The Seven Waste

The primary types of waste is the Seven Waste, which is including Overproduction, Waiting, Transport, Inappropriate processing, Unnecessary inventory, Unnecessary movements, and Defects. (Hines and Rich, 1997) Elimination of the Seven Waste is to improve manufacturing productivity that is easily to measure by monitor such as money, defects, inventory, and time. (Emiliani, 1998)

Hines and Rich, 1997; and Mohan and Sharma, 2003, indicate the seven waste as

1) Overproduction

Overproduction is the most serious waste since it lowers the smoothness of goods or services flow as well as hinder quality and productivity, resulting in excessive lead time, storage time, and work-in-process stocks. This problem is encouraged by the push system of unwanted goods; whereas the pull or kanban system is a way to overcome the problem. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

2) Waiting

The waste of waiting occurs when time is not used effectively. The waiting time waste occurs in factory when goods are not moving or under working process. The ideal state is that no waiting time with a faster flow of goods. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

3) Transport

Any movements in a factory could be viewed as waste, then transportation is the waste involving goods being moved around. Therefore, minimising

transportation is rather than total removal is sought. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

4) Inappropriate processing

In the situation of complex solutions are found for the simple procedures, the inappropriate processing waste would occur; for example, using a large inflexible machine instead of several small flexible ones. After that, this waste would encourage poor layout, leading to excessive transport and poor communication; then, finally, the poor quality goods are able to be made. . (Hines and Rich, 1997) (Mohan and Sharma, 2003)

5) Unnecessary inventory

Unnecessary inventory increase lead time, space, and storage costs; and prevent problem identification, then communication will be discouraged. Therefore, many problems are invisible by inventory. Correcting the problems can be achieved by reducing inventory. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

6) Unnecessary movements

Unnecessary movements take part in the ergonomics of production, including stretch, bending and picking up of operators. Avoiding those unnecessary movements would increase productivity and solve quality problem. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

7) Defects

Defects are the bottom-line waste considered as the direct costs. TPS Philosophy stated that defects should be recognised as the opportunity to improve rather than traded off against poor management. Therefore, defects are overwhelmed by immediate kaizen activity. (Hines and Rich, 1997) (Mohan and Sharma, 2003)

1.2.3.2 Behaviour Waste

The “normal” business behaviours such as the comment that

- I am not doing this for Bill because he never helps me when I need something.
- Susan is really difficult to work with ... stay away from her!
- I don’t think Dan deserved that promotion. Jill thinks the Vice President is an idiot.

are, in fact, behavioural waste. (Emiliani, 1998)

These behaviours are waste because they do not add value to customers; they could be eliminated completely from business conversation, dialogue, discussion, or meeting. The behavioural waste (Emiliani, 1998)

- Disseminate incomplete information
- Reinforce stereotypes
- Build barriers
- Hide important issues
- Completely block progress between individuals

According to Eisenhardt and Katzenbach, Emiliani claimed that to effectively eliminate waste in manufacturing process, it takes a great depth of knowledge and real teamwork as well as to eliminate waste in interpersonal relationships. (Emiliani, 1998)

The concept of “lean” behaviours is comparable to lean production. Lean behaviours are defined as behaviours that adding or creating value. Lean behaviours concept is the waste minimisation of contradictory thoughts and actions

leading to defensive behaviour, ineffective relationships, poor co-operation, and negative attitudes. Behaviours that inhibit work flow are similar to wasteful batch and queue in manufacturing process. The behaviours are termed as “fat” behaviours which are recognised as lots of useless talks containing indirect words and meanings. (Emiliani, 1998)

Moreover, the fat behaviour usually causes unintended consequences such as the ability to ambiguously communicate without committing results in order to avoid conflicts. This cause reduces ability to say directly what individual actually mean; then, in an organisation, people cannot discuss effectively in important issues. Finally, both people and the business lose their learning ability from internal and external sources. As a result, (Emiliani, 1998)

- Conversations are changed to simple comments, obligatory discussions, or debilitating debates
- Emotions are either flat due to the enragement in the defence of one’s views
- Information becomes closely guarded
- Transferred knowledge is biased towards agreement
- Learning is obstructed so that an organisation is unable to accurately assess their competitive position

According to Shaw and Perkins, 1991, Emiliani stated that to suspend ego, emotion, assumptions, and paradigms in dialogue allows the issues appear on the surface for holistic exploration. The suspension also permits colleagues to mutually explore their knowledge fields reflecting upon what they have learned. To eliminate behavioural waste is, firstly, recognising waste and then finds ways to eliminate it. Table II-2 is the comparison of common fat behaviours resulting in waste and selected lean behaviours promoting flow between people (Emiliani, 1998)

Table II-2: Comparison of Behaviour Attributes (Emiliani, 1998)

Fat behaviors	Lean behaviors
Confusion	Self-awareness
Unnecessary commentary	Humility
Irrelevant observations	Compassion
Random thoughts	Suspension
Self-imposed barriers	Deference
Ego	Calmness
Irrationality	Quietude
Revenge	Reflection
Inaction	Honesty
Positions	Benevolence
Interpretations	Consistency
Uncertainty	Generosity
Negativity	Patience
Excess	Humor
Gossip	Understanding
Sarcasm	Respect
Preoccupation	Listening
Ambiguity	Observation
Extreme flattery	Trust
Cynicism	Sincerity
Subjectivity	Equanimity
Bias/prejudice	Objectivity
Deception	Discipline
Selfishness	Rectitude
Pride	Wisdom
Criticism	Balance

The results of fat behaviours commonly found in the workplace are listed below. (Emiliani, 1998)

- threats, real or implied
- micromanagement
- disappointing employee surveys
- few improvement suggestions
- employees stuck in functional area
- employee turnover
- scarcity mentality / limited resources
- low turnout at meetings
- calls not returned
- annoyed stakeholders
- slow response to changing conditions
- unmet stakeholder needs

- rumours
- transactional focus
- crisis management
- failure not tolerated
- unclear expectations
- little or no feedback
- favouritism
- many procedures
- low trust
- talk not walked
- management secrets
- few rewards
- ego-driven decisions
- department or functional focus
- relentless pace
- poor listening skills
- broken promises
- elitism
- delays in action
- confusion
- destructive politics
- declining market share
- fear
- ignorance
- blind obedience
- reduced loyalty
- mistakes repeated
- conflict

The consequences of fat behaviours involve the loss of employee commitment. The employees would participate in the business dramatically decreasingly if the employees do not feel they are being heard. (Emiliani, 1998) Therefore, this behavioural waste is a must to be eliminated.

1.2.4 The Five-Step Involved in Lean Thinking

There are five basic concepts of lean thinking: value, the value stream, flow, pull, and perfection. (Piercy and Rich, 2009)

1) Value

Determine what it is customer value in the product or service, specifically what they are prepared to pay for.

In lean production, the value is defined by the end-customer. The product must meet customer requirements at both a specific time and price. (Emiliani, 1998)

An analysis of a company's value proposal is a must, according to Sellitto, Borchardt, and Pereira, there are six items are suggested by Tucker. (Sellitto, Borchardt, and Pereira, 2003)

a. Evaluate if the company is competing in price or in value

b. Evaluate how the company is adding value to its customers

c. Identify what is exclusive in its value proposal

d. Identify the client

e. Evaluate how clients perceive value

f. Identify what the company is committed to do to deliver better value

"According to Womack, once the target cost is defined, it becomes the lens to examine each stage of the value chain, like product development and registration of production orders." (Sellitto, Borchardt, and Pereira, 2003)

2) The value stream

Map out how value is delivered. The value stream is used as a basis elimination of area that does not add value.

This step is to understand all the activities required to produce a specific product by identifying the value in lean production, and then to optimize the whole process from the view of the end customer. The customer viewpoint helps to identify activities that add value, add no value but cannot be avoided, and add no value and can be avoided. (Emiliani, 1998)

According to Sellitto, Borchardt, and Pereira, Womack stated that the value chain is the collection of all specific actions of taking a specific product through three tasks in a business. (Sellitto, Borchardt, and Pereira, 2003)

a. Problem solving: from conception to launch

b. Managing information systems: from order to delivery, respecting a detailed timetable

c. The physical transformation: from raw materials to the product

3) Flow

Ensure products and information smoothly flows from the beginning to the end of the value stream by removing inventory or buffer zones with enablers such as modular designs, cellular working, general purpose machines, and multi-skilled workers.

The next step after specifying value and identifying value stream is to get the activities that add value flow without interruption. (Emiliani, 1998) Value flow in lean production is all actions concerning a product with consisting of the production flow from raw materials to customers. Moreover, drawing a value flow is useful in many aspects. (Sellitto, Borchardt, and Pereira, 2003)

a. Help to realize the development of material and information flow during the whole process.

b. Help to identify sources of waste in the value flow.

c. Integrate lean techniques as a whole, avoiding partial implementation.

d. Be able to explicit the relation between information and material flow

e. Identify where waste comes from

In 2003, Sellitto, Borchardt, and Pereira claim that Womack considered 3 steps to apply flow techniques in practice.

a. After the identification of the whole value chain, focuses on the real object

b. Make the first step possible by ignoring traditional boundaries in tasks, functions, departments and businesses to create a lean company

c. Rethink working practices and specific tools, enhancing performance and reducing rework and waste

4) Pull

Only deliver demanded (pulled) products by the customer.

The concept of pull in lean production is to respond to the customer demand. Comparing with the batch and queue manufacturers, lean manufacturers design the operations for responding end-customer requirement; while the other designs the operations for meeting their own needs. (Emiliani, 1998) In other word, pull production is an initial process that does not produce goods or services without the customer authorisation. This rule is not so simple in practice. (Sellitto, Borchardt, and Pereira, 2003)

5) Perfection

Continually seek for improvement of the process and system with the above principles, striving for perfection.

If the first four steps can be done well, then all activities will become transparent which is enable people to identify and eliminate waste easily. Moreover, it also focuses on continuous improving activities that create value. (Emiliani, 1998)

"The concept of perfection in lean production means that there are endless opportunities for improving the utilization of all types of assets. The systematic elimination of waste will reduce the costs of operating the extended enterprise and fulfils the end-use customer's desire for maximum value at the lowest price." (Emiliani, 1998)

1.3 Lean Enterprise

1.3.1 Lean Enterprise in Concept

In 1997, Kippenberger claim that the lean enterprise in the view of Womack and Jones is: "a continuing conference of all the concerned parties to create a channel for the entire value stream, dredging away all the muda, or waste."

Although, JIT is analogous to Lean principle, the different is that JIT deliver system only relocated the same inventory further back up the supply chain. The waste still exists but in a different place. A lean enterprise mechanism intended to put the entire value stream for a specific product. Then, reconsidered every aspect of jobs, functions, and firms so that value will be specified correctly and flow continuously. (Kippenberger, 1997)

There are many obstacles of people thinking – nobody gives priority to the whole value stream along a supply chain; people or organisation only concern about their own jobs and functional career. Breading down such barriers would be difficult

since the joint analysis along the supply chain make every firm has no privacy. (Kippenberger, 1997)

Womack and Jones suggested the solution of a set of principles to guide joint behaviour and mechanisms; including (Kippenberger, 1997)

- Joint definition of value
- Target costing
- Assurances that all firms should make and adequate return
- Joint action to achieve the target cost and required rates of return
- Repeated analysis
- Renew target setting

A final suggestion is that “every participating firm has the right to examine every activity in every firm relevant to the value stream as part of the joint search for waste.” (Kippenberger, 1997)

Hines, Holweg, and Rich claimed that the following Table II-3 was from Womack & Jones, Lean Thinking: Banish Waste and Create Wealth for Your Corporation, 1996, which describes the time frame for the lean leap. (Hines, Holweg, and Rich, 2004)

Table II-3: Time Frame for the Lean Leap (Hines and Rich, 1997)

Phase	Specific steps	Time frame
Get started	Find a change agent Get lean knowledge Find a lever Map value streams Begin *kaikaku* Expand your scope	First six months
Create a new organization	Reorganize by product family Create a lean function Devise a policy for excess people Devise a growth strategy Remove anchor-draggers Instill a "perfection" mind-set	Six months through year two
Install business systems	Introduce lean accounting Relate pay to firm performance Implement transparency Initiate policy deployment Introduce lean learning Find right-sized tools	Years three and four
Complete the transformation	Apply these steps to your suppliers/customers Develop global strategy Transition from top-down to bottom-up improvement	By the end of year five

1.3.2 Lean Enterprise in Practical

According to Jones, Medlen, Merlo, Robertson, and Shepherdson, in 1999, they proposed that lean enterprise in practice should be

1) Lean thinking in manufacturing industry

A traditional non-lean manufacturing organisation is characterised by (Jones, et al., 1999)

a. Functional organisation

b. Disconnected processes

c. Products moving from one functional department to another

d. High levels of inventory

e. Long delays among departments

f. Using big machines to process large batches of products

g. Goods are made to a forecast

h. Targets are not customer focused, but are based around cost reduction and increasing productivity.

i. Command and control culture which reflected in relationships with suppliers; only the minimum possible amount of information being exchanged.

j. The organisation is very hierarchical, and decisions are made by managers who are isolated from day-to-day production.

k. The operators' opinions are not considered, nor none of the opportunity to contribute to improvement activities.

l. Morale and job satisfaction are low, since most people could not see how they can contribute related to the whole process.

A lean manufacturer, the functional organisation is replaced by (Jones, et al., 1999)

a. A process-based manufacturer

b. A culture of trust giving that rising in a sense of pride in a job well done, which acts as an intrinsic motivator.

c. Operations people involved in the decision-making process.

d. Low levels of inventory

e. Batch processing has been replaced by single piece flow

f. Short cycle times

g. Enabling goods to be produced to order, not to forecast

h. Using right-sized machines in each process area.

i. Focus on doing what adds value in the eyes of the customer, not use cost and productivity targets.

j. Time of operations people is allowed for everyone to participate in continuous improvement (kaizen) activities.

k. Suppliers are viewed as partners that the information is openly exchanged to each other.

2) Lean thinking in communication providers

A non-lean communications company as shown in Figure II-1 consists of (Jones, et al., 1999)

a. Several functional departments

b. Jobs are passed sequentially from one department to another with no end-to-end ownership and poor communication between departments

c. A long delay incurred while the job is queued for awaiting attention in each time of the job is passed on to another department.

d. There is a command and control culture and decisions are made by managers in isolation.

e. There is little attempt of matching supply of network capacity with demand in individual areas.

f. There is unused capacity in some geographic areas; whereas in other areas is insufficient capacity to meet the demand for service.

g. Sales people are unaware of the status of network capacity, and may encourage customers to buy the insufficient-capacity-products.

h. Highly uniform and standardised products offered by the organisation

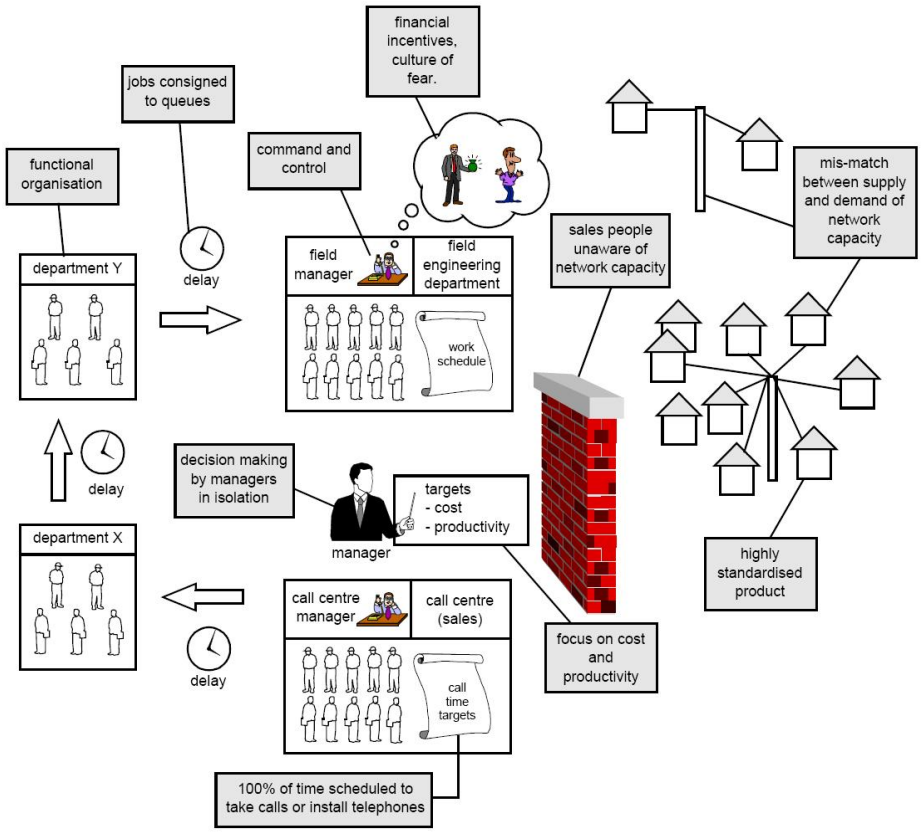


Figure II-1: Non-Lean Communication Providers (Jones, et al., 1999)

Figure II-2 illustrates a lean process-based communications provider. (Jones, et al., 1999)

a. The organisation is based around customer-focused teams.

b. A job will typically be owned first by a call centre advisor and then by a field engineer, with these people pulling in any other specialist functions required to progress the job, yet maintaining ownership.

c. This helps to achieve a short cycle time for fulfilling the customer's order.

d. Through dialogue with customers and the use of information such as demographic profiles, there is a good understanding of the likely demand for network capacity.

e. The consequence is that a level of network capacity just adequate to meet demand is maintained at all times.

f. This is complemented by a network build process with a sufficiently short cycle time so that additional capacity can be installed rapidly in response to an increase in demand.

g. Service is customised to the individual needs of each customer, and the focus is always on doing whatever adds value in the eyes of individual customers, rather than focusing on artificial cost and productivity targets and other non-customer-centric measures.

h. Communication between the various units (e.g. call centre and field) is excellent, and sales people are fully informed of the status of network capacity and workforce availability.

i. As with the lean manufacturing organisation, there is a culture of trust and everyone is involved in decision-making and continuous improvement activities. This leads to pride of ownership, which acts as a motivator.

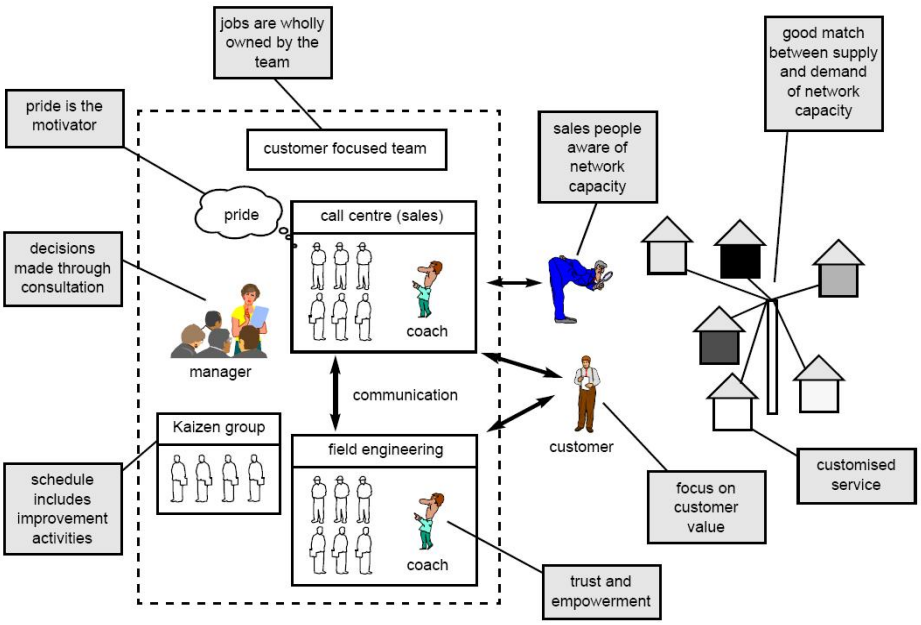


Figure II-2: Lean Communication Provider (Jones, et al., 1999)

1.4 Benefits of Lean

Lean approach is contributed by the value team which consisted of the representatives of different department; resulting in the team members become the owners of the process and information flow and decision-making is significantly enhanced. (Mohan and Sharma, 2003)

1.4.1 Benefits at top management level

"The job of strategic planning and scheduling and its implementation becomes easy for top management under lean approach as:

1) Improved ability to produce plans that meets management objectives.
2) Significant cost reduction in a short period of time.
3) Improved cash flow or quick ROI.
4) Increased productivity and asset utilisation.
5) Better capacity planning resulting in increased productivity.

6) Increased competitiveness and enhanced reputation of organisation.

7) Improved customer, distributor and vendor relationships

8) Overall increased profits and higher shareholder value." (Mohan and Sharma, 2003)

1.4.2 Benefits at middle management level

"The achievement of organisation's objectives and goals becomes easy for this level of management by adoption of lean process as:

1) Better decision-making and improved anticipation of problems.

2) Faster and easier creation of effective contingency plans.

3) Improved resource planning and utilisation.

4) Better communication and coordination within and outside the organisation.

5) Increased competitiveness and enhanced reputation of organisation due to adherence with ATP.

6) Reduction of cycle time and WIP

7) Increased on time procurement and delivery, which in turn enhance the reliability.

8) Best opportunity to perform and grab the rewards." (Mohan and Sharma, 2003)

1.4.3 Benefits at shop floor or lower management level

"The employees at this level recognise the ease of handling the day-to-day operational activities through lean practices as:

1) Better communication between departments

2) Improved bottle-neck management or faster implementation of recovery plans.

3) Less set-up, queue, wait, and flow time.

4) Less expedition.

5) Reduction of overtime due to completion of jobs in less time." (Mohan and Sharma, 2003)

1.4.4 Benefits at customer level

"Entire philosophy of lean approach revolves around the customer, so customers get the maximum benefits whenever organisations opt for lean approach as:

1) Easy retrieval and dissemination of product/service and organisation related information.

2) Able to track the progress of order.

3) Availing the product/service according to decided ATP norms.

4) Achieving "value" for money spent.

5) Quick trouble shooting through timely feedback and corrective actions." (Mohan and Sharma, 2003)

2. Lean Service

The establishment of lean transformation in the manufacturing sector is well recognised. Nonetheless, the use of lean improvement tools to improve service quality in the service sector is relatively new. (Piercy and Rich, 2009)

Piercy and Rich claim that Womack and Jones had proposed a major role of lean improvement in the service sector. While Bowen and Youngdahl had

highlighted on lean approach such as work redesign and increasing training. (Piercy and Rich, 2009)

"Extensions of lean thinking outside of production manufacturing are first identifiable in the application to supply chain management. Management of inbound and outbound supply was always part of lean manufacturing in the automotive sector." (Piercy and Rich, 2009)

"The key area of lean service has emerged beyond the handling of commercial products to the handling of patients in the healthcare sector.

- In common to retail, some research has focused on the purchasing practices and supply chain of inputs to the healthcare system, applying lean supply partnership and inventory reduction approaches to improve responsiveness and cost.

- A greater body of research has focused on the movement of patients through the treatment process. Whether the focus is on products or people, the key concept of moving a physical entity through an operational system remains the same, allowing the use of established lean tools such as mapping techniques and waste reduction.

- Focusing on the flow of activities through the healthcare system, approaches to lean improvement has adopted process mapping and the use of constructed process maps as tools to identify areas of waste and inefficiency in the process." (Piercy and Rich, 2009)

"Having quantified the pre-existing state of operations at the three businesses, attention turned to generating a new, lean organisational system." (Piercy and Rich, 2009) Moreover, Piercy and Rich also proposed the management systems before and after lean implementation in Table II-4.

Table II-4: Management Systems before and after Lean Implementation (Piercy and Rich, 2009)

Workforce strategy	Management systems before lean implementation	Management systems after lean implementation
Decision making	Management prerogative and deployed "top down"	Flat structure with shared goals and values and minimum status differentials
Organizational design	Functional by area of specialist repetitive activity	Delayered management structure with workers holding broad worker knowledge of processes and products. Cross-skilling and flexible design
Key measures	Departmental budget performance and productivity through servicing as many customers as possible in the shortest time period	Value delivery measured at point of service (customer)
Design of work	Separated to functionally specialize and controlled by industrial engineering function	Customer "one stop" shop
Job design	De-skilled to tasks with customers routed to employee using information technology and advanced telephony systems. Employees also controlled by "scripts" used to guide the conversation with the customer	Emphasis on whole task, flexible, use of teams. Employees empowered to resolve customer issues, acting independently
Treatment of labor	Eliminate through automation and tolerate high attrition/absenteeism	Treat as "value adding" resources. Team activities with joint planning and problem-solving
Performance expectations	Time standards established per task with defined routines	Meet customer needs effectively (service) and reduce system failures
Rewards	Individual incentives, linked to job evaluation and "productivity"	Group incentives, with gain sharing, linked to skills and mastery of product processes
Employee participation	Narrow with high levels of initial training to ensure person is capable of working with customers then low levels of on-going training in non-product/task routines. Repetition is preferred to employee reformulating work requirements	Encouraged at the team and inter-team levels with widely shared business information. Constant training in process improvement

2.1 Service waste

Sayer defined service process waste that is just like product or material process waste. “Service-business waste may look a little different, but it happens the same way:” (Sayer, 2007)

1) “Transportation: Service transportation waste is the unnecessary and non-value-added movement of people, goods, and information in order to fulfil the service obligation to a customer.

2) Waiting: If people, systems, materials, or information is waiting, that’s waste.

3) Overproduction: Are your services producing sooner, faster, or in greater quantities than the customer is demanding or requiring?

4) Defects: Defective services are those that do not deliver the correct requirements to the customer.

5) Inventory: Are certain services half-finished?

6) Movement: Are activities, paperwork, and other efforts unnecessarily juggled?

7) Extra processing: How much extra effort do people go to in order to deliver the service? Could any of these steps be eliminated?” (Sayer, 2007)

2.2 Lean Service Process

2.2.1 Traditional service-centre design

Piercy and Rich claimed that traditional approaches of worker management have proved the ineffective in the service environment, with employee displeasure of constant monitoring and practical problems in planning task design for every situation that arrives in the service encounter. Moreover, the traditional management performance systems was designed to improve deliver such as measuring

call duration, and number of calls answered, have tended to focus on speed of service delivery rather than quality service delivery (Piercy and Rich, 2009)

2.2.2 Service Process: Differential characteristics

As early as 1950s, researchers began to examine the characteristics of services and attempt to apply some of the concepts that were developed and proven in manufacturing. (Wei, 2009)

Like the industrial production, service production seeks to implement added value processes with the proper consumer resources. However, service production differs from the industrial production in the following aspects: (Arbos, 2002)

- Service operations do not transfer propriety like industrial products
- While industrial products are tangible, services are intangible character.
- Industrial products can be stored, but services cannot. However, it does not mean that there cannot be stocks accumulated in services which could be such as people queuing, depending on the type of service.
- “In industrial production, products and operations are much more approved than services. In services, the product that works well for a client can be a failure for another. As for operations, services concerned, it is more difficult to standardise them and to fix precise times.” (Arbos, 2002)
- “In services, the productive process can coincide with enjoyment of the service and the client can even take part in the process (self-service).” (Arbos, 2002)

The unique characteristics and requirements in non-manufacturing processes that present challenges for applying the principles developed from manufacturing are, apparently, distinctions between manufacturing and services lie in these factors: (Wei, 2009)

1) The nature of the output of the process

2) The life cycle and feasibility of inventory

3) The degree of customer interaction

2.2.3 Service Process: Lean Management

Arbos specify the way to be taken in the case of service operations bearing in mind the differential aspects mentioned before. The actions are the following: (Arbos, 2002)

1) "Progress from an arrangement that will normally be of the functional type, to:

   a. The Linear flow arrangement in a closed U-shape (making up flexible cells), with operations located as close as possible to each other. The cells lay out in as U-shape allows the grouping of tasks by different workstations, permitting the flexibility required for attuning production to demand.

   b. In services, flow arrangement will be equally convenient, whether there is movement of products or people (case of a personal service) advancing in a regular flow through the operations. In the case of a service with physical distribution (as in a hospital or restaurant), a linear flow arrangement can be attuned. As for a service "in situ" (case of many professionals and services like the one that will be handled in this work), this aspect can be an irrelevant result, although the rest of the aspects of the lean production can be assumed.

2) Progression from an operation using large batches to:

   a. Operation with small production batches, at all times attuned to demand and with the transfer between operations of the smallest possible

batches which, in the case of a linear flow arrangement, could comprise a single unit of product (the only option with no waits for product units and no stocks of products in process).

b. In services, there is nothing to prevent operation with small production and transfer batches, regardless of whether the process involves products or people.

3) Progression from an operation with long preparation times to:

a. Rapid preparations to carry out processes, requiring flexible production teams.

b. In services, the requirement of rapid preparation for small batches is the same.

4) Progression from an operation with independent workstations, where the objective is maximum productivity by each workstation (sacrificing overall balance), to:

a. Processes carried out with grouping of tasks by workstation, so that they complete a single cycle, which, in turn, must conform to a given takt time, i.e., the cycle time allowing production attuned to demand to be carried out in the time available. Logically, takt time will vary according to demand.

b. In services, a balance also has to be struck on the basis of a variable takt time, applying the same methodology.

5) Progression from the conventional specialised worker to:

a. Versatile personnel, able to operate in different processes and re-assignable depending on takt time. This condition, along with the

arrangement in flexible cells, will allow introduction of the required flexibility and adjustment to variable takt time. In the event that even under these conditions difficulties arise in assigning tasks to workstations on the basis of that takt time, special solutions can be introduced, of the so-called rabbit run type.

b. This condition must also be met in services and the methodology for doing so will be the same.

6) Lastly, and although this falls outside the scope of the present work, progression from back-end quality control and repair-based maintenance management to:

a. Quality assurance at each workstation and the proper functioning of production equipment, with suitable preventive maintenance.

b. This is likewise fully applicable to services."(Arbos, 2002)

2.3 Designing Lean Service Process

In the research of Applications of Piercy & Rich, 2009, they use the following steps as a way of applying lean approach to service industry.

1) "Considering the pure-service environment, specifically within this paper.

2) Analysis of the activities taking place does provide many parallels with physical product environments such as a series of input-transformation-output process activities.

3) Mapping out and following the customer as they progress from start to finish of their encounter with the company.

4) Plot out a series of activities and operational actions being.

5) The co-production of the pure service by customer and employee (the role of the customer interacting with the company, in-part determines the service items and levels that are provided) supports the tracking of services as a production process

6) Thus, as a producer of a service, following the production from start to finish (as proposed by lean manufacturing principles), is possible by following the customers experience throughout the service encounter (Seddon, 2003).

7) Mapping out, step-by-step, the activities required in the construction of a product or service can be applied to both manufacturing (such as the different materials, parts and machining required to produce a car door) or to pure service (such as the different information, administrative activities and service issues required to open a new savings account) (Womack and Jones, 2005).

8) With this visualisation in hand, framing the input-transformation-output cycles, it is possible to optimise this process." (Piercy and Rich, 2009)

3. Performance Measurement

Bhasin claimed that the proponents of lean according to Womack and Jones, 2005; Bicheno, 2004; Liker, 2006, advocate that lean has the following benefits to offer: (Bhasin, 2008)

- shorter cycle time
- shorter lead times
- lower WIP
- faster response time
- lower cost

- greater production flexibility
- higher quality
- better customer service
- higher revenue
- higher throughput
- increased profit

Table II-5 is a template for a business to evaluate the impact lean.

Table II-5: Performance Template (Bhasin, 2008)

Financial	Profit after interest and tax
	Rate of return on capital employed
	Current ratio
	Earnings per share
Customer/market measures	Market share by product group
	Customer satisfaction index
	Customer retention rate
	Service quality
	Responsiveness (customer defined)
	On-time delivery (customer defined)
Process	NPD lead time
	Cycle time
	Time to market for new products
	Quality of new product development and project management processes
	Quality costs
	Quality ratings
	Defects of critical products/components
	Material costs
	Manufacturing costs
	Labour productivity
	Space productivity
	Capital efficiency
	Raw material inventory
	WIP inventory
	Finished goods inventory
	Stock turnover
People	Employee perception surveys
	Health and safety per employee:
	Accidents
	Absenteeism
	Labour turnover
	Retention of top employees
	Quality of professional/technical development
	Quality of leadership development
Future	Depth and quality of strategic planning
	Anticipating future changes
	New market development
	New technology development
	Percentage sales from new products

Moreover, Sellitto, Borchardt, and Pereira have proposed the variable of lean performance measurement as in Table II-6.

Table II-6: Structure of the Object under Investigation (Sellitto, Borchardt and Pereira, 2003)

Theoretical Term	Construct	Manifest variable
Lean thinking	Value analysis: ability to identify what adds value	Knowledge of customer's characteristics
		Knowledge of customer's objectives
		Knowledge of the factors that affect client decision
		Knowledge of the moment client requires service
		Knowledge of the rhythm client requires service
		Knowledge of place client requires service
	Continuous flow: ability to eliminate losses in the chain of value production	Knowledge of the concept of wastes
		Ability to identify wastes
		Ability to classify wastes
		Ability to measure wastes
		Ability to eliminate wastes
		Understanding of the importance of speed
	Balanced flow: ability to make operations predictable	Understanding of the processes accomplished
		Appreciation of process mapping
		Appreciation of the measurement of internal processes
		Appreciation of the measurement of partnership processes
		Disposition to modify processes
		Ability to comprehend multifunctionality
	Pull production: ability to allow the customer to pull the operations	Ability to listen to customer's opinion
		Appreciation of customer's opinion
		Importance gave to customer's opinion
		Ability to take advantage of customer's opinion
		Disposition to take advantage of customer's opinion
		Intensity of the interaction with customers
	Continuous improvement: ability to evaluate and improve the results continuously	Understanding of continuous improvement
		Ability to implement continuous improvement
		Ability to focus on continuous improvement
		Ability to control continuous improvement
		Appreciation of continuous improvement
		Intensity of continuous improvement

4. The Case Study

4.1 Heath Care

Ben-Tovim, Bassham, Bolch, Martin, Dougherty, and Szwarcbord researched in 2007, argued that

"Lean thinking is a method for organising complex production processes so as to encourage flow and reduce waste. While the principles of lean thinking were developed in the manufacturing sector, there is increasing interest in its

application in health care. This case history documents the introduction and development of Redesigning Care, a lean thinking-based program to redesign care processes across a teaching general hospital. Redesigning Care has produced substantial benefits over the first two-and-a-half years of its implementation, making care both safer and more accessible. Redesigning Care has not been aimed at changing the specifics of clinical practice. Rather, it has been concerned with improving the flow of patients through clinical and other systems. Concepts that emerged in the manufacturing sector have been readily translatable into health care. Lean thinking may play an important role in the reform of health care in Australia and elsewhere."

Kollberg, Dahlgaard, & Brehmer researched in 2007, argued that

Find that "Lean thinking is applicable in health care settings, and that the flow model is a suitable tool for following up these initiatives. However, it is argued that the flow model needs to be balanced with other measurements in order to receive a complete picture of lean performance."

Show that "health care practitioners may use the findings to develop measurements of the outcome of lean initiatives on existing care processes."

4.2 Quotation Process

Buzby, Gerstenfeld, Voss, and Zeng, researched in 2002, argued that

"The quotation process tightly links the manufacturer and its suppliers and customers on a supply chain. An excellent record of successful quotes not only benefits trading partners, but also positions the manufacturer on the market in terms of its responsiveness, customer service, efficiency, and competitive pricing. In the literature, lean principles are generally applied to manufacturing only, this paper relies on a case study to show the application of lean manufacturing principles to the administrative function of the quotation process. In addition, the case demonstrates that electronic solutions are the best remedies for streamlining the quotation process

to reduce the total cycle time – the basis of providing competitive prices and excellent customer service."

4.3 Call Centre

Sprigg and Jackson researched in 2006, argued that

"Call centres can be considered as lean service systems, with leanness being described in terms of both dialog scripting and performance monitoring. Using data from a sample of 823 call handlers from 36 call centres, these lean characteristics are examined in relation to the prediction of call handler job-related strain. Moreover, the extent to which this relationship can be accounted for by work design characteristics are examined. Findings confirm that employees who experience greater dialog scripting and more intensive performance monitoring show higher levels of strain. These relationships are fully mediated by work design. These findings demonstrate the importance of considering the impact of lean working practices on employee health."

4.4 University

Comm and Mathaisel researched in 2005, argued that

"The focus in higher education is now on cost reduction or budget containment initiatives. Although these initiatives were not implemented with the knowledge that they were implementing "lean" practices, their application has often reduced waste, improved operational efficiency, and contributed to sustainability."

Chapter III

Apartment Background and Current Situation

1. Lean Manufacturing to Lean Service

Service is another form of product; therefore, there is something in common. To apply lean principle to apartment process, the common characteristics of manufacturing product and apartment service shall be clarified as shown in Table III-1. Moreover, there are 2 main parts of apartment service:- front office service and housekeeping service.

Table III-1: Manufacturing Product and Service Comparison

Manufacturing Product	Service	
	Front Office	Housekeeping
Raw Material	Information	Dirty Rooms and Cleaning Solutions
Process	Analysis	Cleaning
Equipment	Stationary and Computer	Cleaning Equipment
Product	Service	Clean Rooms
Workforce	Receptionists	Housekeepers
Production Engineer	Front Office Manager	Housekeeping Manager

Furthermore, the critical idea of lean principle is to eliminate the Seven Waste in manufacturing; therefore, the Seven Waste in service must be identified in order to adopt the lean principle to apartment service.

Table III-2: The Seven Waste in Service

Manufacturing Waste	Service Waste
Overproduction	Duplication, re-entry data, repeat details, copy information
Waiting time	Waiting time of people, material, and information, and processes to deliver service
Transportation	People, material, and information moving around to get job done
Extra Processing	Poor communication, recheck, seeking for confirmation, finding location, paper work, and unnecessary processing steps required
Unnecessary Inventory	Uncompleted service considered as WIP, and paper work
Unnecessary Movement	Poor ergonomics and unnecessary movement required
Defect	Not deliver customer requirement, not meet service standard

2. Apartment Background

Owner and his family are Chinese who settle down in Thailand. He came from the middle class of society; however, he has been working for his family for many years. He can support his family with well-being; his children graduated from Thailand, China, Australia, and Switzerland. His family culture is Chinese; all of his family members can speak Chinese.

The owner was in construction and apartment business for years, his company was established as a family business in 1983. Objective of the company is to run apartment business; however, it is including both construction process and apartment management. Moreover, the owner has expanded his business by increasing numbers of apartment building, and getting into new business line of service apartment.

While the company has been growing every year, the owner is only one who runs all apartment buildings. The owner hires many employees in different positions; however, all of them report directly to the owner. In the last few years, the owner's son and daughter got in the business. However, final decision of all issues is always made by the owner.

Until now, there are 5 running apartment buildings and 1 apartment building under construction. Using numbers of rooms as criteria, the six buildings are divided to 3 ranges of size; large, medium, and small size. There are approximately 300 rooms for large size; 200 rooms for medium size; and 60 rooms for small size. And there are 2 buildings for each size.

In this thesis, two of them are chosen which are one large size and one small size building. After investigation and research on apartment processes, work activities, information flow, and resource allocation, both of them faced the similar problems. Therefore, the more complexity and difficulty one is chosen to be a model of introduction of Lean Apartment Management System, which is the large apartment building.

3. General Information

3.1 Location

The apartment building is located in metropolis area with convenience transportation. Nearby the location, there are MRT train stations, Suthisan and Huai Khwang Station; fresh markets; police station; pubs and restaurants; Chinese Ambassador; Hotels, such as Swissotel Le Concorde Hotel, department stores, such as Robinson, Carefour, Jusco, Esplanade, Tesco-Lotus, Fortune, and Central Rama 9.

The apartment is on Ratchada Road where many famous nightlife entertainment places are located. Those places are well-known in Thailand, for example, Poseidon and Ratchada Soi 4 zone. However, there is another main road near the apartment, Vibhavadi Rangsit Road. On this road, there are Office buildings such as Ericsson, University of the Thai Chamber of Commerce, and Surasak Montri School. The apartment location is shown in Figure III-1.

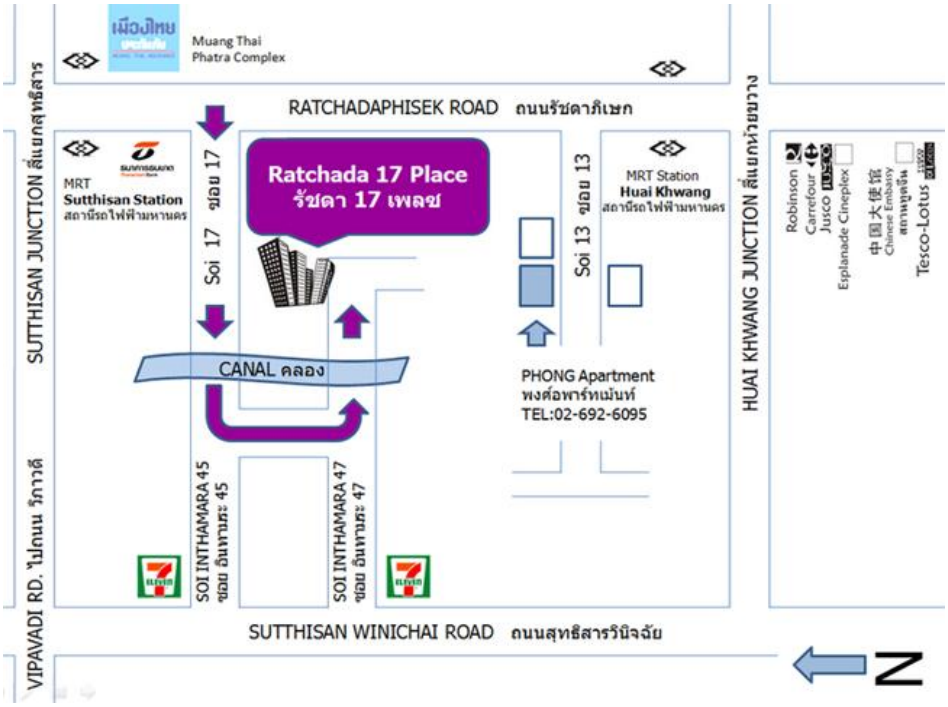


Figure III-1: Location of the Apartment

3.2 Room Type and Price

3.2.1 Monthly Rooms: there are 232 rooms divided into 3 types

– Standard Room	4900 Baht
– Corner Room	7000 Baht
– Superior Room	9000 Baht

3.2.2 Daily Rooms: there are 68 rooms divided into 6 types

– Standard Room	390 Baht for 24 hr. and 1 breakfast coupon
– Standard Queen Room	600 Baht for 24 hr. and 1 breakfast coupon
– Deluxe Queen Room	650 Baht for 24 hr. and 2 breakfast coupons
– Standard Twins Room	600 Baht for 24 hr. and 1 breakfast coupon
– Deluxe Twins Room	650 Baht for 24 hr. and 2 breakfast coupons
– Superior Corner Room	800 Baht for 24 hr. and 1 breakfast coupon
	850 Baht for 24 hr. and 2 breakfast coupons
	900 Baht for 24 hr. and 3 breakfast coupons

Additionally, the Figure III-2 shows the floor layout of the apartment.

