The Effects of using Artificial Intelligence Facilities in Building Harmonious Communities in Property Management in Hong Kong and China

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Abstract

This research attempts to explore the effects of using Artificial Intelligence (AI) facilities to build harmonious communities in residential estates in Hong Kong and mainland China. Three studies have been conducted with positive findings. Study 1 collects primary data from ten (10) senior property management professionals from top tier land developers in Hong Kong, to identify the effects of using AI facilities that outperforms traditional human-led property management services in terms of service efficiency. The finding is positive and the theory of "***Building Harmonious Communities with AI Facilities in Property Management in Hong Kong***" is established in Study 1.

Study 2 and Study 3 aims to testify the hypotheses that AI facilities help building harmonious communities via five (5) independent variables paired with five (5) selected mediating variables including "*Service Quality*" with "*Service Efficiency*", *"Social Chat Group"* with "H*appiness*", *"On-line booking platform"* with *"Service Fairness"*, *"Access Control System"* with *"Conflict"* and *"Chatbot Solution"* with *"Complaint"*. These matched pairs of variables help predicting the building of harmonious communities within the estate. Study 2 was conducted in Hong Kong and Study 3 in mainland China, so as to explore the extent to which my findings are consistent across different regions in China. Some contributions are noted that AI facilities (i) are of higher efficiency that outperforms traditional human-led services in property management; (ii) achieve cost saving; and (iii) help building harmonious communities with matched pairs of variables.

Limitations of the research include time constraint to obtain larger sample for analysis and government stringent policies on quarantine for travellers due to COVID-19 pandemic.

Declaration

I, Edward Yau-hang LUI, hereby declare that this work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed ..... (Edward Yau-hang LUI)

Date 29th July 2021

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed ..... (Edward Yau-hang LUI)

Date 29th July 2021

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository**.**

Signed ..... (Edward Yau-hang LUI)

Date 29th July 2021

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Contents

List of Abbreviations:

Short Form	***Standard Term***	***Page***
AI	Artificial Intelligence	1
Air BnB	Air Bed & Breakfast	10
AGI	Artificial General Intelligence	37
ANI	Artificial Normal Intelligence	37
ASI	Artificial Super Intelligence	37
APP	Application	9
AIoT	Artificial Internet of Things	16
ANOVA	Analysis of Variance	145
CCTV	Closed Circuit Television	10
CFPS	China Family Panel Studies	100
CHE	Customer Harmony Enhancement	101
COVID-19	Corona-virus 2019	14
CRM	Customer Relationship Management	13
EBA	Entity Behaviour Analytics (surveillance)	18
EI	Emotional Intelligence	65
E&M	Electrical and Mechanical	27
GPS	Global Positioning System	9
H	Hypothesis	96
HI	Human Intelligence	44
HKPASEA	Hong Kong Professional and Senior Executive Association	53
HK SAR	Hong Kong Special Administrative Region	53
IHS	Independent Happiness Scale	60
IoT	Internet of Things	11
JFK	John Fitzgerald Kennedy	39
NFC	Near Field Communication	11
OHI	Oxford Happiness Inventory	58
PFM	Property and Facility Management	30
PROPTECH	Property Technology	34
QR Code	Quick Response Code	18
QUAL	Qualitative	88

QUAN	Quantitative	88
RESERV	Real Estate Service Quality	56
RFID	Radio Frequency Identification	11
RQ	Research Question	96
SARS	Severe Acute Respiratory Syndrome	53
SEB	Skandinaviska Enskilda Banken	41
SERVQUAL	Service Quality	56
SHS	Subjective Happiness Scale	58
SPSS	Statistical Product and Service Solutions	101
WLEIS	Wong & Law Emotional Intelligence Scale	101
WSN	Wireless Sensor Network	11
24/7	Twenty-Four-Seven (24 hours a day, 7 days a week)	1
4-D	Four Dimensional	19
5-G	Fifth Generation (Mobile Communication Technology)	20

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Chapter 1 - Introduction

1.1 Research Background

Entering into the second millennium with advanced technologies and digitalized applications, increasing computerisation at work and at life has ushered a new era by reaching out to different nations via mobile electronic devices including but not limited to individual smart phones and personal note-book/desk-top computers. As a result, most companies and most populations are able to enjoy the benefits of using a mobile device to get instant access to these digitalised innovative applications under the backbone of technological advancement. These systems work through a wireless platform to operate mobile electronic devices for instant communication with 24/7 convenience. Hence, the development of digital technologies and on-line applications bring about numerous positive impacts affecting all walks of life in most part of the world nowadays. In the commercial world, many companies and professional firms are utilizing these advance technologies by using the software and programme to achieve the desired outcome. For example, Product Development Process (PDP) software, Product Data Management (PDM) software, Product Life-cycle Management (PLM) software and so on are used to enhance the efficiency and accuracy in the production processes management within the manufacturing industries; the Vector Snape, QSPlus International, CostX, etc. are used by most Quantity Surveying firms in providing the best estimation on building costs and measurements in the construction industry; the NetSuite, QuickBooks and so on in the Accounting sector; the AbacusLaw, App4Legal, PracticePanther Legal in the Law Firm sector and so on are proved to be most reliable and competent in many different professions. All these useful software enhance the accuracy and efficiency at work in different industries under the umbrella of technological advancement through applications of Artificial Intelligence (AI).

Thanks to the affordability, we are now seeing an unprecedentedly high penetration rate of personal digitalised electronic mobile in society. To utilise the enormous potential of artificial intelligence made available by smart phone manufacturers e.g. Samsung, Apple and Huawei, mobile application developers are introducing the Property Management sector to community enhancement functions smart home configuration, security control through facial or voice recognition, as well as facility management e.g. lighting on or off via designated mobile applications connected with specific hardware. From the perspectives of management companies, these AI functions and digitalized applications are accurate and efficient in providing 24-hour, instant and close to personal touch services to all mobile app users nowadays.

The value of AI has been somehow proven by its extensive adoption in the market. In this regard, it is interesting to understand and explore how the use of AI applications via the most convenient mobile electronic devices can have correlating relationship with the building of harmonious communities among the stake holders, i.e. staff in the property service providers and the residents, and also among the residents, owners, visitors and staff of an AI-driven residential estate. This empirical research also aims to explore if AI applications have different impacts between the Hong Kong and mainland China due to differences in the institutional contexts.

1.1.1 The Incentive for the Research

Recognizing the merit of AI facilities being largely adopted in the field of property management in Hong Kong and the mainland China, this study aims for a 3-step authentication of the following assumptions:

1. Does the use of AI facilities surpass or completely replace traditional human-led property management practice? If yes,
2. Does the implementation of AI facilities enhance the building of harmonious relationship among property owners/residents and management company/staff within an AI-driven residential estate? If yes,
3. Should governments, property developers, and property management companies treat that as a reference point to make good use of AI facilities to enhance and build harmonious communities and gradually make necessary steps to achieve social harmony at the national level?

In general, use of AI in property management sector can achieve the followings:

- Enhanced customer service experience through more diversified communication channels; and
- Cost-saving on routine repetitive work e.g. access control, collection of fees, posting of notices, cleaning, lighting control etc., in which staff salaries normally account for around 40 - 50% of the management expense of a residential estate.

1.1.2 The Property Management Industry in Hong Kong and Mainland China

The property management industry in Hong Kong became professionally standardised since 1953 after the fire disaster broke out in the squatter areas at Shek Kip Mei district on Christmas Day that reminded the government of the pressing needs for properly managed communities. Public housings were largely built by the Government and consequently private residential properties were also developed by private land developers to meet the demand of basic private accommodation in Hong Kong. To provide more comprehensive functionalities other than mere shelters, upgraded hardware facilities plus improved customer services were common offerings to newly developed properties. Therefore, the

property management industry in Hong Kong has been gradually becoming a sophisticated and comprehensive expertise that provides convenience, customer-care user experience to residents. The keen competition among the industry also facilitated further market progression.

Beneficial to the investment by Hong Kong developers, property development in the mainland China saw a remarkable boom in the early 90's. New properties were mainly modelled from the Hong Kong market whereas professionals were recruited to lay the foundation of property management in terms of streamlined work-flow and facility requirements. Relations of property development between Hong Kong and mainland China encountered a shift change upon the economic boom in mainland China. Hosting the Olympics in 2008, mainland China introduced advanced city planning covering infrastructure network and large-scale property development which largely changed the face of the country. The higher standards in hardware and software even exceeded that of Hong Kong with its advantages in the supply of natural resources including the skilled but low-cost labour forces, the supply of all kinds of construction materials, the bountiful supply of undeveloped land banks and later on the application of advance technologies, computerization and digitalization.

Property ownership is similarly highly demanded in China as in Hong Kong. However, people in mainland China generally perceive that property management services should be inclusive of the property purchase cost and therefore they are reluctant to pay management fees, in which this is a mandatory requirement to contribute the management fees from each unit to maintain the management services provided by the management company. On the other hand, due to commercial reasons and company objectives, property management companies tend to create revenue for the companies themselves rather than

achieve surplus balance in the building management account for the property owners. The phenomenon gradually changed until large management companies from Hong Kong set a code of practice in mainland China. Nowadays, property developers and management companies in Hong Kong and mainland China are targeting the ultimate interests of and benefits to their property owners especially in the provisions of AI facilities in establishing a smart and intelligent building for premium living as their main direction nowadays.

1.2 Artificial Intelligence (AI) - its functions and facilities

1.2.1 Today's AI becomes the Magic Power in Old Days Fairy Tales

For many years, cartoon movie lovers are envious of the magic powers that can only be seen in fairy tales. For example, the step-mother of Snow White has a magic mirror that can monitor every move of Snow White on a 24/7 real time basis; Marvel superheroes have their own instinct to immediately sense happening of crimes so that the villains are always stopped before they could escape; the handy tools from Doraemon's magic pocket provide huge convenience for Nobita during his hard times. These powers are now partially and practically achievable by the development of digitalised AI facilities while the unity and harmony thanks to the superpowers can also be realised.

In modern terminologies, artificial intelligence facilities are widely used as a reliable tool to analyse and conclude the symptoms then provide the best treatment/solution to handle the irregularities, this covers the medical & healthcare sectors, the customer service industries, the professional services e.g. lawyer, accountant, surveyors…etc. Especially in the medical & healthcare sector, artificial intelligence tools and facilities can accurately analyse symptoms of patients that release the heavy workload and burden of an overloaded

restless medical practitioner in handling the large numbers of consulting patients. It also enhances effective treatment that helps curing the bad cells and accurately identifies symptoms of patients in the medical & healthcare sector.

There are many gaps in the research world about the applications of AI facilities in different industry nowadays, this research takes a micro perspective attempts to explore the positive effects and benefits of AI applications on property management industry by means of building facilities and mobile applications which are provided and supported by the AI-driven policies and initiatives of the property management company. This research attempts to explore the effects of using Artificial Intelligence (AI) facilities to build harmonious communities in residential estates in Hong Kong and China. Three studies have been conducted with positive findings. Study 1 by collecting primary data from ten (10) senior property management professionals from top tier land developers in Hong Kong, to identify the effectiveness of using AI facilities that outperforms traditional human-led property management services in terms of service efficiency. Study 2 and Study 3 aim to testify that AI facilities help building harmonious communities via five mediating variables paired with selected independent variables including "***Service Quality***" with ***"service efficiency"***, ***"Social Chat Group"*** with "***Happiness***", ***"On-line Booking Platform"*** with ***"Service Fairness"***, ***"Access Control System"*** with ***"Conflict"*** and ***"Chatbot Solution"*** with ***"Complaint"***. These matched pairs of variables help predicting the building of harmonious communities within the estate. Study 2 was conducted in Hong Kong and Study 3 in mainland China, so as to explore the extent to which my findings are consistent across different regions in China. There are positive effects of using AI facilities to achieve service quality of the property management company in terms of data accuracy, effective communication, fair and justice system in satisfying customers' requests, cost effectiveness while some repetitive works and straight

forward mechanical tasks originally handled by human may be replaced by AI (e.g. clubhouse receptionist to reserve clubhouse facilities for residents could be replaced by mobile apps for booking and payment; access control being monitored by a building attendant to verify the identity of incomers before granting the access into the building can be taken over by machines with pre-registered function for access control, car park control system with car plate recognition facilities…etc.), all these functions of AI enhances cost saving and uplift service quality with efficiency and accuracy when compared to the traditional labour intensive human-led property management solely relies on staff performance. It is worth exploring the development of AI facilities and applications in different industries and professional fields to make good use of the magic power of AI to build harmonious communities within the environment. This would be the main objective of this research.