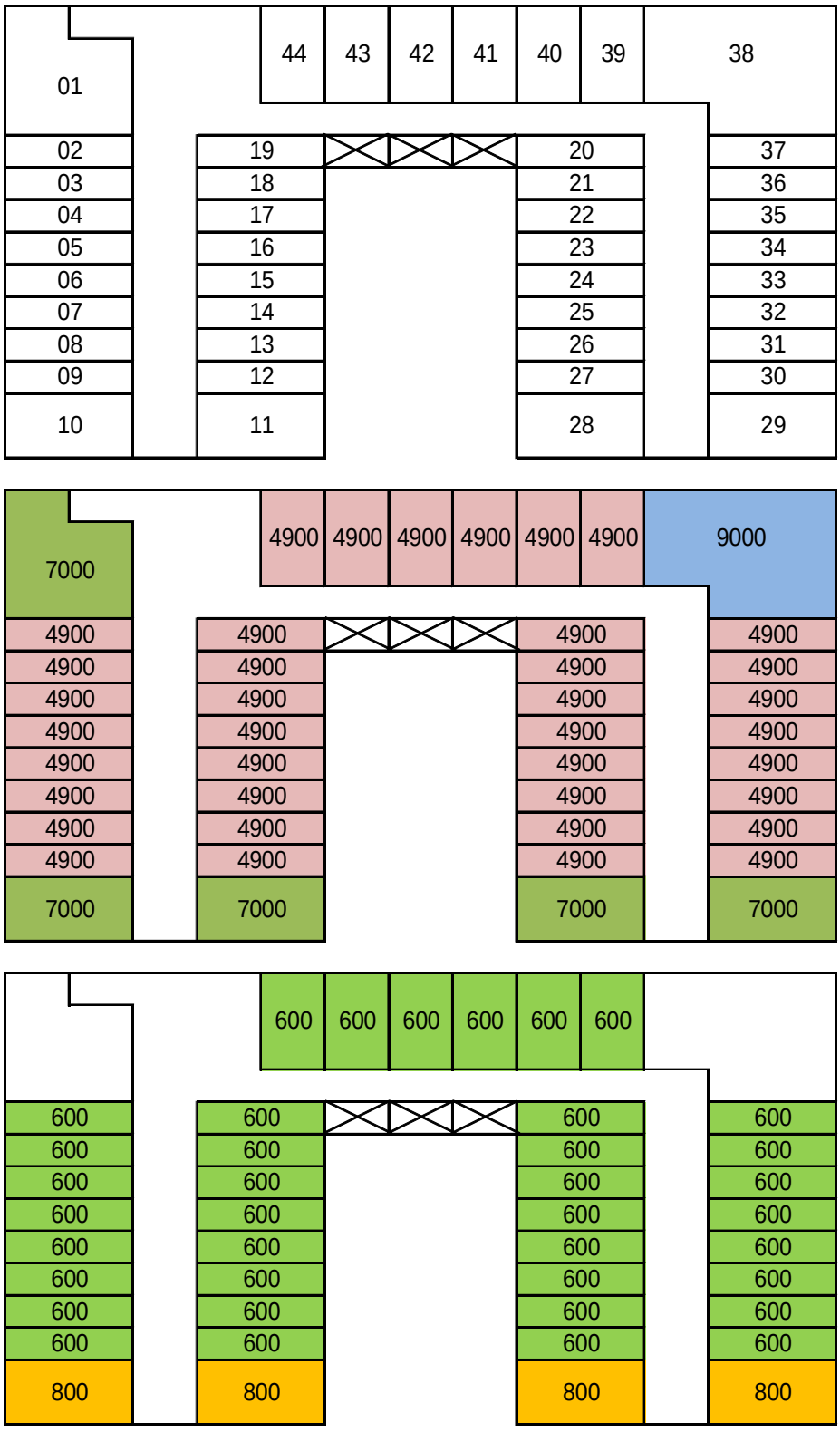


Figure III-2: Floor Layout for Monthly and Daily Rental

3.3 Facilities and Services

- Wireless internet
- Key card
- Telephone
- Cable TV
- Room Service
- Housekeeping
- Public internet
- Security guard
- Pool
- Swimming pool
- Fitness
- Table tennis

4. Customer and Marketing

The company is positioning themselves in middle market; and clarify the apartment as a mass product. They implement economic price strategy; and promote the apartment through many websites. However, when low price strategy combines with its location condition, it leads to wide range of customers in the apartment.

Customers of the apartment are including foreign tourists, Chinese tourists, employee of signed contract bank, students, working people, uneducated people, unemployed people, concubine, and people who had night time entertainment.

The variety of customers could discredit the apartment; for example, there was a group of drug addict check-in the apartment. A few days later, police officers came to catch those people aggressively.

According to the nature of customer, check-in and check-out time of the apartment is different from other serviced apartments. Other serviced apartments have set check-in time and check-out time strictly; for example, 2.00pm for check-in and 12.00pm for check-out. While the apartment provides fully 24 hours stay after customers check-in; for example, if a customer check-in at 2.35 am, the customer has to check-out by time 2.35 am of the next day.

5. Resource Allocation

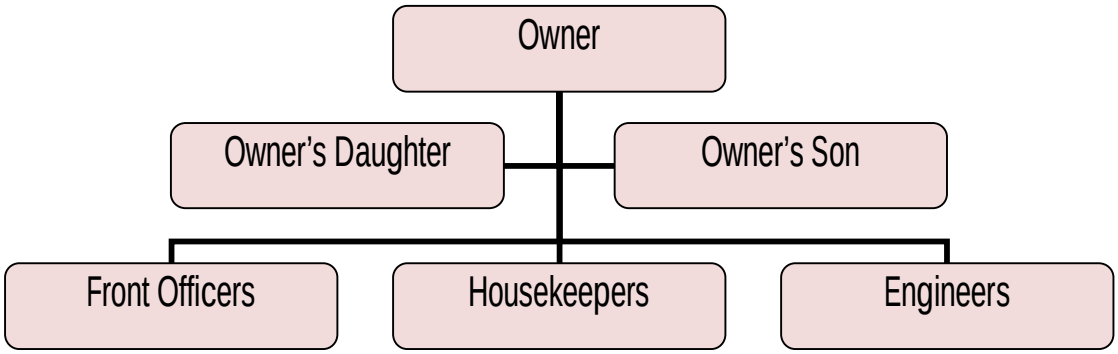


Figure III-3: Current Organisation Structure

Waste 1

As mentioned, the organisation structure of the apartment is flat as shown in Figure III-3. All employees can report directly to the owner; the owner is only one can make decision. When the organisation requires a decision making, sometimes they have to wait until the owner comes to the apartment.

Waste 2

The owner's children work at the apartment irregularly in part of business management; moreover, his children do not have enough management power over the apartment. His daughter only audits overall accounting; although she graduated in hotel management from Switzerland. While his son supplies raw material and maintenance stuffs.

In fact, working as the family business is more flexible to deal with situations; and for this family, there is no business conflict among the family members. However, sometimes the relationship in the family affects working performance of the family members themselves, such as when the owner and his children have disagreed with the other's opinion in private issue.

As a result, the relationship between them is unstable; the owner does not acquire the highest degree of his children' abilities and performance.

Waste 3

Human resource and recruitment is done by the owner. Since the owner control the new apartment construction himself, he has much manpower on hand. He chooses a few women from the construction site to be housekeeper at the apartment.

However, the new housekeepers have no cleaning skill and serviced mind. Besides, the housekeepers cannot speak Thai. Therefore, their performance is unacceptable; the cleanliness of the rooms is rejected, they refuse to work alone, and they cannot complete the assigned task in a given time.

Waste 4

There is no training procedure set officially to train the new housekeepers and to improve the old housekeepers' performance. Moreover, there is no training course since the beginning; therefore, the old housekeepers always make mistakes without noticed even by her or the management level.

Finally, without training, wastes are introduced in form of consuming time to finish, consume more cleaning material, unable to meet cleaning standard, redo the tasks again, and gradually damage the rooms and the building infrastructure.

Waste 5

All employees work in shift; however, there is no one to manage the existing workforce. Once the owner find out that there is no room available for new customer because rooms are not made up, he just simply hire more housekeepers; and spend more money in unqualified workforce.

Waste 6

There are 7 housekeepers working in 2 shifts; 7.30 am – 17.30 pm and 13.00 pm to 23.00 pm. And there are 5 receptionists working in 5 shifts; 7.00 am – 17.00 pm, 9.00 am – 19.00 pm, 11.00 am – 21.00 pm, 18.00 pm – 2.00 am, and 21.00 pm –

7.00 am. The 10-hour shift is exceeded the man working capacity; moreover, there is no day off as well. This policy is exceeding manpower capacity.

Waste 7

There are 68 rooms for daily rental which is required the cleaning everyday; only 30 rooms are checked in by guests in high season. Therefore, it is impossible that there is no room to sale. But the apartment faces this situation; mean that, the other 36 vacant rooms are dirty.

The 7 housekeepers, each works 9 hours daily; therefore, there are 54 hours available for housekeeping work. If there are only 4 housekeepers for cleaning rooms; 36 hours are available for 30 rooms in high season. Therefore, in average, the housekeepers use 1.12 hours per room.

If the housekeepers actually use 1.12 hour to finish a room everyday, there should not be vacant dirty rooms in the system even in high season. But the fact is the new customer cannot check-in because there are only the vacant dirty rooms in the apartment. It means that the housekeepers double the cleaning time from 1.12 hours to 2.24 hours.

Waste 8

There is no department manager in charge; including front office manager and housekeeping manager. As a result, there is no one to manage, supervise, control, and be responsible to the front office and housekeeping departments.

6. Working Activities

6.1 Front Office

Initially, front office was designed as a straight counter, the black-white counter on the left of Figure III-4. Behind the counter, 3 computers were established for front office operation. These 3 computers have functions of firstly, key card activation;

secondly, monthly rental report and accounting; and thirdly, daily rental report and internet administration. Figure III-5 closes up the old front office in the customers' view.

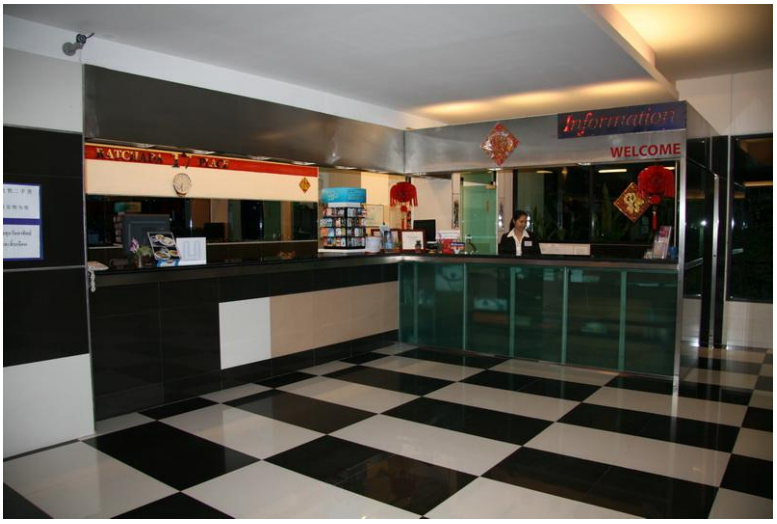


Figure III-4: Front Office

Later, the apartment faced a problem of the front office counter did not be recognised by customers at first grant, therefore; they built a front office counter adjacent to old one in right angle. The new counter as shown in Figure III-6 was made from transparent mirror, and front office's entrance is located here.

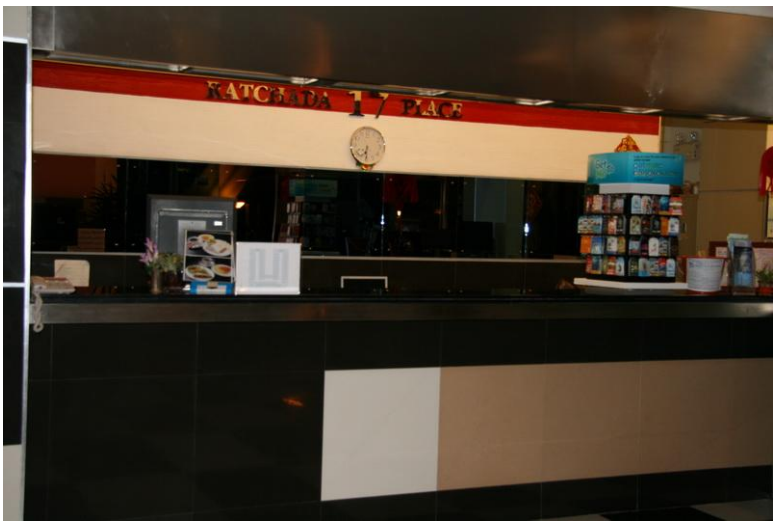


Figure III-5: The Old Front Office Counter

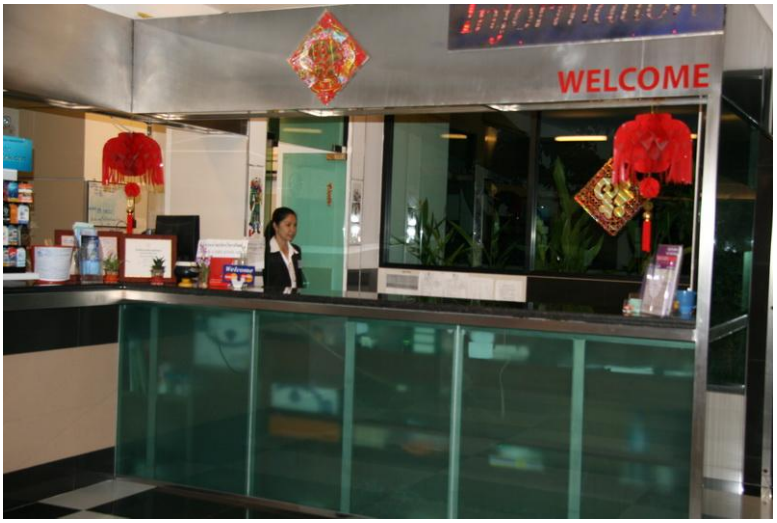


Figure III-6: The New Front Office Counter

Waste 9

However, the location of computers is not changed; none of them was re-established on the new counter, whereas front office normally stands by for customer at the new counter. All documents such as check-in form, accounting books, and cash are kept in the new counter; whereas scanning customer national identification card and activating key card have to be done at the old counter. Then, the front office layout in the receptionists' view as shown in Figure III-7 is cause of waste.

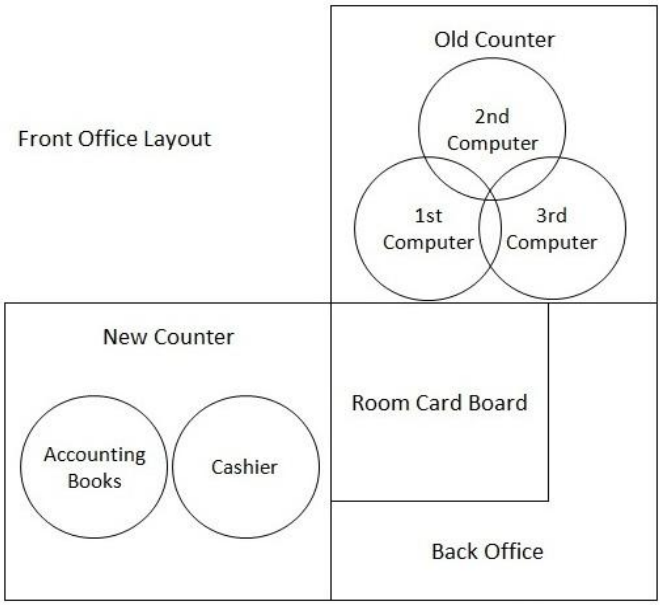


Figure III-7: Front Office Layout

Waste 10

According to the front office working station shown in Figure III-8 and Figure III-9, all of stuffs in front office area are in a mess; including post-it, documents, books, water bottles, shoes, paper, newspaper, bag, plastic bags, boxes, and etc. These disorder stuffs cause uncomfortable environment in work station.

The disordered working station leads to the receptionists work in the inconvenience environment. Then the improper environment is the cause of wastes such as waiting time, extra processing, unnecessary movement, and defects.

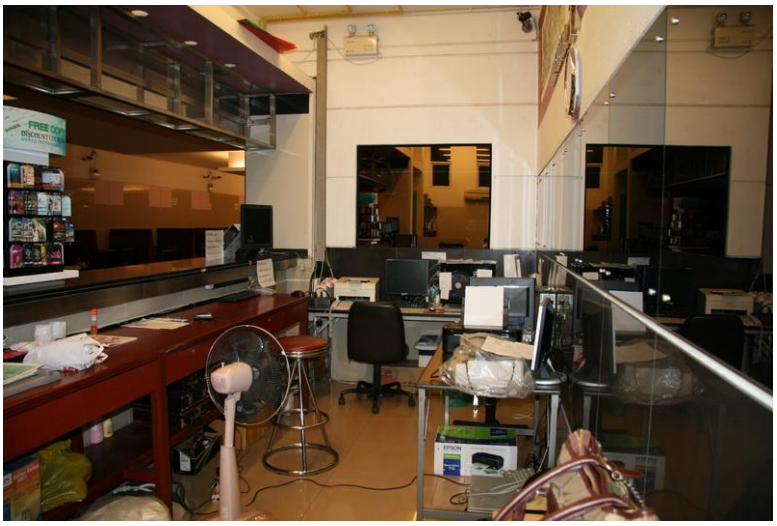


Figure III-8: The Old Front Office

Figure III-9: The New Front Office

Waste 11

In the back office shown in Figure III-10, there is space provided for keeping customers' stuffs and housekeeping inventory; for example, cleaning liquid, window cleaner, and bathroom amenities. However, back office where is on the first floor is very far away from housekeeping office where is on the ninth floor. This is the cause of transportation waste.

Figure III-10: Back Office

6.1.1 Check-In Process

Waste 12

The check-in process shown in Figure III-11 requires 8 steps to complete the task. These steps are waste; it does not add value to customer; however, it is necessary for running apartment business. The customer has to wait until the process finish; therefore, the shorter process, the less waste.

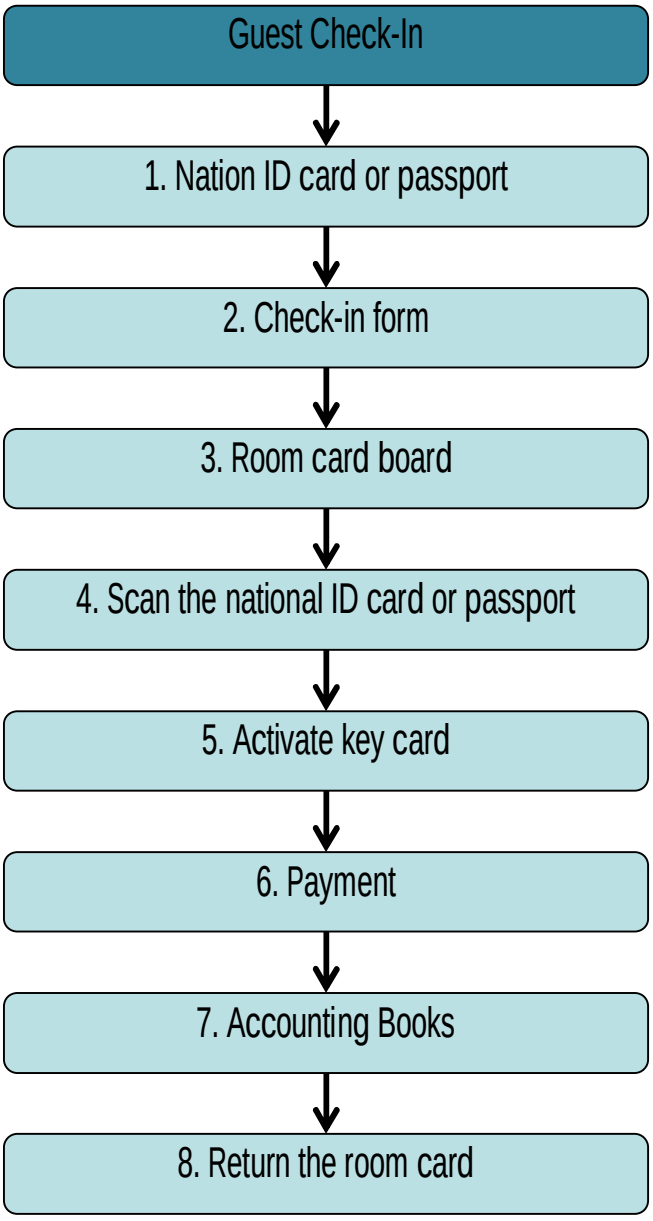


Figure III-11: Check-In Process

Waste 13

Moreover, to perform each step in the check-in process, the front office has to walk to 3 working stations; new counter, room card board and old counter. Figure III-12 illustrates the layout that front office walks through the working stations. This causes transportation, extra processing, and unnecessary movement waste.

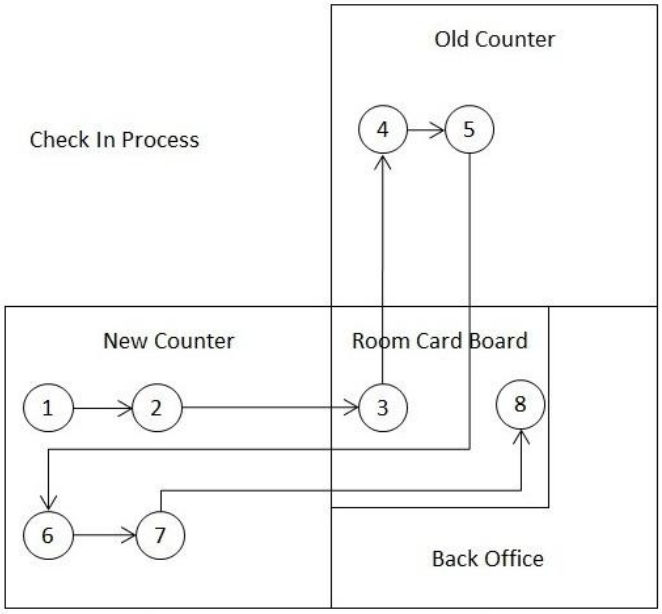


Figure III-12: Check-In Process Layout

Step 1

When a customer checks in at the new counter, firstly, front office would request for customer national ID card or passport. Then, the front office would gather basic information such as how many guests, and how many days. This information would help front office to select appropriate room for the customer.

Waste 14

Step 2

The customer has to fill in the Guest's Check-In form as shown in Figure III-13. The form request for the information of check-in date and time, guest's name, national identification card number or passport number, age, nationality, mobile phone, car registration, address, and customer's signature. The check-in form is considered as the unnecessary waste since the apartment has to stock the form.

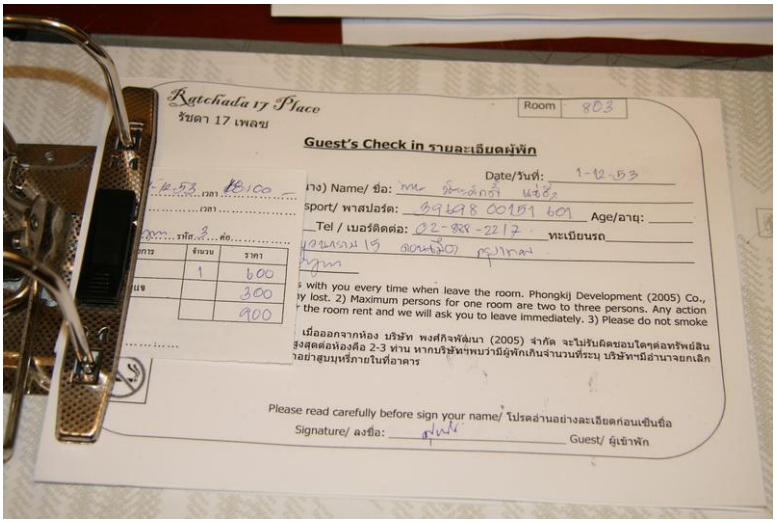


Figure III-13: Guest's Check-In Form

Waste 15

Step 3

After that, front office takes customer's national identification card or passport with her and walks to room card board. At the room card board, front office chooses a room card from the available room bay as shown in Figure III-14; and clock time-in, as shown in Figure III-15.

Figure III-14: Front Office Choose Room for Customer at Room Card Board

Like the check-in form, the room card is considered as an unnecessary inventory. Moreover, to use the room card board is to increase task to front office, considered as transportation, extra processing, and unnecessary movement waste.

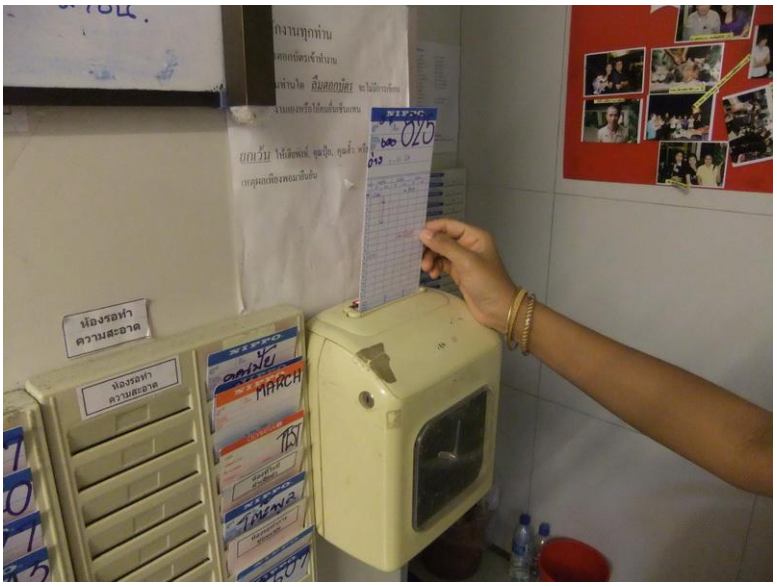


Figure III-15: Front Office Clock Time-In

Waste 16

Step 4

Then, the front office would take customer's national identification card or passport together with room card and walk to the second computer at the old front office counter. At this computer, front office would scan customer's national identification card or passport and save in a folder divided by date.

Figure III-16 shows the front office is scanning customer's ID card; and Figure III-17 shows the scanned file recorded in the computer.

This is a waste of extra processing required to get job done; and the scanned file itself is the unnecessary inventory to the system. However, it is a company policy to keep the copy of customers' identification document. Besides, saving the

scanned file divided by time is the overproduction waste when the same customer visits the apartment again.

Figure III-16: Front Office Scans Customer's National ID Card

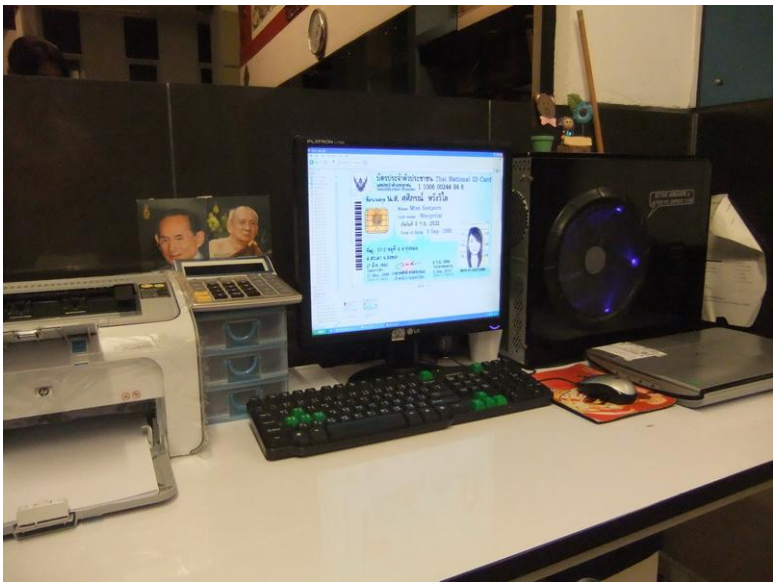


Figure III-17: Scanned Customer's National ID Card File

Step 5

After that, front office would turn around to her left to use the first computer activating key card as shown in Figure III-18. This is not a waste since key card add value to customers.

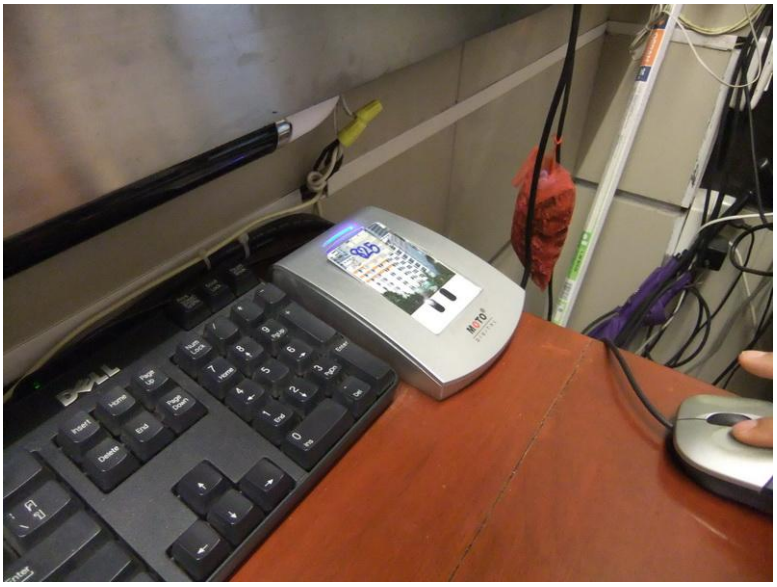


Figure III-18: Activating Key Card

Waste 17

Step 6

Then, front office takes customer's national identification card or passport, room card, and key card and goes back to the new counter. Front office gives the customer national identification card and key card; as well as the customer pays for the rental and key deposit. After that, the customer will go to his room.

Figure III-19: Desk Drawer for Keeping Cash

Anyway, the desk drawer keeping cash is not well organized as shown in Figure III-19, it is difficult to collect and check daily balance. The difficulty requires extra processing and more afford to get job done; therefore, this is waste.

Waste 18

Step 7

After front office finish her greeting the customer, she has to write down this transaction in to three accounting books as shown in Figure III-20; namely, blue book, daily rental records; green book, daily income records for operators, and red book, daily income records for boss. However, the transactions written down in those three books are the same. In Figure III-21, front office is writing the transaction in the accounting books.

Figure III-20: The Three Accounting Books

Figure III-21: Front Office Writing Down the Transaction in Three Accounting Books

Writing the transaction repeatedly 3 times is the real waste; it includes all types of waste. Firstly, this is overproduction since the front office has to duplicate same information 3 times. Secondly, this is consuming time and causing delay. Thirdly, this is transportation waste because the information is moving around. Fourthly, this is extra processing waste that is no use. Fifthly, the accounting books are inventory. Sixthly, front office is required the unnecessary movement. And finally, mistakes often occur.

Step 8

Finally, the front office will walk to room card board again to keep the room card in in-house guest bay, as shown in Figure III-22

Figure III-22: The Room Card Kept in In-House Customer Bay

6.1.2 In-House Process

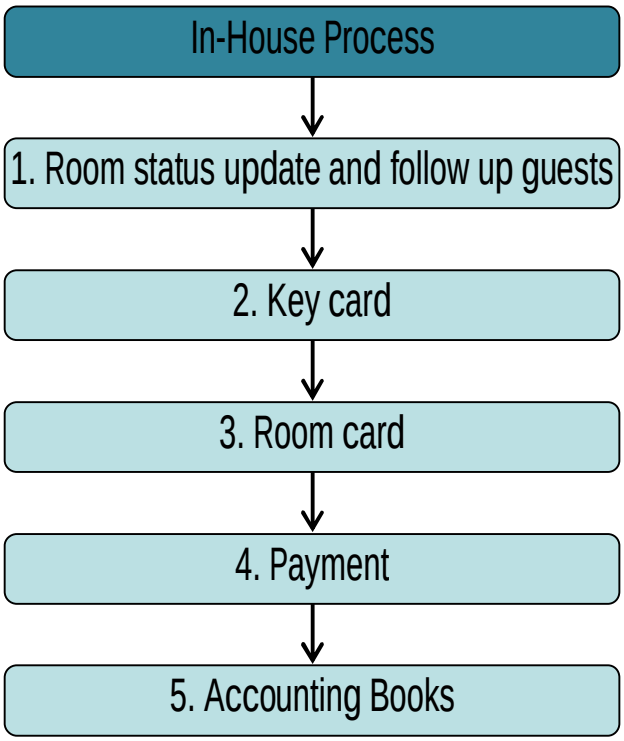


Figure III-23: In-House Process

Waste 19

The in-house process, as shown in Figure III-23, is the waste themselves because the process does not add value to customer. Moreover, the company policy states that the apartment is the prepaid rental. Therefore, this in-house process wastes customers' time to extend their stay.

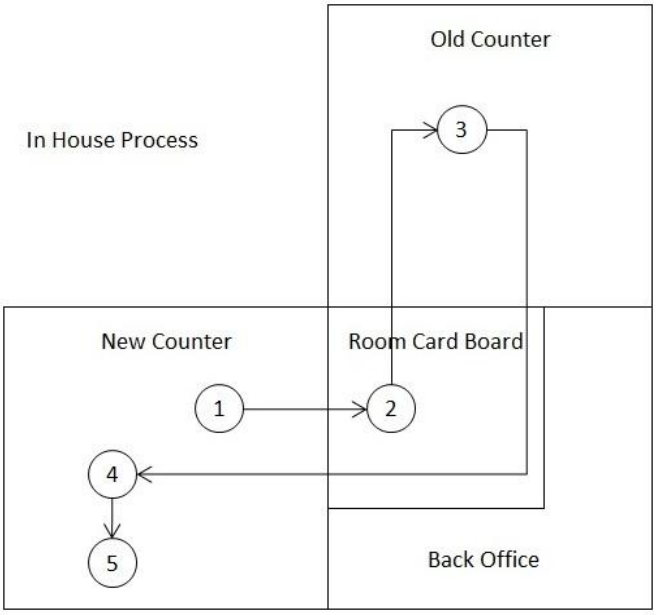


Figure III-24: In-House Process Layout

Waste 20

Figure III-24 shows walking layout that front office would follow to complete the process. The layout is considered as transportation waste, extra processing waste, and unnecessary movement waste.

Waste 21

Step 1

Every day, front office has to update status of all in-house customers by hand; at specific time which rooms are needed payment, which rooms have to be check-out, and which rooms are already check-out and required cleaning. Therefore,

when in-house customers request extend their stay or check-out, the front office will know immediately the status of the customers and enable to calculate their balance.

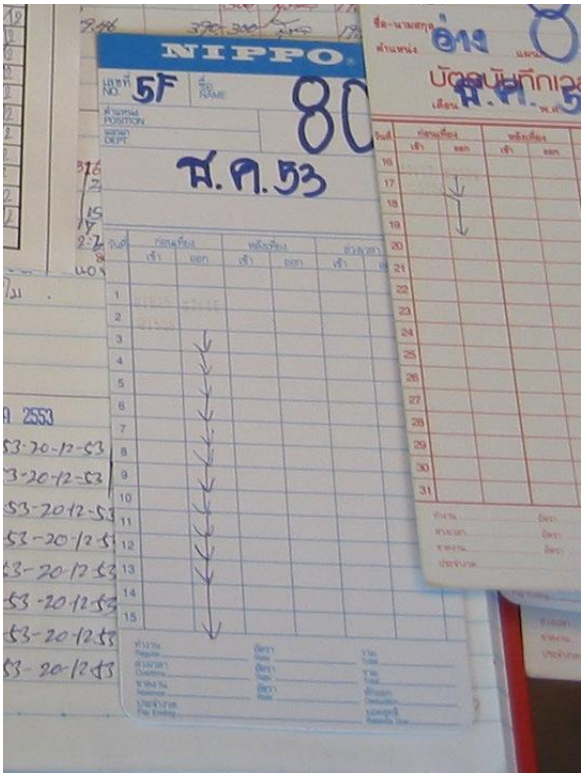


Figure III-25: Extending of Customer's Stay

To update room status manually is to increase the numbers of extra processing and movement waste to front office. Moreover, the front office has to update the room status all the time; means that, the waste exists all the time.

Step 2

If a customer extends their stay, front office would walk to activate key card at the first computer. To activate key card adds value to customer; therefore, this step is not a waste.

Step 3, 4, and 5

Then, the front office will walk back to the room card board. The front office would pick up the customer's room card in order to mark an arrow sign into the room card, as shown in Figure III-25, indicating the numbers of extending days. After that the front office would receive payment; and write down the transaction in the three accounting books. However, these kinds of waste are mentioned in check-in process.

6.1.3 Check-Out Process

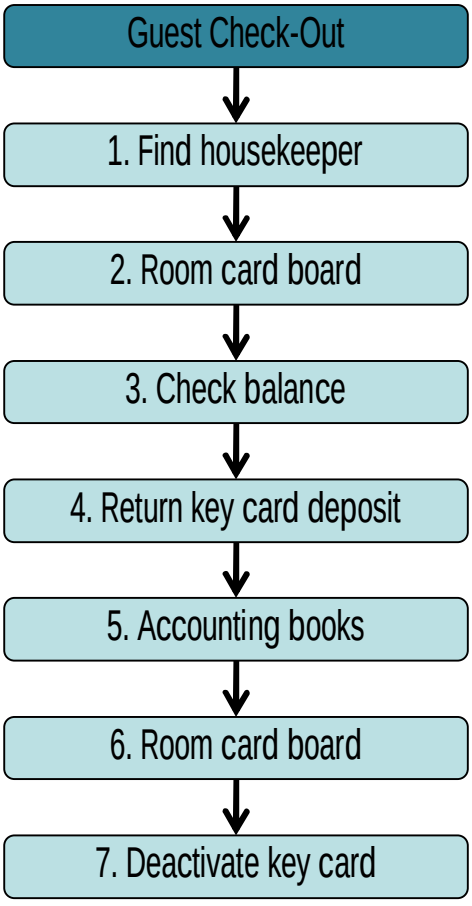


Figure III-26: Check-Out Process

Waste 22

Again, the check-out process as shown in Figure III-26 does not add value to customer; however, it is necessary for the apartment record.

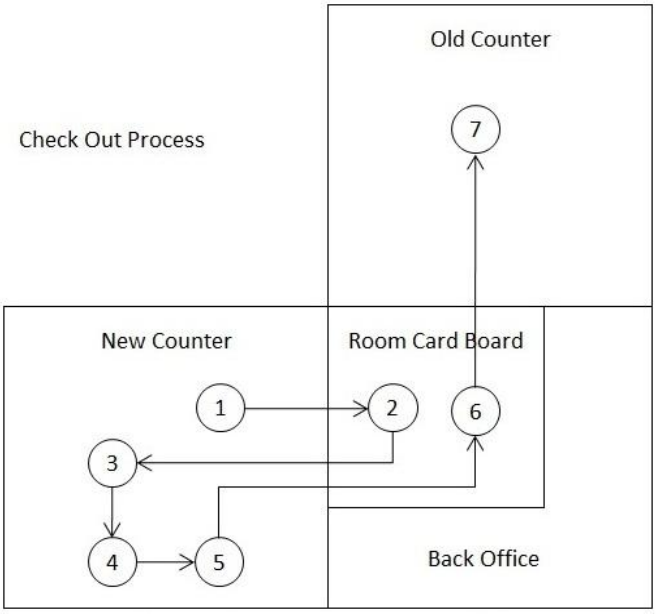


Figure III-27: Check-Out Process Layout

Waste 23

The layout of walking in the check-out process as shown in Figure III-27 is transportation waste, extra processing waste, and unnecessary movement waste.

Step 1 and 2

When a customer checks out, firstly, front office would search for a housekeeper in order to let the housekeeper inspect the check-out room. Meanwhile, the front office walk to the room card board; clock time-out on the room card; and take the room card back to the front office counter.

Step 3 and 4

Then, the front office would recheck the room status and calculate the balance of the room at the check-out time by using the room card, room status update list, and the accounting books. If the housekeeper reports that the room is clear or there is no damage charge, the front office will clear the balance with the customer and return him the key deposit.

Step 5 and 6

And after the customer leaves, front office will update the room status to be vacant dirty; as well as record the transaction in the 3 accounting books.

Step 7

Finally, the front office would walk to the room card board to place the room card in vacant dirty bay. Then, they would walk to deactivate key card at the first computer.

6.2 Housekeeping

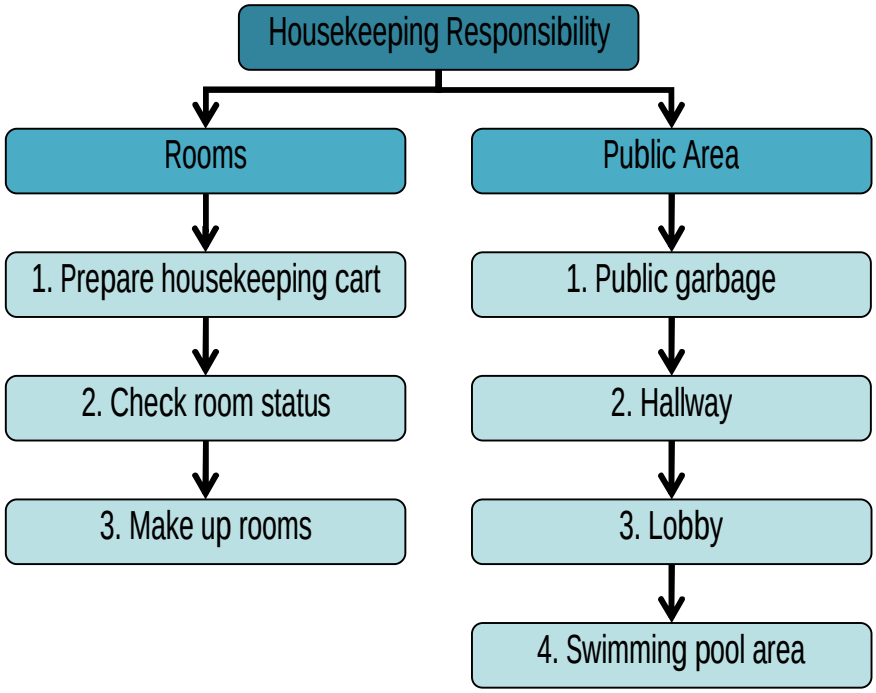


Figure III-28: Housekeeping Responsibility

The housekeeping has 2 areas of responsibility; rooms and public area, as shown in Figure III-28. Housekeepers of two areas are obviously separated. The ones who take responsibility of room have to work in 13.00 pm – 23.00 pm shift. And the others who cleaning public area work in 7.30 am – 17.30 pm shift.

6.2.1 Rooms

6.2.1.1 Prepare Housekeeping Cart

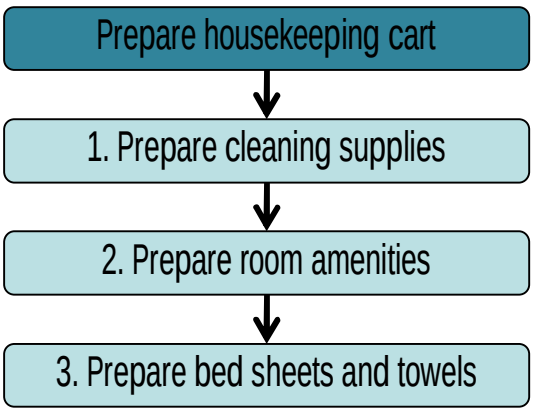


Figure III-29: Steps of Preparing Housekeeping Cart

Figure III-29 illustrates 3 steps to prepare the housekeeping cart; firstly prepare cleaning supplies; secondly prepare room amenities; and thirdly prepare new bed sheets and towels.

Step 1

Once a housekeeper receives an assignment from front office on the first floor, she will go to housekeeping office on the ninth floor to prepare her cart as shown Figure III-30.

Figure III-30: Housekeeper Cart

Figure III-31: A Small Housekeeping Cart

Waste 24

The housekeeping carts are designed by the owner himself; he invented from his travel experience in China. However, the carts have limited abilities; first there is no linen bag and trash bag. Second, there are longitudinal pillars in the middle of the cart which is obstructed when housekeepers put on bed sheets, towels, and blankets.

There are 2 kinds of housekeeping cart in the apartment, the first one is shown in Figure III-30; and the second one is shown in Figure III-31. Both carts have no linen bag and trash bag for keeping dirty bed sheets and trash. Moreover, the housekeeper in Figure III-38 has a small cart which has no space to carry broom, dust pan, and mop. Therefore, she has to carry cleaning equipment by herself.

Instead of the housekeeping carts are the useful equipment, they are the increasing-waste equipment.

Waste 25

The preparation starts with preparing cleaning material and supplies as shown in Figure III-32.

Figure III-32: Housekeeper Preparing Her Cleaning Materials

Many times that a housekeeper finds out in the morning that materials are finished including cleaning liquid, shampoo, and liquid soap for guests as well. She does not have any stocks; she has to refill them in the morning as shown in Figure III-33. The unexpected additional task delays overall process; therefore it is a waste.

Figure III-33: Housekeeper Refilling Materials

Waste 26

Step 2

After that, the housekeeper would continue with preparing room amenities; and Figure III-34 shows the amenities on the housekeeping cart. Like cleaning supplies, many times housekeepers find out that the room amenities are finished in the morning.

Housekeepers have to refill liquid soap and shampoo for customers at back office on the first floor. This causes inconvenience to housekeepers and front office who has to share the limited area together. This is considered as waste.

Figure III-34 shows the room amenities that housekeepers have to prepare them on the housekeeping carts; and the empty bottles of shampoo and liquid soap are shown in Figure III-35.

Figure III-34: Room Amenities

Figure III-35: Refill Bottles for Liquid Soap and Shampoo at Back Office

Waste 27

In addition, when washing powder and cleaning liquid are finished, housekeepers have to take those materials at the back office. This causes housekeepers take more time to get their job done. Figure III-36 shows a housekeeper is taking washing powder.

Housekeepers can use cleaning supplies, room amenities, and washing powder freely. Although there is record when housekeepers take more material; the record does not apply regularly. Therefore it is unreliable. Moreover, there is no one control the amount of material used per room.

When the inventory is finished, the owner's son just supplies a new lot of raw materials in the system. However, to order the new material, he has to gather the total number that the materials are required from other apartment building as well. Therefore, the apartment would not know the exactly numbers of material use.

Figure III-36: Housekeeper Taking Washing Powder

Figure III-37: Housekeeper Finishing Preparing a Cart

Figure III-38: Housekeeper and Her Cart on Floor

On the cart, a housekeeper puts on blankets, pillow cases, bed sheets, towels, water bottles, shampoo, liquid soap, mop, broom, rags, dustpan, cleaning materials, cleaning gloves, plastic bag, and refresher spray. The finished housekeeping cart is shown in Figure III-37 and Figure III-38.

6.2.1.2 Check Room Status

Once a housekeeper finishes preparing her cart, she will pull the cart to a guest room as in the assignment. If the housekeeper sees the Do Not Disturb sign face on at the guest room as shown in Figure III-39, the housekeeper has to check the status of the room with front office again.

If the room status is definitely checked-out, the housekeeper may get in and make up the room immediately. However, if the room status is in-house guest, the housekeeper cannot knock the door to make up the room.

Figure III-39: Do Not Disturb Sign

In the case of the housekeeper sees the Make Up Sign, as shown in Figure III-40, facing on any other rooms except in the assignment list, the housekeeper will not make up that room until front office would confirm that the guest has already paid for the rental of that day. Once front office confirm, the front office may assign job to other housekeepers.

Figure III-40: Make Up Room Sign

Waste 28

Therefore, some housekeepers just ignore the make up room sign once the room is not in their assignment list. Because, they think that it is not their responsibility. It shows that housekeepers have no serviced mind; and this is waste in process that the apartment cannot deliver service to customer.

Table III-3: Making Room Criteria

Sign	The room is in the assignment.		The room is not in the assignment.
	In-House	Check-Out	
Do not disturb	Not knock the door	Check status	Ignore
Make up room	Knock the door	Check status	Check status/Ignore

In conclusion, there are criteria used to check the room status as shown in Table III-3. Since the apartment policy is the customers have to prepay for room rental before the stay. The apartment needs to ensure that this policy has enforced.

Waste 29

There are 4 criteria used to housekeepers decide that they should clean the room with the show up sign or not. However, the waste in this process is why the housekeepers have to go back to front office to recheck again.

Especially in the case of the check-out room; the housekeepers always check room status with front office although they are assigned that this is a vacant dirty room. The show up sign is just happened because the left guest forget to remove it.

6.2.1.3 Make Up Rooms

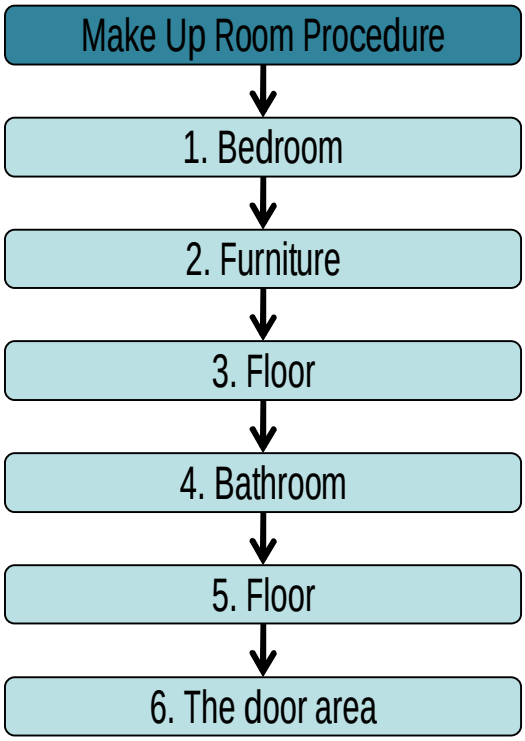


Figure III-41: Make Up Room Procedure

Waste 30

The make up room procedure is shown in Figure III-41 indicates that the steps of make up room are not well designed; cleaning the room floor has repeated twice. This is the extra processing waste, unnecessary movement waste, and defects.

The make up room walking layout is shown in Figure III-42; the thin arrows indicate sequence of working steps as shown in Figure III-41. Moreover, the circles with confused line represent indicate wastes in each step that will be described later.

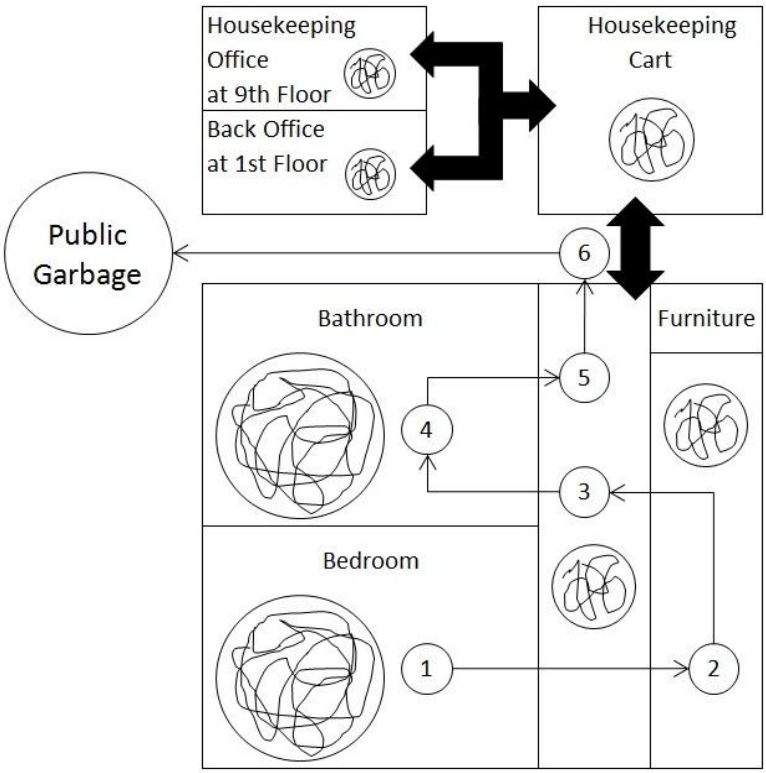


Figure III-42: Make Up Room Layout

Waste 31

In addition, the thick arrows in the figure indicate the transportation waste and movement waste; between the room and the cart; and between the cart and inventory office including housekeeping office and back office. Since a housekeeper has to walk among these stations many times.

Step 1 Bedroom

There are 2 housekeepers making up one room since a housekeeper on the green t-shirt is the new housekeeper on training. Normally, one housekeeper would start making room by clear bedroom trash; remove bed sheets, pillow cases, and dirty towels; and sweep room floor.

Figure III-43 shows the housekeepers open the room for cleaning; and Figure III-44 shows that they start with clearing trash. Then, as shown in Figure III-45 and Figure III-46, the housekeeper removes dirty bed sheets and places them in front of the room.

Figure III-43: Housekeeper Opening a Room to Make Up

Figure III-44: Housekeeper Clearing Trash

Figure III-45: Housekeepers Removing Bed Sheets and Sweeping Room Floor

Figure III-46: In Front of Making Room I

Waste 32

Because the housekeeper does not have linen and trash bags, she has to place the dirty bed sheets and trash in front of the room. Therefore, the housekeeper has extra process, more transportation, and more movement to do in the job; it waste. After that, she picks new bed sheets and pillow cases and walk into the room.

Moreover, Figure III-47 shows that there is another housekeeper who works in different room places the dirty sheets and trash in front of the room as well. This is not only the individual waste, but the organisation waste.

Figure III-47: In Front of Making Room II

Waste 33

Moreover, the working station of housekeeping is dirty as shown in Figure III-48 and Figure III-49. This unpleasant working station degrades the cleaning standard of the apartment. It is considered as defects.

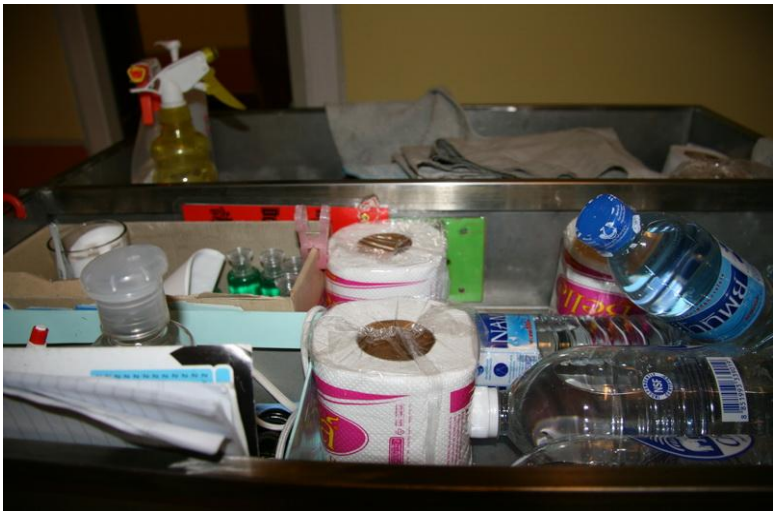


Figure III-48: On the Top of Housekeeping Cart when Making Room

Figure III-49: Housekeeping Cart when Making Room

Figure III-50: Housekeeper Making Bed

Then, the housekeeping walks back with new bed sheets to make bed, as shown in Figure III-50. After that, the housekeeper rearranges table and chair to be in the proper position; as well as she make bed.

Waste 34

Step 2 Furniture

After she finishes making bed, she walk to the cart again to pick up a wet rag and wash it in the bathroom, as shown in Figure III-51. However, the housekeeper has one rag to clean all furniture in bed room and in bathroom. And there is no dry rag. As a result, water stains are left on the furniture. This is considered as a defect.

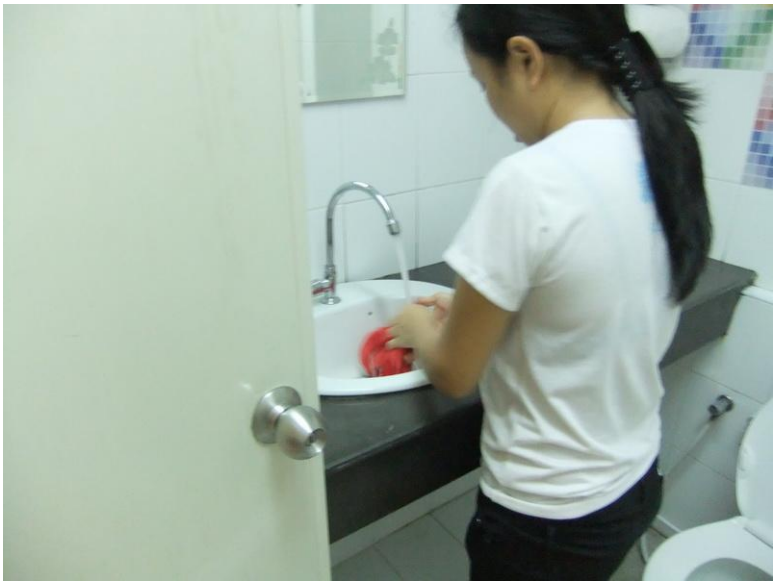


Figure III-51: Housekeeper Washing Rag

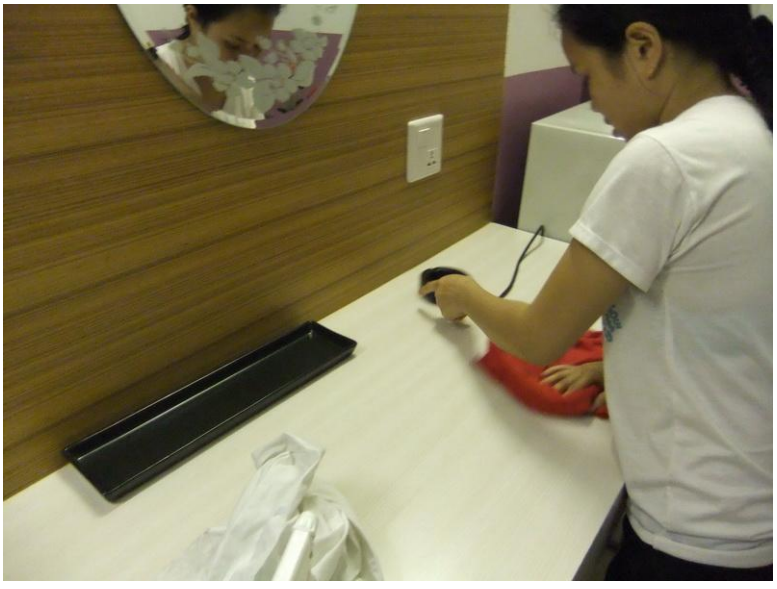


Figure III-52: Housekeeper Cleaning Table with Wet Rag

She clean all of furniture in the room with the wet rag as shown in Figure III-52, and then she walk to the cart again to pick up tissue paper, water bottle, shampoo, and liquid soap to rearrange them on the black tray. In Figure III-53, the housekeeper is arranging the room amenities.

Figure III-53: Housekeeper Arranging Room Amenities

Figure III-54: Housekeeper Wearing Plastic Bag on Trash Bin

After that, the housekeeper walks to the cart again to take plastic bag in order to wear on the trash bin as shown in Figure III-54. And then, she goes to the cart and takes towels. Figure III-55 shows that the housekeeper is folds towels on the bed.

Figure III-55: Housekeeper Folding Towels

Waste 35

Step 3 Floor

Then, housekeeper walks to the cart and takes a mop to wash it in a bathroom, as shown in Figure III-56; and mops the floor. However, the mop is not clean enough; and she does not be careful with the floor towel, as shown in Figure III-57.

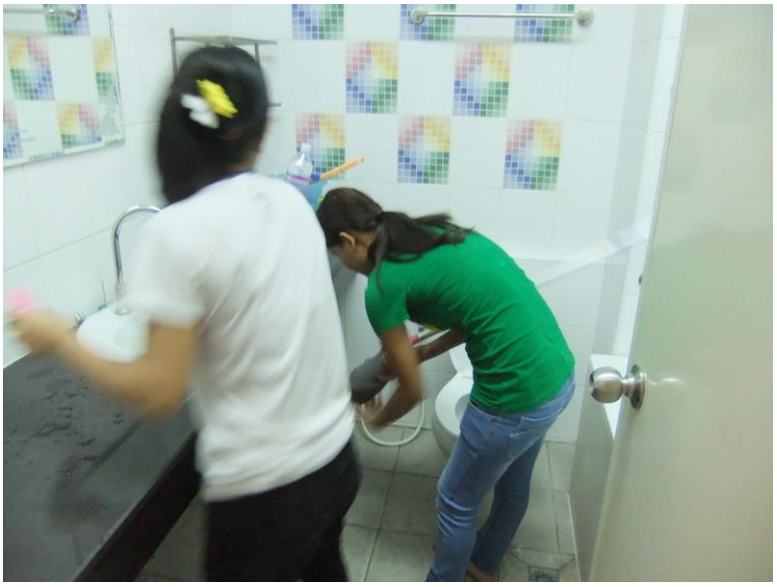


Figure III-56: Housekeeper Washing Mop

Figure III-57: Housekeeper Mopping Room Floor

Step 4 Bathroom

The housekeeper starts to clean bathroom by bring cleaning supplies from the cart to the bathroom, as shown in Figure III-58. Firstly, she washes ashtray and moves customer's belongings, as shown Figure III-59.

Figure III-58: Housekeeper Starting to Clean Bathroom

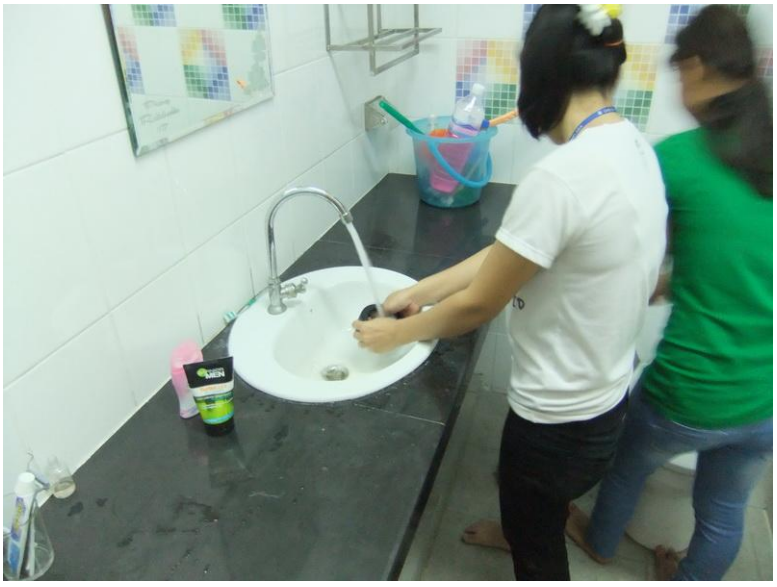


Figure III-59: Housekeeper Washing Ashtray

Waste 36

Secondly, the housekeeper uses the pink solution to wash the washbasin and the black counter as shown in Figure III-60; and then, she uses the green solution to wash the water tap, as shown in Figure III-61.

Figure III-60: Housekeeper Cleaning Washbasin

Figure III-61: Housekeeper Cleaning Water Tap

Figure III-62: Housekeeper Cleaning inside of the Toilet

Thirdly, the housekeeper washes inside of the toilet by using the red solution as shown in Figure III-62; and outside the toilet by using the pink solution, as shown in Figure III-63

Figure III-63: Housekeeper Cleaning outside of the Toilet

Figure III-64: Housekeeper Cleaning Toilet Plug

Fourthly, the housekeeper uses the green solution to wash the toilet plug and shower, as shown in Figure III-64 and Figure III-65, respectively. The housekeeper washes the bathroom by pouring too much cleaning solutions all the time. Therefore, the materials are dramatically finished; while the bathroom does not meet standard. This is a costly defect that requires high inventory.

Figure III-65: Housekeeper Cleaning Shower

Waste 37

Fifthly, the housekeeper use the red solution together with the same brush that has cleaned the toilet washes a tub as shown in Figure III-66. Sixthly, the housekeeper flushes all solution out by using toilet flush, as shown in Figure III-67. This is inappropriate using equipment that can damage bathroom equipment in long term.

Figure III-66: Housekeeper Cleaning Tub

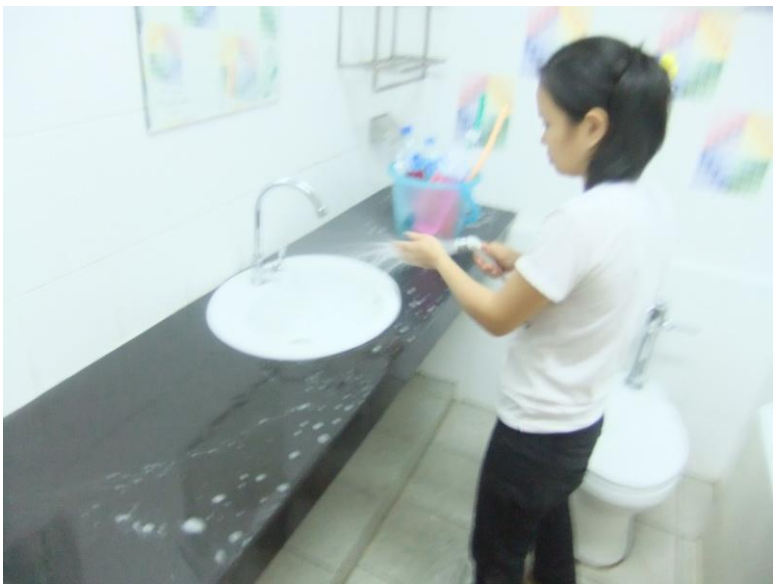


Figure III-67: Housekeeper Clearing All Solution

Waste 38

Figure III-68: Housekeeper Cleaning Drain

Moreover, the housekeeper clears drain by using an old toothbrush take hair and waste out of the drain, as shown in Figure III-68. And then leave them into the drain pipe, as shown in Figure III-69. This cleaning method seriously damages the building infrastructure; and it is worse when, there is no one in management level even front office notice the crucial mistake.

Figure III-69: Housekeeper Throwing Hair and Waste into the Drain Pipe

Waste 39

Figure III-70: Housekeeper Cleaning Bathroom Floor

Seventhly, the housekeeper continues flushing to the bathroom floor; and scrubs part of them, as shown in Figure III-70. This is not met quality standard; therefore, it is rejected. The rejected work required the cleaning again; therefore, the wastes are in form of defects, extra processing, unnecessary movement, transportation, and delay.

Waste 40

Finally, the housekeeper uses the wet rag that she uses to clean furniture in the bed room to rub bathroom counter, toilet, and bathroom wall, as shown in Figure III-71, Figure III-72, and Figure III-73, respectively. However, she does not concern that those portions of bathroom are not real dry; and it would leave stain behind. Moreover, she does not dry bathroom floor. This is not met quality standard.

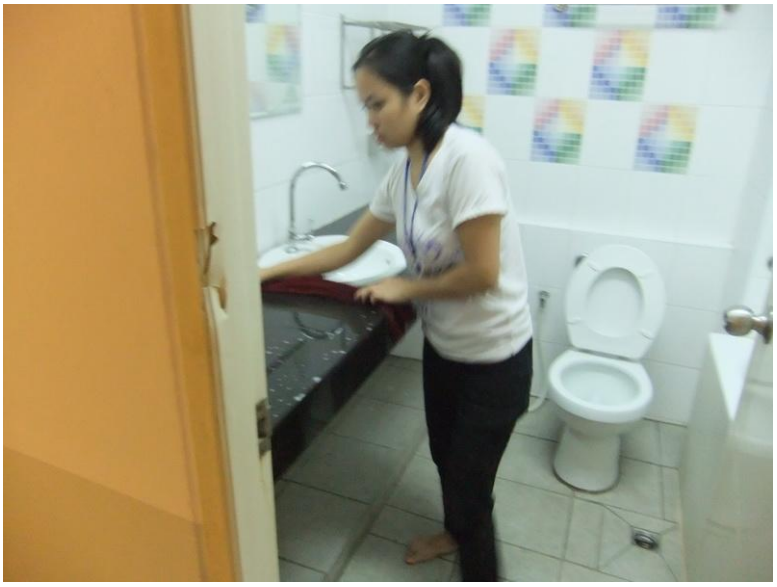


Figure III-71: Housekeeper Rubbing Bathroom Counter

Figure III-72: Housekeeper Rubbing Toilet

Figure III-73: Housekeeper Rubbing Bathroom Wall

Waste 41

Moreover, all the time that she is washing and flushing the bathroom, the door is open; and there is no floor towel in front of the door, as shown in Figure III-74. Therefore, there is flushed water around the door area.

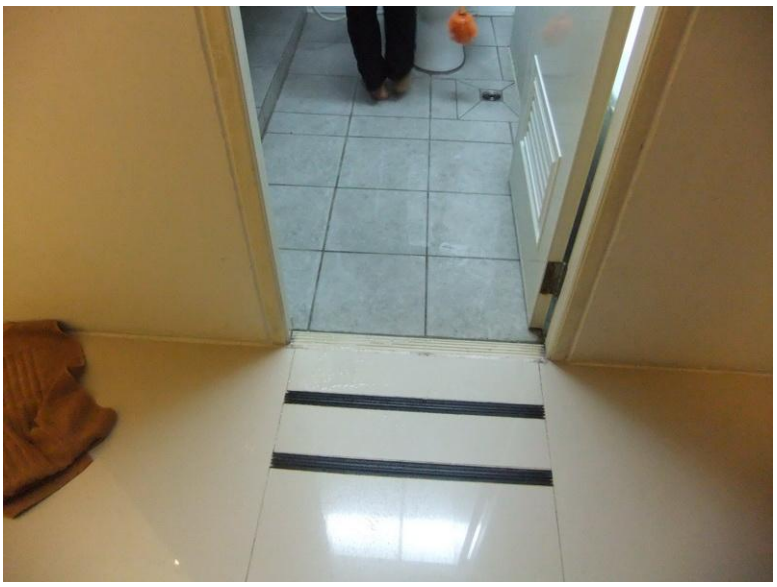


Figure III-74: No Floor Towel in front of the Door

Figure III-75: Housekeeper Finishing Bathroom

Consequently, the housekeeper has to place the old floor towel over the flushed water from washing bathroom. Then she reuses the floor towel again, as shown in Figure III-75. This is also another waste in process; extra processing, unnecessary movement, and defect.

Waste 42

Step 5 Floor

Sometimes, housekeeper would recheck bedroom again; and sweeping may be required. It is depended on the housekeeper's decision on that day; it is not a procedure. In addition, housekeepers usually do not clean neatly; this is a defect that rework is required. And finally, she finishes her job by spraying refresher as shown in Figure III-76.

Figure III-76: Housekeeper Spraying Refresher

Waste 43

Step 6 The door area

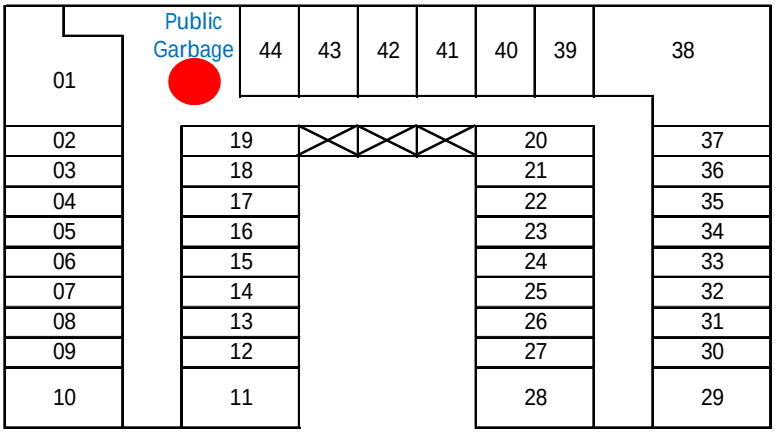


Figure III-77: Public Garbage Location

After finishing cleaning job, the door area is dirty caused by there is not linen and trash bags integrated with the housekeeping cart. After a housekeeper finishes making room, she takes the trash to the public garbage bin of the floor which may be on the other side of the building, as shown in Figure III-77. And the housekeeper would take the dirty sheets into the bottom of the cart. And they leave waste behind both in the room and on the hallway.

These are cause of extra processing waste, rework, defect, transportation, and unnecessary movement wastes.

Waste 44

In conclusion, because there is no training to housekeeper, the cleaning quality is under standard; and causes the wastes in housekeeping process.

The result of no training reflects in various ways. The steps of cleaning room are varied due to individual housekeeper's skill. Although after they finish making room, there is a front office to inspect the rooms, there is no one who trains them how to clean and using cleaning supplies correctly with cleanliness.

Some housekeepers do not know how to sweep, how to mop, how to use cleaning solutions, how to select cleaning equipment, and how to pass cleaning standard. For example, a housekeeper has washed glass already, but it is not clean. However, the housekeeper provides that glass to guest. The glass is shown in Figure III-78.

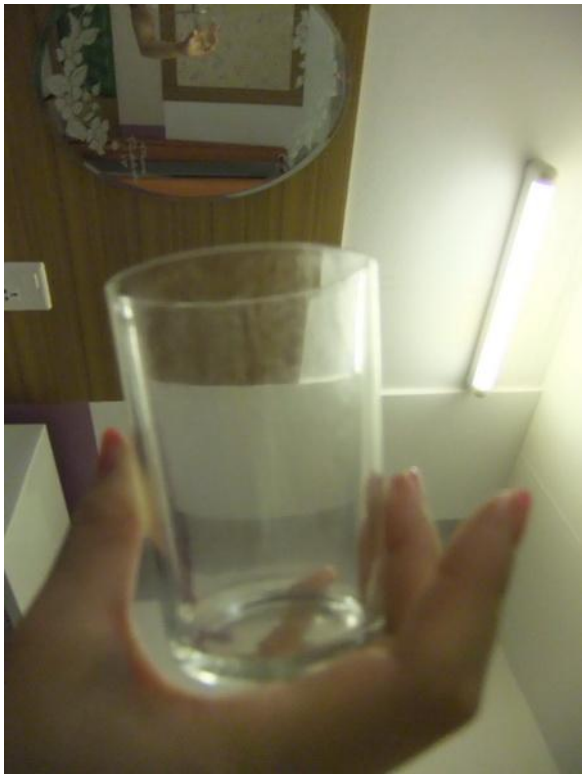


Figure III-78: Dirty Glass

The lists below are the activities a housekeeper making room in detail.

1) A housekeeper clock-in at front office on the first floor.
2) The housekeeper receives work assignment.
3) The housekeeper goes to the ninth floor to prepare a housekeeping cart.
4) The housekeeper may have to go to the first floor to refill cleaning supplies and bathroom amenities.
5) The housekeeper takes all working materials and equipment into the cart.
6) The housekeeper goes to assigned rooms.
7) If it is necessary, the housekeeper has to recheck the status of the room.
8) The housekeeper gets into the room, and leaves the cart outside the room.

9) The housekeeper gathers all the trash inside bedroom and bathroom.

10) The housekeeper walks to the cart and leaves the trash in front of the room, beside the cart.

11) The housekeeper walks back into the room with a broom.

12) The housekeeper rearranges furniture and other facilities to be in the proper position.

13) The housekeeper sweeps the room floor; and leaves the trash from sweeping in front of the room.

14) The housekeeper walks back into the bedroom to remove dirty bed sheets, pillow cases, and dirty towels except floor towel.

15) The housekeeper walks to the cart to place the dirty bed sheets, pillow cases, and dirty towels in front of the room, beside the cart.

16) The housekeeper takes new bed sheets, blanket and pillow cases from the cart.

17) The housekeeper walks back into the room to make bed

18) Then, the housekeeper walk to the cart to takes a rag.

19) The housekeeper walks to the bathroom to wash the rag.

20) The housekeeper cleans all furniture with the wet rag.

21) The housekeeper walks to the cart to leave the wet rag and to pick up room amenities.

22) The housekeeper walks to the bedroom to arrange the amenities on a black tray.

23) The housekeeper walks to the cart to take plastic bag.

24) The housekeeper walks to the bedroom to wear plastic bag on the trash bin.

25) The housekeeper walks to the cart to take towels.

26) The housekeeper walks to the bedroom to fold the towels and place them on the bed.

27) The housekeeper walks to the cart to take a mop.

28) The housekeeper walks to the bathroom to wash the mop.

29) The housekeeper mops the room floor.

30) The housekeeper walks to the cart to place the dirty mob beside the cart.

31) The housekeeper takes bathroom cleaning equipment from the cart.

32) The housekeeper washes ashtray and glasses in the bathroom.

33) The housekeeper washes the bathroom by using pink, green, and red solutions; and starting with washbasin, bathroom counter, toilet, tub, wall, and part of bathroom floor.

34) The housekeeper flushes the bathroom by using toilet flush.

35) The housekeeper rubs the washbasin, bathroom counter, toilet, tub, and wall by using the same rag that is used in bedroom.

36) The housekeeper cleans the wet floor in front of the bathroom by reusing the old floor towel and placing it flatly on the bathroom door area.

37) The housekeeper sweep and mop again

38) The housekeeper walks to the cart to take the refresher spray.

39) The housekeeper walks to the bedroom and sprays the refresher.

40) The housekeeper walks to the cart, takes trash, dirty bed sheets, pillow cases, and towel into the cart.

41) The housekeeper sweeps the area in front of the room by using broom and dustpan

42) The housekeeper locks the door.

43) If it is necessary, the housekeeper hold mop, broom, and dustpan on one hand; and use the other hand push the cart straight forward to the public garbage bin.

44) The housekeeper throws dust and trash from the room into the public garbage bin.

45) The housekeeper moves to make the next room in the assignment.

6.2.2 Public Area

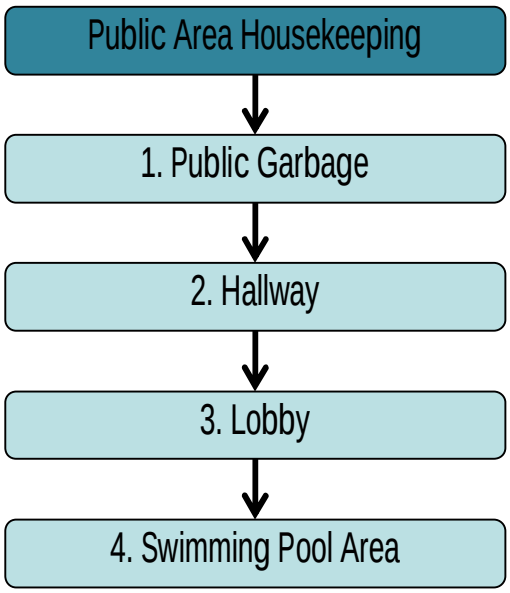


Figure III-79: Public Area Housekeeping

There are 4 areas of responsibility public area housekeeping; public garbage, hallway, lobby, and swimming pool area, as shown in Figure III-79.

Waste 45

The waste in public area process is that, there is no quality control. The housekeepers only finish their routine job, in practically; it is excluding swimming pool area. Everyday, housekeepers start their job with public garbage, hallway, and lobby. They do not clean the swimming pool area; and there is no one assigns the job to the housekeepers.

6.2.2.1 Public Garbage

There are one or two public garbage bins on each floor serving 44 rooms, as shown in Figure III-80. However, the public garbage bins are located on the same position, a corner of the building. There is a black plastic bag in the garbage bin to contain all trash.

Figure III-80: A Garbage Bin on Floor

Waste 46

Everyday, 7 o'clock in the morning, housekeepers with a big garbage trolley will go down on each floor; the trolley is shown in Figure III-81. They do not take

the black plastic bag, but they take to whole garbage bin to downstairs. They will take the garbage trolley to the parking area where the garbage damp is located, as shown in Figure III-82. This is the transportation waste.

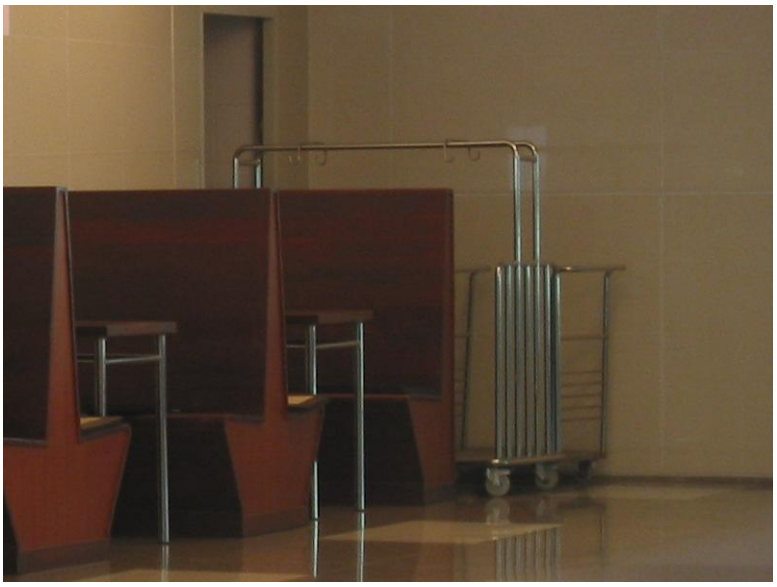


Figure III-81: Garbage Trolley

Figure III-82: Garbage Damp Area

After that, they will pull out all trash from each garbage bin into the damp; and change the new black plastic bag. Then, they will take those empty garbage bins back to its location on each floor, as shown in Figure III-83.

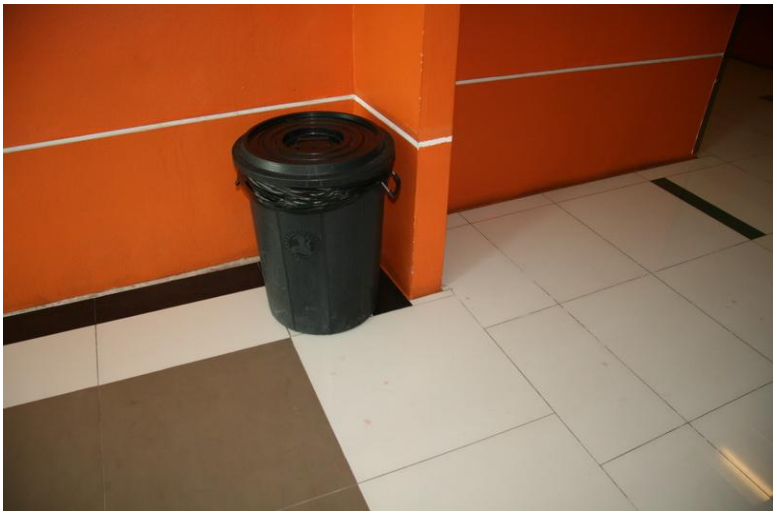


Figure III-83: Cleared Garbage Bin

Waste 47

Many times, housekeepers do not clean the garbage area after they clear the garbage bins, as shown in Figure III-84. Moreover, sometimes, they do not take the garbage bins to the garbage damp downstairs; they just remove trash inside the bin by hand at the position of the bin. Moreover, they would not change the black plastic bag also. Therefore, the garbage bin area would be very dirty and smell.

Figure III-84: Garbage Bin Area

6.2.2.2 Hallway

Waste 48

After housekeepers finish cleaning garbage, they start to clean hallway of each floor. The housekeepers go to the ninth floor; and take 4 pieces of equipment, namely broom, dustpan, mop, and bucket with half of water. After that, the housekeepers take the equipment by hand to clean floors. This inconvenience causes transportation waste, extra processing, and unnecessary movement.

There are 9 floors in the building, only 8 floors are the rental section; the ninth floor is the housekeeping office. Housekeepers clean floors from higher level to lower level. And the housekeepers start cleaning a floor with sweeping by using broom and dustpan as shown in Figure III-85.

Figure III-85: Housekeeper Sweeping Floor

Waste 49

After a housekeeper finishes sweeping, the other starts to mop the floor by washing a mop in the water bucket. And then, she wrings the mop beside the bucket; and she mops the floor. To wring the mop by hand would splash water around the area, as shown in Figure III-86. Then, the extra processing is required; as well as it is the unnecessary movement waste and defect.