1.2.2 Applications of Artificial Intelligence in Commercial Markets

Artificial Intelligence (AI) is kind of advanced technologies which operate through computer programmes or "Digitalization" on a wireless basis. AI has nowadays been incorporated into the open markets covering a wide range of service industries by providing different kinds of tailored made applications and functionalities. For instance, New York Start-Up Dataminr helps companies to take better public relation and stock market decision. The Cambridge Analytica analyse the Facebook users' behavioural trends and browsing habits in order to feed relevant political messages to them. It is obvious that many electronic or digital devices are marketed under the shadow of AI applications as it is able to think and behave like human beings. AI has developed in a sage that is largely applied in the healthcare industry, according to Phil Nedin, Global Healthcare Leader of ARUP that, Molecular Biology activates through the AI technology to understand human body through sequencing of human genome which gauges our

vulnerability to disease. This also predicts how immune system might respond to different diseases then, tailored therapies to cure the disease. This can be used as preventive strategies to reduce in-patient attendance and avoid human contacts, travelling time, clinic/hospital accommodation and so on. In terms of Nanotechnology, the processes of radiation and chemotherapy as cancer therapies can be replaced by targeted nano-therapies. AI can diagnose imaging by using vitro nano-cameras instead of using large magnetic instrument. These AI facilities being applied in the healthcare industry can largely reduce the risk of infection during patients' face-to-face consultation with doctors, which also enhances flexibility for bedside treatments, and easy to obtain the supports from friends and relatives in a higher privacy environment. Furthermore, under the National Health Scheme (NHS) in the United Kingdom, the healthcare estate has developed over many years into a number of distinctive types. The Royal Institute of British Architects publications has also promoted the models of changing hospital architecture so as to achieve higher level of flexibility for adoption of new clinical functions while others are still using the traditional treatment matrix.

Apart from the specialist markets, the following showcase the remarkable contributions of AI by some leading AI-driven companies that are well-known and benefiting majority of the human beings around the globe.

(i) IBM's Watson System developed by Microsoft transforming traditional graphical interface to an interactive interface with natural language and emotional understanding;

(ii) Watson System being utilized in hospitals to rapidly screen millions of patient records for histories of cancer treatment in order to provide suggestions for diagnosing leukemia and providing therapeutic schedules. This changing the paradigm of onco-therapy and clinical diagnosis;

(iii) Amazon's Alexa ensures that they accurately reflected their company's brand;

(iv) Baidu, being the smartest corporation in translation, natural-language understanding and smart vehicles;

(v) Facebook algorithm recognizes digital pictures and communicates the information in audio form;

(vi) Google's AI entry beats the world champion Go player;

(vii) Google's automatic language translator;

(viii) Apple's Siri develop an AI voice assistant that answer your questions, carry out research work for you and even order a pizza for you via the internet network; the personality of Siri has been trained to be more human with a touch of sassiness that Apple's consumers are expected;

(ix) Bing's airfare predictions,

(x) Yelp's system that helps us find a place to eat;

(xi) highly accurate GPS navigating & mapping system in helping drivers or location seekers to identify the destinations they are heading to via the on-line real time point to point navigating function;

(xii) Tesla's advance self drive and parking mode for electric vehicles that drivers do not need to worry about their poor parking technique and use the function to park their cars by mean of the self-parking button;

(xiii) Meitu, a Chinese APP for the beautification of photos that adjusting the skin quality, the sharp of your face, fine tuning your figures and so on so that the automatic adjustments to the picture image make you looks better than the real personal appearance in the picture;

(xiv) Many online shopping applications e.g. eBay, Amazons, TaoBao, Alibaba, Louis Vuitton, Net-a-Porter, Shopbop, thredUP…etc. The search engines are trained to learn and understand your shopping behaviour so that they can keep pushing you

with the new arrival items or season sales items that can draw your full attention which are interested by you as you have looked for the similar items frequently in the past;

(xv) various electronic payment gateways facilitate sale transactions in one go;

(xvi) e-Booking system including the Air BnB and Car Rental in the tourist industry;

(xvii) food ordering and delivery APP and food ordering kiosk save queuing time for food ordering and payment with cashier. It also reduces waiting time on food production while using the APP to order and pay the meal at your own place; and

(xviii) Public Transportation app, e.g. "Grap" or "Uber" services to specific locations with relative low price and so on.

All the above-mentioned facilities and applications through AI technologies enhance the service efficiently and convenience to suit various demands of human beings in different localities around the globe. Having a broad view of the background of AI facilities in the commercial world, let's focus on the AI applications in the Real Estate industry particular to the property management sector in the following discussions.

1.2.3 AI Facilities/Applications in Residential Estates in Hong Kong

The Hong Kong Market

For residential properties, mobile applications through mobile phone are widely adopted nowadays in Hong Kong and mainland China by providing 24/7 round the clock convenience service to property owners/residents by the property management company. These AI-driven applications installed on the mobile phone mainly offer the following functionalities:

- Assigning access control to designated areas via pre-registered Facial Recognition, fingerprint or Smart Resident Card;

- 24-hour Closed Circuit TV (CCTV) monitoring of specific areas;
- Keeping of property management records such as video footages, case logs for further investigation by management staff or insurance companies;
- Clubhouse services such as facility booking, ticketing, payment, event announcements, etc.;
- Peer exchange platforms for staff and residents to attend specific requests or complaints;
- Understanding of customers' preferences for further sales promotion.

AI facilities also cover the functions of Internet of Things (IoT), that is by linking or activate the IoT devices via the backbone communication platform by using either the Radio Frequency Identification (RFID), Near Field Communication (NFC), Wireless Sensor Network (WSN) and Nano / Smart Technology, in which signals are paired with designated microchips or tags being attached to certain IoT devices e.g. sensors, readers, receivers…etc. to control and perform its 24/7 monitoring functions. The collected data from all these stand-alone IoT devices can be linked into the system for management to analysis and manipulate revise policies for better control and performance of the frontline services that enhances service quality to customers. For instance, small and stand-alone smart sensors are installed in all toilet seat / water closet to detect the frequency of usage so that the cleaning company can grasp the information in sending the toilet cleaners to refill the toilet paper, liquid soap, dry mopping the toilet after certain numbers of patronages and so on. These AI-driven IoT devices help improving the cleaning standard in a cost-effective way which is far economical than arranging a toilet attendant in one toilet to achieve the same result. Therefore, the cost of deploying one cleaner for one toilet is not necessary and the cleaning standard of this particular toilet can be ensured to achieve a clean and hygienic condition at all times. This is one of the benefits derived

from the merit of IoT under the implementation of AI facilities in the property & facility management industry.

In property management, some of the market leaders are placing emphasis on the development of mobile applications for property owners and residents of their prestigious residential developments. These include the top 10 land developers in Hong Kong namely, the Sun Hung Kai Properties, the Cheung Kong (Holdings) Ltd., the Sino Group, the Henderson Land Development Co., Wheelock Properties (HK) Ltd., Great Eagle Holdings Ltd., The Mass Transits Railway Corporation, Nam Fung Group, New World Development, Kerry Properties Ltd. and so on. Most of these market leaders are deploying advance technologies via mobile apps tailor-made for its developments to keep abreast of time in this digital era. Thus, many different mobile apps unique to certain properties are established to provide 24/7 intensive care customer service to property owners and residents of respective estate. These include the "***Live Easy***" and "***The Wings***" of Kai Shing Management Service Ltd. (a full subsidiary of the Sun Hung Kai Properties); "***W-Living***" and "***Oasis Kai Tak***" of Harriman Property Management Ltd. (a full subsidiary of Wheelock Properties (HK) Ltd.); "***One Mayfair***" of the Sino Estates Management Ltd. (a full subsidiary of the Sino Group); "***The Dragon Range***" and "***The Bloomsway***" of the Kerry Properties Ltd.; "***Park Signature***" of the New World Development Co. ltd.; "***ONTOLO***" of the Great Eagle Properties Management Co. Ltd.; the "***Visionary***" of the Nam Fung Development Ltd. and so on. All these mobile apps of different prestigious residential estates based on their company's AI-driven policies and facilities that are providing an all time services to their customers. Its effects include but not limited to cost effectiveness benefit by minimising labour costs and achieve the best attentive services to customers in need, brand building of the company...etc. It is therefore worth exploring the effects of using these AI-driven mobile apps in establishing

harmonious relationship of its users, that is, in the communities within residential estate as such pioneer attempt shall have valuable contributions not only to that estate but also to the society at large.

1.2.4 AI Facilities/Applications in Residential Estates in mainland China

The China Property Management Market

In China, the overall usage of AI or digital applications and facilities are widely adopted by the mainland Chinese as they value convenience over privacy. Therefore, all these AI facilities are linked with various on-line payment gateways so that the sales transaction for goods and services are easily handled with high accuracy. Therefore, many renowned real estate developers are willing to equip their intelligent buildings / properties with artificial intelligence facilities (i.e. smart intelligent building). The main purpose of implementing these artificial intelligence facilities into the service scope for occupants of these properties is to achieve convenience, instant service, better communication, high degree of accuracy in the services provided, keep track records for every patronage, benefits of grasping big data of customers for effective Customer Relationship Management (CRM) and so on. A brief introduction of renowned property developers in mainland China with their unique AI initiatives is discussed as follows.

(i) **Greentown Service Group Co. Ltd**., being the first place winner of the "2019 China Property Service Top 100 Enterprises Research Results Conference" organized by the China Index Academy, a professional independent third party Real Estate Research Organization in mainland China, is a pioneer to promote happy living service for all her customers over different provinces in China. The system of intelligence service offered by Greentown is based on the setting up of a big data platform that facilitates the proposed intelligence services to provide services to the property owners and residents. Careful considerations are focused

on the health, education, household living…etc to achieve the high-level communications between human-material, human-nature, human-human, and human-society. In order to provide happy living to property owners, Greentown establishes the Greentown Intelligence Service Platform consisting of three features. The "***Cloud Platform (雲平台)***" is formed to facilitate the technological advancement and innovations; "***Services Platform (生活服務中心)***" is to provide property owners with instant caring services; and "***Community Relationship Platform (睦鄰舍)***" to promote the social/group harmony among the neighbourhood. In addition, the happy living services are strongly associated with life by providing access to a variety of products and services portfolios that cater for the evolving every day and life-style needs of customer, property owners and residents. The community living services of Greentown include community products and services, home living services, community spaces services, property assets management services, cultural and education services according to the needs for better living of her residents. At the same time emphasis is put on innovation and promotion for all traditional service by utilizing mobile internet and smart community portal in offering wide range of required services to satisfy most residents.

Under the corporate vision of becoming a happy life service provider in the industry, Greentown creates a slogan of "***Be Friend and Help Each Other***" to achieve the happy life vision and mission. According to the Chairman Message delivered by Li Hairong, Chairman of the Greentown Service Group Co. Ltd. published online via the source: "http://www.lvchengfuwu.hk/?page_no=2&lang=1&show_case" that in year 2019 Greentown has organized and sponsored 1,046 number of projects by recruiting over 110,000 volunteering property owners to lead 15,000 volunteers activities in

promoting the "***Happiness Communities***" in China. In defending the current COVID-19 among the communities, Greentown has developed the "***Fresh Green Orange***" plan by cooperating with CenturyMart during the epidemic by utilizing the function of frontline warehouses within the communities. As of 31 December 2019, Greentown's "***Greentown Living APP***" has become the "internet celebrity" nationwide due to the fact that during the time of COVID-19 epidemic the number of registered users of such app has increased by 30% up to 1,000,000 number and the hit rate has reached 3.8 million, which is 11 times over the same period of time in 2018. Chairman Li of Greentown reflects that the growing usage rate in the technological platforms by property owners do establish a solid foundation for Greentown to their precise service demand algorithm as services connected with technologies make life safer and more convenient. Greentown, in fact, has focused her strengths and on building smart communities and actively participated in the construction of future communities in Zhejiang Province. Such initiatives cover the joint venture business with Sense Time to explore the smart communities solutions based on graphic recognition; signing a cooperation agreement with Alibaba Cloud to study the "Platform + Stewart" business model; and formed a strategic cooperation with Hikvision to set up a joint laboratory for the development of Internet of Things to enhance smart fire protection and smart security system by integrating the real time capturing scene closely with local communities functions. All these AI initiatives and provisions of AI facilities provided by Greentown is to achieve the main objective of utilizing company's technological resources to foster good relationship amongst those property owners, so as to build harmonious communities under the corporate vision of building a "***Happy Life***" and "***Be Friend and Help Each Other***" property management services.