Figure III-86: Water Bucket and Splashed Water in the Area

Figure III-87: Housekeeper Mopping

Waste 50

After she finishes mopping a floor as shown in Figure III-87, she would wash the mop again; it means that the mop is not clean enough to clean the floor. Without enough water to wash the mop, only half of the water bucket, the floor could not be clean.

In addition, the housekeepers face difficulty to refill water in the bucket because of 2 factors. The first one is the housekeeper has no cleaning cart which provides convenience to carrying equipment and materials. The second factor is that the location to refill water is on the first and the ninth floor which is far from working stations. This is transportation waste and defect.

Waste 51

Without a cleaning cart, housekeepers have to place cleaning equipment and materials on the stair while they are cleaning the floor as shown in Figure III-88. This is unsightly when guests go down by using the stair. This also causes waste in transportation, unnecessary movement, extra processing, and defect.

Figure III-88: Cleaning Equipment and Materials

Waste 52

In addition, without the cleaning cart, the housekeepers cannot clear the used dishes out of the hallway. And customers would be unsatisfied. Therefore, this is the defect which needs to rework.

Figure III-89: Used Food Container in front of Guest's Room

6.2.2.3 Lobby

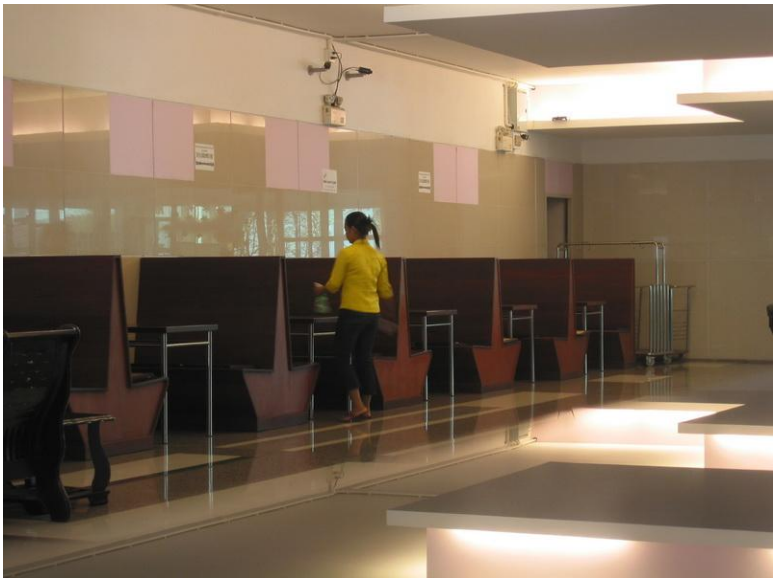


Figure III-90: Housekeeper Cleaning Desks

After housekeepers finish cleaning floor, they would continue clean the lobby, including desk, internet computer, pool, mirror, and floor. Figure III-90 and Figure III-91illustrate housekeepers are cleaning lobby area.

Figure III-91: Housekeeper Cleaning Internet Computer Counters

6.2.2.4 Swimming Pool Area

There are many facilities in the swimming pool area such as swimming pool, kid swimming pool, table tennis table, fitness, and rooms prepared for spa service. The swimming pool is shown in Figure III-92.

Figure III-92: Swimming Pool

Waste 53

However, there is no one in charge to assign cleaning job in this area to housekeepers. In the other word, housekeepers do not clean swimming pool area regularly. Moreover, there is a swimming pool for kids beside the swimming pool for adult. But there is no kid use this swimming pool; as well as there is no maintenance provided for this swimming pool. Therefore, the kids' swimming pool is very dirty as shown in Figure III-93.

Figure III-93: Swimming Pool for Kids

Figure III-94: Around the Swimming Pool Area

Figure III-95: Area in front of Swimming Pool Bathroom

Waste 54

Moreover, the area around the swimming pool is very dirty; for example, there is a hanger in the area as shown in Figure III-94. Besides, there is water in front of swimming pool bathrooms as shown in Figure III-95; as well as a water bottle considered as trash on the backside of the swimming pool as shown in Figure III-96.

Figure III-96: Backside of Swimming Pool

Figure III-97: Plant Pot in Swimming Pool Area

Additionally, there are plastic tubes and garbage in the plant pot of swimming pool area as shown in Figure III-97. Moreover a leg of table tennis table has benched. These unserviceable facilities do not be fixed for long time as shown in Figure III-98. The dirty area and the unserviceable facilities are considered as defects.

Figure III-98: Table Tennis Table

Figure III-99: Fitness

Figure III-99 is the fitness facilities and Figure III-100 is area prepared for spa service in the future.

Figure III-100: Part of Area Prepared for Spa Service

7. Information Flow

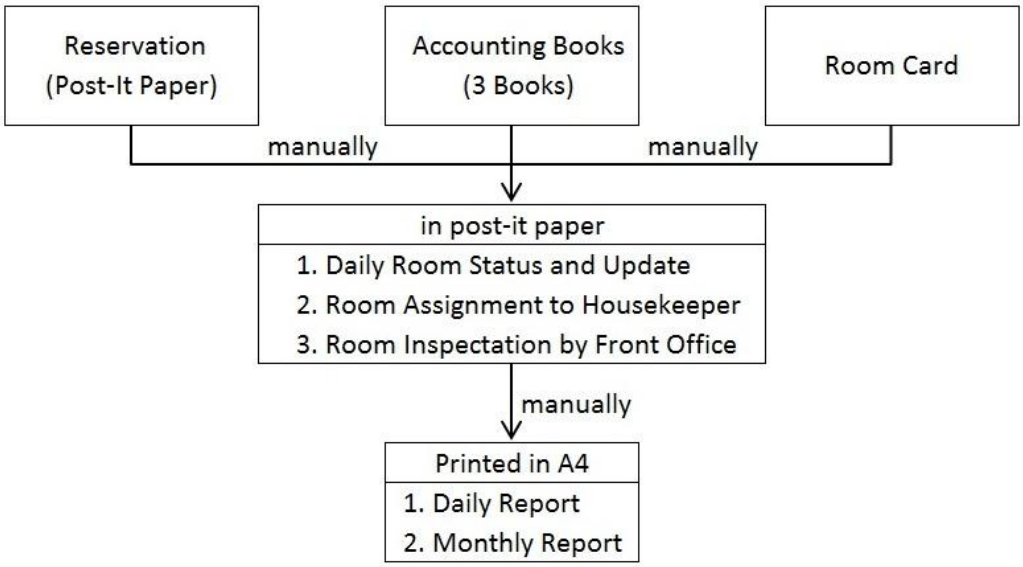


Figure III-101: Information Flow of the Old Process

Waste 55

There are 3 main documents that have the major in information flow in the process; post-it paper, accounting books, and room card, as shown in Figure III-101. Front office will analyse and transform the information to be firstly daily room status, secondly room assignment for housekeeper, and thirdly room inspection, the post-it – paper form. And finally, the front office would input the same information again into a computer; and print daily and monthly report.

The repeating paper work with unorganised approach would increase waste in process such as transportation waste, extra processing waste, overproduction waste, inventory, unnecessary movement, and defect. Moreover, it is time consumption.

Step 1 Available bay and in-house guest bay

The Figure III-102 shows that there are 3 bays in the room card board, namely available bay, in-house guest bay, and vacant dirty bay. If a customer checks in, front office will choose a room from available bay for the customer. And then, the front

office will clock time into the room card; mark an arrow sign representing numbers of days that the customer paid; and place the room card in the in-house bay.

Figure III-102: Three Bays on the Room Card Board

Step 2 Daily room status

When guests go to front office to extend their stay, front office would take the room card from the in-house guest bay; and mark an arrow sign indicating numbers of days extended. If guests want to check-out, front office will clock time-out on the room card; and place it into the vacant dirty bay.

Therefore, front office would like to know all of room status anytime. Then, everyday in the morning, front office would list all in-house guest rooms of that day by using room card. In addition, front office has to confirm the payment status again by referring to the red accounting book. This process is shown in Figure III-103.

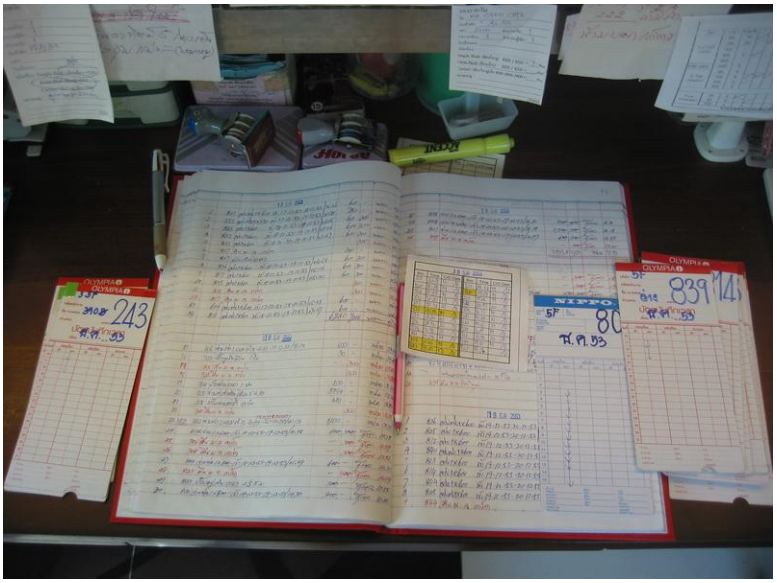


Figure III-103: Front Office Checking Payment Status

Front office will list date and time of each of the in-house guest rooms is expired in a piece of paper. After that, they would highlight the rooms that needed payment today. The paper is shown in Figure III-104.

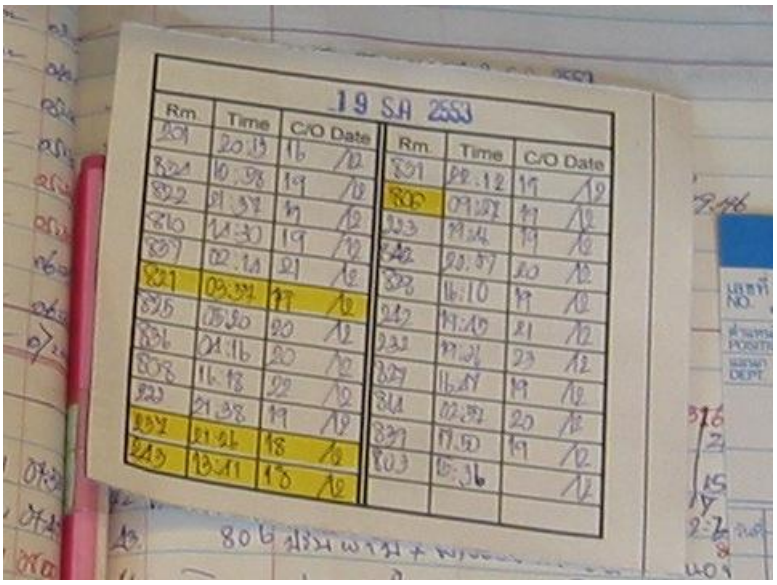


Figure III-104: List of Expired Time of In-House Guest

Waste 56

After that, the front office would recheck the room status frequently for the whole day; which is considered as waste. They will update room status in the list, as shown in Figure III-105.

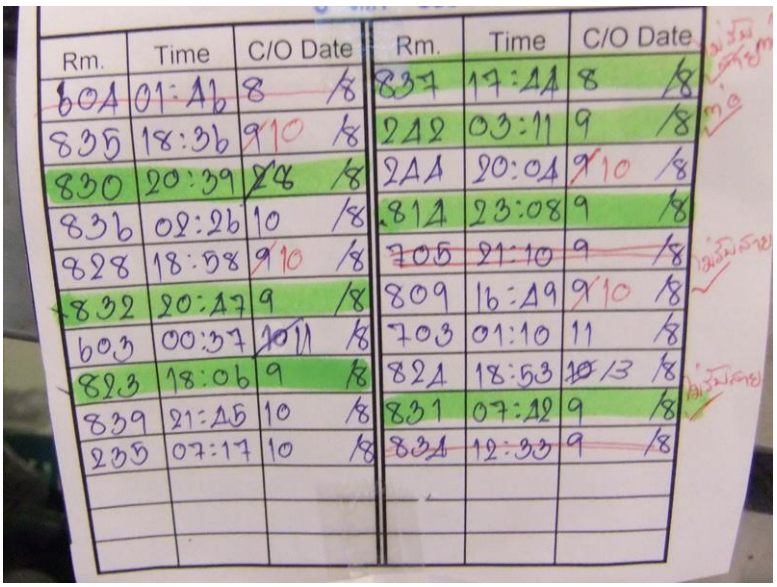


Figure III-105: Updated List

A few hours before the expired time, front office would make a phone call to the guests; and remind them to extend their stay or check-out on time. If the guests do not answer the phone call, front office will mark “do not answer” into the list.

Step 3 Vacant dirty bay

Once the guests show up at the front office to extend their stay, front office will change the expired date as the guests’ payment. If the guests have checked out, front office will cross the record with the red pen; place the room card in the vacant dirty bay. And if the current time is expired time and the guests do not extend their stay nor check-out, front office will highlight the record to follow up.

Waste 57

Step 4 Housekeeping assignment

After all of room status is updated, front office is able to list occupied dirty rooms and vacant dirty rooms to housekeeper. When housekeepers finish making rooms, front office would inspect the rooms and write down comments. Later, front office will assign the housekeepers again to complete their job if it is necessary. This assignment is done in a piece of paper as shown in Figure III-106.

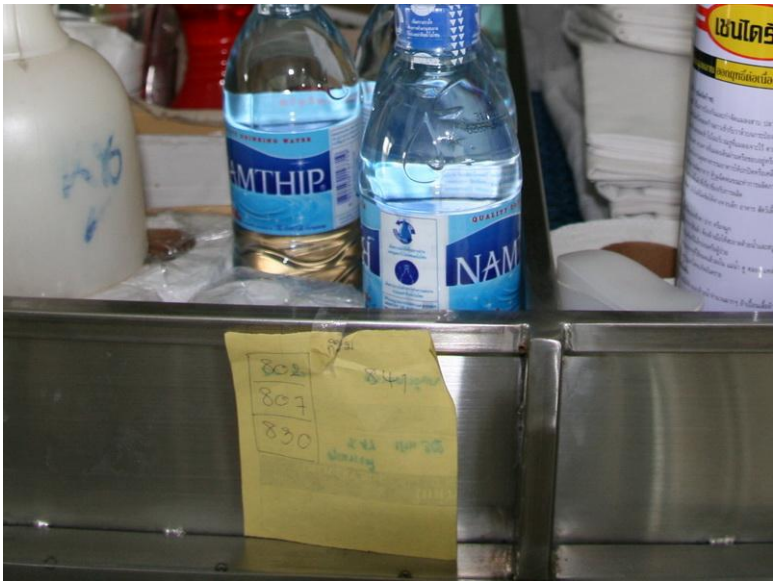


Figure III-106: Rooms Assigned to Housekeeper

Step 5 available bay

When the vacant dirty rooms are clean, their status would be vacant clean rooms. Therefore the room card of the vacant clean would be placed in the available bay.

Waste 58

Step 6 Communication Method

Moreover, front office communicates among their member via post-it as shown in Figure III-107 and Figure III-108; for example, when guest leave the key to her friends; when a customer make a reservation call; and when maintenance for a room is required.

However the way of communication does not record officially; problem may occur. For example, in the case of customer's key has lost accidentally, there is no one who takes responsibility; or if customer's friends have picked up the key but later the key is lost, the customer may claim that his friends did not pick the key yet; or if the post-it note has lost between changing day shift and night shift, there is no one follow up the case mentioned on the post-it note.

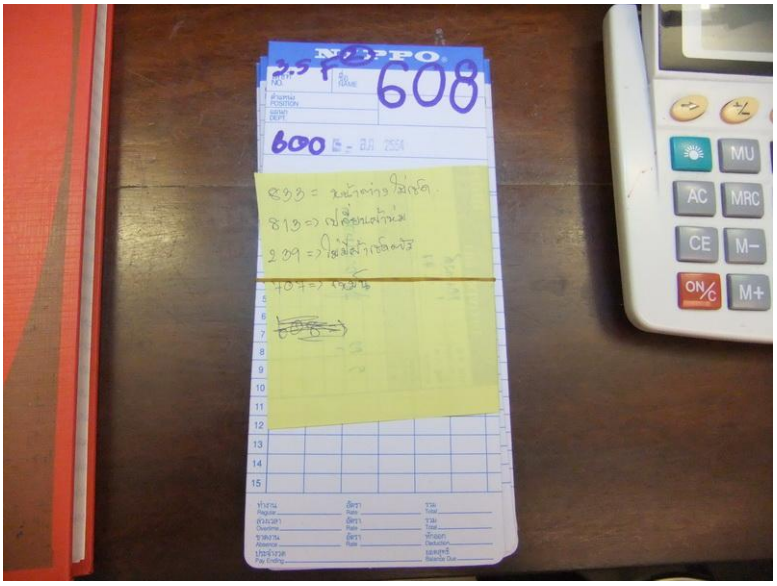


Figure III-107: Comments of Front Office to Each Room

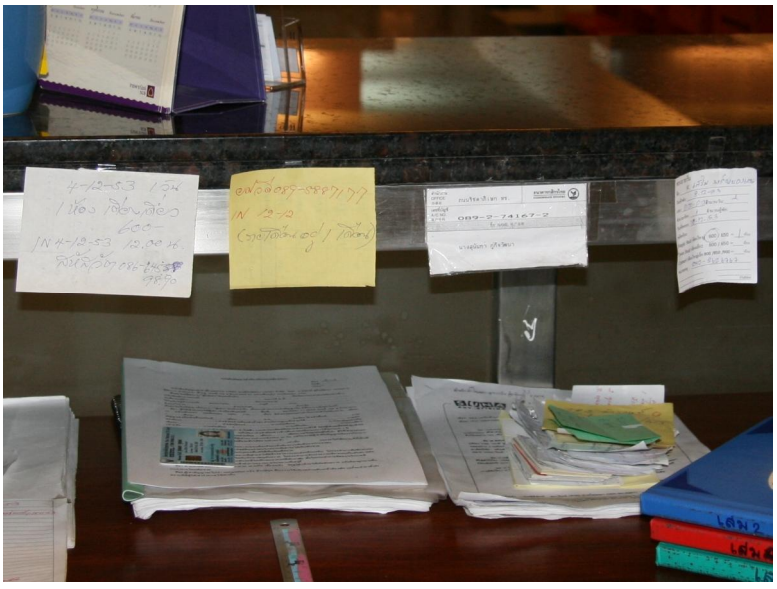


Figure III-108: Post-It in Front Office

8. Value Stream Mapping

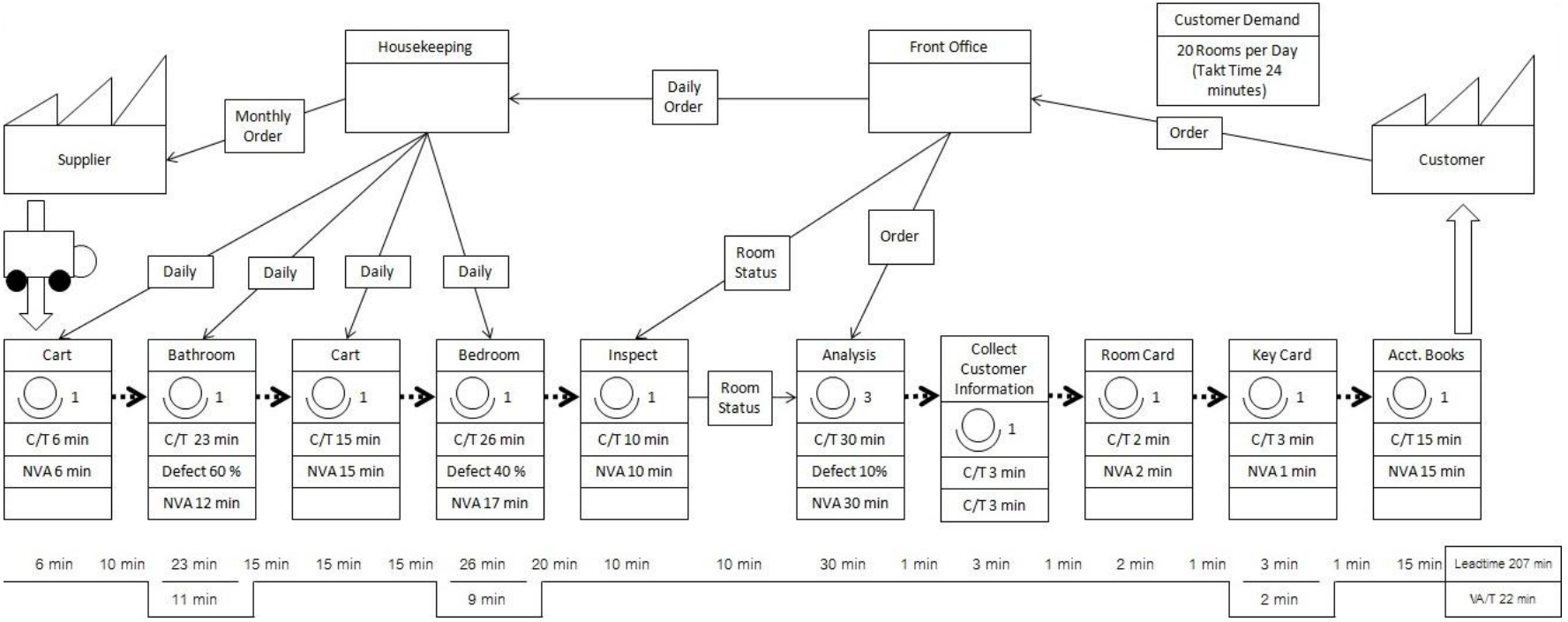


Figure III-109: The Current Stage Value Stream Mapping

The value stream mapping of the apartment process is generated as shown in Figure III-109. Normally, only 20 rooms are required per day or per 8 hours; therefore, takt time is 24 minutes. Moreover, with the apartment characteristic, only one piece of product which is a room; and only one operator which is a housekeeper and a receptionist is required in each process. As a result, the lead time to deliver a room to customer is 207 minutes with only 22 minutes value added.

9. Wastes Identification

According to lean principle; the service wastes in process are identified in Table III-4.

Table III-4: Waste Identification

	Activities	Muda							Mura	Muri
		Overproduction	Waiting time	Transport	Extra Processing	Inventory	Movement	Defects		
1	Decision making		X						X	
2	Family relationship								X	
3	Human Resource		X		X			X	X	
4	No training policy		X	X	X		X	X	X	
5	Hire more employee					X			X	
6	10 hr. Per shift									X
7	Housekeeper performance		X		X			X	X	
8	No department manager								X	
9	Front office layout		X	X	X		X			
10	A mess in front office		X		X		X	X		
11	Housekeeping inventory location			X						
12	Check-in process		X		X					

Table III-4: Waste Identification

	Activities	Muda							Mura	Muri
		Overproduction	Waiting time	Transport	Extra Processing	Inventory	Movement	Defects		
13	Check-in layout			X	X		X			
14	Check-in form					X				
15	Room card				X	X	X			
16	Scanning national ID card	X			X	X				
17	Desk drawer				X		X			
18	3 accounting books	X	X	X	X	X	X	X	X	X
19	In-house process		X		X					
20	In-house layout			X	X		X			
21	Follow up guest				X		X			
22	Check-out process		X		X					
23	Check-out layout			X	X		X			
24	Housekeeping cart structure			X	X		X			
25	Refill cleaning supplies		X	X	X	X	X			
26	Refill room amenities		X	X	X	X	X			
27	No stock control					X				
28	No serviced mind							X	X	
29	Recheck status	X		X	X		X			
30	Repeat cleaning				X		X	X	X	
31	Walk between working stations			X	X		X			
32	No linen bag and trash bag			X	X		X			
33	Unpleasant working station							X	X	
34	Wet rag (bedroom)				X			X	X	
35	Mop				X			X	X	

Table III-4: Waste Identification

	Activities	Muda							Mura	Muri
		Overproduction	Waiting time	Transport	Extra Processing	Inventory	Movement	Defects		
36	Material consumption					X		X	X	
37	Misuse of equipment							X	X	
38	Cleaning drain							X		
39	Cleaning bathroom floor		X	X	X		X	X		
40	Wet rag (bathroom)		X		X		X	X	X	
41	Area in front of bathroom				X		X	X	X	
42	Finished room rejected			X	X		X	X	X	
43	Door area			X	X		X	X	X	
44	No practical training		X	X	X	X	X	X	X	
45	No quality control							X	X	
46	Garbage			X			X		X	
47	Garbage selection				X		X	X	X	
48	Carry cleaning equipment by hand			X	X		X			X
49	Splash water from mop				X		X	X	X	
50	Refill water location			X			X	X		
51	No cleaning cart			X	X		X	X	X	X
52	Dishes							X	X	
53	No one assign public area jobs							X	X	
54	Dirty swimming pool area							X	X	
55	Repeated paper work	X		X	X	X	X			
56	Room status checking	X			X		X	X	X	
57	No official assignment to housekeeper							X	X	
58	Communication via post-it paper				X			X		

Chapter IV

Benchmarking

1. General Information

There are three processes that have been observed and interviewed, working activities, information flow, and resource allocation. A 4-star hotel in central of Bangkok, as shown in Figure IV-1, and 4-star resort in Pattaya, as shown in Figure IV-2, are coordinated to give information of those processes; whereas a private hospital, department stores, and a university are observed their cleaning activities and equipment.

Figure IV-1: The 4-Star Hotel in Central of Bangkok

Firstly, the hotel in Bangkok, Director of Rooms gave an interview on overall policy of running the hotel including marketing strategy, recruitment, training, promotion, front office, customer service, and hotel vision and direction. Moreover, Housekeeping Manager gave an interview on housekeeping activities with closely observation Rooms Attendant Boy and Girl make-up rooms.

Figure IV-2: The 4-Star Resort in Pattaya

Secondly, the resort in Pattaya, Assistant Front Office Manager gave an interview of front office activities, database system, and information flows, as well as showed how the database system works. Moreover, Assistant Housekeeping Manager also gave an interview of housekeeping department procedure, information flows, training procedure, and resource allocation. Meanwhile, Manager continually support and provide more information through the discussion with Assistant Front Office Manager and Assistant Housekeeping Manager.

Finally, a private hospital was observed the housekeeping activities in a patient room; department stores were observed the cleaning activities and equipment in public area; and a university were observed the cleaning checklist in a restroom and there was a university student to give a comment of cleaning procedure in the restroom.

2. Resource Allocation

2.1 Shifts

In hotel business, guests are limited the check-out time not later than 12.00 pm, whereas the check-in time not before 2.00 pm. Therefore, the peak hour of housekeeping is between times 12.00 pm to 2.00 pm, all check-out rooms should be

cleaned. Moreover, there are in-house rooms that have to be made daily together with turndown service.

To provide those services, there are 2 shifts for the hotel's housekeeping department, namely morning shift and afternoon shift. The morning shift starts at time 7.00 am to 4.00 pm with the responsibilities of check-out rooms and in-house rooms; while the afternoon shift starts at 12.30 pm to 21.30 pm for check-out rooms, turndown service, and completing the unfinished job of morning shift.

Those 2 shifts are also split into 2 halves, the first and the second half. For morning shift, the first half starts at time 7.00 am to time 11.00 am; and the second half is between times 12.00 pm to 4.00 pm. For afternoon shift, the first half starts at 12.30 pm to 4.30 pm; and the second half is between times 7.30 pm to 9.30 pm.

For the first half of morning shift, Rooms Attendant Boys and Girls will make their assigned rooms. Usually, each housekeeper was assigned initially the floor of responsibility; however, they will be assigned rooms day by day. The assigned rooms may be on the other floors depending on current situation decided by supervisors. The second half which is overlap with the first half of afternoon shift is for Rooms Attendant Boys and Girls to finish their work.

However, there are some work that morning shift cannot complete it in time unless afternoon shift would help. For example, there is an in-house room that has to be made in the morning, but the "do not disturb" sign is shown; therefore, the afternoon shift has to follow this room status whether the room is available for making up. As well as many more rooms will be check-out around noon and need to be clean within 2 hours later.

Therefore, the first half of afternoon shift is for making check-out rooms in the peak time and completing the unfinished job of morning shift. The second half of afternoon shift is for turndown service, a service that housekeeper will prepare guest

rooms for welcome in-house guests with warmness when they come back in the evening.

Normally, turndown service is based on five senses; sight, hearing, taste, scent, and touch; for example, some hotels rearrange blanket in the beautiful way; some turn on soft music in the guest room; some provide chocolate; and some spray fresh perfume. The housekeeping supervisors of the hotel assign 3 floors of turndown service per a housekeeper.

2.2 Workforce Assignment

Usually, each room attendant would be assigned to some particular floors. Sometime, there are floors that need greater number of people, for instance, the floor that many rooms are check-out. This is the supervisor's responsibility to transfer workforce from other to that floor suitably.

To allocate workforce, supervisors need room status information and workforce capability information. Firstly, room status information, supervisors shell know the room status in advanced; which rooms have in-house guests now and when will they leave; which rooms are booked for which period. Then, they would analyse that in a specific day how many rooms will be check-out, be check-in, or be in-house guest room.

Secondly, supervisors need to know the capability of their workforce. The maximum time allowed for making check-out rooms is set as superior room is 50 minutes; deluxe room is 60 minute, and suite room is 90 minute. Like check-out, the in-house guest room is set allowance to 20-25 minute or less. However, the supervisors expect 6-7 check-out rooms will be done within 4 hours for an expert housekeeper. Together with information of reservation, check-in, and check-out, supervisor would allocate workforce efficiently.

With this information, daily room status and workforce capability, number of housekeepers required for each day is known. Therefore, supervisor can arrange schedule of each housekeeper properly, as well as assign rooms to them in that day. In detail, supervisor can identify which rooms are more urgent than others by filtering the rooms that the new customer will check-in on the same day the old customer check-out.

2.3 Sequence and Priority

The sequence of making room can be varied by current situation. Normally, check-out rooms should be cleaned by time 2.00 pm, especially the urgent rooms, and the in-house guest rooms are required to be done before time 4.00 pm. However, the sequence of doing check-out rooms first and in-house rooms later may be switched.

For example, a customer requests his should be finished within 1 hour before he comes back again, the room has priority; or a check-out room is not reserved for that day. Above of all, all assigned rooms shall be made by running out of time, 4.00 pm. Therefore, as resources; workforce, time, and cost, are organised appropriately.

2.4 Differences between the Hotel and the Resort

Not only the method of resources allocation mentioned above has implemented in the hotel, but also is applied in the resort. However, the resort is more stick with area of responsibility than the hotel does because of the different characteristic between the resort and hotel.

The first difference is size; while the hotel has more than 400 rooms, the resort has only 60 villas. The second is the different features between room and villa, such as villa has garden while room does not. The third difference is the villa need more attention and continuous maintenance than the room does. And the forth difference is policy. With these differences, the resort assigns 2-3 housekeepers to 5 villas for 3 months. After 3 months, supervisor will rearrange workforce to other 5 villas for another 3

months. The Figure IV-3 and Figure IV-4 illustrate the differences of hotel room and resort villa.

Figure IV-3: A Room in the Hotel

Figure IV-4: A Villa in the Resort

2.5 Benefits of Turning Area of Responsibility

There are benefits of turning area of responsibility every three months as shown in Figure IV-5. Firstly, housekeepers have enough time to sustain the villa conditions including bedroom, living room, bathroom, foyer, pavilion, pool terrace, pavement, and landscape. And secondly, resort can maintain housekeeping standard

by observing and comparing housekeeper performance from their assigned villas in the 3-month.

Additionally, office hour of housekeeper in the resort is 9.00 am - 6.00 pm only and all villas have to be made by that time. If there is urgent housekeeping job in the night, room boys will handle it instead.

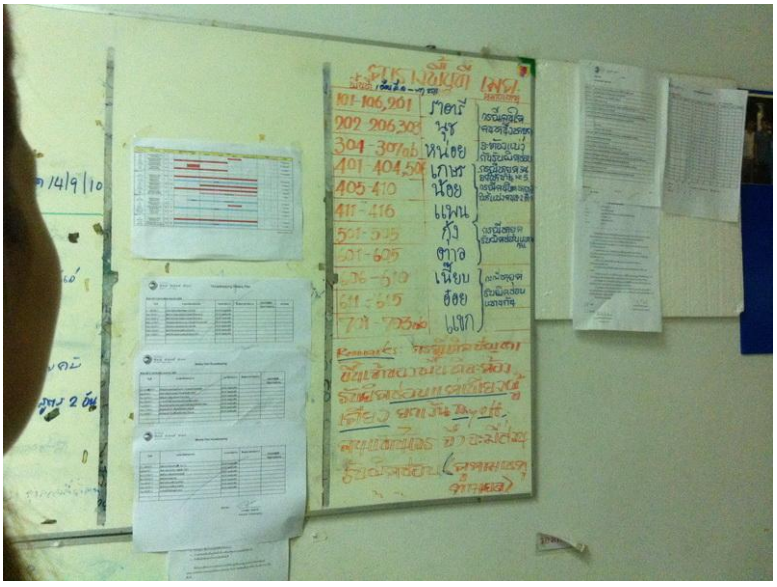


Figure IV-5: Area of Responsibility in the Resort

2.6 Training Policy

Besides, both hotel and resort have the same training policy; housekeeping supervisors will train a new housekeeper themselves. The policy ensures that the new housekeepers will meet the making room standard from the beginning.

3. Working Activities

3.1 Front Office

3.1.1 Reservation

According to the interview of the resort, there are 60 villas in the resort with 2 channels to approach their customers; the first is a website, and the second is their sales contact with international travel agencies.

The resort implemented database system to handle information of employees, customers, villas, and facilities. The system accommodates customer to check villas' availability and reserve; front office to handle villa and customer information. Moreover, the system also accommodates manager to plan, manage, and run the business. As well as the system flows information through departments concerned such as housekeeping and front office (this topic will be discussed later in information flows.)

When a reservation from retail customer is made via the website, the reservation system automatically reserved the required villas immediately; while front office has to reserve villas by themselves when a travel agency conclude number of villas required for a trip.

The reservation system will reserve specific villa on specific date; therefore, front office would know exactly which villas are available on which day. Then, front office could use the system as a tool to provide such information to new customer.

3.1.2 Guests Check-In

Practically, there are 2 computers used for check-in and check-out separately for customer convenience; however, both computers can do either check-in or check-out. When a walk-in customer comes and check-in, there is a form for customer to fill in, in the mean time, front office also keys customer information into their database system.

For customers who already made reservation either via website or travel agency, their information was recorded in the database since the day the reservation was made, front office only confirm in the system that the customers are actually show

up as they reserved. The Figure IV-6 shows a group of customers from a Chinese agency checking in the resort at lobby.

Figure IV-6: A Group of Customers from Chinese Tour Agency at Front Office of the Resort

Although the villa status in database system is updated by housekeeping department when it is available and clean, sometimes, it is necessary for front office to confirm with housekeeping department via radio communication or telephone again. For example, the vacant clean status was updated for the villa in the morning, after that it rains, then its terrace and garden area are dirty. After raining, customers come and check-in; it is a must that front office has to ensure that the room is perfectly cleaned.

Next, it is the responsibility of guest service agent to drive the customers to the villa and show them how to use facilities equipped in the villa such as telephone, air conditioner, and bathroom. However, bell boys also are trained to do this job when guest service agent is not available.

3.1.3 Information Centre

While the customer stays in the resort, front office is also information centre and communication media between customer and housekeeping to satisfy all their needs. For example, front office will deliver messages from customer to housekeeper; as well as advise customer the room cleaning status when they make a call from outside.

3.1.4 Guests Check-Out

Last, when the customer is check-out, by using the database system, front office will calculate all expenses that have been updated all the time, such as mini-bar and room services. Then, front office keys the receipt information, such as payment method, into the database system. After that they print the receipt for customer and receive payment from them.

Figure IV-7: Customers at Front Office of the Hotel

Regarding to observation the front office in the hotel as shown in Figure IV-7, a database system is implemented as well, then only computers and printers are required in front office. They minimize number of paper used for reservation, check-in, check-out, and communication procedure. Therefore, the front office counter is very neat and clean.

3.2 Housekeeping

3.2.1 Floor of Responsibility

To make room, the hotel set up the procedure as described below. Firstly, the housekeeping office would have room status list for that day. Then, housekeeping supervisors will assign rooms for Room Attendant Boys and Girls specifically. Additionally, each room attendant is assigned the floor of responsibility permanently; therefore, the daily assigned rooms from supervisor are normally matched with the floor of responsibility except in the urgent case.

3.2.2 Morning Work

At 7.00 am, room attendants prepare their housekeeping cart; and sign for master key of their floors. At 8.00 am, room attendants walk down on their floor to check that the room status in the list is correct or not, since the room status may change after the list is printed. And then, room attendants will mark the up-to-date status in their daily report. For example, room status is vacant clean in the list; after checking the actual status, it turns to be check-in guest.

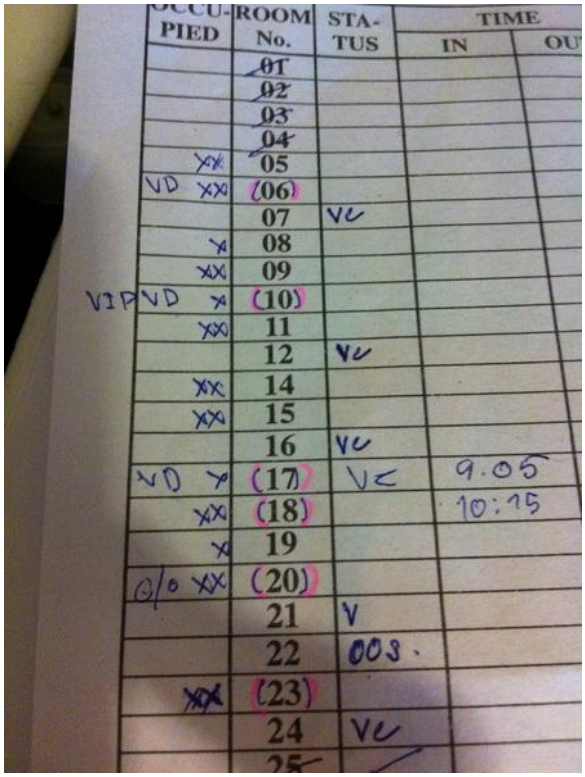
At 9.30 am, room attendants walk down on each floor again; knock in-house guest rooms to take guests' clothes to laundry. It is prohibited to collect the laundry bags in the early time since it would disturb the guests. Moreover, if the sign in front of the room is "do not disturb", room attendants are not allow to knock the door.

3.2.3 Bedroom First or Bathroom First?

After room attendants complete collect the laundry bags, they will go to the guest rooms as in the assignment; and start to make up rooms. If the room is an in-house guest room, Room attendants should clean bathroom first before bedroom. However, if the room is checked-out room, bedroom portion should be made first.

The reason behind is that, for the check-out room, new guests will be check-in shortly. If room attendants could not complete the room in time, the new guests are still able to move in the room while room attendant are cleaning the restroom. If in-house guests come back to the room before the room is made up completely, at least the in-house guests can use their own bathroom rather than public bathroom. And room attendant may ask for making bedroom or may come back to make bedroom later.

3.2.4 Daily Report



OCCU-PIED	ROOM No.	STA-TUS	TIME IN	TIME OU
	01			
	02			
	03			
	04			
	05			
VD	06			
	07	VC		
	08			
	09			
VIP VD	10			
	11			
	12	VC		
	14			
	15			
	16	VC		
VD	17	VC	9.05	
	18		10:15	
	19			
O/O	20			
	21	V		
	22	003.		
	23			
	24	VC		
	25			

Figure IV-8: Daily Report

Since room attendants are initially assigned the floor of responsibility, everyday in the morning they would receive a daily report in the A4 size as shown in Figure IV-8. The daily report lists all the rooms in the floor of responsibility. When room attendants start make up rooms, the daily report is filled in each column room by room.

In the report, there are columns of room number, room status, time in, time out, room facilities status, and numbers of refill towels. The room status is updated

in the morning, while the other columns will be updated when the room attendant making room.

3.2.5 Preparing Housekeeping Cart

To prepare the housekeeping cart, room attendants have a check list on their cart; the check list is shown in Figure IV-9. The check list ensures that room attendant would not forget cleaning supplies and room amenities.

Figure IV-9: Check List of Preparing Housekeeping Cart

The Figure IV-10 shows housekeeping cart is containing towels and bed sheets. The bottom level of the housekeeping cart contains Bed sheets, pillow cases, and duvet cover. The middle level of the cart is for containing bath towels, face towels, hand towels, and floor towels. And on the top level of the cart, it should contain room amenities and stationary as shown in Figure IV-11.

Figure IV-10: Housekeeping Cart Containing Towels and Bed Sheets

Figure IV-11: Room Amenities

In addition, there are 2 linen bags on the both sides of housekeeping cart. One bag is for keeping dirty bed sheets and towels; and the other is for keeping rags. Moreover, there is a plastic bag for damping trash also. Additionally, there is the cart cover to keep working station out of sight as shown in Figure IV-12. Then, the cart is in good order.

Figure IV-12: Back of Housekeeping Cart

Figure IV-13: Cleaning Equipment

Moreover, room attendant's cleaning equipment is kept under a linen bag as shown in Figure IV-13. The cleaning equipment includes cleaning solution, bowl, and wiper.

3.2.6 Make Up Rooms

When a room attendant goes down on the floor to make up rooms, there are 2 electronic signs might be shown up on the room door; the “do not disturb” sign as shown in Figure IV-14, and the “make up room” sign, as shown in Figure IV-15.

Figure IV-14: Do Not Disturb Sign

Figure IV-15: Make Up Room Sign

Beside the sign, there is a doorbell for calling guest attention instead of knocking the door. If the “do not disturb” sign is shown up, the doorbell will be unserviceable. If the “make up room” sign is shown up, or there is no sign, the doorbell will be usable.

To make up a room, firstly room attendant would clear trash and rubbish in the room as shown in Figure IV-16 and Figure IV-17; by damping them into the plastic bag integrated with the housekeeping cart. Secondly, the room attendant will turn off all electronic equipment such as television in the bedroom and hair dryer in the bathroom. Thirdly, the room attendant would place bedroom facilities in the right position.

Figure IV-16: Rubbish in the Room

In fact the room under the observation is check-out room; according to the housekeeping procedure, room attendant would make bedroom before bathroom for check-out room. However, there is another room attendant on the same floor, using bedroom cleaning equipment which is sharing together. Therefore, the room attendant for this room would start making room by cleaning bathroom first.

Figure IV-17: Room Attendant Clearing Trash

3.2.6.1 Bathroom

To clean the bathroom, in Figure IV-18, room attendant will take the hair dryer out off the bathroom; and the dirty towels in Figure IV-19 to the housekeeping cart.

Figure IV-18: Room Attendant Turning Off Hair Dryer

Figure IV-19: Bathroom before Clearing Dirty Towels

Then, he will take the cleaning supplies from the cart to the bathroom as shown in Figure IV-20.

Figure IV-20: Cleaning Supplies

Figure IV-21: Floor Towel and Hair Dryer in front of the Bathroom Door

And then, he places the floor towel in front of the bathroom door as shown in Figure IV-21. After that he would wash ashtray and glasses before cleaning the bathroom as shown in Figure IV-22 and Figure IV-23

Figure IV-22: Room Attendant Taking Glass to Wash

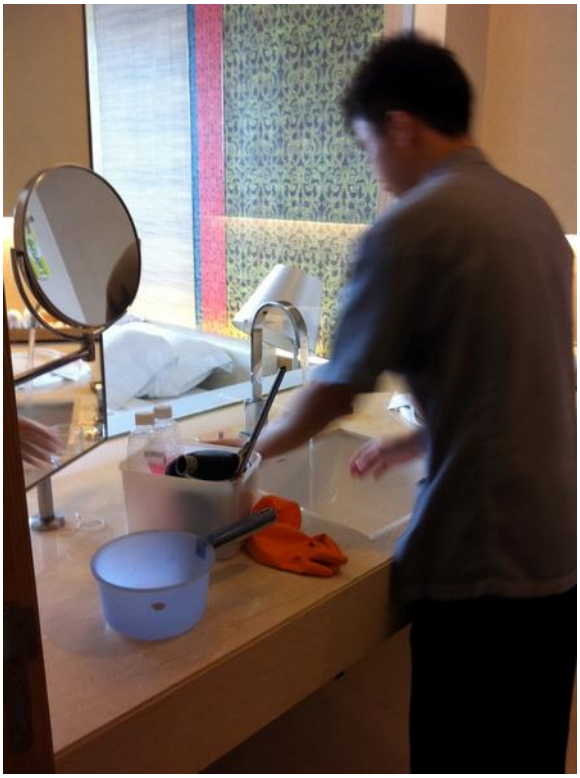


Figure IV-23: Room Attendant Washing Ashtray and Glasses

After that, room attendant cleans a tub by using pink solution and wash the tub immediately. Moreover, he washes all area around the tub with hot water including wall and tub door, as shown in Figure IV-24 and Figure IV-25.

Figure IV-24: Room Attendant Cleaning Tub

Figure IV-25: Room Attendant Cleaning the Tub Door

And then, room attendant fills washbasin with hot water; and use a bowl to shovel water and pour it over the toilet, as shown in Figure IV-26.

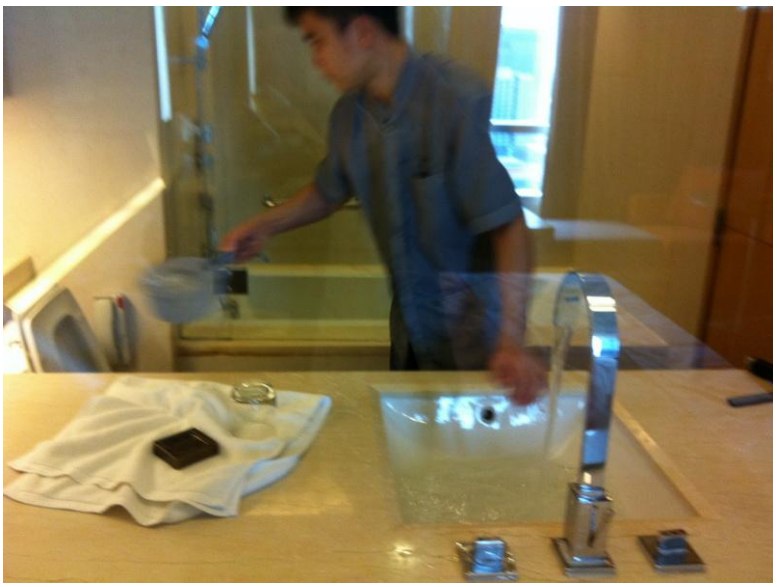


Figure IV-26: Room Attendant Cleaning Toilet

Figure IV-27: Room Attendant Cleaning Bathroom Floor

After that, he washes the toilet with the pink solution. Moreover, he pours hot water to bathroom floor to wash it as shown in Figure IV-27.

Figure IV-28: Room Attendant Wiping Bathroom Counter

The reason of using hot water in cleaning process is that the hot water would have more effectiveness to sanitize. Moreover, hot water would dilute smell of the bathroom.

Then, room attendant wipe bathroom counter and bathroom floor, as shown in Figure IV-28 and Figure IV-29. Wiping bathroom surfaces to be almost dry would reduce work for room attendant when he dries the bathroom. Moreover, it would reduce numbers of rug used for rubbing the bathroom dry.

Figure IV-29: Bathroom Floor after Wiping

After that, room attendant would use the dry rags to rub the tub, wall, tub door, washbasin counter, toilet, and bathroom floor, as shown in Figure IV-30, Figure IV-31, and Figure IV-32. In addition, they do not need to concern whether outside the bathroom area is wet because they already place the old floor towel before cleaning bathroom.

Figure IV-30: Room Attendant Rubbing the Tub Dries

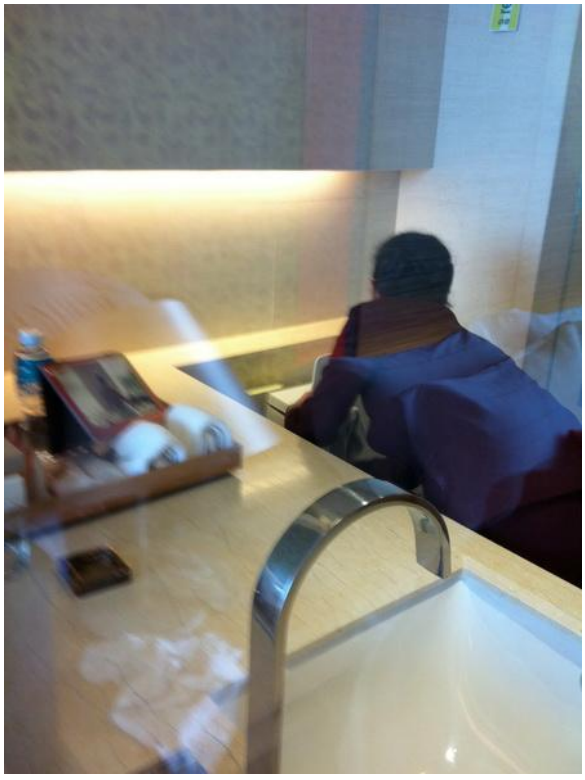


Figure IV-31: Room Attendant Rubbing the Toilet Dries

Figure IV-32: Room Attendant Rubbing Bathroom Floor Dries

And then, room attendant starts to decorate the bathroom. The room attendant would take all missing bathroom amenities for the housekeeping cart in one time, as shown in Figure IV-33. After that, room attendant would arrange the amenities in a wood tray, as shown in Figure IV-34. The finished amenities arranging is shown in Figure IV-35.

Bathroom amenities are soap, shampoo, foam bath, body lotion, toothbrush, shower cap, cotton bud, nail file, toilet paper, tissue paper, water bottles, glasses, and laundry bag.

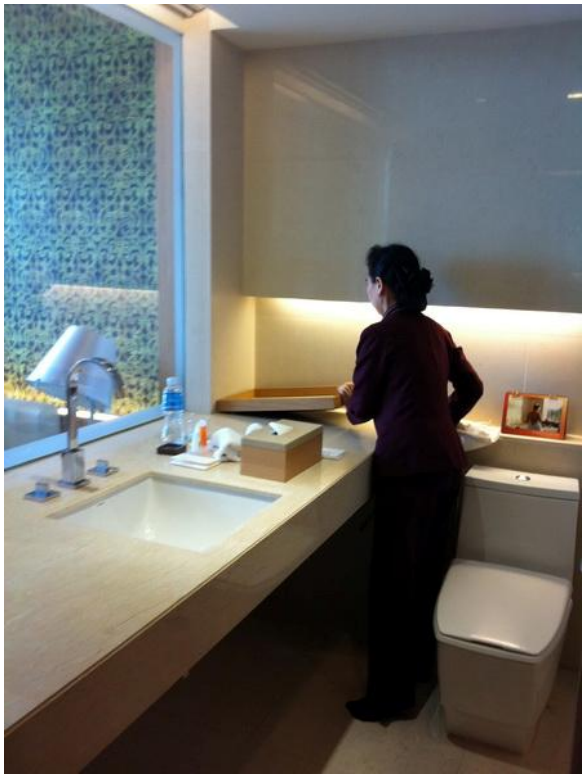


Figure IV-33: Room Attendant Taking Amenities from Cart

Figure IV-34: Room Attendant Arranging Bathroom Tray

Figure IV-35: Room Attendant Finishing Bathroom Decoration

After that, room attendant would take towels from the housekeeping cart; and record numbers of new towels. And then, they fold and fill the towels in the bathroom as shown in Figure IV-36 and Figure IV-37. Towels include 2 bath towels, 2 face towels, 2 hand towels, and 1 floor towel. Moreover, they would use two of them fold to be swan, elephant, dog, and cat.

Figure IV-36: Room Attendant Folding Towels

Figure IV-37: Room Attendant Placing Towels

The finished bathroom is shown in Figure IV-38, Figure IV-39, and Figure IV-40.

Figure IV-38: Finished Bathroom I

Figure IV-39: Finished Bathroom II

Figure IV-40: Finished Bathroom III

3.2.6.2 Bedroom

After room attendant finish cleaning bathroom, they start to make bedroom. First, room attendant would remove duvet cover, as shown in Figure IV-41; bed sheets, as shown in Figure IV-42; and pillow cases, as shown in Figure IV-43. They would place pillows on sofa rather than bed. Second, room attendant takes the dirty sheets to the housekeeping cart; put them into the linen bag as shown in Figure IV-44.

Figure IV-41: Room Attendant Removing Duvet Cover

Figure IV-42: Room Attendant Removing Pillow Cases

Figure IV-43: Room Attendant Removing Bed Sheets

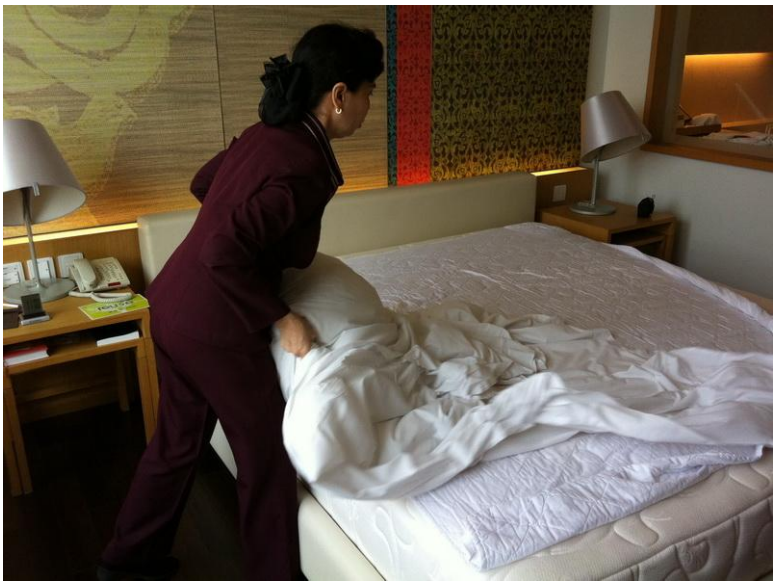


Figure IV-44: Room Attendant Folding the Dirty Sheets Together

Then, room attendant would take clean duvet cover, bed sheets and pillow cases from the housekeeping cart to replace the dirty ones. Moreover, the room attendant would count numbers of the new sheets using in the room; and record them in the daily report.

After that, room attendants would make bed; wear pillow cases on the pillows as well as the duvet cover, as shown in Figure IV-45. Moreover, they would decorate the bed by coverlet as shown in Figure IV-46. Additionally, colour of coverlet depends on the theme of the room. There are many colour themes such as orange, yellow, purple, and dark brown. Those colour themes are presented on bedroom, sofa, and wall.

Figure IV-45: Room Attendant Covering Pillows with Pillow Cases

Figure IV-46: Room Attendant Covering the Coverlet

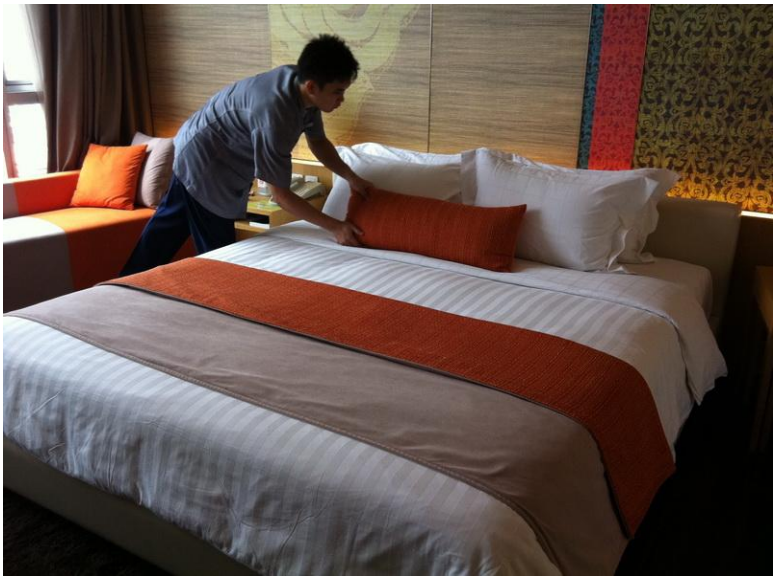


Figure IV-47: Room Attendant Finishing Making Bed

After the room attendant finishes making bed as shown in Figure IV-47, he would clean the room facilities and arrange them to be on their position. The room attendant uses a wet rag to scrub them clean; and a dry rag to rub them dry. In Figure IV-48, room attendant is cleaning refrigerator.

Figure IV-48: Room Attendant Cleaning Refrigerator

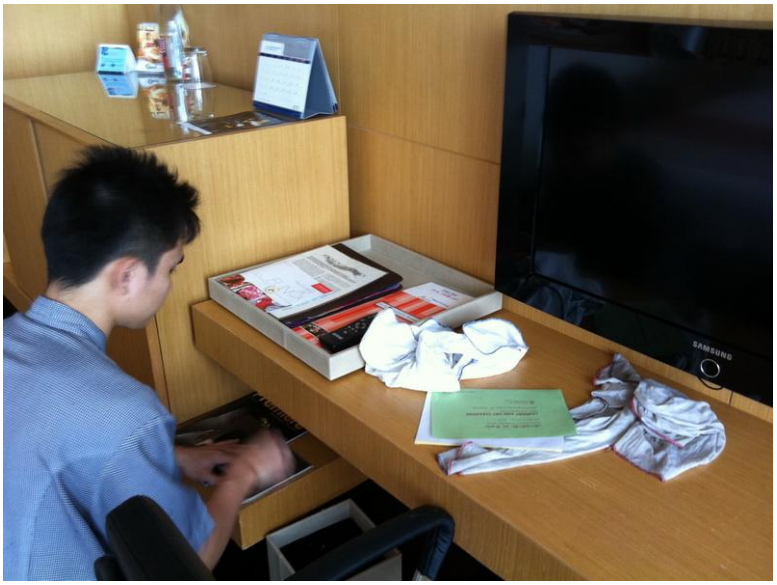


Figure IV-49: Room Attendant Arranging Magazines

In Figure IV-49, the room attendant is arranging magazines; and in Figure IV-50, he is cleaning roof lamp.

Figure IV-50: Room Attendant Cleaning Roof Lamp

Figure IV-51: Room Attendant Cleaning Window Mirror

Room attendant is cleaning window mirror in Figure IV-51; bed stand in Figure IV-52; and hair dryer box in Figure IV-53. Moreover, in order to clean the facilities, room attendant would move in one direction; entry at the room door, move to the right, and exit at the door again. After that, room attendant would vacuum and mop room floor from inside to outside direction.

Figure IV-52: Room Attendant Cleaning Bed Stand

Figure IV-53: Room Attendant Cleaning Hair Dryer Box

Figure IV-54: Room Attendant Vacuuming Room Floor

After room attendant finishes vacuum room floor by using vacuum machine, as shown in Figure IV-54; she would mop the floor by using hot stream machine, as shown in Figure IV-55. The room attendant would vacuum and mop all the area of the room floor including bedroom floor under bed, under carpet, behind sofa, and bathroom floor, as shown in Figure IV-56. Again, hot stream would sanitize the floor more than using just stream.

Figure IV-55: Room Attendant Mopping Bedroom Floor

Figure IV-56: Room Attendant Mopping Bathroom Floor

Figure IV-57: Last Time Check

Finally, room attendant would check and arrange the room for the last time, as shown in Figure IV-57. She lights on the lamp at the bed stand since a guest will check-in the room in the afternoon. And then, she reports the front office by internal telephone network that the room is vacant clean, as shown in Figure IV-58. There are 3 statuses that room attendant would report; vacant dirty is cleaned, and occupied dirty is cleaned.

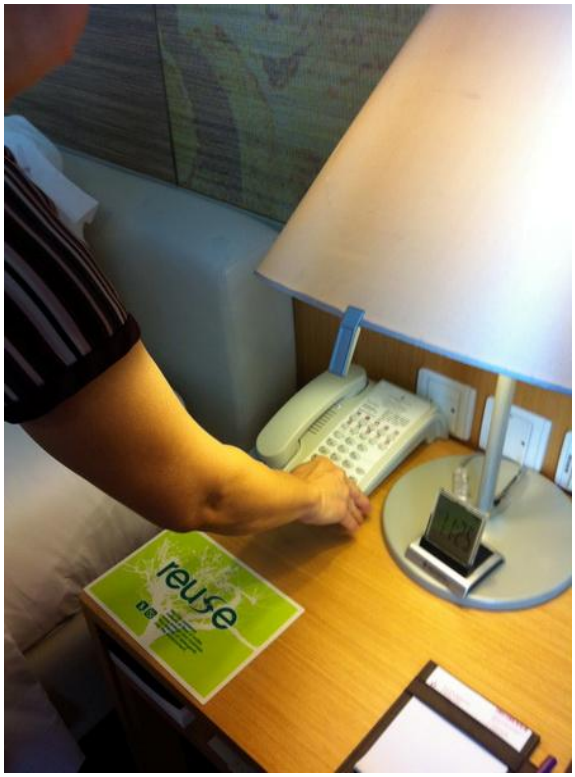


Figure IV-58: Room Attendant Reporting the Vacant Clean Room

Additionally, for the in-house guest, if the room attendant did not make the room because of the “do not disturb” sign, there is a message provided telling the guest that they could call for housekeeping service whenever they wish.

3.2.6.3 Supervisor Inspection

Once a room attendant makes a room completely, a housekeeping supervisor will inspect the completed room. If there are some parts of the room under the room standard, the supervisor would assign the room attendant redo cleaning again. However, the supervisor would take this situation as a chance to teach the room attendant the cleaning procedures again. However, the supervisor would inspect the check-out room only, not in-house room. Because the supervisor needs to ensure that there is no mistake could occur when the new guest check-in.

3.2.6.4 Mini Bar

In addition, when guests check-out the room at front office, front office would like to know additional charge such as mini bar. Therefore, front office would contact a room attendant who in charged on the floor via a radio handy. The room attendant shall get in the check-out room to inspect the mini bar charge as well as the damage charge. Then, the room attendant shall report the charge to front office immediately in order to minimize waiting time of the guests at front office.

However, it is possible that the room attendant cannot get in the check-out room since there is the “do not disturb” sign shown up at the door. This situation may occur when there are 2 guests for the room; one guest may be at the front office to check-out the room, while the other is packing bags in the room. In this case, the room attendant should contact the front office; and let the front office ask the first guest that is the room attendant able to disturb the second guest by knocking the door.

3.2.6.5 Mini Training

Moreover, after room attendants finish their routine works, there is a mini training in the housekeeping department. This mini training is conducted by

housekeeping supervisor to review cleaning procedure, to improve cleaning quality, to pronounce new policy, and to discuss and share knowledge among the department.

4. Information Flow

4.1 Between Housekeeping and Front Office

4.1.1 Villa Status

Since the hotel and the resort implemented database system, the majority of information would flow through the system. There are different levels to access the information in the system separating by department; for example, front office level and housekeeping level.

For the resort, front office level can access the information of reservation, check-in, check-out, and receipt. While housekeeping level can access the information of reservation and villa status, namely vacant clean, vacant dirty, occupied clean, and occupied dirty.

This is a procedure of the resort that all dirty villas must be clean by the end of the day. Therefore, everyday in the morning the vacant-villa status should be “vacant clean”. However, housekeeping clerk would change the vacant clean status in the database system to be vacant dirty. Therefore, front office could not release the villas to the check-in guest until housekeeping clerk change the status again.

Then, housekeepers would check all the vacant villas whether they are clean and ready to check-in. The morning check before hand in the villas ensures that the villas are definitely clean. After completing the morning check, housekeeper would hand in the information to housekeeping clerk. Then, the housekeeping clerk would update the status in the database system.

When guests check-out the villa at front office, the front office would update the villa status in the database system that the villa is vacant dirty. Therefore,

housekeeping department would know immediately once there is a check-out villa need to be clean.

As well as when housekeepers finish make up villas; and housekeeping supervisor approve the cleanliness already, the housekeeping clerk would update the villa status to be vacant clean or occupied clean.

Moreover, if some villas need maintenance works, housekeeper would notify housekeeping supervisor or clerk. The housekeeping clerk would change the villas status to be out of service; then, front office and maintenance would know immediately. And they would take appropriate actions required.

4.1.2 Reservation Information

The reservation information is useful to forecast and prepare the resort be ready in advanced. With the reservation information, both front office and housekeeping department are able to plan their workforce to balance with workload. By using the database system, the reservation information from front office would be shared with housekeeping department.

4.1.3 Guests' Special Requests

Once guests check-in, they may request some special needs; for example, some may request double numbers of bath towels. Front office is normally the first one who acknowledges the request; therefore, they should inform housekeeping department the guest's request. Therefore, housekeeper would service the guests exactly what they need. The database system is an effective tool to transfer the information to housekeeping department.

4.1.4 Guest Type

Since there is sale department in the resort to promote the resort to travel agencies, there are various types of guests. Some are VIP guest; but, some are not. In

addition, the resort has to provide commission to those agencies as well. To handle of the running cost, the resort has to cut off some costs for agencies' customer.

There are the ways to cut off running cost without degrading quality. For example, normally, the guestroom amenities would be packed in a pleasant box. The housekeeping department can save cost by do not provide the amenities in the box; just arrange them in the villas in nice look. Besides, housekeeper may reduce numbers of towels provided in the villas in order to save the cost.

However, the resort cannot cut off the cost with the VIP guests. Therefore, it is essential that housekeeping department should know the guest type. The database system would inform housekeeping department the information.

4.2 Among Housekeeping Department

4.2.1 In-House and Check-Out List

The resort characteristics make housekeeping job difficult; for example, housekeepers may have to redo cleaning again if it rain on that day. One characteristic that make housekeepers face complexity to finish job is the resort layout. The way connecting among villas and housekeeping department is far away; only golf car can reach working site and housekeeping office easily. It is almost impossible if a housekeeper would walk back to the housekeeping office to refill the towels.

Therefore, housekeepers need roomboys to prepare the refill towels in every villa; as well as to empty housekeeping cart when it is full with dirty sheets. The roomboys have to prepare the towel boxes in the night shift for tomorrow cleaning. However, there is no housekeeper work in night shift. Therefore, roomboys need a list; the list of in-house and check-out villa of tomorrow works.

By using the list, roomboys would know exactly how to prepare towels for each specific villa. Then, they would use a plastic box containing towels per villa. After that, in the morning, they would deliver those boxes to each villa for housekeepers. In

conclusion, the villa status information would flow to roomboys as well to smoothen overall working process.

4.2.2 Daily Report

Everyday, housekeepers would to fill in a daily report when they make up villas. In the daily report, there are 2 parts; check list part, and remark part. The check list part includes room number, status, time in, time out, room amenities, linen used, towel used, mini bar used, and coffee bar used.

The remark part is for housekeepers write everything unusual to report them officially. Moreover guests' valuable belongings shall be written down on the remark part as well. The remark part will be a part of the logbook.

4.2.3 Logbook

The logbook of housekeeping department is a crucial book that records all events occurred or reported in the resort in specific date and time. The logbook is like the resort diary; telling that what is going on in the resort.

The information to record in the logbook has various resources such as housekeeper and maintenance officers. The resort official members can refer to the logbook when they need an evidence to prove something.

Chapter V

Lean Apartment Management System Design and Implementation

Production Operations Transition-To-Lean-Roadmap

Massachusetts Institute of Technology introduced the Product Operations Transition-To-Lean Roadmap in year 2000 as shown in Figure V-1. To design and implement Lean Apartment Management System, the roadmap is adopted in this study to the service process.

There are 8 phases of transition;

1. Phase 0: Adopt Lean Paradigm
2. Phase 1: Prepare
3. Phase 2: Value Define
4. Phase 3: Identify Value Stream
5. Phase 4: Design Production System
6. Phase 5: Implement Flow
7. Phase 6: Implement Total System Pull
8. Phase 7: Strive for Perfection

However, the Production Operations Transition-To-Lean Roadmap is aim to manufacturing not service. Therefore, the details of each phase would be differed from the roadmap.

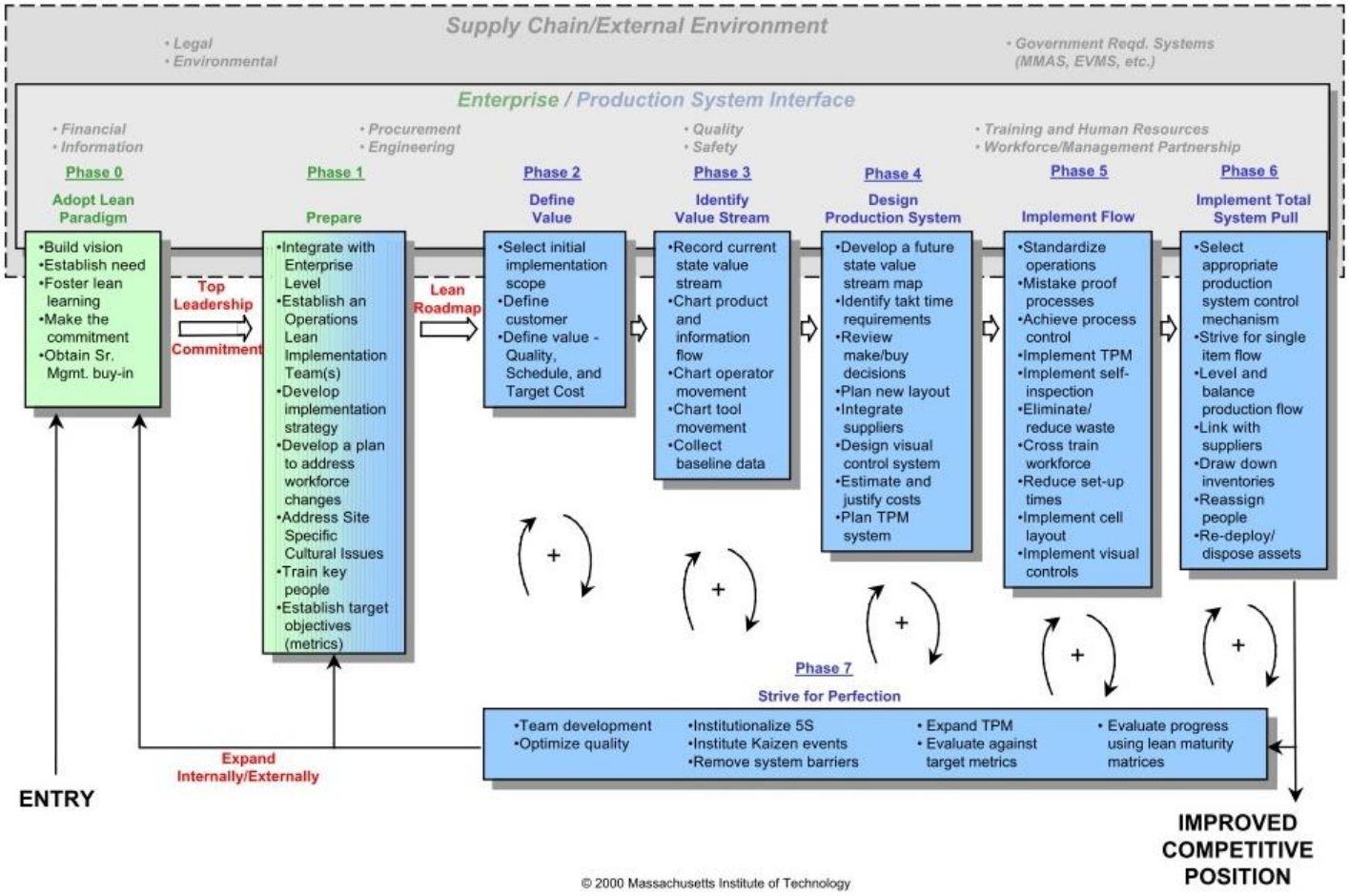


Figure V-1: Production Operations Transition-To-Lean Roadmap (Massachusetts Institute of Technology, 2000)

Source: http://lean.mit.edu

1. Phase 0: Adopt Lean Paradigm

In this phase, the researcher has to conduct the meeting with the owner and top management level in order to explain the lean principle and develop organisation vision and strategy regarding to implementation Lean Philosophy.

2. Phase 1: Prepare

2.1 Organisation Structure

The company is family business formed from a small business; therefore, initially, the organisation structure could be flat and only the owner could handle all issues. However, the company is growing year after year; there are complexities that the manager cannot solve it by himself alone. Therefore, the organisation structure should be modified.

In addition, there are 5 apartment buildings owned by the company, but each of the buildings is in the middle market; not the global market. Therefore, the functional organisation structure is chosen for each apartment situation.

However, in the company's point of view; they have to manage 5 apartment buildings which are complicated to get in detail of each building. Therefore, for the simplest to manage, they need key persons who take responsibility for each building. Then, the divisional organisation structure is selected in the overall management level. The combined of functional and divisional structure make the company more organised and flexible. The organisation structure is shown in Figure V-2.

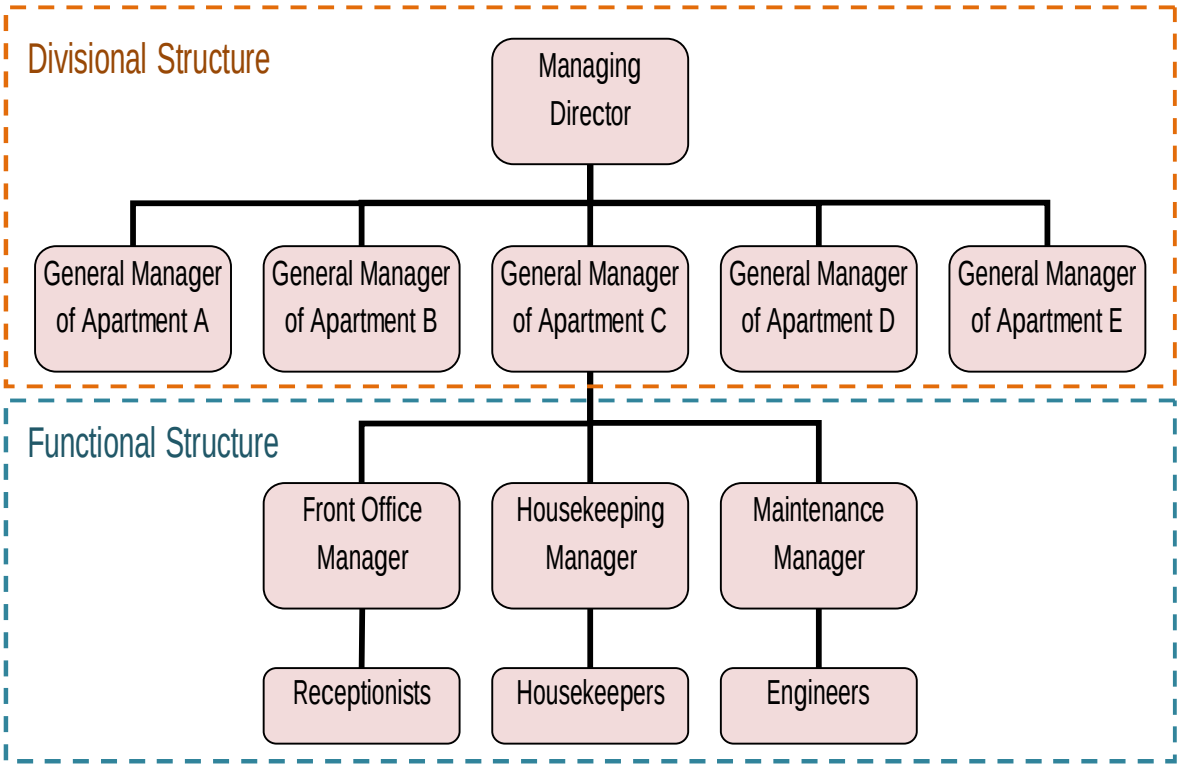


Figure V-2: Organisation Structure

2.2 Vision

To be the serviced apartment chain in mass market of Thailand

2.3 Mission

To provide safe and clean serviced apartment that exceeding living standard with affordable price

2.4 Value

2.4.1 Standardisation: to ensure that services quality are consistent to exceed the customers' expectations

2.4.2 Responsibility: be responsibility with society and customer

2.4.3 Integrity: be honest to running business

2.4.4 People: value employee that are the most crucial driven force of the company

2.4.5 Continuous Improvement: continuous improve service quality, employees, and the organisation

2.5 Policy of the apartment is "R.A.T.C.H.A.D.A."

2.5.1 Responsibility

2.5.2 Ability

2.5.3 Teamwork

2.5.4 Customer

2.5.5 Human

2.5.6 Analysis

2.5.7 Development

2.5.8 Accountability

3. Phase 2: Define Value

The initial implementation scope is housekeeping and front office process which the internal customers are owner and employees; and the external customer is the apartment guest. The internal customers value the efficiency of working process to deliver service to external customer; while the external customer values the quality of service including room cleanliness, public facilities, and pleasure service delivery.

4. Phase 3: Identify Value Stream

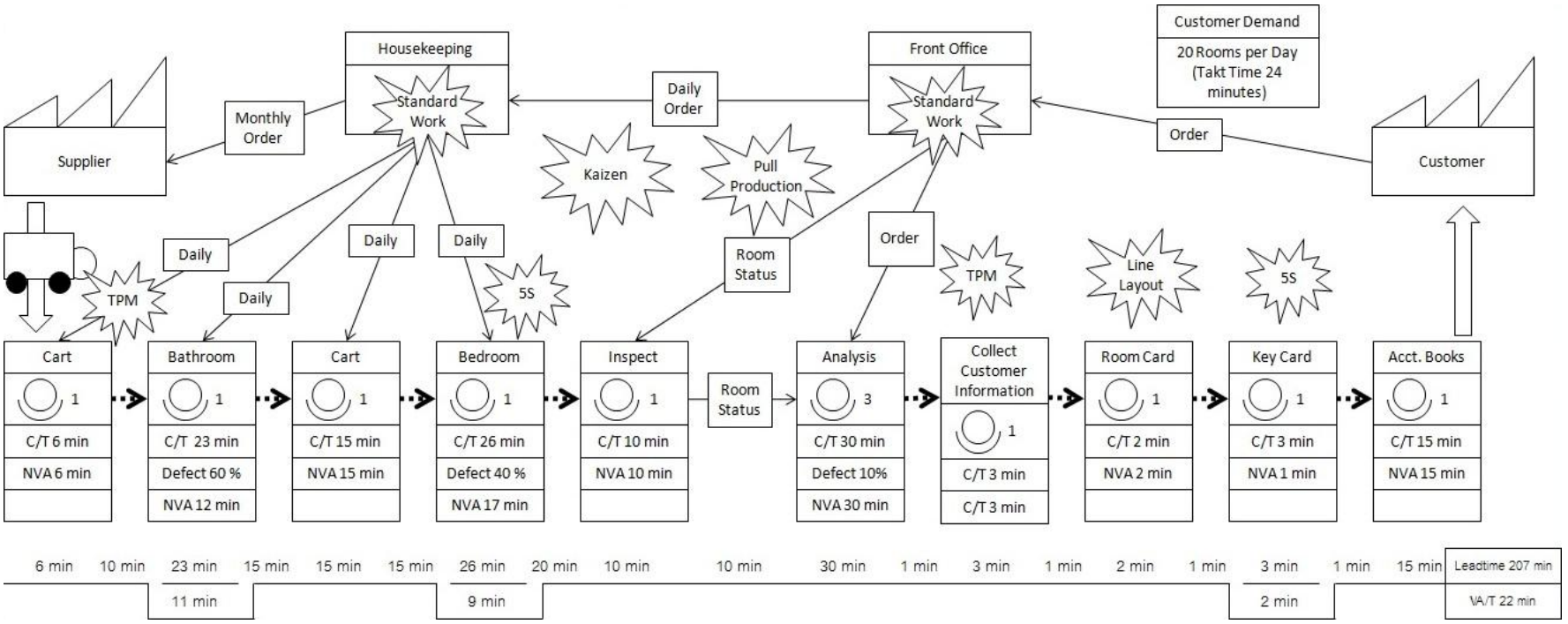


Figure V-3: Value Stream Mapping with Opportunities Reducing Waste

The Value Stream Mapping as shown in Figure V-3 identifies tools and opportunities to eliminate waste in apartment process. The implemented tools are Kaizen, pull production, standard work, TPM, line layout, and 5S.

5. Phase 4: Design Production System

5.1 Lean Apartment Management System

The Lean Apartment Management System is designed for reducing waste and non-value-added activities in apartment process. According to the non-value-added and waste identification tables mentioned in chapter 3, the Lean Apartment Management System is designed to consisting of 4 elements; namely organisation, software, hardware, and people, as shown in Figure V-4.

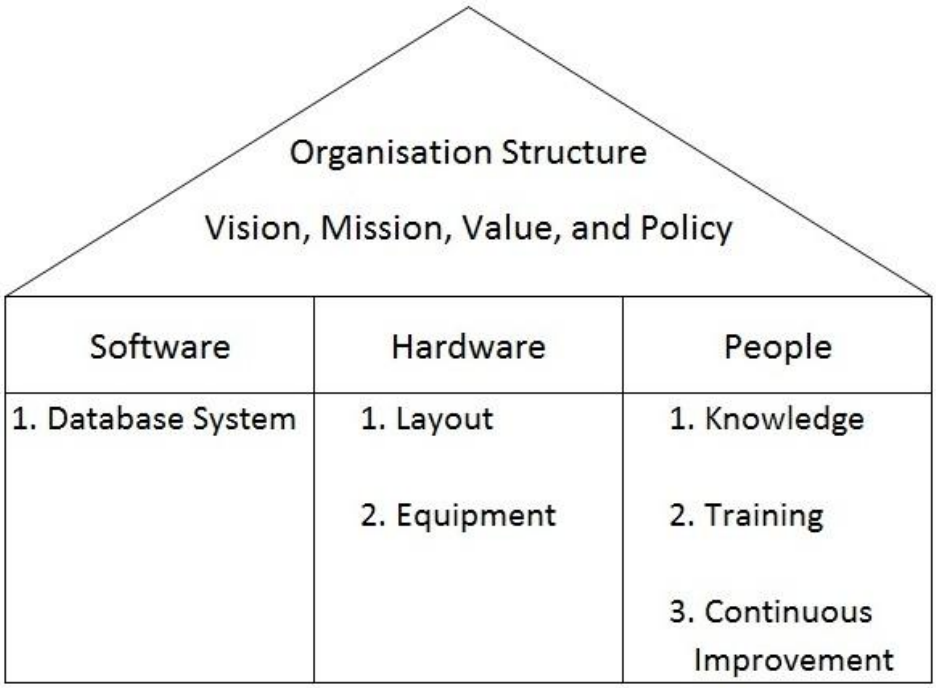


Figure V-4: Lean Apartment Management System

The organisation part was described in phase 1 that what the organisation structure, vision, mission, value, and policy are. Then, the software is a mechanism of pull production in service business that will be described in phase 6. The

hardware including office layout and provided equipment are part of implementation of lean tools which will be described in phase 5.

Employees is one of a key to run business successfully; because, employees is the ones who interact with customer, the ones who use material, and the ones who deliver product and service. Therefore, a company shall realise the important of their employees. After the organisation gains knowledge, they have to train their people to ensure that employees can consistently meet the working standard.

Lastly, the continuous improvement of organisation and employees is required to sustain and achieve the goal. Moreover, to continuously improve, the circle process is seeking for improvement, innovate the new method, acquire knowledge, and back to train the people again. Then, the people who involving in every step of apartment process will be described in phase 5, phase 6, and phase 7.

5.2 Future Stage Value Stream Mapping

The future stage value stream mapping shown in Figure V-5 clarifies that after implement the lean technique, the apartment process should provide only 22 minutes lead time to achieve the 24 minutes takt time.

The database system is implemented to facilitate pull production. Front office can update customer demand in the database system; while housekeeping manager can deliver the clean room information via database system as well.