(ii) **China Vanke Company Ltd.** is one of the large-scale and leading property management companies in mainland China providing property management services in most of the first-tier city in China including Guangzhou, Shenzhen, Beijing, Shanghai and Chengdu. Vanke's top priority is to allow property owners to experience the considerate property services by providing full life-cycle services to property owners in different dimensions including but not limited to the Residential Property Services, the Smart Technologies and the Life Services business unit. The vision and mission of Vanke Service is to "***change your life for the better***" and "***allow more users to experience the delight of property service***" respectively and its core values include reassurance, engagement, trust and co-existence. Furthermore, some value statements that have been planted into the mindset of all employees are "Customers are always Right", "No Achievement means Negligence", "Always to be The First" and "Personality of Integrity, Courtesy and Honesty".

With the main objective in maintaining the value of property owners' home, the highly recognized "***Farsighted Services (睿服務)***" system is set up to create an artificial internet of things (AIoT) that facilities excellent safety management, landscaping, cleaning, and maintenance services to property owners and residents in their managed residential properties. The Farsighted Services is a set of web-based solutions via internet platform to transmit the information to the control station so that most of the tough problems and deficiencies that are of remote and unexpected nature causing much headaches to frontline operation of property management can be solved instantly under the 24/7 surveillance cameras or by property owners / residents without hassle. This first version of Farsighted Services gathers some basic information of peoples and objects online, but further develops to connecting peoples with objects in the second version. The current system 3.0

of the Farsighted Services are able to connect peoples, wealth and objects together in creating a better scenario of communication within the communities to achieve an efficient and transparent property management services.

In addition, the "***Butler School***" is established to train frontline managers on very important service skill sets in providing customer services to property owners, fully understand and grasp the professional practices in property management and asset management. In brief, this Butler School, serves as a cradle in cultivating property managers to understand customers' needs, providing professional services and creating happiness for property owners and residents. The Data Management System under the Farsighted Services provides a smart platform to manage the Facility Management System, War Map System and the "***Live Here***" App which has been proved to be able to link customers and employees together in an effective and harmonious way.

Apart from the remarkable AI services provided by Greentown and Vanke in the field of property management as mentioned above, there are quite a number of property developers who have invested vast resources in developing intelligent services in their developed properties to ensure higher degree of services efficiency and convenience for their property owners and residents.

(iii) **A-Living Services Co. Ltd.** (formerly known as Agile Co. Ltd.) who is implementing the value-added community services called "***A-Living Community Commercial Services***" to explore the community economic ecosphere by focusing on residents, houses, vehicles and public resources in the communities. The main objective is to incubate many kinds of community services for the benefits of her stakeholders. This community service provides a solution to the property owners of A-Living Services Co. Ltd. which has established a trust and good life service

scene for all property owners by all means. Through this community service, it also assembles property sales business, advertisement, engineering consultation, network technology, intelligent household and community business so as to promote a steady development of economies among the communities. In addition, the "***A-Connection (雅智聯)***" and "***A-Steward (雅管家)***" mobile applications operated under the A-Living Information management Platform provides a wide range of services for their property owners including Smart Home, Cloud Intercom, Patrol Robot, Facial Recognition Access Control, License Plate Recognition for vehicles, QR Code app for door opening, EBA surveillance equipment for security monitoring, Smart Light for energy saving, on-line payment gateways for Management Fee Payment, Visitors Registration Control, Complaint and Compliment platform, Concierge Service, Communities Group Bulk Purchasing, Reports and Evaluation of Services and Neigbourhood Social Network. All these AI facilities function well to promote the well being of all property owners of her developed properties with particular concerns over the building of harmonious communities within the property management industry.

(iv) **Country Garden Services Holdings Company Ltd.** owns the brand name of Country Garden Property Management is another large scale China-based property developer focusing her business on residential property management services and community value-added services in the domestic market. The value-added services include advisory services, cleaning, landscape condition and maintenance services for the local communities. The AI facilities termed as "***Phoenix Magic Box (AI-鳳凰魔盒)***" is a centralized big data management platform that helps maintaining a safe and pleasant environment in the communities and the residential estates with the online close circuit TV (CCTV) cameras system by capturing the real time motions of different locations. These CCTV cameras will be

automatically scanning all faces of peoples appearing within the coverage areas of those individual CCTV cameras, so that when an elderly is reported missing or kids are reported gone astray the system will search automatically these lost persons and identify their location instantly without the help of police that may be arousing the media reporting. This full time all weather condition all year round surveillance system also placed at the top location to cover the whole district termed as the Eagle-Eye Cameras to provide a 4-D video capture to detect any irregularities happened in the district such as object fallen from height, fire at roof top of building, trespassers in the swimming pool when it is closed, rubbish bins are overflowed that require cleaners to clean, traffic accidents that ends up with serious traffic congestion that road diversion is required by the authorities , and so on. All these AI features are opened to all members of the communities on a real time basis via the Communities Service App so that each member is able to view the situation from their pre-downloaded apps. For domestic premises, finger print apps, shaking command and voice command to open door or turn on/off electrical appliances are in operation, automatic ventilation system to maintain at preset temperature and humidity, air quality control, smoke detecting system, flooding sensors, emergency button, etc. are widely used and become the most welcome AI facilities by property owners of Country Garden developed properties in mainland China. Although the 5-G mobile phone system is under development, Country Garden has already signed a strategic agreement with China Telecom to explore the 5G-intelligence facilities to build the safe and intelligent communities that may attribute to the building of harmonious communities in mainland China.

(v) Other top tier developers including the **Longfor Group Holdings Ltd.** being named as a developer with high-quality service of "***Satisfaction*** **+** ***Surprise***" by her customers in elderly-care & urbanization projects and develop renting houses to

satisfy the living pattern of new generations and rank top 10 in China property enterprise brand value. **Hunan Poly Tianchuang Property Development Co. Ltd.** uses AI technologies via the "***Core Smart Community Cloud Platform (芯智慧社區雲平台)***" to promote family-members like relationship in a community. The "***Ening Wisdom Platform (一應雲智慧平台)***" developed by **ChangCheng Property** and the award winning "***Bauhinia Distinguished Service (紫荊花專享服務)***" developed by **Feng Cheng Property Management** are also providing one stop intelligent services to their property owners by utilizing the big data platform through AI facilities. All the above mentioned property developers or property management firms are emphasis on using a large scale and latest AI facilities to build harmonious communities for their property owners.

1.2.5 AI facilities as medium to achieve Harmony in Property Management

This research aims to demonstrate that property owners in an AI-driven residential estate would be enjoying a higher degree of harmonious living environment than those in a traditional labour intensive and human-led property management. Three (3) studies will be conducted to collect data to explore the needs and advantages of using the AI (Study 1) and to explain that AI-driven property management is more effective than the traditional human-led property management in terms of building harmonious communities of the residential estate (Study 2 and Study 3). Therefore, having investigated the functions and the effectiveness of AI facilities and applications in property management industry, the next step is to understand the concept of harmony and harmonious communities in a residential estate. We must establish the fact that the use of AI facilities/applications shall have a positive and strong relationship with the harmony of communities, in other words AI facilities establish a harmonious communities of a residential estate; or so to speak, to prove that residents in an AI policies driven estate are enjoying the harmonious

communities with other residents in the estate. Therefore, we shall examine the definition of harmony within the communities of property owners and residents in a residential estate by examining the AI facilities being provided in the estate.

There were many researchs works on Artificial Intelligence in the past, nowadays and they will most probably continue in the foreseeable future as more and more advance levels will be discovered in the application of AI. Obviously, AI is one of the most valuable products and inventions produced by advance technologies with innovative backbone. AI is able to process large amount of data generated by different human activities so that a trend or pattern of human behaviours can be anticipated through the AI's learning experience. Today's AI's functionalities and applications are highly sophisticated and widespread into many industries when compared to their original ancestors dated back in the early 50's of the last century, however most of its functions used to be straight-forward and merely focused on low-tech tasks , e.g. web searching via words or voice, the search engine will memorize those frequent search items and will automatically prioritise these new and sales items to these regular searchers through the internet platform, on-line shopping and on-line payment and the latest on-line learning mode via Zoom or Team Meeting are a solid proof of effective AI applications that are widely adopted in human's life on a round the clock basis in different part of the world. Despite the convenience, AI failed to cover the most intrinsic elements of human's social life include but not limited to emotions and relationship building among groups. This is rare in the research world to study AI in this respect and it is worth examining whether the functions and merits of AI are positive and powerful enough to promote human relationships in a positive way. In other words, to explore the possibility of AI's functions that helps building relationships among human groups. We have so far identified many different functions and applications of AI which have been taken place in the past and at the present time and

therefore it's time to look into the building relationship for human with the help of AI facilities in the digital world.

Relationships of human can be positive or negative, due to limited resources on this research work, positive relationship will be focused. There are many expressions in words or phrases to describe a positive relationship for humans and above all, harmony is the most suitable term to investigate. Harmonious communities is therefore used to describe the positive good relationship among a group of peoples that are enjoying good relationships with a relatively high degree of peace in minds both mentally and physically, enjoying happiness in life, respecting or being respected during the social intercourses within the communities, acquire the feeling of fairness and justice in keeping things in order within the communities, living environments are harmonized with the nature with green aesthetics and fresh air quality and so on. The following discuss the term harmony with regard to building positive relationship among the stakeholders within the communities.

1.3 Social Harmony and Harmonious Communities

For an easy indication and understanding of the term harmony, I use the meaning of harmony in music theories to first explain the concept and the definition in achieving harmony in a musical piece. In a simple term in music, harmony is the process by which the composition of individual sounds or the superposition of sounds, are analysed by hearing. Usually this includes the elements of sound frequencies, pitches (tones and notes) and chords. Harmony in music often refers to vertical structure of notes which is different from the melodic line under a horizontal movement in forming a musical piece. Musical piece with harmonization sounds produce pleasant sounds to ears and minds when there is a balance between the consonant and dissonant sound frequencies. That is, a

harmonic music movement would be more relaxing and full of sentimental enjoyment whereas, disharmonized music notes arrangement create tense atmosphere that leads to uncomfortable feeling of the audiences. A harmony can be defined as a state where alignment, balance and order are being achieved. In other words, there is a dynamic balance among parts to emphasis the intended deep expression, but at the same time maintaining balance and movement in a peaceful of mind order. When the dynamic of balance is lost, it becomes disharmony that hampers the whole piece of music being performed. This meaning of harmony in musical theory could well indicate and being a helpful metaphor in the understanding of the term harmony in human behaviour and psychology under the mainstream of social science study.

Harmonious relationship is very often referred to human behaviour and their expectation of enjoying a state of well-being with happiness in life's experience including social life with peoples and the nature with green living environment. Normatively, we therefore define social harmony as a social state displays balance, alignment, mutual support and flourishing. It is a state with minimal conflicts, tensions and discords. A more harmonious society shall possess more harmonious elements than others. In explaining and defining the term harmony, various elements and yardsticks are used to measure the degree of harmony and these yardsticks can be in two fold, consists of both positive and negative elements.

1.3.1 Positive and Negative Elements of Harmony

Positive elements in an established society include benefits, interests, needs, relationships, activities, rules, values…etc which are well coordinated in balancing differences of peoples to achieve a common goal. A more generic dimensions include mutual supports to others and harmonious with nature in sustaining it. Other positive elements featuring

happiness, peaceful, good relationship, friendship, sense of safety, protection, freedom, mutual respect, accommodation, satisfaction, trust, sharing, helpfulness, beneficial cooperation, empathy, tolerance, reciprocity, fairness, justice, honesty, moral awareness, reasonableness, considerateness, sharing, caring, goodwill, generosity, sustainable, quiet enjoyment, healthy and so on. In real life, all these components may not be easily realized in full, but most of them in various combinations shall exist in a society that enhances building a harmonious society. On the contrary, harmony can be perceived negatively in terms of conflicts, strife, confrontations, tensions, contradictions, suspicion, distress, selfishness, hostility, hatred, unstableness, unfairness, selfishness, fraudulence, dishonesty, deception, corruption, falsehood, complaints and so on. The above-mentioned various dimensions in measuring the degree and level of harmony is of vital importance in the research work by testing the correlation of some selected elements toward the implementation of AI facilities in property management in Hong Kong and mainland China. In establishing a clear and better line of thoughts for the research works, the following dimensions of harmony are selected among the above mentioned, these are happiness and fairness in the positive side and conflict and complaints in the negative side of the same coin. These dimensions will be treated as the independent variables in the quantitative study of this research which will be explored and tested in Study 2 and Study 3 to demonstrate and to verify the reliability and significance of correlation between these variables termed as the mediating variables in establishing harmonious communities of a residential estate in Hong Kong and mainland China. Detail discussion on the findings of these studies will be discussed in Chapter 4.