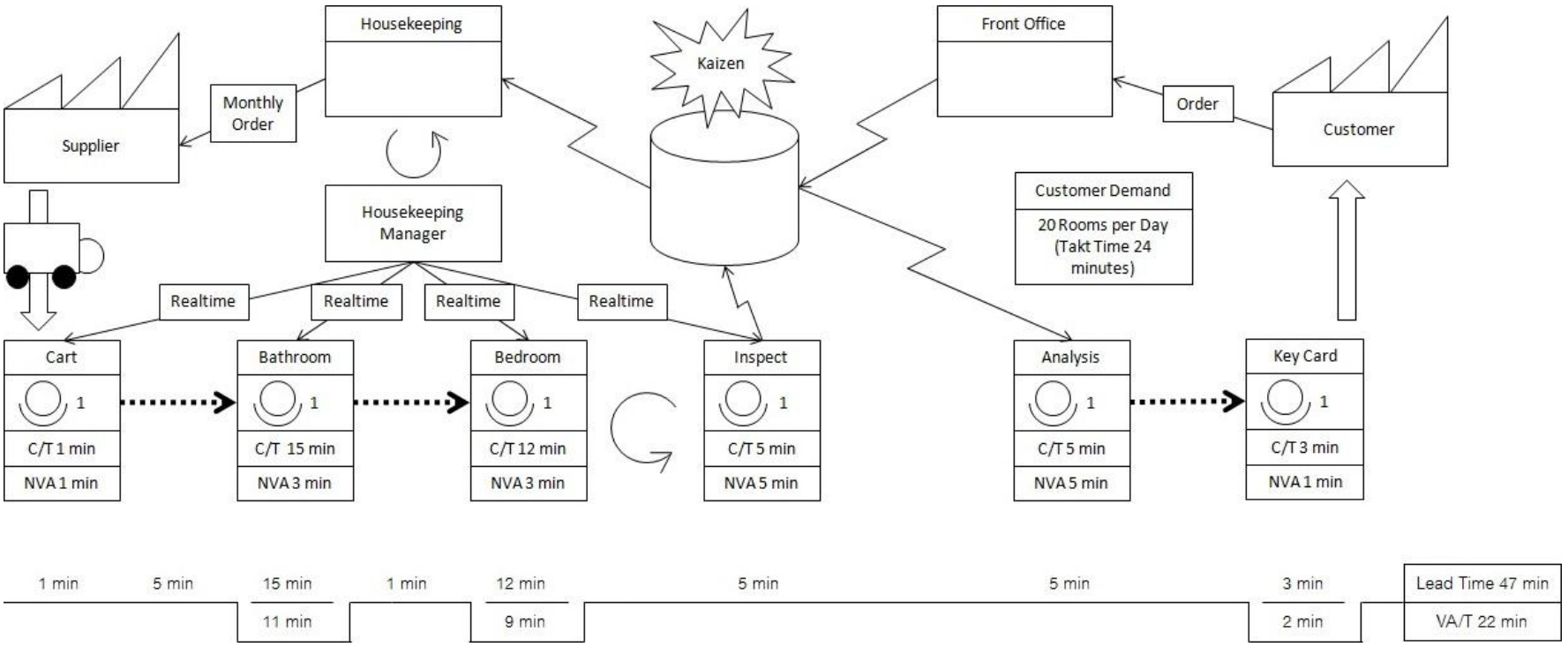


Figure V-5: The Future Stage Value Stream Mapping

6. Phase 5: Implement Flow by Lean Tools

6.1 Line Layout

Many times that wastes in the process are caused by the poor layout; for example, front office layout, and housekeeping inventory location. Therefore, rearranging front office and relocate housekeeping inventory is a must.

According to the benchmarking hotel and resort, their front offices are organised in good order; it clean and well equipped with technology. Their front office counter consists of 5 one-stop-service stations in the hotel and 2 stations in the resort. To adapt appropriately with the apartment situation, only 2 one-stop-service stations are implemented as shown in Figure V-6; and the one-stop-service station is shown in Figure V-7.

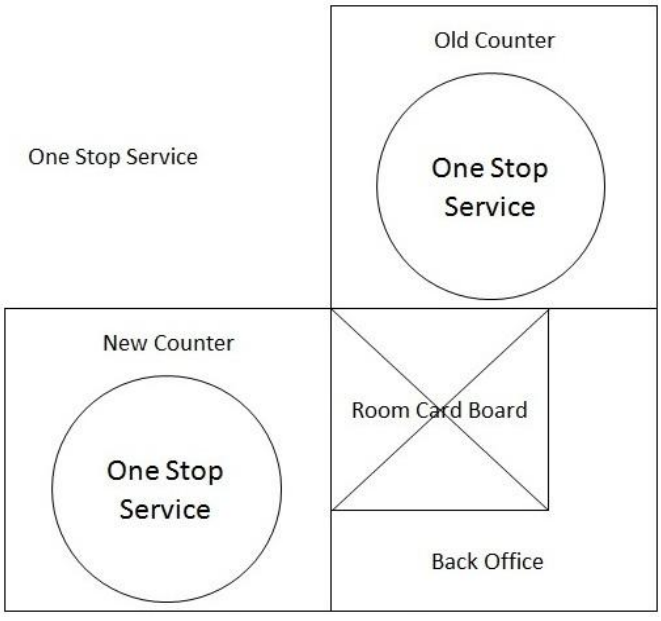


Figure V-6: The New Front Office Layout

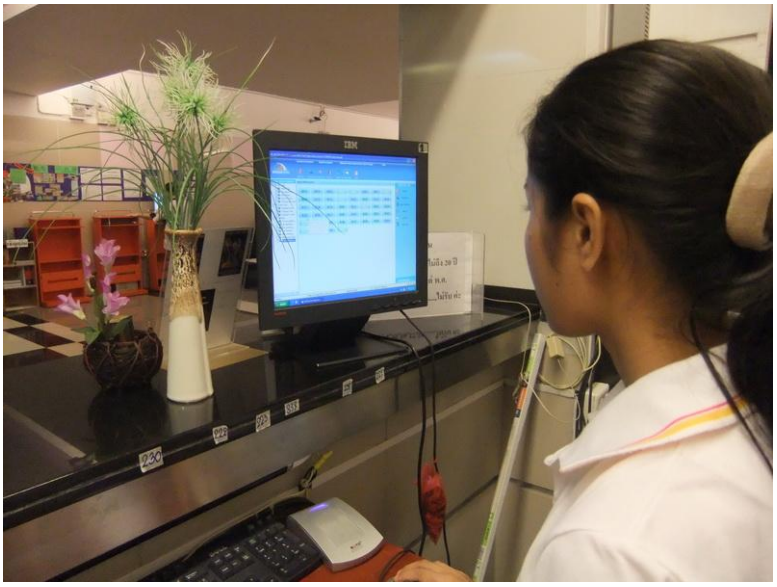


Figure V-7: The One-Stop-Service Station

The front office is rearranged to be the one-stop-service; while housekeeping inventory is relocated to be on the ninth floor at housekeeping office. Moreover, the database system installed in the computers of both one-stop-services is connected through the same network and same system. In addition, the room card board is not necessary anymore since the implemented database system replace the use of the board.

Once all interaction-with-customer processes are bounded in the one-stop-service station, the transportation waste and movement waste are firstly eliminated. Moreover, when the database system is installed and connected the 2 one-stop-service stations as the benchmarking companies did; the 3-accounting book and post-it are no use. Therefore, overproduction, waiting, extra processing, poor communication, unnecessary inventory, and defects wastes are eliminated.

6.2 5S

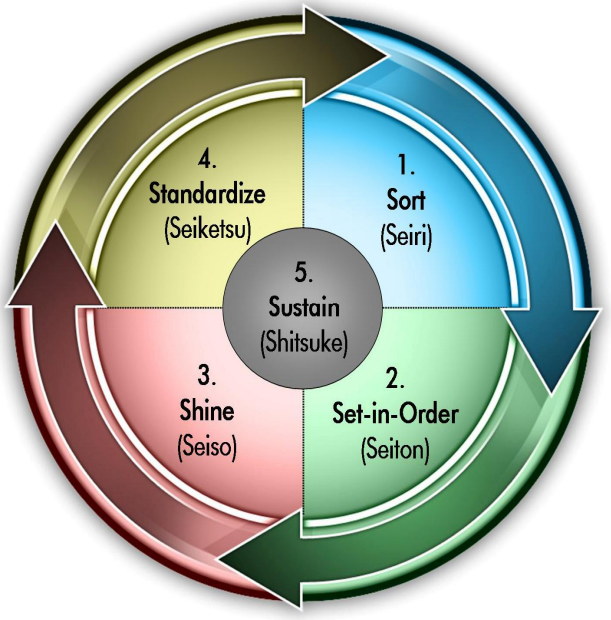


Figure V-8: 5S

Source: http://www.operational-excellence-consulting.com

To organise workplace, the 5S tool as shown in Figure V-8 is adopted. The 5S tool consists of

1. Sort (Seiri): to separate and eliminate the unnecessary stuffs from workplace.
2. Set-in-Order (Seiton): to arrange workplace stuffs and equipment in good order.
3. Shine (Seiso): to clean workplace and maintain the cleanness condition.
4. Standardise (Seiketsu): to set the good workplace standard and train employees how to sustain the good condition all the time.
5. Sustain (Shitsuke): to sustain the good workplace.

The disorder cashier is renovated by installing cash bay into the desk drawer as shown in Figure V-9. Moreover, the apartment also re-organise the front office to be clear and clean as it should be. The post-it paper for communication is removed as show in Figure V-10 and Figure V-11. Besides, the back office is reorganised as shown in Figure V-12.

Figure V-9: New Cashier

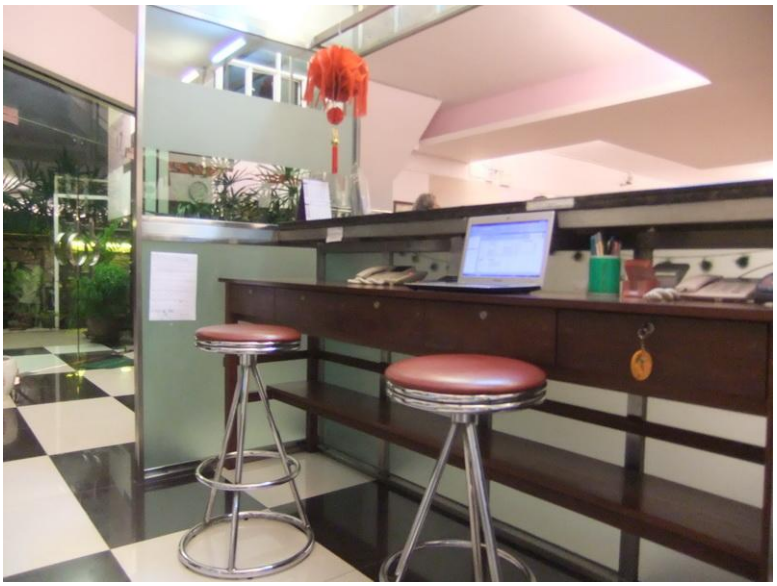


Figure V-10: The Cleaned New Counter

Figure V-11: The Cleaned Old Counter

Figure V-12: The Clean Back Office

6.3 TPM: Total Productive Maintenance

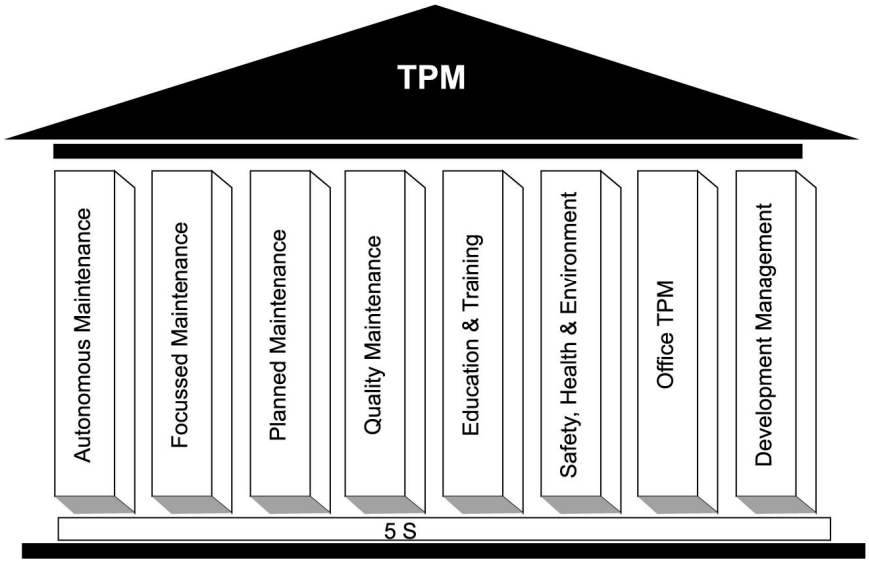


Figure V-13: TPM

Source: http://www.emeraldinsight.com

In fact, the idea of TPM as shown in Figure V-13 is purely in manufacturing field; however, it can be adopted in the apartment process to provide suitable equipment for employees.

6.3.1 Carts

The non-value-added activities in apartment process are the resultant of non functioned equipment. For example, there are housekeeping carts provided; however, the carts are not well equipped resulting in extra process, transportation, and unnecessary movement waste. Moreover, the front office does not be facilitated with well equipment also; therefore, there are wastes in front office process as well.

For the housekeeping, the existing housekeeping carts are modifying by equipping linen bag, trash bag, and tray, as shown in Figure V-14. Moreover, new mops with mob bucket and wringer are provided as well.

Figure V-14: Modified Housekeeping Cart

In addition, the cleaning carts for public area are implemented as major equipment in the cleaning process including hallway, lobby, and swimming pool area. The cart is shown in Figure V-15 and Figure V-16. With these 2 cleaning carts, public area housekeepers can carry all cleaning equipment conveniently. The cleaning equipment consists of a big trash bag, mop, bucket and wringer, broom, dust mop, cleaning supplies, and solutions.

Figure V-15: Cleaning Cart I

Figure V-16: Cleaning Cart II

6.3.2 Computer and Printer

There are 2 one-stop-services located in new counter and old counter. Both of them have to be equipped with computer installed the database system, a printer, a scanner, a key card activation module, a telephone, a credit card reader, and a cashier.

6.4 Standardize Working Activities

From benchmarking hotel and resort, their processes would be adapted to suit appropriately with the apartment situation. There are many ways to gain knowledge; however, the apartment starts with benchmarking with the high end hotel and resort. In the future, the apartment would develop and improve their knowledge to be standard work.

6.4.1 Front Office

The database system and one-stop service simplify and increase efficiency of the front office routine jobs including reservation process, check-in process, in-house process, and check-out process. The front office can easily reserve rooms when customer phone in, clock time when customers check-in and check-out, and be notified the status of rooms real time.

6.4.1.1 Reservation Process

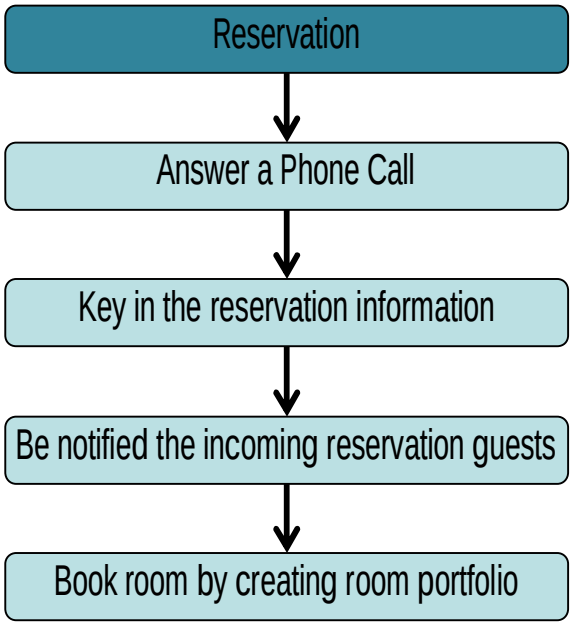


Figure V-17: Reservation Process

The reservation process is shown in Figure V-17, starting with a customer makes a phone call to reserve rooms. The front office would ask for general information to key in the database system as shown in Figure V-18, such as customer name, numbers of guests, numbers of reserved rooms, expected check-in date and time, and expected check-out date and time.

Then, the system will notify front office one day in advanced before the expected check-in date; the front office will book rooms in the system by creating the room portfolio for the reservation.

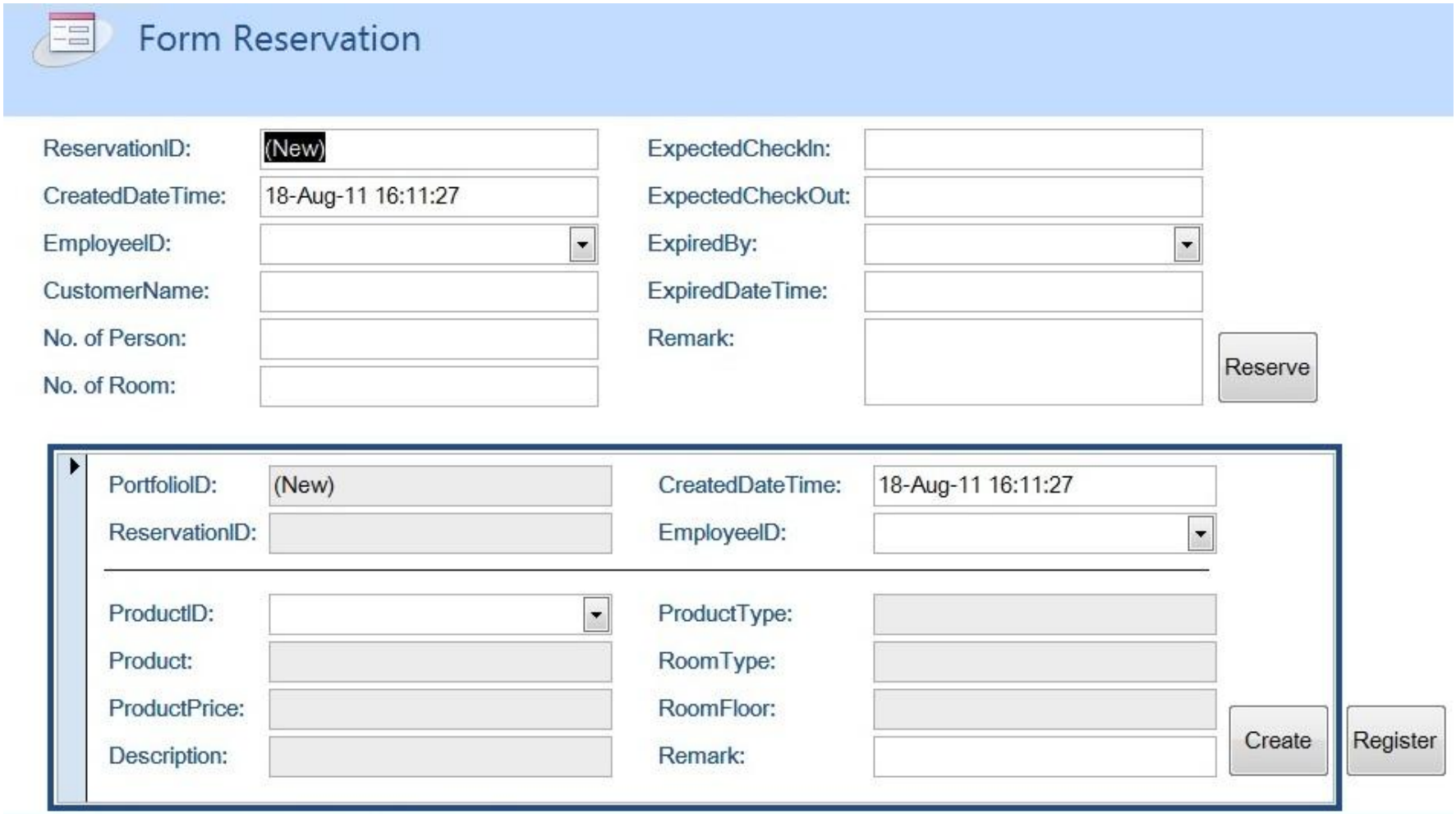


Figure V-18: Reservation

6.4.1.2 Check-In Process

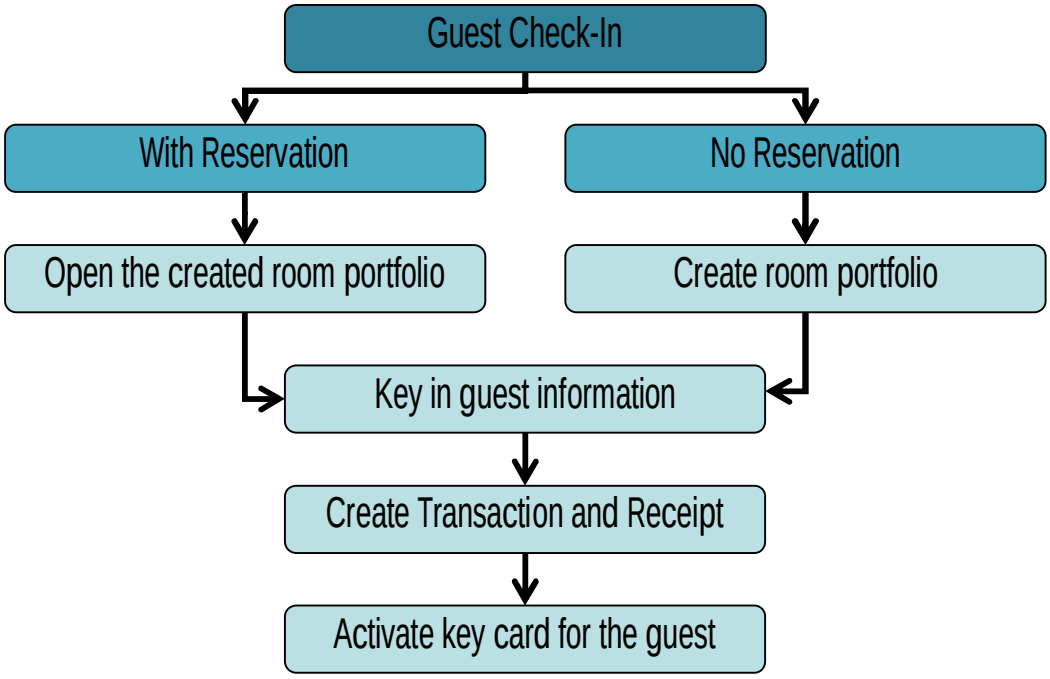


Figure V-19: Check-In Process

When a guest checks in, front office would ask for the reservation information. If the guest has made the reservation, the front office will open the created room portfolio related to the reservation. If the guest has not, the front office would create the new room portfolio.

After that, front office would request the guest's national identification card or passport. Using the information in the card, the front office would key in the guest information, check-in date and time, and transaction and receipt detail. The guest information includes name, surname, nationality, national identification card number, address, mobile phone, and car registration. Figure V-20 shows check-in interface of the database system.

And finally, the front office would activate a key card of the check-in room for the guest; and guide the guest how to get to the room. The overall check-in process explained above is shown in Figure V-19.

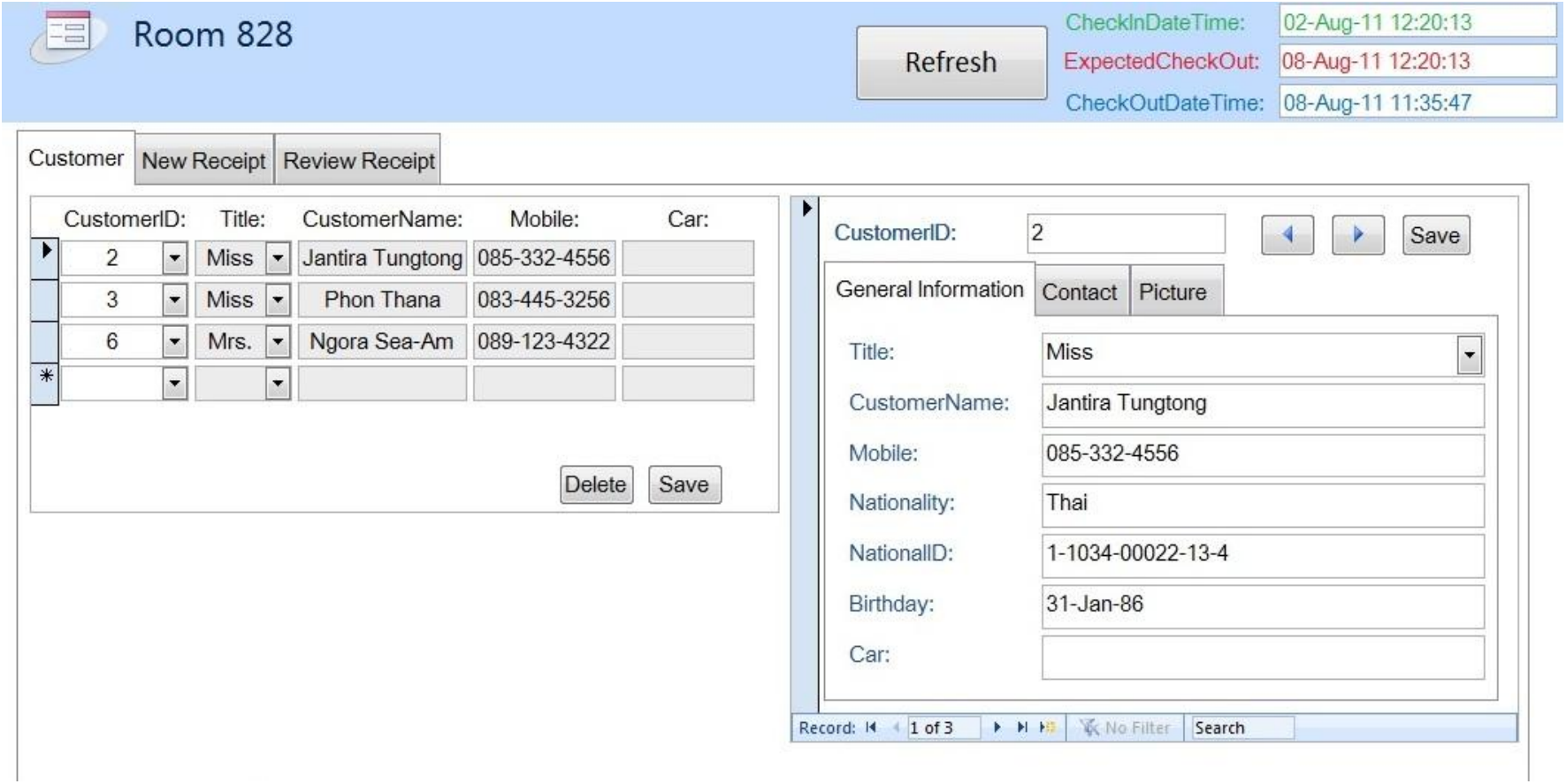


Figure V-20: Check-In Guest

6.4.1.3 In-House Process

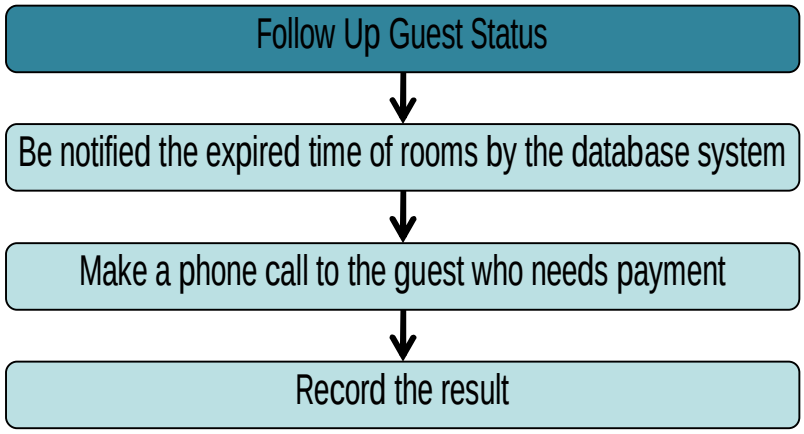


Figure V-21 Follow Up Guest Status Process

The major difference between the apartment and the benchmarking hotel and resort is check-in time and check-out time policy. For the hotel and resort, the check-in time is 2.00 pm and check-out time is 12.00 pm; whereas the check-out time of the apartment is 24 hours after the check-in time. Moreover, the guests' behaviour is likely to extend their stay frequently.

Therefore, most difficulty of front office task is to follow up room status all the time. What the front office concerned are the expired time of each in-house guest; and the guests' intention. With the old process, front office has to update the room status list in a piece of paper when time is up. This manual process leads to financial leakage once front office makes a mistake.

With the new process, the front office would be notified by the database system in advanced that at what time which room would need the payment. Therefore, the front office follow up the guest by making a phone call to confirm that the guest would extend their stay or check-out.

The alerting feature of the database system reduces wastes in process such as overproduction, waiting, extra processing, unnecessary movement, and defects. The Figure V-21 show how front office follows up the guests' status.

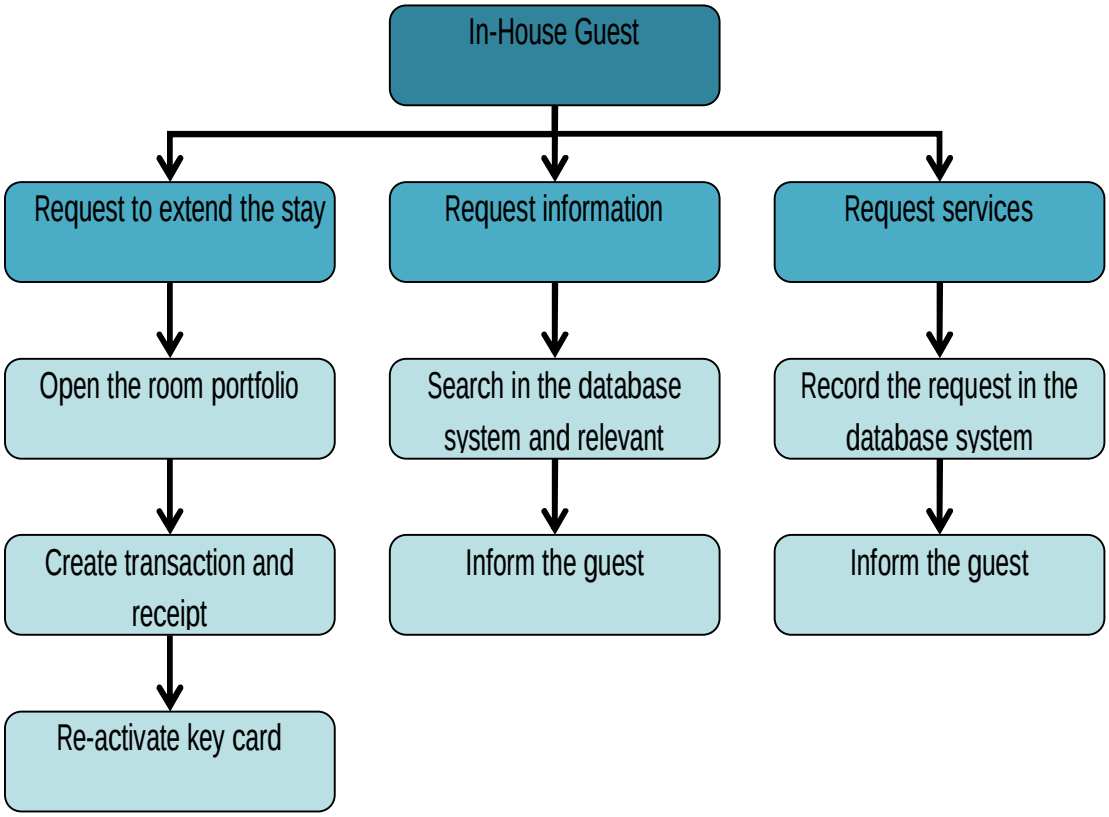


Figure V-22: In-House Process

The process of handling in-house guest is shown in Figure V-22. Normally, there are 3 types of in-house guests' request; request extending their stay; request general information; and request specific services. Firstly, when the in-house guest requests to extend their stay, front office would open the room portfolio in the database system. After that, the transaction and receipt will be created according to the customer request, as shown in Figure V-23. And then, the front office would re-activate the key card for the guest.

Secondly, when a guest requests for general information such as room status or facilities information, front office would search for information in the database system and relevant source if necessary. And thirdly, if a guest requests for services such as maintenance work, front office would record the request in the database system; make an appointment between the guest and involved officers; and inform the result to the guest.

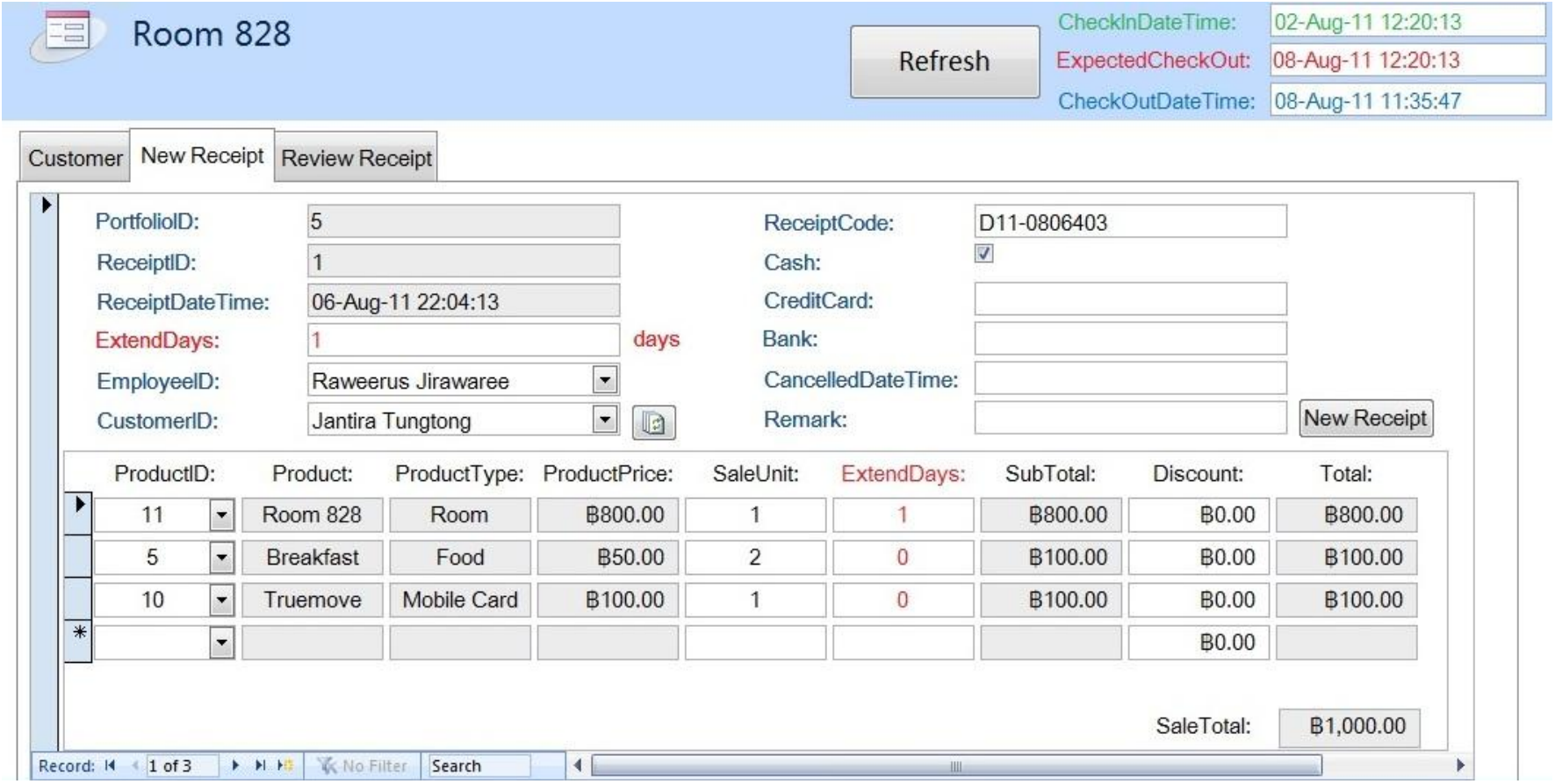


Figure V-23: In-House Transaction

6.4.1.4 Check-Out Process

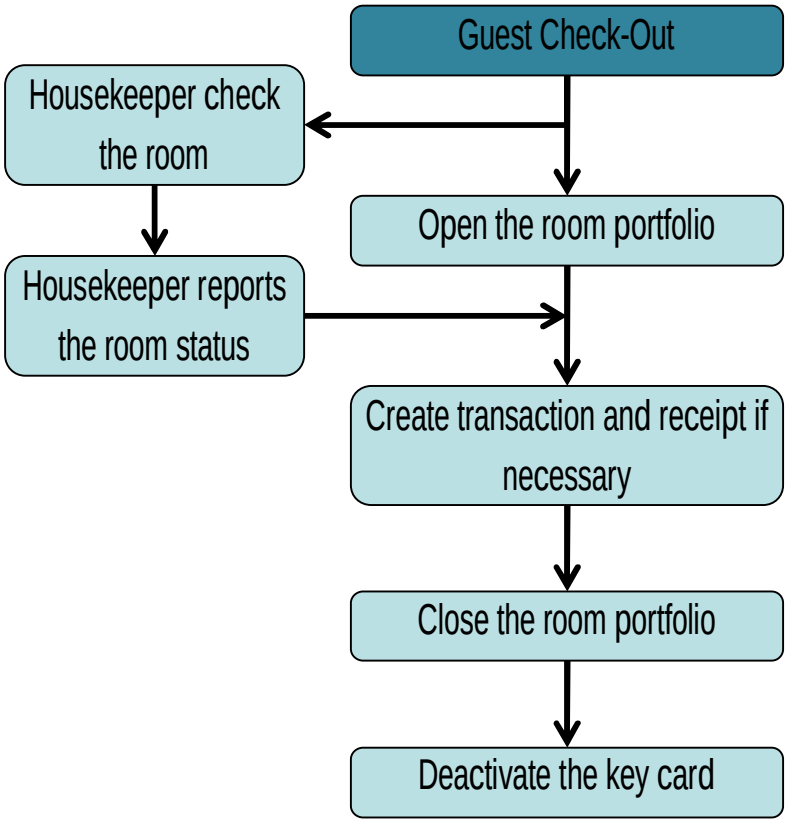


Figure V-24: Check-Out Process

The Figure V-24 shows the check-out process. When a guest check-out the room, front office would assign a housekeeper to check the room that is the additional charge should be applied; for example, the damage charge. Then, the front office would check current balance by using the database system whether the last transaction is required, as shown in Figure V-25. Finally, the front office would close the portfolio and deactivate the key card.

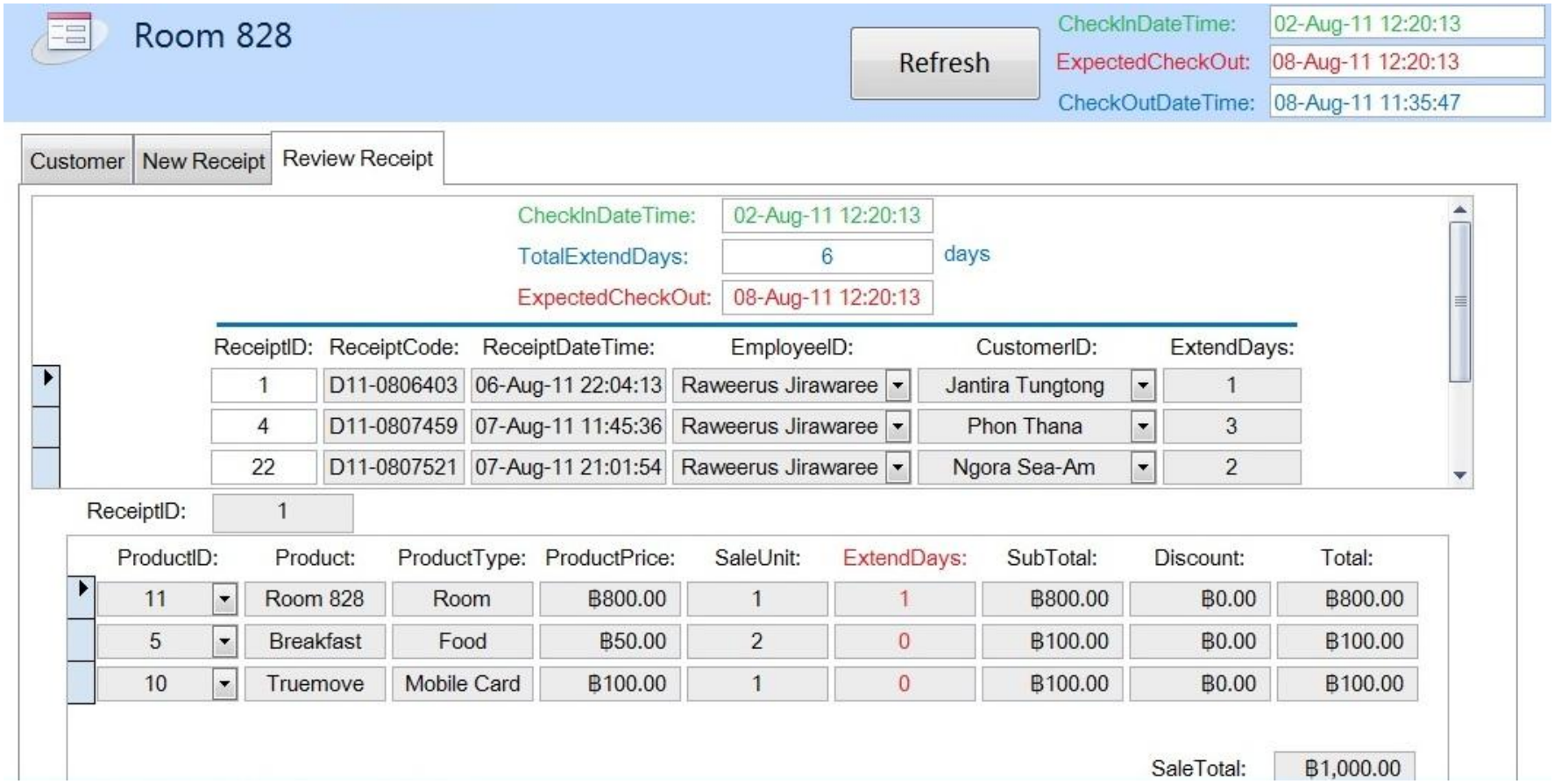


Figure V-25: Review All Transactions

6.4.2 Housekeeping

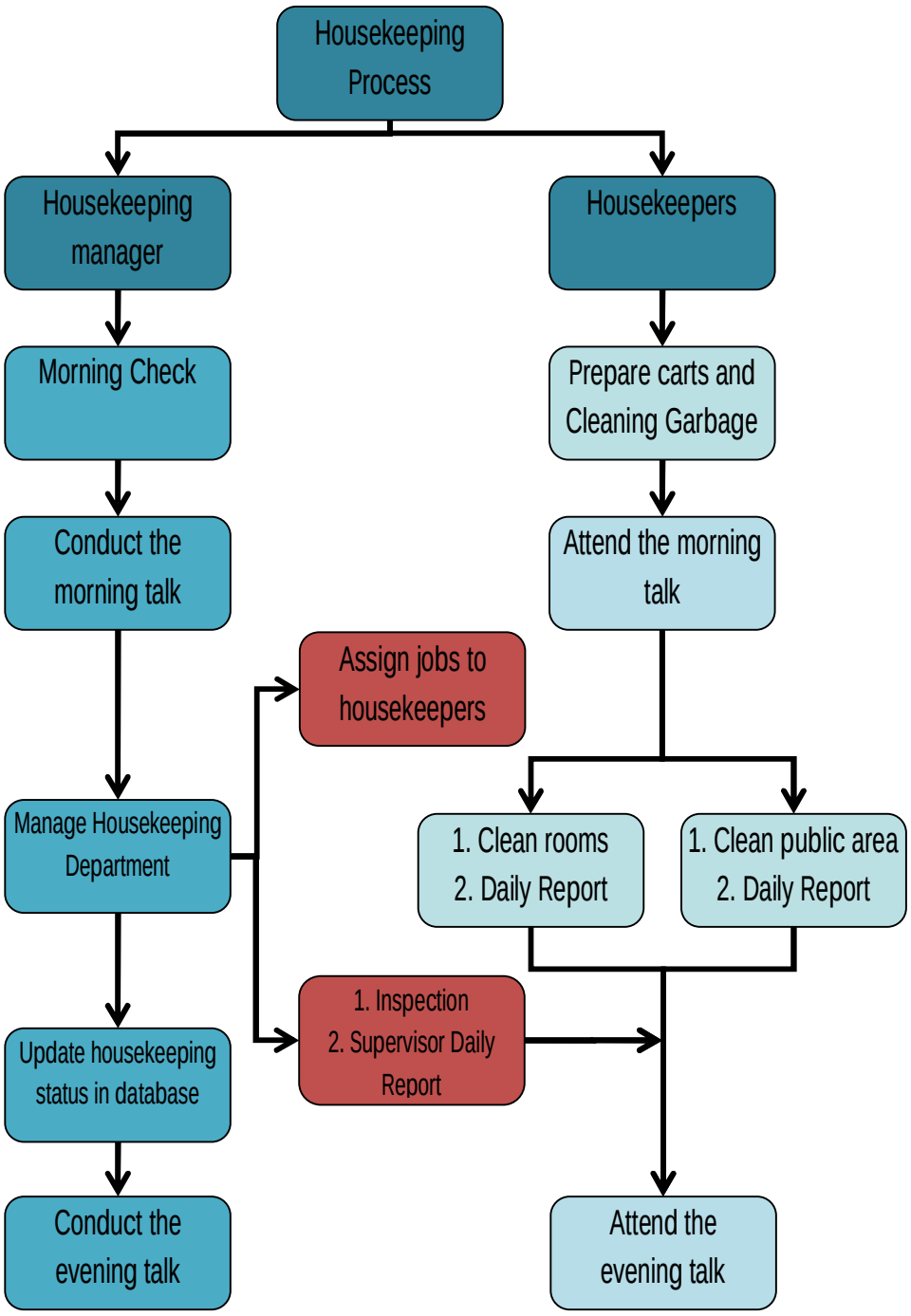


Figure V-26: Housekeeping Process

The housekeeping process has been changed; since there is a housekeeping manager to assign and inspect housekeeping works. Moreover, the manager also smoothens and upgrades housekeeping quality. The overall housekeeping process is shown in Figure V-26.

6.4.2.1 Housekeeping Manager Process

Step 1 Morning Check

Everyday in the morning, housekeeping manager would work 30 minutes earlier than housekeepers in order to run the “morning check”. The morning check is a process that the manager would inspect quality and functionality of apartment rooms and facilities. Moreover, the morning check also includes documentary reports check as well. To run the morning check, the manager would identify housekeeping jobs for that day appropriate with the current situation.

Step 2 Morning Talk

At 8.00 am, the housekeeping manager would conduct the morning talk. All housekeepers have to attend the morning talk in order to be assigned for the daily jobs and follow up the daily events.

Step 3 Manage Housekeeping Department

While housekeepers are working as the assign jobs, the housekeeping manager would inspect their works; assign and advise the appropriate tasks; and record the supervisor daily report. Moreover, the manager would manage inventory, manpower, and room capacity to be balanced with customers.

Step 4 Update Housekeeping Status in Database

Moreover, the manager would update housekeeping status; and transfer vacant clean rooms to front office via the database system once the rooms are qualified.

Step 5 Conduct the evening talk

The housekeeping manage will conclude all work performance of the day; prepare mini training required for housekeepers; and list tasks that have to be done in the night. And then, the manager would conduct the evening talk that all housekeepers have to attend.

6.4.2.2 Rooms

6.4.2.2.1 Preparing Housekeeping Cart

A housekeeper would prepare housekeeping carts before make up rooms as shown in Figure V-27. All bed sheets, blanket, and towels would be placed in a good order as shown in Figure V-28 and Figure V-29.

Figure V-27: Housekeeper Preparing Housekeeping Cart

Figure V-28: Bed Sheets and Blanket

Figure V-29: Pillow Cases and Towels

The housekeeping cart is modified by integrating a black linen bag for keeping dirty sheet. Moreover, it is also integrated yellow trash bag as shown in Figure V-30. Moreover, there are new equipment installed for housekeeping work; such as the blue mop with bucket and wringer, wiper, and amenities tray as shown in Figure V-32. The dust mop as shown in Figure V-31 is also installed as well.

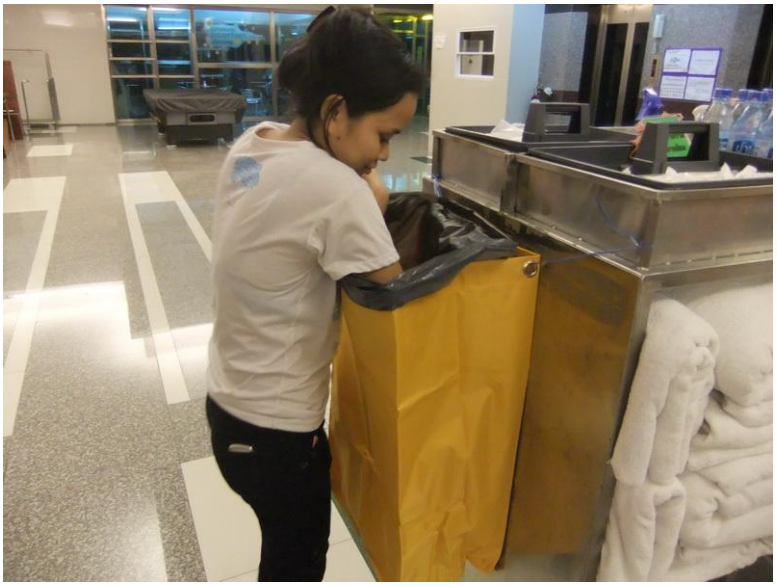


Figure V-30: The Yellow Trash Bag

Figure V-31: Dust Mop

Figure V-32: Amenities Tray

Moreover, there is a white cloth covering the top level of housekeeping cart in order to keep the working station out of guest's sight. The cover sheet is shown in Figure V-33

Figure V-33: Cover Sheet

6.4.2.2.2 Make up room

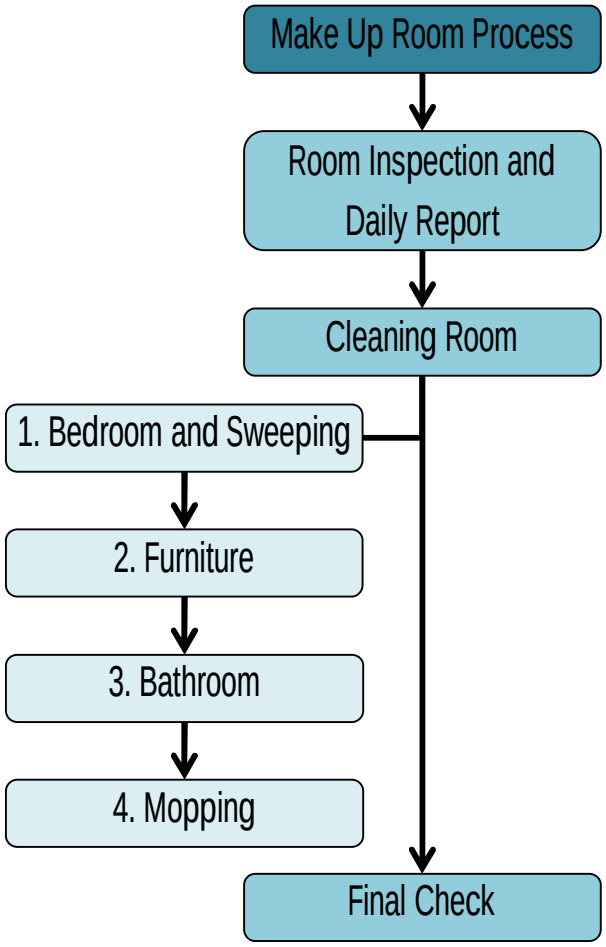


Figure V-34: Make Up Room Process

The make up room process shown in Figure V-34 consists of 3 parts; firstly room inspection and daily report; secondly cleaning room; and thirdly final check. Moreover, there are 4 tasks of cleaning room; bedroom and sweeping; furniture; bathroom; and mopping. The cleaning room layout is shown in Figure V-35.

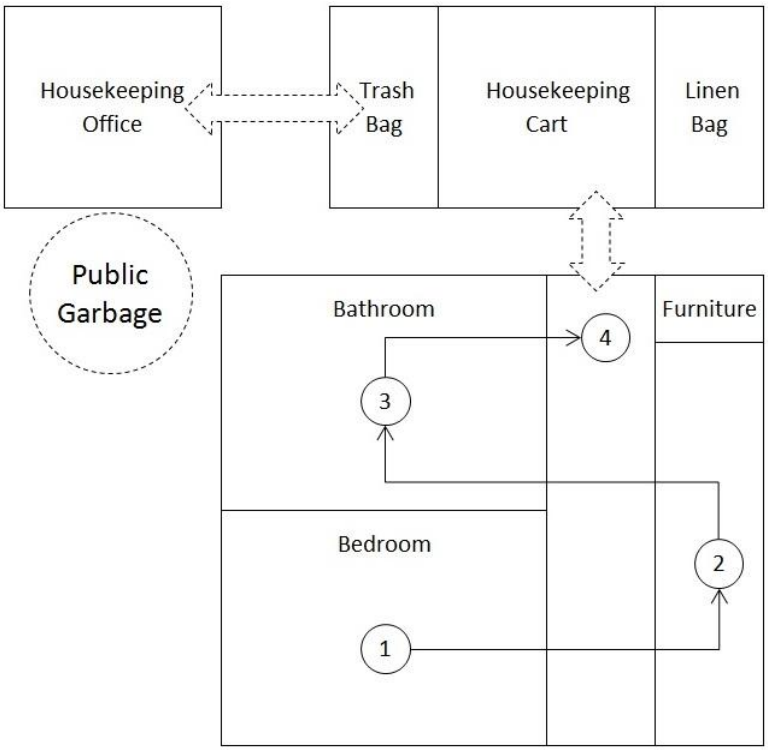


Figure V-35: Cleaning Room Layout

To reduce the transportation waste, the 4 cleaning tasks should require only necessary walk to the housekeeping cart. There is more than 20 times of walking between the room and housekeeping cart in the old procedure; however, for the new procedure only 10 times of walking is required.

Moreover, with the new modified housekeeping cart and new procedure, the walking between cleaning room and housekeeping office or public garbage is rarely. The cart already provides linen bag and trash bag; therefore, the transportation waste can be reduced.

The overall process in Figure V-34 is broken down into 10 steps of cleaning which means 10 times of walking between the room and the housekeeping cart as mentioned.

Step 1 / Walking 1

When a housekeeper opens a vacant dirty room for cleaning, she has to inspect all facilities and electronic equipment in the room that which one is required maintenance work. In addition, the housekeeper may found guest's belonging left in the room; then she would keep it for the guest at back office after finish cleaning.

Once the housekeeper gets into the room, she would walk around the room in one direction; for example clockwise direction. And then, she will do the tasks below at the same time.

- Inspect maintenance works required
- Inspect guest's belongings
- Turn off electronic devices; for example, the turn off refrigerator is shown in Figure V-36
- Rearrange the and furniture to be in the proper position
- Open the window
- Remove bed sheets, blanket, and pillow cases; Figure V-37 shows that the housekeeper is removing bed sheets
- Remember numbers of bed sheets, blanket, and pillow cases required
- Clear all trash in bedroom; for instance, the housekeeper is clearing all trash in Figure V-38
- Clear all trash in bathroom
- Remove towels except floor towel

Figure V-36: Turn off Refrigerator

Figure V-37: Housekeeper Removing Dirty sheets

Figure V-38: Housekeeper Clearing Trash

Figure V-39: Housekeeper Damping Trash into the Trash Bag

Step 2 / Walking 2

After that, the housekeeper would walk to the cart; damp all trash into the trash bag; and put the dirty sheets into the linen bag. Moreover, she would record all required bed sheets and pillow cases into the daily report in materials used section; maintenance works required in maintenance section; and guest's belongings found in logbook section. Then, she would take cleaned bed sheets; blanket; pillow cases; and a broom with the new dust pan to the bed room.

Figure V-39 shows the housekeeper is damping trash into a trash bag; Figure V-40 shows the housekeeper putting dirty sheets into the linen bag; and Figure V-41 shows the housekeeper is taking blanket from the cart.

Figure V-40: Housekeeper Putting Dirty Sheets into Linen Bag

Figure V-41: Housekeeper Taking New Blanket

Step 3 / walking 3

The housekeeper would replace the new bed sheet Figure V-42; and make the bed as shown in Figure V-43. After that the housekeeper would sweep bedroom floor from inside to outside the room as shown in Figure V-44. When she is sweeping, she has to remember numbers of room amenities that has to be replenished.

Figure V-42: Housekeeper Replacing the New Bed Sheet

Figure V-43: Housekeeping Making Bed

Figure V-44: Housekeeper Sweeping Floor

Step 4 / Walking 4

At the housekeeping cart, the housekeeper would damp trash from sweeping into the trash bag. And then she would write down the numbers of room amenities required in the daily report. After that she will take the room amenities as well as wet rag and dry rag to the room, as shown in Figure V-45.

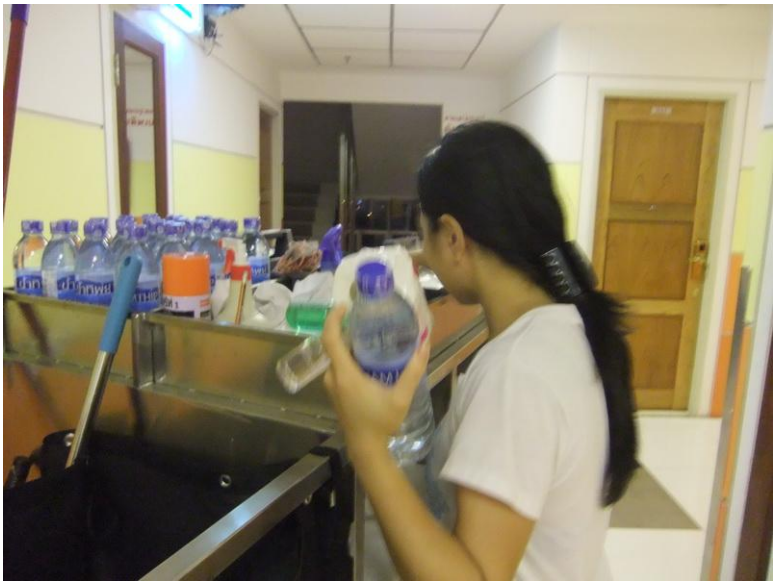


Figure V-45: Housekeeper Taking Room Amenities

Figure V-46: Housekeeper Cleaning Refrigerator

Step 5 / Walking 5

The housekeeper cleans furniture with wet rag followed by dry rag immediately, as shown in Figure V-46. After that she will wear plastic bag over a trash; and wrap it fit to the trash as shown in Figure V-47. And then the housekeeper would arrange the room amenities in the black tray.

Figure V-47: Housekeeper Wearing Plastic Bag over a Trash

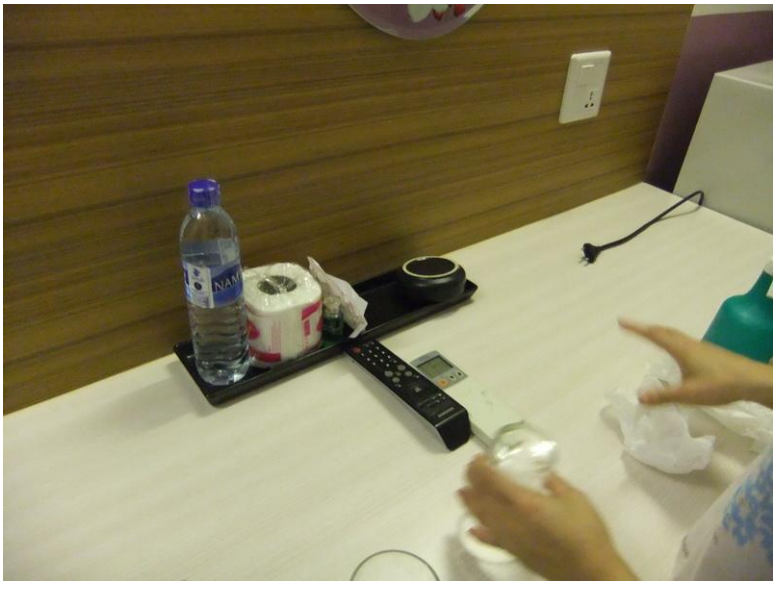


Figure V-48: Housekeeper Arranging Room Amenities

Step 6 / Walking 6

The housekeeper walks back to the cart; and take cleaning equipment and solution and a dry rag for bathroom. Moreover, she would take the wet rag used in bedroom, a mop, and its bucket to wash in the bathroom before start cleaning. Cleaning a mop and filling water in it bucket is for mopping the room; whereas washing the wet rag is for using in the next room.

Step 7 / Walking 7

The housekeeper would place the old floor towels in front of the bathroom before cleaning as shown in Figure V-49. The process of using cleaning solution is the same except the solution containers are changed to be smaller. Moreover a small hole is made on the bottle caps in order to pour the solution little by little.

In addition, there are 2 steps added; first is to wipe bathroom; and second is to dry bathroom with the dry rag. Example of wipe the bathroom and dry the bathroom is shown in Figure V-50 and Figure V-51, respectively. Moreover, the housekeeper has to dry bathroom floor as shown in Figure V-52.

Figure V-49: The Floor Towel

Figure V-50: Housekeeper Wiping the Bathroom Wall

While the housekeeper is cleaning the bathroom, she has to remember the numbers of towels required to replenish after finish cleaning.

Figure V-51: Housekeeper Drying the Bathroom Wall

Figure V-52: Housekeeper Drying Bathroom Floor

Figure V-53: Housekeeper Placing Towels

Step 8 / Walk 8

The housekeeper would keep the cleaning supplies and solutions at the housekeeping cart. Then she will record the numbers of towels required in the daily report; take the towels; and walk back to place them in the bathroom, as shown in Figure V-53.

Step 9 / Walk 9

The housekeeper would wring the mop with the wringer as shown in Figure V-54; then, she would mop the room floor as shown in Figure V-55.

Figure V-54: Housekeeper Wringing the Mop

Figure V-55: Housekeeper Mopping the Floor

Step 10 / Walk 10

Then, the housekeeper would finish the floor cleaning by using the dust mop in order to collect small dust; as well as she will inspect the completion of the room for the last time. Using the dust mop is shown in Figure V-56.

Figure V-56: Housekeeper Using Dust Mop

And finally, the housekeeper would place the new floor towel in front of the bathroom door as shown in Figure V-57.

Figure V-57: The New Floor Towel

Moreover, at the end of the day, housekeeper should check their housekeeping cart and refill the cleaning supplies and solution ready to be used on the next day.

6.4.2.3 Public Area

6.4.2.3.1 Public Garbage

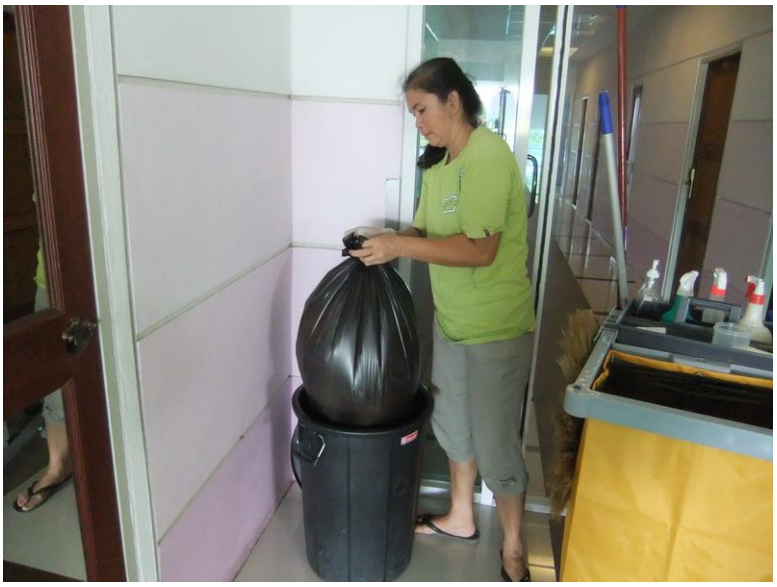


Figure V-58: Housekeeper Changing Public Garbage

The apartment has installed 2 set of public garbage bins in order to wash the bin daily. At 7.30 am, before the morning talk, public housekeepers would replace the dirty garbage bins on floors by the clean ones. And they will wash the dirty garbage bins at the garbage area, preparing the clean garbage bins for the next day.

The public garbage is changed easily in the day. The more frequent changing public garbage, the more cleanliness they are. In the Figure V-58, the housekeeper is removing the public garbage.

6.4.2.3.2 Hallway

The housekeeper can easily wash the mop by using bucket and the bucket wringer as shown in Figure V-59. There is no water splash surround the bucket area. Moreover, the water bucket can be moved when the housekeeper is cleaning the hallway as shown in Figure V-60.

Figure V-59: Housekeeping Washing Mop with Bucket

Furthermore, the housekeeper can clean dishes along the hallway easily, as shown in Figure V-61. And the housekeeper also mopping dust on the hallway by using dust mop as shown in Figure V-62.

Figure V-60: Housekeeper Mopping Hallway

Figure V-61: Housekeeper Clearing Dish

After housekeepers finish sweeping and mopping floors, there is no need to sweep and mop again; but they have to mop dust on the floor in the afternoon instead unless the floor is really dirty.

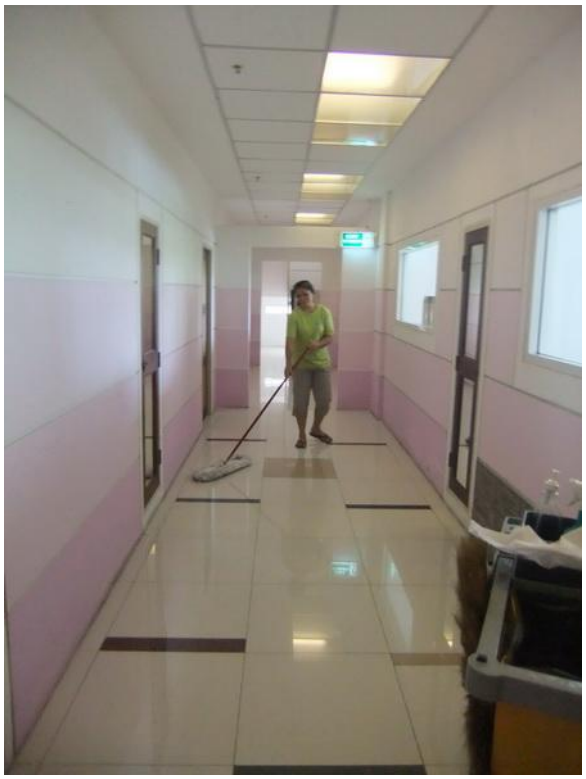


Figure V-62: Housekeeper Dust Mopping

6.4.2.3.3 Lobby

After housekeeper finishes cleaning hallway, she would clean lobby at the first floor. At the lobby, public housekeepers have to sweep and mop the floor, and clean furniture as shown in Figure V-63. Moreover, they have to clean front office and the entrance area of the building, as shown in Figure V-64.

Figure V-63: Housekeeper Cleaning Lobby Area

Figure V-64: Housekeeper Cleaning Entrance Area

6.4.2.3.4 Swimming Pool Area

After the public area housekeeper finished their work in hallway and lobby, they would continue cleaning the swimming pool area as shown in Figure V-65 and Figure V-66.

Figure V-65: Housekeeper Cleaning Swimming Pool Area

Figure V-66: Housekeeper Clearing Beer Bottles around Swimming Pool

Figure V-67: Swimming Pool for Kids

Although the swimming pool for kids is out off serviced, but the water inside received treatment; then the pool as shown in Figure V-67 is better compared with previously look in Figure III-93.

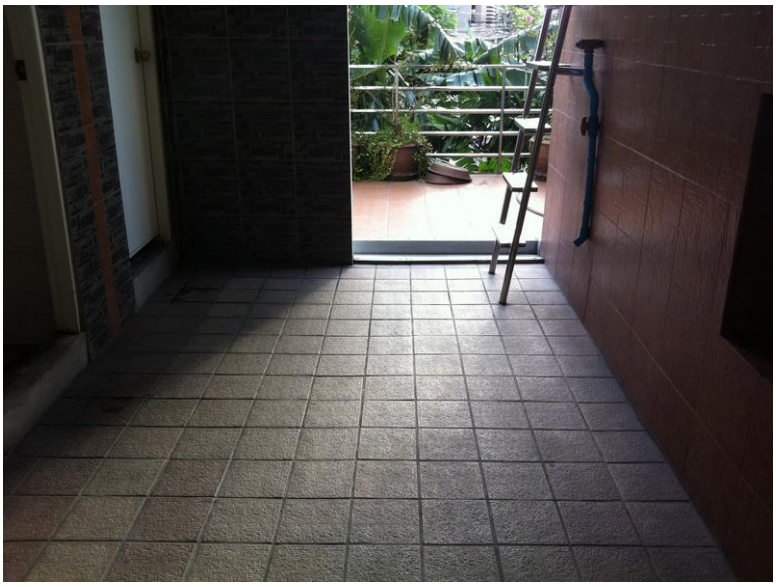


Figure V-68: In front of the Swimming Pool Bathroom

Figure V-69: Table Tennis Table

The swimming pool area is under housekeeping works; the apartment improve the quality of cleanliness by provide housekeepers regularly cleaning the area. The better cleanliness of swimming pool bathroom area is shown in Figure V-68; the table tennis table is fixed and serviceable, as shown in Figure V-69; and a Thai style massage and spa is opened in the swimming pool area, as shown in Figure V-70.

Figure V-70: Thai Style Massage and Spa

7. Phase 6: Implement Total System Pull

7.1 Database System

To lean apartment process, computer software is a remarkable tool useful for eliminating wastes and increasing management performance. The non-value-added activities could be reduced; those activities are, for example, recording each transaction 3 times repeatedly, walking to other station to get transaction done, poor communication among the organisation, wait for searching result, and paper work and inventory.

Moreover, it would increase management performance as well; for example, the software would help to plan room capacity and workforce in balanced way; and the software would block the business transaction leakages.

The database system is computer software that is design for the apartment in the case study. Its features are shown in Table V-1; and the database system structure is shown in Figure V-71.

Table V-1: Database System Features

Front Office	Housekeeping	Others
–Reservation	–Cleaning history	–Room Information
–Room portfolio	–Maintenance History	–Employee Information
–Transaction	–Room Status Control	–Customer Information
–Expired time notification	–Logbook	–Follow Up Board
–Front office Reports	–Housekeeping Reports	–Management Reports

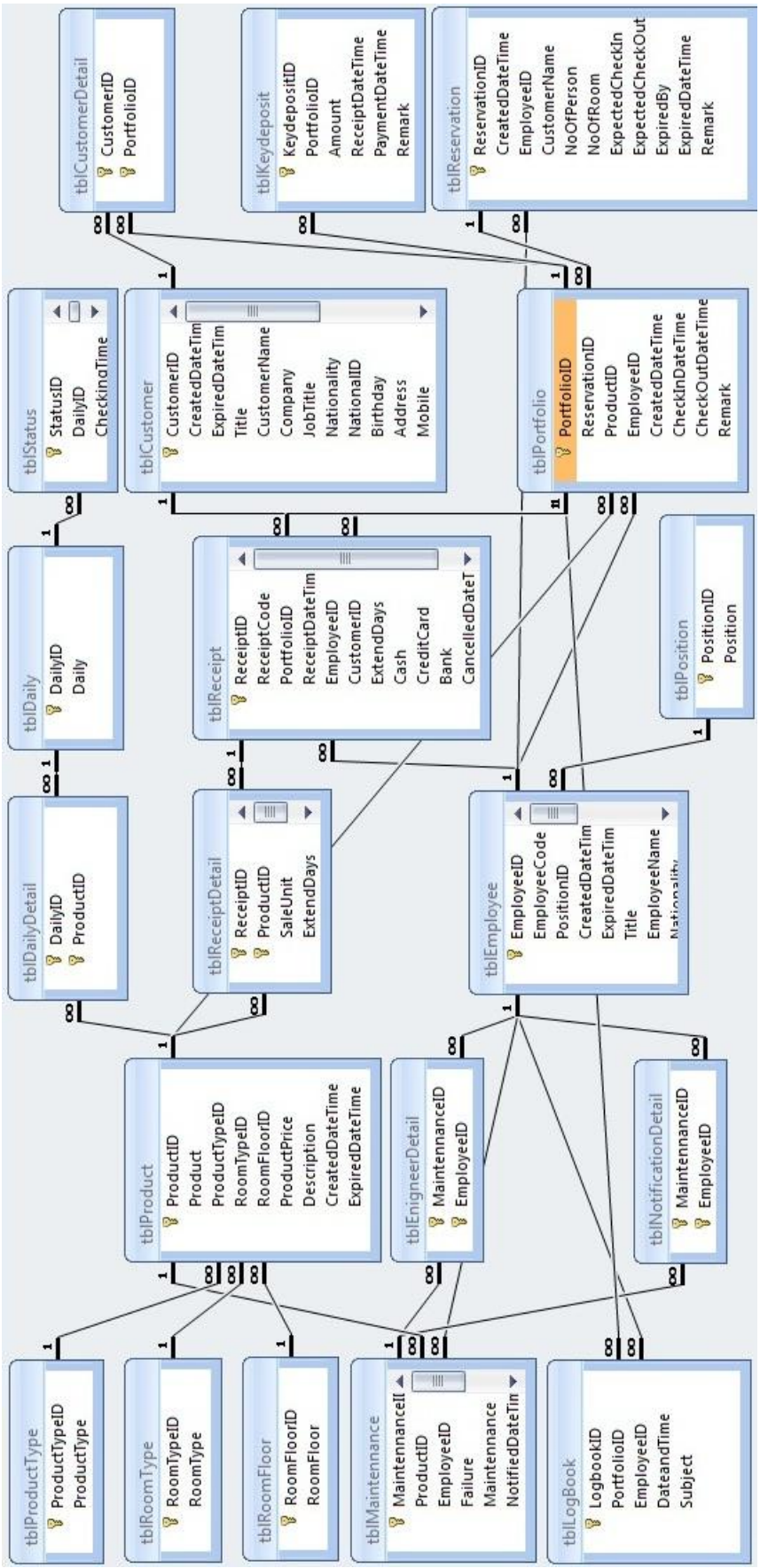


Figure V-71: The Database System Structure

7.2 Information Flow

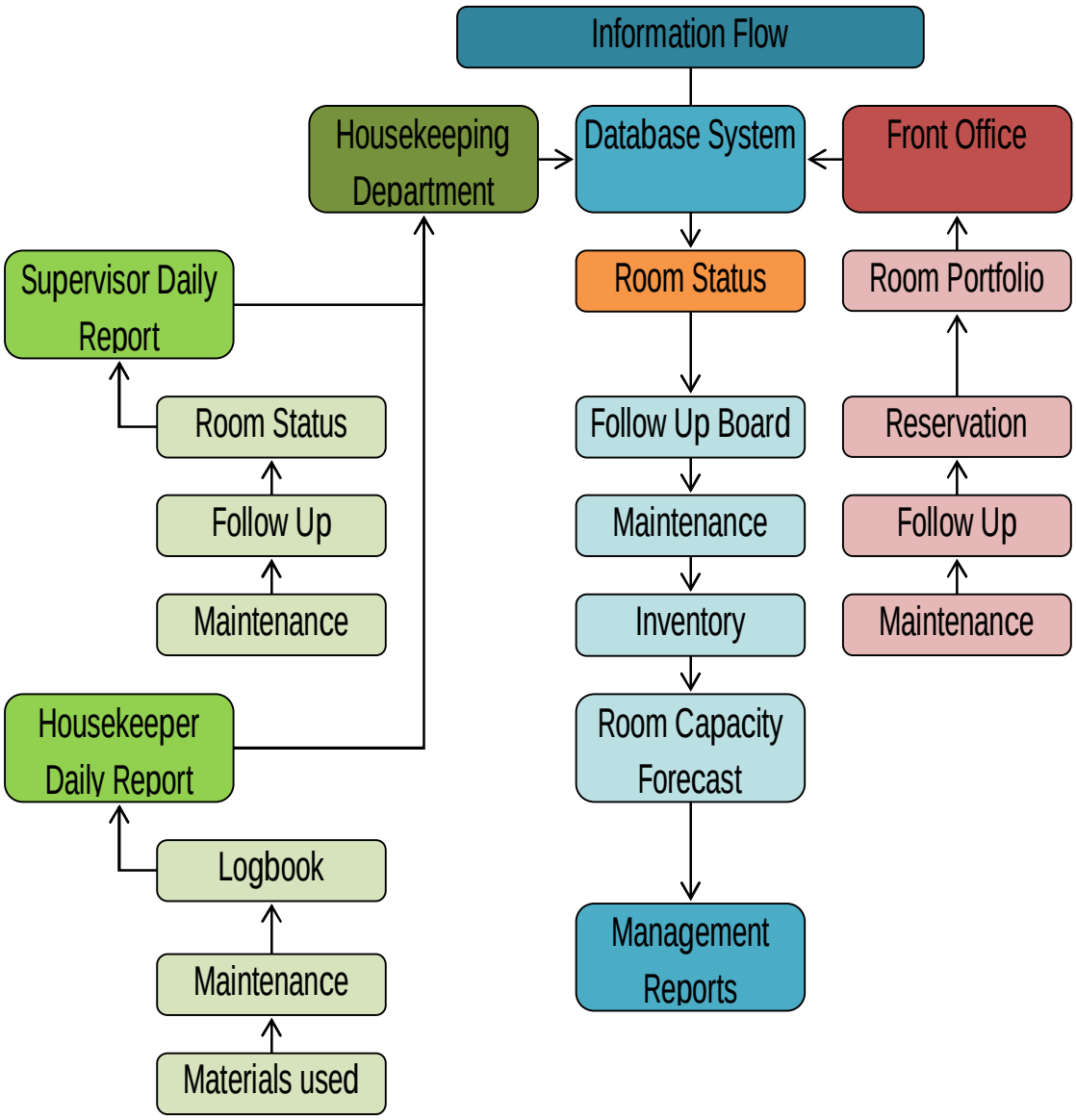


Figure V-72: Information Flow Process

The concept of the database system is mainly to update room status real time since the apartment provide fully 24 hours rental per day. Using the old process, front office faces difficulty of update room status and follows up in-house guest; and this leads to wastes in process.

Using the database system is to reduce those wastes; moreover, its feature would increase management performance in front office and housekeeping department as well. The overall information flow process is shown in Figure V-72.

7.2.1 Front office

As discuss earlier, front office would input reservation information and room portfolio in the database system. Then, the database will analyse the reservation information to be room capacity forecast; and room portfolio information to be room status. Then, the system flow the information to housekeeping department in terms of check-in guests, occupied dirty rooms, vacant dirty rooms, and room capacity forecast.

Moreover, the room status analysed by the database system would alert the front office that which room will be reach the expired time. Therefore, the front office can follow up of guests in advance.

In addition, the guests always interact with front office first; although the issue may be related to housekeeping department or maintenance works. Then, the front office has 2 channels to flow this information; via follow up board and maintenance records.

Furthermore, the issue that front office has to follow up or transfer to housekeeping department; the follow up board would be a better way of the communication instead of post-it paper.

7.2.2 Housekeeping Department

When the room status is updated by room portfolio input by front office, the occupied dirty and vacant dirty rooms are the daily work of housekeeper. And once the housekeepers finished cleaning rooms; and the rooms are approved by housekeeping manager, the manager would update the room status in the system to be

occupied clean and vacant clean. Then, the room status information would flow back to front office again.

In housekeeping department, there are 2 reports involved; the housekeeper daily report and the supervisor daily report. Everyday in the morning, housekeeping manager would assign jobs; including occupied dirty rooms, vacant dirty rooms, and public area works, to housekeepers via housekeeper reports. The housekeeping report consists of 3 sections; logbook, maintenance, and materials used.

While housekeepers are working, they would fill in the report all the time. After that, when the housekeeping manger inspects their work, the manager, would update her supervisor report according to the housekeeper reports.

The housekeeper report would be analysed by the manager. Then the logbook section will be part of follow up board; while the maintenance and materials sections will be input in the system as maintenance records and inventory.

Moreover, there are many works that the housekeeping manager would follow up such as maintenance works to sustain life time of the apartment. Therefore, the housekeeping manage can use the follow up board as channel to transfer and follow up works. Furthermore, the housekeeping manager would assign works and manpower balancing with room capacity forecast and inventory.

7.2.3 Management Reports

In the management level; there are reports analysed from housekeeping information and front office information. Examples of the reports are

- Revenue Report
- Cost Report
- Employee Performance Report

- Customer History
- Maintenance History
- Forecast / Trend Analysis
- Daily and Monthly Report

7.3 Resource Allocation

7.3.1 Housekeeping manager

For a hotel business, including serviced apartment, there are 2 main departments involving delivering the best service to customer; housekeeping department and front office department.

Comparing with manufacturing business, serviced apartment is producing the clean rooms as a product; therefore, housekeeping department is similar to the production department. Therefore, to satisfy customers and maximize production performance, the housekeeping department should be well organised and managed.

There is a new position in housekeeping department, which is housekeeping manager. The responsibility and role of the housekeeping manager are

- To check and inspect quality of rooms and public area
- To check and manage the cleaning supplies stock
- To check and manage linen supplies
- To assign housekeeping job to housekeepers
- To supervise housekeeping work
- To ensure quality standard can be reached and maintained

- To allocate workforce balanced with room capacity
- To control housekeeping cost
- To coordinate with front office department
- To ensure that the great housekeeping service would be delivered

Furthermore, the housekeeping manager would update the housekeeping status in the database system in order to transfer room information to the sale department which is front office department in the apartment business.

7.3.2 Front office Manager

If housekeeping department is the production department, the front office department is the sale department interacting with customer. The two departments have to coordinate to work efficiently all the time; therefore, front office manager is a must.

Front office manager has responsibility and role in

- To manage front office activities
- To manage workforce balanced with room capacity
- To ensure that the great quality service would be delivered
- To manage rooms and service by coordinating with housekeeping department
- To analyse the apartment situation
- To forecast room capacity in specific period
- To supervise receptionists

7.3.3 Housekeeping time

According to the apartment nature, customers can check and check-out 24 hours a day; therefore, the peak time of the day is not between 12.00 pm to 2.00 pm like the benchmarking hotel and resort. The peak time of the apartment is unpredictable depending on customers' behaviour. Majority of customers like to have a night life; therefore, they need a deep rest in the morning. It is not appropriate to clean room early.

The customers are normally checked-in in the late night; and checked-out in the afternoon. Therefore, the real peak time of housekeeping is in the afternoon. The housekeeping manager has to ensure that before housekeepers leave, there are enough numbers of vacant clean rooms to sale for the whole night.

7.3.4 Shift

There are 2 shifts for housekeeper and 4 shifts for front office; only 9 hours per shift are provided. For the housekeepers, the first shift is between 7.30 am to 16.30 pm called morning shift. Housekeepers who work in this shift are public area housekeepers. The afternoon shift is between 13.00 pm to 22.00 pm; and the housekeepers are room housekeepers.

The first half of morning shift is for public area housekeepers cleaning public area; while the second half is for cleaning rooms together with room housekeepers. The room housekeepers would clean rooms for both halves.

For front office, the shifts are between 6.00 am to 15.00 pm; 13.00 pm to 22.00 pm; 17.00 am to 2.00 am; and 21.00 pm to 6.00 am. The shift of front office is more spread than benchmarking hotel and resort because customers' behaviour.

In addition, the housekeeping manager would work between 7.00 am to 16.00 am; whereas the front office manager works between 12.00 am to 21.00 pm to hand over jobs smoothly.

7.3.5 Area of Responsibility

The apartment would adapt area of responsibility from the benchmarking hotel and resort. There are 8 floors of services and one floor for housekeeping department. Each of housekeepers would be assigned to responsible for specific floor. The responsibility is the cleanliness of the floor; including room, facilities, and hallway for the whole working time. However, to clean every floor in the morning is a duty of public area housekeepers.

8. Wastes Elimination

According to Figure V-4, the Table V-2 illustrates that which elements of the Lean Apartment Management System eliminate waste in processes, identified in Table III-4.