1.3.2 Mediating Variables to achieve Harmonious Communities

This research aims to explore the hypothesis of AI facilities is of higher efficiency and accuracy than those traditional human-led labour-intensive services in the field of property

management in Hong Kong and China. Furthermore, to explain the hypothesis of using AI facilities to build harmonious communities in an AI-driven residential estate both in Hong Kong and mainland China, first thing to check is how strong the relationship between AI applications and harmonious relationship in residential estate communities. Secondly, look into the cultural difference in adopting and utilizing AI facilities in different locality with different cultural backgrounds in the same piece of land in China, i.e. Hong Kong region in the south and other regions in mainland China. In testing the relationship some mediators are used for the hypothesis testing under the Linear Regression Analysis through the SPSS (version 25) computation and analysis to obtain the findings. These mediators are (i) Service Efficiency, (ii) Happiness; (iii) Service Fairness; (iv) Conflict and (v) Complaint. The first three mediating factors are classified as the performance of the management companies in terms of service quality that build trust and respect of the stake holders in a residential estate. In achieving a balancing effect of the research, three positive and two negative measuring factors of harmony will be used, i.e. service efficiency, happiness and fairness in the positive side of harmony, where conflict and complaint are grouped under disharmony relationship for a balance treatment and testing. It is believed that these five mediating variables are ended up in the same direction in building harmonious communities for property owners and residents of a residential estate.

Effectiveness refers to the overall positive effects that advance technologies, for instant, the transformation of digitalization and innovation of property management services through artificial intelligence facilities including mobile apps, IoT devices on access control, on-line booking systems, Chatbot solutions, 24/7 communication platform and so on. This research aims to realize the positive effects that artificial intelligence facilities being implemented in a residential estate will outperform traditional human-led

management services which is subject to the quality of staff performance and effectiveness of building services in various building management systems.

Service Efficiency reflects the level of service quality of a management service provider in terms of effectiveness on maintaining a healthy finance of an estate/ building, effective human resources planning, interactive communication channels, efficiency in handling enquiries, requests and complaints of stake holders, fostering good relationship with stake holders and so on. This should be the main objective for most of the business units in the service industry and is of basic requirement that the service providers in the property management industry shall bear such service quality mission to run their business and build their brand in the market. The main purpose in adopting this mediating factor could also illustrate and to testify that AI facilities outperform traditional human-led labour intensive style of property management in Hong Kong and China. Work Accuracy is also one of the indicators to achieve service efficiency under the objective of service quality of a company. In property management, work accuracy in terms of accounting records in handling the income and expenditure of an estate, these include the receipt of management fees as recurrent income and various expenditure items such as staff salaries, maintenance fees for the building facilities (e.g. lift, plumbing and drainage, E&M facilities…etc.), utilities expenses (e.g. electricity, water, telephone, broadband charges…etc.) and so on. Accuracy and strict compliance according to statutory requirements in accounting principle, auditing, book keeping and budgetary control is of paramount importance in the eyes of those stake holders and the management of the company which effectively reflects the service quality of a service provider in the property management industry. The situation is now becoming complicated as on-line payment of management fee and clubhouse booking charges is common in property management sectors in Hong Kong and China that leaves a gap for the accountants to ensure work accuracy is highly demanded.

Happiness refers to peoples' emotional state of mind and level of satisfaction toward the service quality of the property management company who are delivering the management services to property owners and residents. The positive state of their emotion and mindset toward the service quality of the property management, the happier their response and hence harmony level with the service provider and their neighbours will be achieved. Very often, the degree of happiness of peoples would be suddenly changed subject to many unexpected factors during a face-to-face conversation, visual impacts or in a social meeting. As there may be some words or phrase during the conversation that hit the audience and trigger the sudden changed in their emotional state of mind. This will be further discussed in the literature review section contains in Chapter 2.

Service Fairness refers to the procedural priorities that property owners are entitled to first-come-first-serve principle in using the building management facilities and system, e.g. clubhouse bookings, enquiries waiting times, visitors' car parking spaces…etc. Since human-led style of management ties with more or less subjective manner during the process of service provision by frontline employees, this may result in the issue of fairness in the process of service provisions. That is those property owners / residents with better relationship with the staff shall be treated with exceptional care and higher priority to get what they want but on the contrary, less frequent patronages or new property owners / residents may be treated with the basic service as the relationship between these parties are elementary. Therefore a fair system, in other words service fairness in the property management may directly link with the building of harmonious communities in a residential estate.

Conflict refer to the fact-to-face disagreement or differences of views toward certain subjects so happened in the property management industry, e.g. the ways of handling noise nuisances, pet's disturbances, staff service attitudes, integrity of staff and so on. Conflicts usually occur during or after face-to-face encounters with different viewpoints, timelines or unsolved problems. Through implementation of AI facilities face-to-face encounters between property owners and frontline staff will be minimized and therefore conflicting situations would be eliminated that enhances building harmonious communities within an estate.

Complaint refer to the negative emotions and acts from complainant to express her/her dissatisfactions against the service attitude or some unsolved and long dragged problems affecting their well beings and comforts in their residences in the property management aspects in relation to living environment. The more the number of complaints implies the less harmonious relationship among the complainants, the property owners/ residents being complained, and the on-site staff together with head-office staff of the property management company. More details of these positive and negative mediating variables will be discussed in Chapter 2.

1.4 The Theoretical Base for Study 2 and Study 3 research

For Study 1, I will explore a grounded theory through qualitative approach in explaining the effect of using artificial intelligence facilities outperform traditional human-led approach of property management service in Hong Kong. In addition, there are also associations among the AI facilities and the building of harmonious communities in a residential estate in Hong Kong. For Study 2 and Study 3, the research on human behaviour and the building of relationship falls into the scope of sociological and psychological domain, therefore the theory being adopted for Study 2 and Study 3 under

quantitative approach would be fallen within the scope of "Customer Relationship Management (CRM)". In addition to CRM, measurement of human behaviour, psychological well-being and emotion is also an important prerequisite in the research topic and therefore, the intervening mechanism under the Theory of Fundamental Causes is adopted. Under the intervening mechanism, some intervening variables, also known as mediating variables are used. Intervening variable is defined as hypothetical constructs/variable used to explain the causal links between other variables, in order words it intervenes or mediates between the independent variable and the dependent variable. The contributions by Edward C. Tolman (1938), a behavioural psychologist, on intervening/mediating variable is important in cognitive psychology as such concept made it possible to measure the unseen human behaviour e.g. hunger, demand…etc. in this case, refers to the psychological well-being of property owners, e.g. degree of happiness, service fairness and the levels of conflict and complaint, in building harmonious communities in an estate. It is defined by Boston University that intervening variable is "a control variable that follows an independent variable but precedes the dependent variable in a causal sequence". Therefore, for instance, the use of AI facilities brings happiness to property owners and therefore having positive effects on and having an association with building harmonious communities of an estate.

Property Management falls into the stream of service industry and therefore the effect on customer service attributes to one of the main succeeding factors in the competitive market in Hong Kong. This research adopts the theory of Customer Relationship Management (CRM) as the core theory to develop the hypotheses and apply the findings and managerial implications to uplift the service quality in terms of building harmonious relationship with stake holders in the property management market. Having testified in Study 1 that the effect of using AI facilities outperforms the traditional ways of customer service in property management in Hong Kong, the Service Quality of property management

company plus four identified AI facilities has become the independent variables matched with mediating variables so as to testify the correlation between the independent variables with the dependent variable i.e. the building of harmonious communities in property management in Hong Kong. By matching these independent variables with five mediating variables in Study 2 (for Hong Kong) and Study 3 (for China) of this research, it is testified that AI facilities under the positive effect on CRM help building harmonious communities within the estates.

Since early 1980's, customer service industry has become the largest economic sector that contributed a very high percentage of Gross Domestic Product (GDP) in terms of income-generation and employment. The major components of service industry nowadays in Hong Kong consists of property development, sales of properties, retail shops, financial sector, banking, hotels, trading, tourism, transportation, food & beverage, and so on. Success of these businesses relies very much on the implementation of CRM that uplifts the effectiveness on customer service strategies with immediate response that meets and exceeds customers' requirements and hence, retain market shares and increase the profit margin of the company. Nowadays, CRM places a very important role in making customer-driven strategies of an organization to become successful in terms of delivering the sought after services/products that meet customer needs and finally, enhances their satisfactions and intention to buy as a loyal customer. However, effective CRM in this digitalization era shall be linked with digitalized technologies (e.g. AI facilities) and strategic transformation with service/product innovation to bring service quality to a new horizon that exceeds customers' expectations. These prerequisites are set to predict and guide customers' behaviours but very disappointedly, most of the mere survivors in the property management industry in Hong Kong are adopting traditional practices and

therefore, only those aggressive leaders gain competitive advantages in terms of advance digitalization and transformation of services/products in the market.

Mike Hoots (2004), the Associate Professor in the capacity of the Programme Coordinator for the Degree Course in Facilities Management at Colorado State University, USA opined that customers in Property and Facility Management (i.e. PFM) sector require instant services which are far more ahead than they can deliver. In response to this instant nature, PFM professionals shall adopt an "Outside-in Approach" to identify comprehensive needs of customers on a 24/7 basis so as to meet and hence, exceed their expectations. This is to transform their expectations into the functionalities of various building facilities within the built environment. This outside-in approach is a proactive service concept rather than the traditional inside-out approach under a passive nature. From an inside-out approach, which is considered a passive and reactive perspective, managerial staff will analyse the service scopes of the operations of building facilities to determine what could be delivered to the stake holders to meet their needs. Thereafter, they derive policies, procedures, plans, systems, budgets and require all levels of staff to stick to these pre-determined policies and rules without understanding the details requirements from stake holders' perspectives, and as a result, they have lost the sight of these perspectives. On the contrary the difference that a customer-driven outside-in approach under CRM perspective is that those managerial staff will grasp the ultimate needs of their stake holders by identifying the needs that their customers may not be thinking of, and then move inward to design the flow of operations that not only meet but also exceed customers' knowledge and expectations in the field. In turn, every staff will take ownership of their duties being assigned and the full responsibility to achieve the ultimate goal of customer satisfaction at the workplace.

In order to differentiate a company competitive advantage, the "Outside-in Approach" shall be used as it has been proved to be successful in the PFM profession to gain competitive advantage with innovative service and facilities. For example, the AI facilities including digitalized access control system with facial recognition, QR codes, smart card readers and so on, provided in a property will not only gain competitive advantage in the market in respect of uplifting service efficiency, ensuring security standard, reducing labour cost, avoidable conflicts and hence promote relationship among stake holders …etc.; but also predicts customers' expectations that helps building harmonious communities within the property. In brief, effective CRM with innovative artificial intelligence facilities shall have positive effects that correlate to the building of harmonious communities in a property due to its high level of service efficiency and eliminating the negative emotional state of minds of stake holders.

In summary, under the outside-in approach in PFM, proactive CRM initiatives outperforms traditional service in property management and this certainly enhances service efficiency by means of innovative services with AI building facilities in a residential estate. In addition, such uplifting in service efficiency through the provision of AI building facilities in a residential property including the formation of social chat groups in the building apps to promote happiness of stake holders, online booking facilities with high level of service fairness, digitalized access control system to avoid confrontations during the identity verification procedures and the Chatbot Solution to eliminate stake holder's complaints with instant solution; these independent variables when pairing with the mediating variables namely service efficiency, happiness, service fairness, conflict and complaint respectively helps building harmonious communities in a residential property. It is therefore, the theoretical base for this research is adopting the theory of CRM to explore its correlation with the building of harmonious communities in a residential estate with AI

facilities which shall also fall into the scope of social harmony in the long run with wider perspective. This research adopts a micro perspective approach to testify the building of harmonious communities within a residential estate in the property management industry; rather than from a macro perspective to achieve social harmony which is under the initiatives and jurisdictions of the local government both in Hong Kong and mainland China. However, such micro perspective approach may also at the same time highlight the research gap to achieve social harmony from a macro perspective with wider angles but this is beyond the scope of this research. For this research, the following hypotheses are formed under the theoretical base of CRM.

Study 1:

H1: The effect of using AI facilities outperforms traditional human-led property management services in terms of service efficiency and work accuracy.

H2: AI facilities help building harmonious communities via mediating variables including service efficiency, maintaining happiness, service fairness, avoiding conflict and eliminating complaint.

Study 2 (Hong Kong) and Study 3 (China):

H3: Service efficiency positively correlates with Service Quality of Property Management Company that helps building harmonious communities.

H4: Mobile App Communication Platform i.e. Social Chat Group enhances happiness of residents and helps building harmonious communities.

H5: On-line Booking system enhances service fairness and helps building harmonious communities of an estate.

H6: Access control system avoids conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.

H7: Chatbot solutions with instance responses eliminate complaints that help building harmonious communities of a residential estate.