Table V-2: Waste Elimination

	Activities	Muda							Mura	Muri	Lean Apartment Management System
		Overproduction	Waiting Time	Transport	Extra Processing	Inventory	Movement	Defects			
1	Decision making		X						X		Organisation
2	Family relationship								X		-
3	Human Resource		X		X			X	X		Policy and Training
4	No training policy		X	X	X		X	X	X		Policy
5	Hire more employee					X			X		Policy
6	10 hr. Per shift									X	Policy
7	Housekeeper performance		X		X			X	X		Training
8	No department manager								X		Organisation

Table V-2: Waste Elimination

	Activities	Muda							Mura	Muri	Lean Apartment Management System
		Overproduction	Waiting Time	Transport	Extra Processing	Inventory	Movement	Defects			
9	Front office layout		X	X	X		X				Layout
10	A mess in front office		X		X		X	X			Layout
11	Housekeeping inventory location			X							Layout
12	Check-in process		X		X						Database system
13	Check-in layout			X	X		X				Layout
14	Check-in form					X					Database system
15	Room card				X	X	X				Database system
16	Scanning national ID card	X			X	X					Database system
17	Desk drawer				X		X				Equipment
18	3 accounting books	X	X	X	X	X	X	X	X	X	Database system
19	In-house process		X		X						Database system
20	In-house layout			X	X		X				Layout
21	Follow up guest				X		X				Database system
22	Check-out process		X		X						Database system
23	Check-out layout			X	X		X				Layout
24	Housekeeping cart structure			X	X		X				Equipment
25	Refill cleaning supplies		X	X	X	X	X				Knowledge and Training
26	Refill room amenities		X	X	X	X	X				Knowledge and Training

Table V-2: Waste Elimination

	Activities	Muda							Mura	Muri	Lean Apartment Management System
		Overproduction	Waiting Time	Transport	Extra Processing	Inventory	Movement	Defects			
27	No stock control					X					Database system
28	No serviced mind							X	X		Knowledge and Training
29	Recheck status	X		X	X		X				Knowledge and Training
30	Repeat cleaning				X		X	X	X		Knowledge and Training
31	Walk between working stations			X	X		X				Knowledge and Training
32	No linen bag and trash bag			X	X		X				Equipment
33	Unpleasant working station							X	X		Knowledge and Training
34	Wet rag (bedroom)				X			X	X		Knowledge and Training
35	Mop				X			X	X		Knowledge and Training
36	Material consumption					X		X	X		Knowledge and Training
37	Misuse of equipment							X	X		Knowledge and Training
38	Cleaning drain							X			Knowledge and Training

Table V-2: Waste Elimination

	Activities	Muda							Mura	Muri	Lean Apartment Management System
		Overproduction	Waiting Time	Transport	Extra Processing	Inventory	Movement	Defects			
39	Cleaning bathroom floor		X	X	X		X	X			Knowledge and Training
40	Wet rag (bathroom)		X		X		X	X	X		Knowledge and Training
41	Area in front of bathroom				X		X	X	X		Knowledge and Training
42	Finished room rejected			X	X		X	X	X		Knowledge and Training
43	Door area			X	X		X	X	X		Knowledge and Training
44	No practical training		X	X	X	X	X	X	X		Policy
45	No quality control							X	X		Policy
46	Garbage			X			X		X		Knowledge and Training
47	Garbage selection				X		X	X	X		Knowledge and Training
48	Carry cleaning equipment by hand			X	X		X			X	Equipment
49	Splash water from mop				X		X	X	X		Equipment
50	Refill water			X			X	X			Equipment
51	No cleaning cart			X	X		X	X	X	X	Equipment
52	Dishes							X	X		Equipment

Table V-2: Waste Elimination

	Activities	Muda							Mura	Muri	Lean Apartment Management System
		Overproduction	Waiting Time	Transport	Extra Processing	Inventory	Movement	Defects			
53	No one assign public area jobs							X	X		Organisation
54	Dirty swimming pool area							X	X		Knowledge and Training
55	Repeated paper work	X		X	X	X	X				Database system
56	Room status checking	X			X		X	X	X		Database system
57	No official assignment to housekeeper							X	X		Policy and Database system
58	Communication via post-it paper				X			X			Database system

9. Phase 7: Strive for Perfection

9.1 Daily Operation Management

9.1.1 The morning talk and evening talk

Housekeeping manager would conduct a mini meeting, the fifteen minutes talk, twice a day. The morning talk is to assign jobs and discuss the specific events of the apartment of that day. And the evening talk is more likely to focus on mini training and conclude all day work. Moreover, the manager would assign new tasks to afternoon housekeepers do in their second half of shift time.

9.1.2 The management meeting

Everyday at 12.30 pm, there is management meeting among general manager, housekeeping manager, and front office manager. The purpose of meeting is to coordinate and discuss the apartment current situation.

9.2 Training

Housekeeping manager and front office manager have the responsibility to train their workforce be skilled in the housekeeping and reception, respectively. The manager shall conduct the appropriate training to ensure that each housekeeper or receptionist is qualified.

9.3 Kaizen

Kaizen is philosophy to gradually continuous improve the people, process, standard, and system. To apply Kaizen, the Plan-Do-Check-Act cycle as shown in Figure V-73 is implemented. All employees in all management level would follow the cycle of plan to improve performance, do as they plan, check what they have done, and act the changes required to improve the plan. And then they would plan to improve the performance again and again in order to strive for perfection.

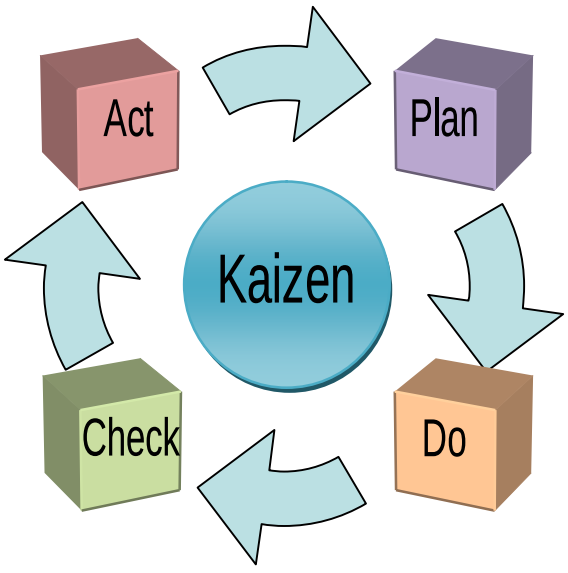


Figure V-73: Kaizen PDCA Cycle

Chapter VI

Result Discussion and Conclusion

1. Lean Apartment Management System

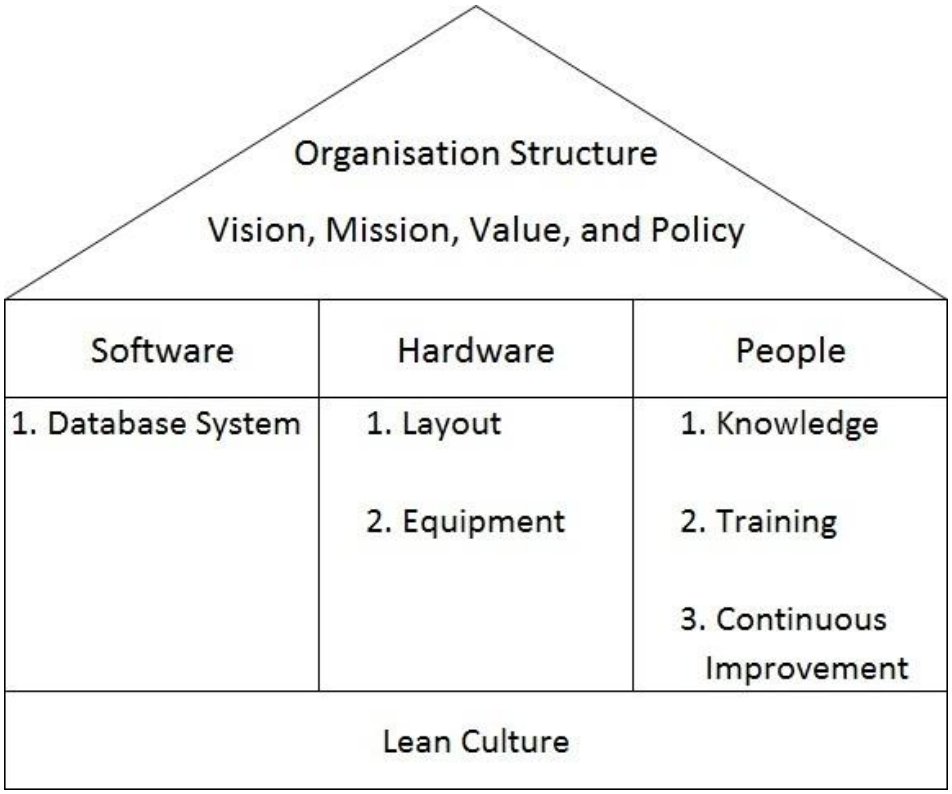


Figure VI-1: Modified Lean Apartment Management System

Lean Apartment Management System developed in the design phase as shown in Figure V-4 has been developed to be the model in Figure VI-1. The Lean Apartment Management System is a tool used to lean apartment management process. This tool consists of 5 elements; namely organisation, software, hardware, people, and Lean Culture.

To lean apartment management process, it shall start at the top management level; the owner of the apartment. Without the coordination of top management level, lean process could not be completed. Therefore, the first element of the Lean Apartment Management System is Organisation; including organisation structure, vision, mission, value, and policy.

Next, the operational levels would get in the lean process. The apartment operations are front office and housekeeping department. Both of them apply another 3 elements of Lean Apartment Management System as a tool to be lean; namely software, hardware, and people.

At this step the majority of wastes in process are eliminated; but the apartment would not sustain lean without the last element, Lean Culture. If the Lean Apartment Management System is a house; organisation is a roof; the three elements of software, hardware, and people, are pillars; and the Lean Culture is the foundation of the house.

If the foundation is not strong, no matter how beautiful the house is, it could be destroyed one day. If the lean organisation would not have Lean Culture, when time goes by, the organisation would not be lean anymore.

2. Sustaining Lean Apartment Management System

All of the tools and techniques described above to implement lean principle in the apartment process is just the beginning of lean journey. But how the organisation can maintain their journey on the road of lean is the crucial issue that have to be considered.

The organisation could sustain Lean Apartment Management System by using Kaizen Philosophy to create the lean culture in the organisation. People in all management level, including owner, managers, and employees, have to seek for opportunities of improvement all the time.

Moreover, the improvement that shall be made should be the result from the coordination among managers and employees. Then the higher standard of quality would be created continuously by deeply considering from operation perception and management perception.

Furthermore, to achieve Kaizen, the organisation has to ensure that their employees have capability to improve. The training course is a proper method to educate employee. After the improvement is set, managers shall conduct training course regarding to the new working standard required to achieving the improvement.

Then, the employees would be well-educated and have skills in their job; they can find the opportunities to improve by themselves. Finally, the Kaizen PDCA Cycle is revolved creating employee perception to being lean; therefore, the lean culture is permanently generated in the organisation.

3. Barriers of Being Lean

3.1 Organisation Culture

When the apartment has been run for years, the organisation culture would be developed with the business. The culture would be a barrier of implementing Lean Apartment Management System. For the apartment, the organisation culture that impedes lean process is that the owner is only one who makes decision. However, to be lean, all people in the organisation from top management level to low operational level are valuable.

3.2 People

The most important and the most difficulty of Lean Apartment Management System are people, including owner, manager, and employee. Because people are the key to run lean process successfully that is why people are important. Moreover, because people are difficult to change their behaviour; it is hard to get people have lean behaviour.

3.3 Time

Being lean is not just happened in one day after the software, hardware, or procedures are implemented; it needs time. Lean process needs time to get along

with the organisation; moreover, the organisation needs time to change their behaviour to be lean.

4. Management Performance

4.1 Waste Reduction

According to Table III-4, from 58 causes, there are 196 wastes in the apartment process; namely Muda, Mura, and Muri. Moreover, the Muda is divided to 7 forms of wastes; overproduction, waiting time, transportation, extra processing, inventory, unnecessary movement, and defects.

The Table V-2 shows that 195 from 196 wastes are eliminated by implementing the Lean Apartment Management System. The elimination not only reduces waste and cost in processes but also improves operation performance and management performance.

4.2 Value Stream Mapping

According to Figure III-109: The Current Stage Value Stream Mapping, there are 4 sub-processes in the value stream mapping to deliver apartment service to end customer.

1. Preparation of housekeeping process: including preparing cart step and transportation to make up room.
2. Housekeeping process: including the cleaning room steps; namely bathroom and bedroom; and refilling cart step.
3. Room inspection: including waiting for inspection, inspection, and update room status.
4. Front office process: including analysis, collect customer information, room card, key card, and accounting books.

Regarding to Figure V-5: The Future Stage Value Stream Mapping, the lean apartment management system can deliver service to customer by performing 4 sub-processes as well

1. Preparation of housekeeping process: including preparing cart step and transportation to make up room.
2. Housekeeping process: including the cleaning room steps; namely bathroom and bedroom.
3. Room inspection
4. Front office process: including analysis and key card.

The time in each sub-process is shown in Table VI-1.

Table VI-1: Time Comparison

Process	Figure III-109	Figure V-5	Percent Reduced
1. Preparation	16 minutes	5 minutes	68.75 %
2. Housekeeping	94 minutes	28 minutes	70.21 %
3. Inspection	40 minutes	5 minutes	87.5 %
4. Front Office	57 minutes	8 minutes	85.96 %
Lead Time	207 minutes	47 minutes	77.29 %
Takt Time	24 minutes	24 minutes	-
Value Added Time	22 minutes	22 minutes	-

The comparison shows that after implementation the Lean Apartment Management System, the time consumption in each sub-process and lead time to deliver service to end customer are dramatically reduced reflecting in waste elimination in apartment processes.

4.3 Housekeeping Time Performance

In the old process, there are 7 housekeepers and 5 receptionists in the apartment. From the housekeepers performance; they use 2.24 hours per room calculated from total time available divided by numbers of finished room. Although, after counting, the cleaning time of check-out room is 49 minutes. Therefore, the housekeepers are wasting time in their work.

After implementing the Lean Apartment Management System, the cleaning time of check-out room is reduced to 28 minutes. Therefore, this is 42.86% reduced time consumption of cleaning a room. Moreover, this is 79.17% increased of housekeeper performance.

In addition, in the old process, two public area housekeepers use 9 hours to finish cleaning hallway and lobby, excluding swimming pool area. Now, two public area housekeepers use less than 5 hours to finish all public work including swimming pool area; therefore, there is 44.44% performance increased.

4.4 Workforce

For the old process, there is 7 housekeepers work 10 hours per day with no day off. With the new capacity of housekeepers; only 4 housekeepers are required for regular day work. The 4 housekeepers consist of one for laundry; one for room housekeeping; and two for public area housekeeping. However, after the public area housekeepers finish their work in the morning; they would be assigned in other housekeeping jobs in the afternoon, such as cleaning rooms or laundry works.

Therefore, the apartment can reduce 3 housekeepers daily. The minimum wage of Bangkok is 215 baht; 3 housekeeper cost 645 bath daily, or 19,350 baht monthly, or 232,200 baht yearly.

Moreover, the apartment can reallocate manpower to be 4 housekeeper work 9 hours per day with 3 days off. This also allows housekeepers have some

holidays. In addition, this allocation increases the apartment flexibility to manage manpower in irregular situation.

4.5 Employee skills

Before implementing the Lean Apartment Management System, housekeepers did not know how to work efficiently with high degree of quality. Moreover, they even do not know what the serious mistakes that shall not do are.

After the system is implemented, there are training activities conducted by the housekeeping manager. Therefore, the housekeepers are starting to learn and be the skilled employees in the near future.

4.6 Hidden cost

To implement the Lean Apartment Management System is to lighten the hidden cost in the first line. The hidden cost is not money wasted in the first stage, but it is a cause of other cost.

For example, the recruitment policy is the hidden cost of the apartment. The apartment aims to hire low salary recruitment. Therefore, the apartment would get the unskilled employee that cannot perform the qualified working standard.

4.7 Information Available

Because of lacking of useful information, the apartment could not be managed efficiently. For example, the apartment does not have employee performance record, raw material consumption, customer history record, reservation record and forecast, revenue and cost analysis, and maintenance history. The lack of information would leads to the difficulty to manage the apartment in short term and to set the apartment direction in long term.

After the Lean Apartment Management System is implemented, the raw data is organised and easy to analyse providing management reports required; while the paper work is reduced by using the system.

4.8 Quality Assurance

Quality assurance at each work station is the key to prevent defect. After the working standard is introduced, housekeeping and front office managers would inspect to ensure that service of each work station is met the standard. Moreover, the training course conducted consistently fulfil employee capability to cross check their performance whether it meets the standard or not. Therefore, they can notice the defects and fix them immediately, before the manager inspect and approve their work.

4.9 Daily Meeting

Since the meeting between housekeeping manager and housekeeper is conducted twice a day: as well as the top management level meeting is conducted daily, all issues and any improvements would be considered, resolved, and implemented in the fast manner. Moreover, the meeting provides opportunities to employees express their ideas to improve the organisation.

5. Owner Satisfaction

The owner has confidence in the system that is a useful management tool for the apartment business. The owner would be relied the system that there are the general manager, housekeeping manager and front office manager in the management team. Moreover, he would not be nervous in financial leakage anymore; as well as he is appreciated the quality of apartment. Therefore, the owner can continue construct the serviced apartment network with confidence.

6. Employee Satisfaction

6.1 Front Office

Front office satisfies the database system that reduces the paper work and possibility of mistakes. They can follow up the customer status promptly; that makes their job easier. Moreover, they can rely on the information in the system; therefore, front office can sale the room with confidence. In addition, the environment of working station is more pleasure.

6.2 Housekeeper

Housekeepers satisfy that they have cleaning carts and equipment in housekeeping work. Moreover, they would not afraid of customer' complain anymore since the housekeeping quality and procedure are set. Moreover, housekeepers have been trained in the housekeeping; therefore, they are empowered to resolve customer issue by themselves.

7. Customer Satisfaction

For measuring the customer satisfaction; check-out guests were asked to complete the questionnaire which is contained the questions about the quality of front office department, housekeeping department, and overall of the apartment.

The questionnaire is separated into 2 phases; before and after implementing the Lean Apartment Management System. There are 52 customers answer the questionnaire before implementing the system; and 47 customers answer questionnaire after the implementation.

7.1 Front office

This part of questionnaire indicates that whether the front office performance can deliver customer expectation and satisfaction through reservation process, check-in process, in-house process, and check-out process.

From the result of the questionnaire, the customer satisfaction in reservation increases 33% while check-in process is increased by 8.3%. Moreover,

customers satisfy extending the stay process 11.4% increased and check-out process 11.4% increased. Overall, customers satisfy front office 27.1% increased.

Although the percent increased of customer satisfaction is changed significantly, the performance of each process is normally increased from higher than average to good.

7.2 Housekeeping

At this part of questionnaire is to measure the quality of housekeeping process including cleanliness of clothes, room, and public area. As a result, customers satisfy the cleanliness of room 36.7% increased; and 32.8% increased for the cleanliness of bedclothes and facilities. The bathroom is satisfied 72.3% increased.

Moreover, the customers satisfy the cleanliness of lobby 17.1% increased; swimming pool area 18.1% increased; hallway 73.2% increased; and the overall of housekeeping department 39.9%

Although the percent increased of customer satisfaction is dramatically changed positively, in fact, the satisfaction level is increased from lower than average to higher than average level. Therefore, there is a gap for further improvement.

7.3 Service Quality

This part of questionnaire reflects the quality of communication among the organisation as well as the service quality of front office and housekeeping.

There are 2 section of the service quality; response guest request, and overall service. The customers satisfy 28.0% increased of front office response to their request; and 35.8% increased for housekeeper response. The customers have satisfied the overall service from front office 12.2% increased; and 39.6% increased from housekeepers.

The service quality, in fact, increases the customer satisfaction from average level to lower than good level. This indicates that the communication quality is increased and the front office and housekeeping services as well.

7.4 Apartment

The last part is to evaluate the overall quality of the apartment. The customers satisfy overall service 18.2% increasingly; 19.3% increased for overall accommodation; 52.3% increased for atmosphere; and the customers satisfy the overall system 29.4%

8. Recommendation and Conclusion

In conclusion, the introducing Lean Apartment Management System has eliminated wastes in processes; and increase management performance. Moreover, the system would increase not only customers' satisfaction but also owner's and employees' as well.

However, the future work of the organisation is that they have to continuously sustain and improve their quality and performance by applying the Kaizen Philosophy and training their employees. Moreover, in the future, they have to integrate the cost and inventory control in the Lean Apartment Management System. Additionally, they have to empower the management reports to establish the organisation strategy catching up the market situation at the specific period.

Table VI-2: Questionnaire Results

		Front Office and Lobby Quality Measures					Housekeeping Quality Measures								Performance of Front Office and Housekeeping Service Quality				Overall Service Quality Measures				Other		
		Reservation	Check-in	Extend the stay	Check-out	Overall front office & lobby	Cleanliness of room	Cleanliness of bedclothes & room facilities	Cleanliness of bathroom	Cleanliness of lobby area	Cleanliness of swimming pool area	Cleanliness of hallway	Overall cleanliness	Overall housekeeping	Response of front officer	Response of housekeeper	Overall service of front office	Overall service of housekeeping	Overall service	Overall accommodation	Overall atmosphere	Overall system (reservation & registration)	Will you return?	Will you recommend to friends?	Gender
Total Count on Degree of Satisfaction																									
BEFORE	1: Poor	16	3	3	0	5	16	16	35	17	18	37	20	36	3	20	3	19	16	17	38	10	**No**	**No**	**Female**
	2: Average	22	15	30	22	26	35	20	16	20	32	13	30	15	29	28	16	31	22	33	12	30	29	31	16
	3: Good	12	30	18	26	20	1	15	1	15	1	2	1	1	20	4	29	1	13	2	1	12	**Yes**	**Yes**	**Male**
	4: Excellent	2	4	1	4	1	0	1	0	0	1	0	1	0	0	0	4	1	1	0	1	0	23	21	36
AFTER	1: Poor	1	1	3	1	2	6	1	8	7	12	7	7	15	4	7	0	6	6	9	12	3	**No**	**No**	**Female**
	2: Average	19	12	11	10	13	24	19	22	23	25	23	20	20	5	23	12	21	20	30	26	14	19	18	15
	3: Good	22	25	21	26	17	12	21	11	13	7	13	17	7	26	13	24	17	20	5	5	27	**Yes**	**Yes**	**Male**
	4: Excellent	5	9	12	10	15	5	6	6	4	3	4	3	5	12	4	11	3	1	3	4	3	28	29	32
Average Degree of Satisfaction																									
BEFORE		2.00	2.67	2.33	2.65	2.33	1.71	2.02	1.35	1.96	1.71	1.33	1.67	1.33	2.33	1.69	2.65	1.69	1.98	1.71	1.33	2.04			
AFTER		2.66	2.89	2.89	2.96	2.96	2.34	2.68	2.32	2.30	2.02	2.30	2.34	2.04	2.98	2.30	2.98	2.36	2.34	2.04	2.02	2.64			
Percent increased		33.0	8.3	24.4	11.4	27.1	36.7	32.8	72.3	17.1	18.1	73.2	39.9	53.9	28.0	35.8	12.2	39.6	18.2	19.3	52.3	29.4			

REFERENCES

Arbos, L.C. Design of a Rapid Response and High Efficiency Service by Lean Production Principles: Methodology and Evaluation of Variability of Performance. International Journal of Production Economics (2002): 169-183.

Bhasin, S. Lean and Performance Measurement. Journal of Manufacturing Technology Management vol. 19 no. 5 (2008): 670-684.

Emiliani, M. L. Lean Behaviors. Journal of Management Decision vol. 36, no. 9 (1998): 615–631.

Hines, P., and Rich, N. The Seven Value Stream Mapping Tools. International Journal of Operations and Production Management vol. 17, no. 1 (1997): 46-64.

Hines, P., Holweg, M., and Rich, N. Learning to Evolve: a Review of Contemporary Lean Thinking. International Journal of Operations and Production Management vol. 24, no. 10 (2004): 994-1011

Jones, C., Medlen, N., Merlo, C., Robertson, M., and Shepherdson, J. The Lean Enterprise. Journal of Business Transformation Technology vol. 17, no. 4 (1999): 15-22.

Mohan, A., and Sharma, S. Lean Approach: Some Insights. Journal of Advances in Management Research vol. 1, no. 1 (2003): 48-55.

Papadopoulou, T.C., and Ozbayrak, M. Leanness: Experiences from the Journey to Date. Journal of Manufacturing Technology Management vol. 16, no. 7 (2005): 784-807.

Piercy, N., and Rich, N. High Quality and Low cost: the Lean Service Centre. European Journal of Marketing vol. 43, no. 11 (2009): 1477-1497.

Piercy, N., and Rich, N. Lean Transformation in the Pure Service Environment: the Case of the Call Service Centre. International Journal of Operations and Production Management vol. 29, no. 1 (2009): 54-76.

Sayer, N. Lean for Dummies. NJ: Wiley, 2007.

Sellitto, M.A., Borchardt, M., and Pereira, G.M. Assessing the Degree of Promptness of a Service Industry to Adopt Lean Thinking. REAd – Special Issue 36 vol. 9, no. 6 (Nov-Dec 2003).

Kippenberger, T. Apply Lean Thinking to a Value Stream to Create a Lean Enterprise. The Antidote vol. 2, no. 5 (1997): 11-14.

Wei, J.C. Theories and Principles of Designing Lean Service Process. IEEE (2009): 821-826.

Interview with Pisuth Nitivitayathep. Director of Rooms. Hotel Management, vol. 17 February 2011.

Massachusetts Institute of Technology. Production Operations Transition-To-Lean Roadmap. available from: http://lean.mit.edu

Operational Excellence Consulting. 5S. available from: http://www.operational-excellence-consulting.com.

Total Productive Maintenance. available from: http://www.emeraldinsight.com.

BIBLIOGRAPHY

Achanga, P., Shehab, E., Roy, R., and Nelder, G. Critical Success Factors for Lean Implementation within SMEs. Journal of Manufacturing Technology Management vol. 17, no. 4 (2006): 460-471.

Allway, M., and Corbett, S. Shifting to Lean Service: Stealing a Page from Manufacturer's Playbooks. Journal of Organization Excellence (2002): 45-54.

Barlow, G.L. Just-In-Time: Implementation within the Hotel Industry-a Case Study. International Journal Production Economics vol. 80 (2002): 155-167.

Barraza, M.F., Smith, T., and Dahlgaard-Park, S.M. Lean-Kaizen Public Service: an Empirical Approach in Spanish Local Governments. The TQM Journal vol. 21, no. 2 (2009): 143-167.

Bell, S. Lean enterprise systems: using IT for continuous Improvement. NY: Wiley-Interscience, 2006.

Ben-Tovim, D.I., Bassham, J.E., Bolch, D., Martin, M.A., Dougherty, M., and Szwarcbord, M. Lean Thinking Across a Hospital: Redesigning Care at the Flinders Medical Centre. Australian Health Review (Feb 2007).

Bowen, D.E., and Youngdahl, W.E. "Lean" service: in Defense of a Production-Line Approach. International Journal of Service Industry Management vol. 9, no. 3 (1998): 207-225.

Boyer, K.K. An Assessment of Managerial Commitment to Lean Production. International Journal of Operations and Production Management vol. 16, no.9 (1996): 48-59.

Buzby, C.M., Gerstenfeld, A., Voss, L.E., and Zeng, A.Z. Using Lean Principles to Streamline the Quotation Process: a Case Study. Industrial Management and Data Systems vol. 9, no.102 (2002): 513-520.

Camp, R.C. Business process benchmarking: finding and implementing best practices. Milwaukee, Wis: ASQC Quality Press, 1995.

Carroll, B.J. Lean Performance ERP Project Management: Implementing the Virtual Lean Enterprise. NY: Auerbach, 2008.

Comm, C.L. A Case Study in Applying Lean Sustainability Concepts to Universities. International Journal of Sustainability in Higher Education vol. 6, no. 2 (2005): 134-146.

Cox, B. Internet marketing in hospitality. Upper Saddle Rive, NJ: Pearson / Prentice Hall, 2004.

Emiliani, M.L. Improving Business School Courses by Applying Lean Principles and Practices. Quality Assurance in Education vol. 12, no. 4 (2004): 175-187.

Gray, W. S. Hotel and motel management and operations. Englewood Cliffs, NJ: Prentice Hall, 1990.

Johansson, H.J., McHugh, P., Pendlebury, A.J., and Wheeler, W.A. Business process reengineering: breakpoint strategies for market dominance. Chichester: Wiley, 1993.

Kennedy, F.A., Widener, S.K. A Control Framework: Insights from Evidence on Lean Accounting. Management Accounting Research vol. 19 (2008): 301-323.

Kollberg, B., and Dahlgaard, J.J. Measuring Lean Initiatives in Health Care Services: Issues and Findings. International Journal of Productivity and Performance Management vol. 56, no. 1 (2007): 7-24.

Lai, P., and Baum, T. Just-In-Time Labour Supply in the Hotel Sector. Employee Relations vol. 27, no. 1 (2005): 86-102.

Lewis, M.A. Lean Production and Sustainable Competitive Advantage. International Journal of Operations and Production Management vol. 20, no. 8 (2000): 959-978.

Maleyeff, J. Exploration of Internal Service Systems Using Lean Principles. Management Decision vol. 44, no. 5 (2006): 674-689.

Mann, D.W. Creating a Lean Culture, Tools to Sustain Lean Conversions. NY: Production Press, 2005.

Marlow, P.B., and Casaca, A.C.P. Measuring Lean Ports Performance. International Journal of Transport Management vol. 1 (2003): 189-202.

Mathaisel, D.F.X., and Comm, C.L. Developing, Implementing, and Transferring Lean Quality Initiatives from the Aerospace Industry to all Industries. Management Service Quality vol. 10, no. 4 (2000): 248-256.

Mollenkopf, D., Stolze, H., Tate, W.L., and Ueltschy, M. Green, Lean, and Global Supply Chains. International Journal of Physical Distribution and Logistics Management vol. 40, no. 1 (2010): 14-41.

Motwani, J. A Business Process Change Framework for Examining Lean Manufacturing: a Case Study. Industrial Management and Data System vol. 5, no. 103 (2003): 339-346.

Nyheim, P.D. Technology strategies for the hospitality industry. Upper Saddle River, NJ: Pearson/Prentice Hall, 2005.

Pauline Leading the Lean Enterprise. IET Manufacturing Management, 40-43. Feb-Mar 2007.

Pedler, M., Abbott, C. Lean and Learning: Action Learning for Service Improvement. Leadership in Health Services vol. 21, no. 2 (2008): 87-98.

Pingnan, R., and Weimao, R. Lean Production Characteristics Analysis Based on Tech-Economic Paradigm. International Conference on Information Management (2009): 294-298.

Pyo, S, ed. Benchmarks in hospitality and tourism. Binghamton, NY: The Haworth Hospitality Press, 2001.

Seddon, J., and O'Donovan, B. Rethinking Lean Service. (2009).

Smeds, R. Managing Change towards Lean Enterprises. International Journal of Operations and Production Management vol. 14, no. 3 (1994): 66-82.

Souza, L.B. Trends and Approaches in Lean Healthcare. Leadership in Health Services vol. 22, no.2 (2009): 121-139.

Sprigg, C.A., Jackso, P.R. Call Centers as Lean Service Environment: Job-Related Strain and the Mediating Role of Work Design. Journal of Occupational Health Psychology vol. 11, no. 2 (2006): 197-212.

Suarez-Barraza, M.F., Ramis-Pujol, J. Implementation of Lean-Kaizen in the Human Resource Service Process. Journal of Manufacturing Technology Management vol. 21, no. 3 (2010): 388-410.

Wilson, M.M.J., Roy, R.N. Enabling Lean Procurement: A Consideration Model for Small- and Medium-Sized Enterprises. Journal of Manufacturing Technology Management vol. 20, no. 6 (2009): 817-833.

Womack, J. Back to Its Roots. IET Manufacturing Engineer, 8-9. Oct-Nov 2006.

Womack, J. Lean Consumption, Lean Provision, and Lean Solutions. IEE Manufacturing Engineer, 5. Oct-Nov 2005.

Womack, J. Measure of Lean. IET Manufacturing Engineer, 6-7. Sep-Oct 2006.

Womack, J. Take the Lead in Lean. IEE Manufacturing Engineer, 3. Apr-May 2005.

Yile, L.U., Xuehang, X., and ZouLei. Lean Maintenance Framework and Its Application in Clutch Maintenance. International Conference on Information Management (2008): 230-232.

กมล รัตนวิระกุล. Why hotels fail? ทำไมโรงแรมจึงล้มเหลว. กรุงเทพฯ : อดวานซ์ ฮอสปิตาลิตี้ คอนซัลแตนท์, 2551.

ขจิต กอบเดช. การบริหารงานส่วนหน้าในสถาบันที่พักแรมต่างๆ : Front Office Management in Other Institutions. กรุงเทพฯ : ซีซีพริ้นติ้ง, 2550.

ขจิต กอบเดช. งานโรงแรม การบริหารงานแม่บ้านในโรงแรมและสถาบันอื่นๆ : Housekeeping Management in Hotel and Other Institutions. กรุงเทพฯ : ซีซีพริ้นติ้ง, 2548.

นันทนี แขวงโสภา. คู่มือ Access 2007 ฉบับสมบูรณ์ (2009-2010). กรุงเทพฯ : โปรวิชั่น, 2553.

ประดิษฐ์ วงศ์มณีรุ่ง, สมเจตน์ เพิ่มพูนธัญญะ, พรเทพ เหลือทรัพย์สุข, และ นพดล อิ่มเอม. 1-2-3 ก้าวสู่ลีน Lean in Action. กรุงเทพฯ : สมาคมส่งเสริมเทคโนโลยี (ไทย-ญี่ปุ่น), 2552.

ปรีชา แดงโรจน์. การบริหารจัดการและปฏิบัติงานโรงแรม ศตวรรษที่ 21 กรุงเทพฯ: เอส.อาร์.พริ้นติ้ง แมสโปรดักส์, 2549.

วรภัทร์ ภู่เจริญ, จีรพงศ์ พรกุล, และ ธนกฤต จรัสรุ่งชวลิต. KPI ทำให้ง่ายๆ. กรุงเทพฯ : อริยชน, 2550.

วิโรจน์ ลักขณาอดิศร. ลีนอย่างไรสร้างกำไรให้ให้องค์กร: Profitable Lean Manufacturing. กรุงเทพฯ : สมาคมส่งเสริมเทคโนโลยี (ไทย-ญี่ปุ่น), 2552.

ศิ-ต รอดเครือวัลย์. Lean ยุคใหม่สไตล์ Simple. กรุงเทพฯ : ปัญญาชน, 2552.

สุกัญญา เธียรพจีกุล. ทำธุรกิจอพาร์ตเมนต์กันดีกว่า. กรุงเทพฯ : Phisit Thaioffest, 2548.

สุรเชษฐ์ สมไชย. รวม Workshops ระบบงานฐานข้อมูล Access. กรุงเทพฯ : ไอดีซี อินโฟ ดิสทริบิวเตอร์, 2553.

อลงกรณ์ มีสุทธา, และสมิต สัชฌุกร. การประเมินผลการปฏิบัติงาน (ฉบับปรับปรุง) KPI. กรุงเทพฯ : ส.ส.ท., 2551.

Appendix

เรียนท่านผู้เข้าพัก "รัชดา เซเว่นทีน เพลส"
ขอรบกวนเวลาท่าน2-3นาทีตอบแบบสอบถามเกี่ยวกับคุณภาพการบริการ โดยมีจุดมุ่งหมายคือการให้บริการที่ดีขึ้นและการพัฒนาคุณภาพของการบริการอย่างต่อเนื่อง เพื่อความพึงพอใจของท่านในการใช้บริการครั้งต่อๆไป ข้อมูลของท่านจะถือเป็นข้อมูลลับ ที่ใช้เพื่อการติดตามและปรับปรุงคุณภาพของการให้บริการเท่านั้น

Dear our guest,
Welcome to Ratchada 17 Place. We are pleased that you decided to stay with us.
We kindly ask you to participate in a survey which will help us make your future stay here evenmore pleasant. The interview will take 2-3 minutes and is conducted anonymously.

ส่วนที่ : 1 ข้อมูลผู้ตอบแบบสอบถาม
Part : 1 Personnal Information

กรุณาเลือกคำตอบโดย ทำสัญลักษณ์ [O] วงกลมล้อมรอบ
Please circle [O] your chosen answers

1.1	สัญชาติ Nationality	ชาวไทย	Non-Thai (.....)
1.2	เพศ Gender	ชาย Male	หญิง Female
1.3	ประเภทการเข้าพัก Type of Stay	รายวัน Daily	รายเดือน Monthly

ส่วนที่ : 2 ประเมินคุณภาพแผนกต้อนรับส่วนหน้า และ บริเวณล็อบบี้
Part : 2 Front Office and Lobby Quality Measures

ระดับความพึงพอใจ 1 = ควรปรับปรุง 2 = ปานกลาง 3 = ดี 4 = ยอดเยี่ยม
Degree of Satisfaction 1 = Poor 2 = Average 3 = Good 4 = Excellent

ลำดับ No.	รายการ Contents	ระดับความพึงพอใจ Degree of Satisfaction			
		1	2	3	4
2.1	ความพึงพอใจของท่านต่อการจองห้องพัก Satisfaction in Reservation				
2.2	ความพึงพอใจของท่านต่อการเช็คอิน Satisfaction in Checking-in				
2.3	ความพึงพอใจของท่านต่อการขยายระยะเวลาพัก Satisfaction in Extending the stay				
2.4	ความพึงพอใจของท่านต่อการเช็คเอ้าท์ Satisfaction in Checking-out				
2.5	ความพึงพอใจของท่านต่อภาพรวมของแผนกต้อนรับและบริเวณล็อบบี้ Satisfaction in the overall Front Office and Lobby area				

ส่วนที่ : 3 ประเมินคุณภาพแผนกดูแลรักษาความสะอาด
Part : 3 Housekeeping Quality Measures

ระดับความพึงพอใจ 1 = ควรปรับปรุง 2 = ปานกลาง 3 = ดี 4 = ยอดเยี่ยม
Degree of Satisfaction 1 = Poor 2 = Average 3 = Good 4 = Excellent

ลำดับ No.	รายการ Contents	ระดับความพึงพอใจ Degree of Satisfaction			
		1	2	3	4
3.1	ความพึงพอใจของท่านต่อความสะอาดของห้องพัก Satisfaction in the cleanliness of Room				
3.2	ความพึงพอใจของท่านต่อความสะอาดของเครื่องนอน และเครื่องใช้อื่นๆ Satisfaction in the cleanliness of Bedclothes and Room Facilities				
3.3	ความพึงพอใจของท่านต่อความสะอาดของห้องน่า Satisfaction in the cleanliness of Bathroom				
3.4	ความพึงพอใจของท่านต่อความสะอาดของบริเวณล็อบบี้ Satisfaction in the cleanliness of Lobby area				
3.5	ความพึงพอใจของท่านต่อความสะอาดของบริเวณสระว่ายน่า Satisfaction in the cleanliness of Swimming Pool area				
3.6	ความพึงพอใจของท่านต่อความสะอาดของบริเวณอาคาร โถงทางเดินต่างๆ Satisfaction in the cleanliness of Hallway				
3.7	ความพึงพอใจของท่านต่อความสะอาดโดยรวม Satisfaction in the overall cleanliness				
3.8	ภาพรวมของแผนกดูแลรักษาความสะอาด Satisfaction in the overall Housekeeping				

ส่วนที่ : 4 ประเมินคุณภาพการบริการของแผนกต้อนรับส่วนหน้า / แผนกดูแลรักษาความสะอาด
Part : 4 Performance of Front Office and Hosekeeping Service Quality

ระดับความพึงพอใจ 1 = ควรปรับปรุง 2 = ปานกลาง 3 = ดี 4 = ยอดเยี่ยม
Degree of Satisfaction 1 = Poor 2 = Average 3 = Good 4 = Excellent

ลำดับ No.	รายการ Contents	ระดับความพึงพอใจ Degree of Satisfaction			
		1	2	3	4
4.1	เจ้าหน้าที่แผนกต้อนรับส่วนหน้าให้บริการตามที่ลูกค้าร้องขอ Response of Front Officer to your required service				
4.2	แม่บ้านให้บริการตามที่ลูกค้าร้องขอ Response of Housekeeper to your required service				
4.3	ภาพรวมคุณภาพการให้บริการของแผนกต้อนรับส่วนหน้า Overall service quality provided by Front Office				
4.4	ภาพรวมคุณภาพการให้บริการของแผนกดูแลรักษาความสะอาด Overall service quality provided by Housekeeping				

ส่วนที่ : 5 ประเมินภาพรวมการให้บริการ
Part : 5 Overall Service Quality Measures

ระดับความพึงพอใจ 1 = ควรปรับปรุง 2 = ปานกลาง 3 = ดี 4 = ยอดเยี่ยม
Degree of Satisfaction 1 = Poor 2 = Average 3 = Good 4 = Excellent

ลำดับ No.	รายการ Contents	ระดับความพึงพอใจ Degree of Satisfaction			
		1	2	3	4
5.1	ภาพรวมความพึงพอใจของท่านต่อการบริการ Overall satisfaction in our services				
5.2	ภาพรวมความพึงพอใจของท่านต่ออาคารสถานที่ Overall satisfaction in our accommodation				
5.3	ภาพรวมความพึงพอใจของท่านต่อบรรยากาศ Overall satisfaction in our atmosphere				
5.4	ภาพรวมความพึงพอใจของท่านต่อระบบงาน เช่น การจอง การลงทะเบียน Overall satisfaction in our system(reservation system, registration system)				

ส่วนที่ : 6 ข้อเสนอแนะ
Part : 6 Comment and Suggestion

กรุณาเลือกคำตอบโดย ทำสัญลักษณ์ [O] วงกลมล้อมรอบ
Please circle [O] your chosen answers

6.1	ท่านจะกลับมาพักที่นี่อีกหรือไม่ Will you return to Ratchada 17 Place?	ใช่ Yes	ไม่ใช่ No
6.2	ท่านจะแนะนำให้เพื่อนหรือคนรู้จักมาพักที่นี่หรือไม่ Will you recommend Ratchada 17 Place to friends and relatives?	ใช่ Yes	ไม่ใช่ No
6.3	การบริการของแผนกบริการส่วนหน้า / Service of Front Office		
6.4	การบริการของแผนกดูแลรักษาความสะอาด / Service of Housekeeping		
6.5	ข้อเสนอแนะอื่นๆ / Other Comment or Suggestion		

ขอบคุณทุกท่านค่ะ
Thank you for your kindly cooperation.

Biography

In 1985, Raweerus Jirawaree was born in Bangkok, Thailand. Her family members consist of her parents, an elder sister, a younger sister, and her. Since her family business is apartment management, then, it inspires her to do the research on apartment management system.

In academic year 2006, as a full-scholarship student, Raweerus Jirawaree graduated the Bachelor's Degree of Telecommunication Engineering the 1st class honor from Sirindhorn International Institute of Technology, Thammasat University. Then, she worked as a sale engineer for a year before she enrolled the dual Master's Degree Program of Chulalongkorn University, Thailand and University of Warwick, United Kingdom, in Engineering Management and Engineering Business Management, respectively.

In the last year of studying, Raweerus Jirawaree got a new job as an ATC, Air Traffic Controller, in the Aeronautical Radio of Thailand Ltd. In that year, she was trained in air traffic control course at Civil Aviation Training Center; parallel with working on this research. Now, she is an ATC in Phuket Aerodrome Control Tower.