1.5 Research Aim, Objectives and Questions

The main objective of this research aims to explore the fact that AI facilities adopted in property management industry are welcomed by property owners as these facilities are efficient and convenience that enhances the service quality in the property management industry. Although AI facilities provided in property management industry is not of large scale or of specialist level like those software used in the healthcare and medical services, these AI facilities provide convenience for property owners on a 24/7 basis with proper records to further follow up with. Besides, cost effectiveness is also an advantage to property owners as AI facilities would also enhance cost saving and accuracy at works. Having reviewed the AI facilities and its applications in peoples' daily lives in this digitalization era, there are research gaps to explore and explain the effect of these AI facilities which helps streamlining the efficiency of property management and also establishing harmonious communities in residential estates in Hong Kong and mainland China market. In fact, the cultural differences between Hongkongers who are mostly influenced by western education and thoughts and the mainland Chinese with the ancient Confucian style of thinking are also studied to see if the outcomes in response to the applications of AI facilities to build harmonious communities are greatly deviated. The finding of this study may also have impacts on the development and implementation of AI facilities in the field of property management in Hong Kong and mainland China that become a legislative yardstick or pre-requisites infrastructure or hardware in the property development industry, e.g. the PROTECH, BEAM Plus New Buildings, Smart City initiatives and so on in order to develop more smart and intelligent buildings due to the

positive effects of AI facilities on promoting the harmonious relationship among the stakeholders of a residential estate.

1.6 Contributions of the Research

According to the findings of the three studies, some contributions and managerial implications are affirmative. These are (1) AI facilities and services are of higher efficiency than the traditional human-led services in property management in Hong Kong and China. (2) AI facilities replace human repetitive and mechanical duties that not only save the relatively high labour costs in a labour shortage market, but its service efficiency also enhances the harmonious relationships among peoples in the communities. (3) AI services via on-line platforms eliminate human physical contacts that avoid confrontations, conflicts and face-to-face disagreements, which also reduce complaints and enhance service quality of the property management company. (4) AI facilities help building harmonious communities which may, to certain extent, toward the same direction for a certain period may achieve social harmony in the locality by all means. (5) By recognition of the positive effects of AI facilities in a residential estate/building, land developers both in Hong Kong and China can place more emphasis on the provision of artificial intelligence facilities for its developments under the PROPTECH, Smart City, Intelligent Building…etc. incentives to help promoting and the building of harmonious communities in different localities so as to achieve social harmony by all means.

1.7 Chapter Overview

In summary, this chapter introduces the research topic with detailed background, covering the trends to use artificial intelligent facilities in the market as daily routine, with particular highlights focusing on Hong Kong and mainland China property management market in achieving an effective and innovative management for service quality by respective

renowned service providers. The research topic has been discussed and highlighted with the research aims and objectives by exploring the relationship and effects on AI facilities to achieve harmonious communities in the property management industry. This chapter does cover the required ingredient to proceed with the in-depth research on the topic and I am expecting the contributions and managerial implications are both practical in academic domain and across the commercial world particularly in the property management sector. This chapter has provided an overview of the whole research in brief.

Chapter 2 – Literature Review and the Research Gap

The research works on AI in relation to harmony of a community is limited in the academic field and hence it is worth filling the gaps to understand the relationship that a digitalized AI-driven property management services shall have positive effects on building harmonious communities in residential estates. In fact, AI applications are sophisticated and very much trendy, advance and effective than the traditional human-led property management services in Hong Kong and China. This study aims to explore the needs and demands, and hence the advantages of using AI facilities in property management sectors in Hong Kong and China. It is hypothesized that AI-driven policies in providing digitalization systems in a residential estate shall have positive correlation in achieving harmonious communities disregard to cultural differences and the popularities in using AI facilities among property owners and residents in Hong Kong and China property management field. The following examines the term "Artificial Intelligence (AI)", its applications and its effects on nowadays business markets, particularly in the field of property management.

2.1 Artificial Intelligence

2.1.1 Definition of Artificial Intelligence

The term Artificial Intelligence was officially established in 1956 at Dartmouth College in the US by Professor McCarthy of Stanford University, Professor Minsky of Massachusetts Institute of Technology and Professor Simon & Newell of Carnegie Mellon University and other scholars. These scholars define Artificial Intelligence as the ability of machines to understand, think and learn in a way similar to human beings, i.e. using computers to simulate human intelligence. Since the 1970's, Artificial Intelligence has become a

popular research topic covering mechanical theorem proving, machine translation, expert systems, game theory, pattern recognition, machine learning, robotics and intelligent control. Some exploratory findings have led to the development of technologies and during the times which have also been applied to daily lives of every mankind.

According to Kaplan & Haenlein (2019) that the generation of AI can be divided into three stages include, the First Generation with weak and below human-level AI termed as Artificial Narrow Intelligence (ANI), e.g. enabling Facebook to recognize faces in images and tag users; Siri to recognize and understand your voice and act accordingly to respond to your requests; Tesla to develop self-driving function in their comfortable design electric vehicles and so on. The Second Generation with strong and human-level AI termed as Artificial General Intelligence (AGI) is able to reason, plan and solve problems for tasks that they are even never asked for. The Third Generation with above human-level AI termed as Artificial Super Intelligence (ASI) that AI machines are self-aware and conscious of the tasks so assigned and that makes human labour forces redundant. This generation is capable of scientific creativity, social skills and general wisdom. In order words, AI nowadays are capable of learning from humans and is able to analyse and provide the best solution to human for certain situations which has been proved to be the best solution in different scenario among those human experts in particular field. Its powerful ability in scanning the data base by analysing all information so learnt from or being programmed by humans has the potential to outperform human intelligence with certain technological boost and gatekeeping.

2.1.2 Early Development of Artificial Intelligence

It is not clear what the combination of brain functions generates the singular experience of sentience as brain alone cannot produce intelligence, but it is clear that human intelligent is

classified as complex neurological activities. Intelligence only emerges in humans who have fully formed brains and who are also the beneficiaries of long-term socialization experiences (Mead, 1934; Piaget, 1951; Freud, 1961; and Minsky, 1985, 2006). In 1950, Alan Turing introduces the "Turing Test" to prove that computer operated machines could achieve certain level of intelligence. Turing's test involves a remote, three-way conversation between two humans and one machine. A human interrogator is interviewing 2 interviewees, one human and one machine, in order to determine which of these two interviewees is machine. Turing argues that when the interrogator becomes difficult to reliably distinguish between the human and machine interviewees, the computer operated machine in question will have passed the Turing Test. Therefore, when the machines become indistinguishable during communication with human, these machines are artificial intelligence (AI). During the decade, it is arguably that Turing's speculations about AI are more academic than JFK's plan to land astronauts on the moon. Due to the role of a US President, JFK allocated most of the nation's resources to his new frontier on an astoundingly brief timetable, whereas Turing could only focus a fraction of his attention on the problematic issues of AI.

In 1996, the IBM-developed "Deep Blue" intelligence machine earned the notoriety of becoming the first computer to defeat a reigning world champion, Garry Kasparov, in a single chess game (Newborn, 2003). Finally, Deep Blue lost in the game but this inspires IBM to double their efforts to upgrade version of Deep Blue, unofficially named as "Deeper Blue". In 1997, a re-match was arranged between Kasparov and Deep Blue finally, Deep Blue succeeded in defeating Kasparov. The 1997 version of Deep Blue is capable of evaluating 200 million chess positions per second which is twice as far as Deep Blue in 1996 and also search 6 to 8 moves ahead in any situation of the chess game. Interestingly, Kasparov claimed that he has been cheated, and his allegation implies that

humans have interfered with Deep Blue 1997 version during the course of the re-match chess game. Upon entering into the new millennium, the notion of AI remains more fantasy than reality and it is evident that technology is making gradual and steady progress toward the dream of Turing.

2.1.3 Recent Development of Artificial Intelligence

According to Atkinson (2018), AI is defined as a part of computer science devoted to creating computing machines and systems that performs operations analogous to human learning and decision-making. Al involve many functions including but not limited to (i) deep learning (for perceptual tasks), (ii) understand knowledge representation required for domain-specific tasks such as cardiology, accounting or law; (iii) comprehensive reasoning covering deductive, inductive, temporal, probabilistic and quantitative; and (iv) interaction with peoples or other machines to collaborator perform tasks. The Association for the Advancement of Artificial Intelligence describes AI as "*the scientific understanding of the mechanisms underlying thought and intelligent behaviour and their embodiment in machines*".

During the past decade, there are a lot of important advancements in computer science especially in enabling some software systems to improve the way they compute. Nowadays AI is being computed to reason, think and learn more effectively and efficiently. AI therefore has become more powerful and valuable complement to human capabilities. They improve medical diagnoses, accurately predicts weather condition, effective supply-chain management, well-planned logistic strategy, predict customers' behaviour e.g. understand and provide the list of your interested items including where to go for vacation and what to buy.

Apart from all these positive benefits coming from the AI, there are also threats that the myths of future AI that kills human. According to Professor Roger Schank (2014), former Stanford computer science professor concluded that "The development of full AI could spell the end of the human race." Further to the summing up by Professor Robert Provine (2015), professor of Neurobiology from the University of Maryland that "*Fear not the malevolent toaster, weaponized Roomba, or larcenous ATM. Breakthroughs in the competences of machines, intelligent or otherwise, should not inspire paranoia about a future clash between humanity and its mechanical creations*". Professor Roger Schank (2015) further writes, "*Everyone should stop worrying and start rooting for some nice AI stuff we can all enjoy*".

The AI nowadays are trained to grasp the most up-to-the-second information with the on-line big data base through internet, most surprisingly AI are trained to learn, think like human with logical sequences, and response like a consultant with solutions and recommendations. Therefore, AI nowadays are presented in the form of robotic machines that augments a human worker embodied with sophisticated sensors, motors and actuators, beautify like human beings to recognized peoples and objects and work safely alongside humans (e.g. "Sophia" developed by a Hong-Kong based company Hanson Robotics in 2016; "Aida" from SEB, a major Swedish Bank; and "Cortana" as an AI agent that facilitates interactive communication between employees and customers to scheduled meetings and so on) has become the super power in that business organization to uplift the service efficiency, customer services and work accuracy so as to achieve the mission of service quality in the business world.

2.1.4 Government Directions toward AI Development in the US, EU and UK

According to the Report released in 2016 and titled, "***Preparing the Future of Artificial Intelligence***" prepared by the United State White House Office of Science and Technology Policy (OSTP) on AI indicates a confident tone and reflects the positive view of technology reminiscent of that found in Silicon Valley. The Report is aimed at the tech-sector and the general public and defines AI as technology that helps augment human capabilities instead of replacing them to establish a "***Good AI Society***", in which AI is applied for the public good and to tackle some of the world's greatest challenges and inefficiencies. Further, the Report stress that innovation is the thread that holds together the OSTP's approach to AI. In a nutshell, AI is good for innovation and economic growth, and this is good for society. According to Finley (2016), the US Government tries to ensure that the development of AI technologies will not be hindered under the term "***Allowing a thousand flowers to bloom***". The US Government also implements some regulatory schemes to control the development of AI in commercial world, e.g. the automotive and aviation industries. However, AI shall continue to innovate within the broad risk management regulatory framework set by the government. The Report also emphasises the importance of research on AI and requires research community to ensure AI ids accountable, transparent and the AI operation will remain consistent with human values and aspirations.

The House of Commons' Science and Technology Committee release a UK Report in October 2016 aiming at identifying the potential value and capabilities of AI and robotics as well as examining the potential problems and adverse consequences that require prevention, mitigation and government intervening control. It establishes a clear role of the government to play in the development of AI, mainly through "***careful scrutiny of its***

ethical, legal and societal dimensions" in order to develop "***socially beneficially AI systems***".

According to the European Union (2016), the EU Report calls for "***intrinsically European and humanistic values***" to ground "***rules, governing in particular liability and ethics***" of robotics and AI. This represents a guiding ethical framework for the design, production and use of robots. The EU Report also recommends establishing the "European Agency for Robotics and AI" not only monitoring the trends in AI but also envisioning future impacts and giving advice to public players in AI and robotics development.

In brief, those leading countries have already acknowledged the importance of AI development and set some guidance and initiatives towards the research and development of AI and robotics applications in the commercial world. Government interventions have already been taken place by setting a framework to control the functions and applications of AI facilities solely to build a good society in which human dignity may flourish. Under such governmental umbrella, the followings examine the benefits of applications of AI facilities in the commercial world.

2.1.5 Artificial Intelligence and Human Intelligence

All the above-mentioned AI-driven digitalized estate management services bring value added advantages to property owners in many aspects. This comes the threats that sooner or later AI are replacing human workforces totally as technologies make human workforces easier at work and increase profit margin, mitigate risks and keep processes running with machine or robotic devices which are less complicated to recruit human for these tasks. However traditional human-led estate management services may not be easily replaced as AI cannot produce the sense of real care, or warmth, through behaviours

e.g. building / maintaining harmonious relationships in communities, social interaction, caring, proactive manner, suggestions, physical contact.

In addition, any interruption in technology enabled profit accumulation is deemed threat, termed as the cyber threat created by professional PC hackers in the form of astronomical increase in traffic flow to the corporate routers or intrusion attempts to steal data from corporate servers. In which AI is incapable of taking independent decision, especially the decision where AI is competing with Human Intelligence (HI). By far, we trust that AI is winning human intelligence in terms of numeric analysis, repetitive enumeration and statistical patterns and graphs. However, it is believed that the contributions from AI facilities surely benefit all walks of life on daily basis and this, should also promote the harmonious relationship among human beings in human communities. This leaves a gap for AI researchers to fill by investing more resources to find harmonious ways to connect the dots between artificial intelligence and human intelligence so that AI and HI co-exist in a compatible way. As human, we need to demonstrate the ideal human intelligence paradigm as a model to follow and improve on for AI. First thing to do is to examine and testify the benefits of deploying AI facilities in providing an efficient and hassle-free on-line system for a 24/7 round the clock services is always correct and positive. This ensures customer's requests are addressed without physical interaction. This is exploratory to prove the correlation between the AI facilities with a strong relationship in building harmonious communities in a residential estate. This research aims to explore the effects of AI facilities in building harmonious communities in property management in Hong Kong and mainland China. Before investigating the relationship and correlation between AI facilities and harmonious communities, we need to understand the meaning of harmony and in particular with regard to social harmony from a macro perspective and

individual / interpersonal harmony from a micro perspective and its effects in the field of property management.

2.2 Customer Relationship Management (CRM)

It is imperative for any organization to maintain good relationships with its customers in search for business growth and profits in nowadays competitive market. Therefore, first class customer service is of paramount importance and becoming one of the attributes to gain competitive advantages and hence the success of a business in the service sector. Schneider and Bowen (1999) expresses that companies in service industry shall continuously improve customer experience to enhancing their satisfaction with quality in a competitive marketplace. Dean and Terziovski (2000) further reflect that customer service has strategic importance of a company. In addition, Kotler, (2000) opines that customer service refers to the processes and actions that customers can do business with a company in an efficient way. Obtaining the data of existing customers through digitalization and service innovation is importance to enhance growth of the business and gaining competitive advantages in the market. Customer data provides opportunities for a business to practice proactive customer responsiveness (Potter-Brotman, 1994), it implies that an organization can use those collected big data to facilitate their understanding and hence, ability to predict the needs of individual customer.

The main objective of CRM is to collect, as much as possible, the customers' data via information technology and business objectives of an organization so as to retain existing customers and also acquire new customers by extending the lifetime value of its customers (Peppard, 2000). Organizations with strong emphasis on customer relationship initiatives are forward-looking organizations that can establish and maintain customer satisfactions, and hence customer loyalty and intention to buy. However, CRM requires company-wide

commitments and those CRM strategies must be supported by all level of staff in an organization. It also requires interactions with the customers by means of data integration. Without customer data integration, gaining the complete perspective of a customer is considered impossible.

According to Ryan (1999), the primary factors in distinguishing a successful business are price, sales channels and quality of customer service. During the customer life cycle, a business shall build, develop, and maintain the relationships with good customers. Mike Hoots (2004) reflects that "Where there are gaps, there is dissatisfaction", the secret and core competence to the success of the service providers is to close the gaps between customer expectations and service delivery realities. The first attempt is to close the gap in customer expectations; secondly to close the gap in resources and finally, close the remaining gap. Under any circumstances, allows customers to decide his or her interests that will certainly lessen their expectations or requests to provide supplemental resourcing. Guiding and directing the customers to close the gap between their expectations and the delivery of service realities. To maximize the term "whenever possible", PFM professionals shall be more creative with unlimited imaginations with creativity and also focus on outside-in CRM approach and not the traditional inside-out customer service practices. Consequently, PFM professionals can be able to predict and lead customer's behaviour with innovative services/products. Buttle (2004) suggests that CRM is the core business strategy that putting internal processes and functions together with external networks in order to create and deliver value to those targeted customers with profits. It is subject to the high-quality customer data and being manipulated by those IT professionals. CRM can also be classified as a business strategy used to identify, cultivate, and maintain long-term profitable customer relationship. It requires setting up business strategies to pinpoint the most profitable customer relationships and/or those with

the most potential, and then to provide these customers with service quality that will exceed their expectations (McDonald, 2002).

2.3 Social Harmony

According to the definitions contained in the Cambridge Dictionary, harmony means: agreement of ideas, feelings, or actions, or a pleasing combination of different parts. It is also the combination of separate but related parts in a way that uses their similarities to bring unity to a painting, drawing, or other art object. It is also referring to the situation in which people live or work happily together without any big problems, people are peaceful and agree with each other or when things seem right or suitable together. Harmony is a very important concept and top priority to Chinese culture, which is treated as the cardinal cultural value among the Chinese society (Chen and Starosta, 1997). According to Chen (2001, 2002), harmony is the essence of Confucian theories of social interaction. According to Delury (2008), harmony is a central concept originates from the ancient Chinese philosophy particularly the Confucianism. Social harmony has been described as the state without conflicts and disagreements in which there are also rooms for loyal opposition. However, emphasis on order and stability has been happened in a later stage which has ignored social disparities and conflicts (Cheung 1989) in the interpretation of social harmony. According to the research conducted by Ip (2014), the two Chinese societies including Hong Kong and Mainland China shared enough overlaps to warrant the view that "happiness" could be used as a comparatively useful measure of the well-being of Chinese societies. Happiness is deeply influenced by the rooted cultures and values people adopt, which reflects that the nature of Chinese happiness is more effective in measuring social harmony. Under the Harmony Survey conducted by Ip (2014), factors contributing to social harmony including; fair government, facilitating fair competitions, promoting democracy, good relationship between government and citizens, communicate

with peoples with different views, innovativeness, tolerance by accepting difference in opinions, forgiveness and sympathy, and team spirit and cohesion. Further research on Group Harmony conducted by Chen, Unal, Leung & Xin (2016) addressing the imbalance between harmony and conflict by measuring the relative degree of negative relationship among group members in terms of animosity, friction and personality clash among group members (Jehn, 1995). According to Chen et. al. (2016), group harmony associates with innovative performance through increases in knowledge-sharing, reduces in task conflict and neutralizes its negative effect on the other.

2.3.1 Meaning of Harmony in Schools of Thought in Ancient China

The core spirit of harmony from the Confucianism is interpreted as "***he*** (和)", which presupposes the existence of different things and implies a certain favourable relationship among them. "***He***" also covers consent, harmony, friendship which is of great importance to the traditional culture of all Chinese peoples. This serves as a basic principle in communication and basic rule in regulating the relationship among people, individual and the society. Confucius (孔子), Mencius (孟子), Xunzi (荀子) being the remarkable leaders in ancient School of Thought in early China make an incisive statement of the essence of harmony ("***he***") in human relationship, in which "***ren*** (仁)" refers to faculty possesses in human beings that shows love and affection to one's counterparts in social interaction, and "***li*** (禮)" is the fundamental etiquette that shows respect for peoples in social gatherings. "***ren***" and "***li***" is considered the best way to realize and interpret "***he***". In order words, "humanity" and "ritual" is the best indication to interpret harmony. According to Analects 13.23, Confucius uses the concept of harmony toward a "***junzi*** (君子) a gentle person" that "***… "junzi" harmonizes but does not seek sameness whereas the pretty person seeks sameness but does not harmonious…***". One of Confucius's disciples Youzi concludes that "Achieving "***he***" harmony is the most valuable function of observing

"***li***" (Analects 1.12). In is observed that Confucius and his disciples recognize that there is a direct connection and/or a strong correlation between "***li***" and "***he***" in the ancient time of China. This concept also applies to governances that through proper use of "***li***", good government can build a harmonious society. Mencius believes that among "***he***" harmony, "***ren***" humanity and "***li***" ritual these three important elements of a human being, "***he***" harmony among peoples is of the greatest significance that, "***…good timing is not as good as being advantageously situated, and being advantageously situated is not as good as having harmonious people…"***" (Mencius 3B.1). Confucius suggests that "***…to harmonious with others by goodness is being reasonably accommodating; …to harmonize with others by wickedness is fawning***". This is further supplemented by Xunzi that "***…harmony shall equip with principles, and differences and conflicts shall coexist***". Therefore, principle and main conceptual idea of harmony can be defined that, harmony is different from sameness which cannot tolerate differences, in other words, harmony contains differences and encourages coexistence of differences.

In summary, there are some implied principles of Harmony from Confucianism perspectives, according to Li, (2006), he concludes the definitions derived from the leaders of the School of Thought in the ancient China and suggests the following four principles of harmony:

(i) Harmony is an ethical issue;

(ii) Harmony is about interpersonal relationship;

(iii) Harmony is not sameness it contains differences and encourages coexistence of differences. Sameness itself is not harmony; and

(iv) Harmonious relationship implies mutual complement and support (Cheng 1991).

Since the concept of harmony is long established in ancient China, most of the attention has been paid to social harmony to achieve mutual understanding, conflict solving,

cooperation and mutual assistance. This primitive concept of harmony since the ancient time accounts for the cultural differences between Chinese tradition and Western culture up to the present time.

2.3.2 Social Harmony in Nowadays Perspective

Social harmony is defined as individuals who have integrated themselves and unifying with communities of social values that create mutual respect, mutual uprightness, embracing with peaceful mind and safety zones with due respect to humanism, cultural diversity and spiritual levels. Mutual respect refers to the composite of love, affections, admirations, favour, reverence, deference, regard, appreciations, considerations, thoughtfulness and esteem for someone or something with specific roles or functions. Respect is a two-way process which normally embodied voluntarily in words and actions. Mutual uprightness implies being righteous that is behaving in a moral, honourable, decent, honest, respectable, conscientious, and considerate manner. Both these two elements are important in interpersonal communication that builds good and harmonious relationship within a community. In addition, friendship and patience toward interpersonal communication would also lead to harmonious relationship and hence building harmonious communities by all means. Although societies have differences in their social value systems, such as kindness, happiness, peace, personal freedom, preservation of life, peaceful and harmonious relationships; such value systems can exist through good interpersonal communication in uplifting human relationship.

It is impossible to build harmonious communities / society in the absence of moral culture, and social justice and/or fairness is crucial in the process to achieve social harmony in order to build harmonious communities. In Chinese culture, justice is closely linked with sincerity and integrity. The ideal state of social harmony forms a balance between the

interests of different social groups, the interests of present and future generations, and the relationship between society and the nature.

2.3.3 Harmonious Society in Mainland China

The concept of Harmonious Society was introduced by the previous President of the People's Republic of China, President Hu Jintao in the early 21st century. President Hu (2005) sees harmonious society as "*democratic and rules by law, fair and just, trustworthy and fraternal, full of vitality, stable and orderly, maintain harmony between man and nature…etc.*" Each of these items has very complex meaning and implications which may not inherent the same interpretation as in the Western countries. According to Hu (2005) democracy under the socialist government and the rule of law means rule by law, by not the law commonly used in the West. More specifically, Hu suggest that in achieving a harmonious society, only socialist democracy can protect people's democratic right and build the relationship among the party and the people, central and provincial government, different social strata and ethnic groups and different nationalities. Fairness and Justice is to balance the interests of different sectors of society so that internal and social contradiction can be resolved. Trustworthy and fraternal, in normal terms as honesty and friendship implies that the community members help each other and keeping the honest to each other to build stronger relationship. Vitality refers to creative and innovative ideas which are encouraged with due respect and full supports so as to recognize its beneficiary results to the public at large. Stable and orderly covers the provision of an effective and efficient management on all social organizations that equality and accommodating differences are used to build a peaceful and happy living for peoples in the society. Consequently, strong and cohesiveness relationship are being built among the peoples in the society. Last but not least, humans shall live in harmony with the nature and shall maintain an ultimate balancing point by not compromising with

productivity, wealth, individual likings, excessively use of natural resources for low priority purposes and so on. Humans must respect the nature to build the harmonious relationship with the nature.

Further to President Hu's harmonious society administration, the scientific development concept shall be paired with social harmony which is two sides of the same coins (Fan, 2006). Social harmony covers not only family and/or interpersonal relationships, but also those of the rulers and the ruled. Nevertheless, harmonious society/communities still consist of conflicts, disagreements and loyal opposition. As further defined by Li and others (2006, 2008) there are differences and distinctions between harmony and sameness, this is crucial in understanding the definition of harmony. Difference is a precondition and cornerstone of harmony, which is also a process full of tension, conflict, strife, negotiation and sought to become harmonious. Disharmony shall exist during the process of harmonization (Li 2006).

2.3.4 Harmonious Society in Hong Kong

In examining the characteristics of the harmonious society of Hong Kong peoples, we must first understand the historical background that leads to today's culture of all Hongkongers. Before the returning of the sovereignty to China on 1 July 1997, Hong Kong is under the governance of the British government for a century (i.e. 100 years) that most of the policies, systems, rules and regulations and so on are adopted and closely related to and similar with the British standard and practice. Therefore, Hong Kong although geologically part of the mainland China, enjoys the benefit of free-port, high degree of autonomy and freedom that all Hongkongers live under the shadow of a Western country and establish her own culture under the full influences of the West. However, some of the major old Chinese traditions, culture, values and thinking are kept among the society

which is reflected in every detail of the daily life of every Hongkonger. After the formation of the Hong Kong SAR Government upon the returning of the sovereignty to China on 1 July 1997, the Basic Laws governing the rules and regulations of Hongkongers are designed to achieve a stable and peaceful transition by allowing basic freedom, rights, values and ways of life of all Hongkongers are preserved and maintained for a term of 50 years until Year 2047. It seems a good strategy to cope with the transition with minimal adverse societal impacts and to build social harmony in local territory however things do not turn out as expected.

Since 1997, there are many large-scale petitions against the imbalance of wealth distribution between the rich and the grass root income class, political confrontation as a result of inequality in policy making, the adverse effect of so many virus infections (e.g. SARS, Dengue Fever, H5N1 and COVID-19), all these unexpected adverse effects badly destructing the whole economy and society that results in social disharmony in Hong Kong. According to the findings from the surveys conducted by The Chinese University of Hong Kong (CUHK) in 2012 and The Hong Kong Professional and Senior Executives Association (HKPASEA) in 2010 with regard to Peoples' Perceptions of Social harmony in Hong Kong, the figures of CUHK conducted survey shows a declining trend of social harmony in Hong Kong during the Year from 2006 to 2008. In which contradictions between the government and citizen rank as the top attributes to social disharmony and the second top attribute is the contradiction amongst big organisations and their staff. According to the survey conducted by HKPASEA in 2010, social harmony is measured with three domains including (i) political governance, (ii) social aspects and (iii) economy, family and work aspects. The findings show that those declining items are maintaining fair governance; fair competition and giving no preferential treatment for business; and seeking political harmony and reducing disagreements. The results of these two surveys

demonstrate the perception of social harmony of Hongkongers in the society which is also a good source to understand peoples' concepts on harmony in the society and the local communities

According to the research on social harmony in Hong Kong conducted by Ho & Chan (2009) that four core values are suggested to foster social harmony in Hong Kong, these include: (i) A just government with sincerity in communication; (ii) Mutual support and respect with integrity and dedication; (iii) Dedication to one's job and community by helping those in need; and (iv) Creativity and progressiveness in facilitating social integration. These core values should be well recognized by the government officials and her citizens that both parties share the important role to play in fostering social harmony. However, the government should take the leading role to promote social harmony so that peoples can see the government is consciously leading the society to harmony. In fact, social harmony and/or harmonious communities shall be seen from a macro perspective rather than micro perspective,

From a micro perspective, the findings and manipulation of "Harmony" conducted by Professor Wan (2002) in the University of Hong Kong with a sample size of 213 Hong Kong Chinese is that, a high harmony condition under the description of interpersonal relationship is defined as, "*They got along with each other well, had good communication, enjoyed open discussion, often participated as a team in various kinds of competition*". However low harmony condition is defined as, "*did not get along well with each other, each person has his/her own agenda, participated as a team in competition often ended up with quarrels and conflicts*". This could also define harmony in a more practical way among the community of Hongkongers. In this research Service Efficiency, Happiness, Service Fairness, Conflict and Complain are used as mediating variables to paired with the

independent variables (i.e. Ai facilities) to testify the correlation of innovative AI facilities that help building harmonious communities. These identified factors may not only attribute to the building of harmonious communities but also promote social harmony in Hong Kong in the long run.

2.4 Mediating Variables that connecting AI facilities and Harmonious Communities

Having preliminarily introduced the mediators that are thought to have correlations with the building of harmonious communities within a residential estate, these include (i) Service Efficiency, (ii) happiness, (iii) fairness, (iv) conflict and (v) complaint. The followings examine these mediating factors with reference to the views of other scholars in the academic domain.

2.4.1 Service Quality and Service Efficiency

The concept of service quality is complex, diffuse and abstract – largely due to the distinctive features of a service: intangibility, heterogeneity and inseparability (of production and consumption) (Carman (1990), Zeithaml (1988), Parasuraman et al (1985). Service quality is rather subjective and less objective concept by nature which should have direct linkage to expectation of customers. Lewis and Booms (1983) defined service quality is a kind of measurement which is used to determine how well the service quality being delivered could match the expectation of customers. Such concept of expectation is directly correlated with customers' attitudes and that the quality has also been conceptualized from the perspective of attitude. The perception of customers with regard to service quality originates from a comparison of what they feel service providers should offer, this can be treated as customers' expectation. Perceived service quality is therefore viewed as the degree and direction of discrepancy between consumers' perceptions and expectations, i.e. the P-E relationship.

Regarding the dimension of service quality, Lethinen and Lehtinen (1982) viewed quality as a 3-dimensional concept that incorporates physical quality, corporate quality and interactive quality. Gronroos (1984) made a distinction between technical quality and functional quality. Furthermore, Gummesson and Gronroos (1987) divided service quality into four elements including the design quality, product quality, delivery quality and relational quality. Later on, Edvardsson, Gustavsson and Riddle (1989) suggested service quality into four types, i.e. technical, integrative, functionality and outcome quality. Service Quality, SERVQUAL is a 22-item generic service industry instrument which assesses service quality on five dimensions including reliability, assurance, tangibles, empathy and responsiveness. The scale was developed over years of studies undertaken over banking, credit card, telephone and repair & maintenance industries (Parasuraman et al., 1985; 1988; 1991; 1993; 1994). Parasuraman et al suggested that SERVQUAL is appropriate and can be applied to various service industries. This has been, in fact, used for many different service industries including hotels, dentistry, travel, higher education, accountancy, architecture, hospitals and construction services.

Nelson and Nelson (1995) has investigated and develop a version of SERVQUAL for specific use in real estate brokerage, such new instrument which is called RESERV has been adopting the development process of SERVQUAL in the field of real estate development as a reference point. RESERV scale contained 31 items in 7 dimensions and demonstrated high internal consistency and convergent validity. Nelson and Nelson (1995) found that RESERV is appropriate for measuring service quality in the residential real estate industry as this is not uniquely different from other service sectors. They also found that apart from the basic 5 dimensions 2 additional dimensions named professionalism and availability were added. These 7 dimensions being adopted in the real estate industry are (i) Tangible; (ii) Reliability; (iii) Responsiveness; (iv) Assurance; (v)

Empathy; (vi) Professionalism and (vii) Availability. These dimensions also attribute to service efficiency in the property management in terms of 24/7 immediate response and relationship building among the stake holders toward the building of harmonious communities. In fact, most of these dimensions including, reliability, responsiveness, assurance, professionalism and availability are currently adopted in property management industry in Hong Kong and China as AI facilities with 24/7 on-line service basis accounts for the majority of these dimensions with immediate / quick response with professionalism that enhances service quality or RESERV in the real estate industry in terms of service efficiency with quality assurance.

2.4.2 Happiness

Due to the popularity in the research of "Subjective Well-being" over many centuries in a large number of disciplines including ethical, theological, political, economic, and psychological fields (Diener 1984; Veenhoven 1984), many terms are used to describe well-being including happiness, objective & subjective well-being, quality of life and life satisfaction. Due to its most popularity both in research and lay usage, "Happiness" has become an index term in Psychological Abstracts International since 1973. There are two possible components of happiness, (i) peoples are experiencing a positive emotional state, e.g. with joy and satisfaction; and (ii) peoples are satisfied with their life as a whole or with parts of it. However, happiness is not the opposite of unhappiness, depression, poor quality and dissatisfaction of life, and so on as these have some other different causes (Argyle 1987; Lu 1995). As reflected by Andrews and Whitney (1978) that happiness consists of three components, (i) positive emotion, (ii) life satisfaction, and (iii) the absence of negative emotions or psychological distress. Ryff (1989) further supplements that there shall be the fourth component concerns self-fulfilment and other "depth" elements such as purpose in life and personal growth. A similar dimension of inner

psychological experience has been found to be produced by seriously engaged in leisure activities, getting on well with loved ones, or feeling overwhelmed by the beauty of the nature (Argyles & Crossland 1991; Lu & Argyle 1994). Hence, the most generic description of happiness would be "***an internal experience of a positive state of mind***", which can be induced through various means. Although there are many different measurements to measure the degree of happiness, none of these measures has been widely accepted and most of these measures have included either the emotional aspect or the cognitive aspect of happiness (Diener 1984; Strack, Argyle & Schwarz 1991). According to the Oxford Happiness Inventory (OHI); Arygle, Martin, & Crossland 1989, the OHI is the only exception which has been developed with an underlying conceptualization of happiness consisting of life satisfaction, positive effect and absence of negative effect. The OHI has good reliability and validity (Argyle & Lu 1995). Some other researchers perform factor analysis on the OHI with different groups of participants including young and old, male and female, students and community residents. The findings show a relative stable structure consisting of seven components of happiness, i.e. (i) positive cognition, (ii) social commitment, (iii) positive effect, (iv) sense of control, (v) physical fitness, (vi) satisfaction with self, and (vii) mental alertness. These reflect a sense of intrapersonal focus of happiness which is internal evaluation and self-contention. Social commitment is the only component that reflects the interpersonal sphere of happiness. In addition, a brief measure on judgment of people's subjective happiness named the 4-item Subjective Happiness Scale (SHS; Iani et. al. 2014; Lyubomirsky and Lepper 1999) which has been tested in the US and Russia is widely used in many western countries as it has been proved to be valid and reliable in measuring the construct of subjective happiness (Joshanloo and Jarden 2016). So far, all the researches are conducted in the western countries by western scholars with western participants, it leaves the gap of cultural differences in defining and measuring happiness for western culture and

the eastern culture. It remains to prove whether the western conception of happiness via its scientific measurements can be universally applied regardless of cultural differences.

It is therefore of paramount importance in understanding the concepts and the components of happiness of Chinese people whether it differs from that of the western populations. Until recently, the word "Happiness (快樂)" does not appear in Chinese literatures, in fact the ancient Chinese writings similar to happiness is "***Fu Qi*** (福氣)" means "Blessing or Good Fortune" which is a vague description of "anything positive and good in life" (Xin Hua Dictionary, 1987, p.127). Wu (1991) defines best values in life include longevity, prosperity, health, peace, virtue, and comfortable death and therefore, in simple terms, the conception of happiness of Chinese people is material abundance, physical health, virtuous and peaceful life, and relief from death anxiety. Under the primitive influence of the Confucianism in Chinese societies, unlike the Christianity emphasis on salvation in the next life, Confucianism advocates that one should strive to preserve the prosperity and vitality of one's family. In achieving this life-long ultimate mission, one must work hard, be frugal to accumulate materials resources, obtain respectable social status, suppress selfish desires and behaviours, lead a virtuous life and fulfil one's social duties. All these Confucian teachings place emphasis on self-control and social interaction which forms a basic in understanding the cultural influences on interpreting the concepts of happiness among the Chinese societies. Yang and Cheng (1992) divided the Confucian values into four groups, (i) family factors including family responsibilities and obedience to one's elders; (ii) group factors including acceptance of social hierarchical structure with trust and obedience to authority together with commitment to harmony; (iii) job-orientation factors including education, skill learning and hard-working; and (iv) disposition factors including calmness, humility and self-control. Exercising all these values shall achieve happiness in life. Wu (1992) asserted that Confucian happiness is achieved through "knowledge,

benevolence, and harmony of the group. General speaking, Chinese culture emphasises sharing the fruits of individual success with the group and therefore individual contributions to society or the local communities is the ultimate happiness, whereas hedonistic striving for happiness is regarded as unworthy and even shameful. Although there are some conceptual similarities on the definition of happiness between the west and the Chinese such as pleasure and positive effect, the concepts of happiness of Chinese people still exists differences as some distinct sources of happiness that are not considered in the western measurement including the OHI. According to Lu and Shih (1997), "*The conception of happiness as harmony in interpersonal relationship conveys a desire for solidarity and loyalty, especially within the family or clan*". Therefore, western concepts of happiness lean to intrapersonal, individualism and internal evaluation, values and contentment, but the Chinese concepts of happiness place emphasis on interpersonal, collectivism and external evaluation and satisfaction within the societies. This spilt is consistent with Triandis's (1994) distinction between individualism and collectivism. The more the interdependent East Asian cultural contexts, happiness tends to be defined in terms of interpersonal connectedness or a balance between the self and others (see Uchida et. al., 2004; Uchida & Ogihara, 2012), and the pursuit of happiness is not seen as a thing that individuals can pursue, but it is experienced within shared relationships. Furthermore, in cultures that seek harmonious happiness between different generations, Hitokoto and Uchida (2015) proposed the concept and index of interdependent happiness by using a 9-item Interdependent Happiness Scale (IHS). This IHS measures how individuals feel happiness by seeking relationship harmony, quiescence and having an ordinary life through the collective well-being platform. It is therefore noted that Chinese culture on happiness begins with individual contributions to the society and harmony of interpersonal relationship in the communities with gratifications and respects to achieve the harmonious communities for a better life experience.

The mobile applications can establish Social Chat Group under the AI facilities can promote the relationship among the group members with similar interests or purposes. The emphasis on harmony and sharing within the in-group is strong in the Chinese culture (Ho & Chiu, 1994). Chinese devalue self-interest, and value sharing of economic resources and fostering good relationship with in-group members. Chiu & Hong (1997) proposed that Chinese are willing to share both positive and negative outcomes with in-group members. In fulfilling the need to maintain social cohesion and group harmony, property owners and residents within the social chat group would tend to make internal attributions and take personal responsibility for negative outcomes, and also make external attributions and share the credit with others for positive outcomes. This implies that property owners and residents of the social chat group through the mobile apps platform would share the responsibilities and credit with others in the social surrounding for a positive outcome, i.e. the building of harmonious communities within the estate. Happiness is therefore chosen to be one of the mediating factors to testify the relationship between AI facilities and building harmonious communities in this research.

2.4.3 Service Fairness

In better understanding the term fairness, the "Fairness Theory" shall be discussed. The "Fairness Theory" posits that actions seem unfair when people feel that those actions ***would*** have been better if the relevant persons ***could*** have and ***should*** have acted differently. The ***"would-based***" contrast between "feeling good" and "not feeling good" is by itself insufficient as grounds to hold someone accountable for unfair treatment, the money lost from bets at Las Vegas is a good example that no one is accountable for the unfavourable outcome. When a ***"could"*** counterfactual (i.e. contrary to fact) contributes treatment to the possibility that someone might be held accountable for an unfair treatment, the language of perpetrator and victim begins to have the potential for becoming applicable.

In short, the "***would***" counterfactual of a victim involves perceptions on unfavourable conditions, where "***could***" counterfactuals refer to perceiving someone as a person whose actions could account for variations in the kinds of conditions that the victim might experience. Finally, the "***should***" counterfactual in unfair treatment conditions refer to alternative courses of action but applies normative standards of right and wrong to evaluate them. It is because when one person is capable of hitting another does not make it seem like appropriate conduct, but it might well seem fine in a boxing ring competition. Fairness theory does not entail that counterfactuals be conscious or in a specific sequence, and it accommodates interactional, distributive, and procedural justice based on three different counterfactuals, namely ***would, could and should***. According to Robert Folger (2001), modern managers can and should use fairness theory to address issues, challenges, and opportunities they face, but managers need to alert how circumstances can change in the following conditions, (i) what employees perceive "***would***" be more desirable than what the organization provides or is doing; (ii) what employees perceive that management "***could***": be providing or doing; and (iii) what management "***should***" be providing or doing.

According to Seiders and Berry (1998) during the interaction process, customers in the banking industry generally expect expediency, fair price, concerned management and staff, accurate transactions and institutional stability and their perception of fairness of the total interactional experience will determine whether they will be committed, give a voice or exit the bank. Sindhav et. al. (2006) echoed this view that perceived fairness is an important area of investigation in marketing because an exchange relationship could be regarded as unfair by one or both parties with impending outcomes. The perceived fairness during a transaction is of paramount importance in retaining customers in the service industry including banking, property management and so on. According to Namkung and

Jang (2009), perceived service fairness shall have positive impacts on customer's satisfaction and drive their future behavioural intentions. Many scholars hold different views on the structure of service fairness, some research support the two-factor model consisting of distributive and procedural fairness (Greenberg, 1990). Others argue for a three-factor model (Mattila and Cranage, 2005) and even Carr (2007) advocated for a four-factor model comprising informational fairness, interpersonal fairness, distributive fairness and procedural fairness. Furthermore, Namkung and Jang (2009) also proposed a four-factor structure of service fairness including price, interactional, procedural and outcome fairness which found strong psychometric properties for the scales in the restaurant industry in the United State. With regard to service quality and service fairness, Seiders and Berry (1998) however argued that service fairness is distinct from service quality as poor services may be classified as lower in quality but not necessary unfair if it does not violate any principle of justice such as equity and equality.

According to the Equity Theory (Adams 1965), service fairness is performing the function of equitable balance on outputs and inputs in terms of monetary, time and effort expenditure between a firm and its customers (Berry et. al. 2002; Oliver & Swan 1989). Seider and Berry (1998) state that wasting customers' time indicate a lack of accountability on the part of service provider and this further reduces the overall service fairness perception of customers. According to the Justice Theory, customers' perception of service fairness leads to customer satisfaction (Gelbrich & Roschk 2010; Maxham & Netemeyer 2002; Smith et. al. 1999). Bolton et. al. (2003) defined fairness as a judgement of whether an outcome and/or the process to reach the outcome are reasonable, acceptable or just. Unfair service is generally judged as being lower in quality and possesses negative effect on the satisfaction levels as well as future behavioural intention of customers (Namkung and Jang, 2010). In Chinese culture, Confucian belief that

perceived fairness in the distributions of basic means of livelihood is the foundation to build a harmonious society (Chen et. al. 2016; Leung et. al. 2002). Until most recently, according to Unal, Chen & Xin (2017), the analysed data on 106 upper-level management teams from Chinese organizations showed that justice climate are positively associated with group harmony. Therefore, it is quite obvious that perceived fairness is performing the mediating role between service efficiency and customer satisfaction to achieve service quality and hence building harmonious relations among peoples. This research will adopt fairness, more specifically "service fairness" as a mediating variable to testify its mediating role of service fairness in promoting and establishing harmonious relationship among the service provider and its customers and stakeholders in the communities, that is to provide quality service to achieve customer satisfaction in terms of service efficiency under a fair operation system via the independent variable namely the on-line booking facilities in the field of property management of a residential estate, so as to build harmonious communities.

2.4.4 Conflict

The early statement on Conflict Theory was originated by a sociologist named Karl Marx in the early 1800's in response to his main concerns over class and dialects of capitalism in that era. Thereafter, many scholars do contribute to the conflict theories however most of these theories are of macro level in respect of social, economic and capitalism interest and until recently there are researches on micro level in examining the behaviour of human and their interpersonal relationships so as to understand and handle human conflicts in a more practical perspective. In understanding harmony, one may realize the causes of its opposite, disharmony. Disharmony among human beings in a society is the negative results of poor interpersonal and societal relationship in which conflicts exist and destroy the harmony of a society. Conflicts among peoples will lead to an unfair and

disharmonious condition which also diminishes security of peoples' lives. Conflict exists whenever there are differences among groups or between individuals due to different opinions on certain subject, difference in values, expectations, needs, workplace practices and personalities. In turn, this produces conflicting situations, actions and outcomes. Many conflicts happen without warning and therefore a reactive approach is inescapable (Zia and Syed, 2013). Conflict management or conflict handling styles is therefore important for an organization to place emphasis on so as to suggest preventive solutions and aftermath treatment to handle conflicts. Many scholars have their own conceptual models on interpersonal conflict management styles (e.g. Blake and Mouton, 1964; Thomas, 1976). However, Rahim (1992) proposed a conceptualized classification that defines conflict with two basic dimensions including (i) concern for self, and (ii) concern for others in which five interpersonal conflict management styles are also developed. These include (i) Integrating / Collaborating Style; (ii) Obliging / Accommodating Style; (iii) Dominating / Competing Style; (iv) Avoiding Style; and (v) Compromising Style. Social adjustment refers to the strong need and desire for individuals within a social environment to achieve social harmony. According to Otto, Doeringseipel, Grebe, and Lantermann (2001), emotional perception and emotional control are key components of Emotional Intelligence (EI). EI is the ability to process emotional information which encompasses the accurate evaluation of emotional information in one's self and in other. Thus, EI is an important factor influencing the social adjustment of individuals in achieving social harmony. In other words, communities with high EI could accurately recognize emotional information in them and in others, and able to make positive adjustments based on their external and internal needs. This enables them to maintain a favourable condition and harmonious relationship with the external environment and possess stronger adaptability (Otto et. al., 2001; Lopes et. al., 2004; Mestre et. al., 2006).

In the Confucian enrooted Chinese society emphasising on collectivism, team orientation and interpersonal harmony (Hofstede, 1980; Qian et.al., 2013), personal values, beliefs and orientations have significant bearing upon Chinese perceptions on conflict (Kirkbride et. al., 1991). Firstly, harmony urges individuals to control their emotions to avoid confusion and conflicts to seek harmony. Secondly, the virtue of obedience is the root of power distance. Thirdly, face-giving and face-saving are perceived as receiving pride and maintaining a sense of harmony (Leung and Ricky Yee-Kwong, 2003). Fourthly, "***guanxi*** (relationship)" has been adopted in the Chinese society to seek mutual satisfaction and accommodations (Wong & Tjosvold, 2010). Among these four principles, there are remarkable studies on "Mianzi (influence of face)" (Aslani et. al., 2016; Chuah et. al., 2014; Johnson et. al., 2004; Merkin, 2018; Oetzel et. al., 2001; Peng and Tjoysvold, 2011; Ting-Toomey, 2005; White et. al., 2004; Zhang et. al., 2015). Face in Chinese culture represents a strong and critical concern that reflects the social self-worth being built with others' assessments (Ho, 1976; Kim and Cohen, 2010) and often suffers during interpersonal conflicts (Brown and Levinson, 1987; Ting-Toomey, 2005). Therefore, other researches show that Chinese tend to be non-assertive in avoidance of conflicts and compromises when interpersonal conflicts occur, and strategies in emotion regulation and strengthening relationship are required (Kirkbride et. al., 1991; Leung et. al., 2011; Wong and Tjosvold, 2010). According to Brown and Levinson (1987), a distinguished framework known as the "Politeness Theory" is used to describe the correlation between personal face perceptions and conflict handling behaviours. The Politeness Theory highlights the effect of conflict issues and specifically points out that different facets of face would be threatened distinctly in interpersonal interactions (Johnson et. al., 2004; Park and Guan, 2009; Sias et. al., 2012). The classic Brown and Levinson (1987) distinguishes between positive and negative face threats and Hwang (2012) suggests a new dimension known as moral face which are used in conflict negotiation process to complete a business

deal with win-win outcome in conflict management. When confronted with a conflicting issue, Chinese people may give up their positions not only for giving face to their counterparts, but also, to a greater extent, for maintaining their own fellowship face and moral face. In anticipation of reciprocity, they presume that their goodwill and sacrifice will get rewarded in the future. Therefore, Chinese negotiators are more likely to cooperate, compromise and retreat with reservations in a conflict to maintain a favourable interpersonal relationship (Aslani et. al., 2016; Brew and Cairns, 2004; Kirkbride et. al., 1991; Oetzel et. al., 2001). In brief, Chinese people under the deep influence of Confucianism set harmony as the top priority and prefer avoiding conflict in most negotiating contexts (Alsani et. al., 2016; Chuang et. al., 2014; Leung et. al., 2011).

Discussions about conflicts as mentioned above are referred to human relationships, this research aims to use artificial intelligence facilities to eliminate human conflicts and physical in-person confrontations, that the conflict handling styles and different conflict management cultures particularly, the Chinese Confucian can be used as reference points, for the AI to learn and hence provide solutions to handle human conflicts more effectively to enhance a harmonious communities. The mediating role of conflict is yet to be discussed to testify its positive effect on building harmonious communities via the use of AI facilities i.e. Access Control System in a residential estate in Hong Kong and China.

2.4.5 Complaint

The word "Complaint" is originated from a Latin verb "***plangere***" meaning "hit" in the ancient time. In modern terms "complaint" covers a wider scope including dissatisfaction, annoyance, sub-standard, unpleasant, painful, fault-finding, grievances, opposition…etc. This consists a sense of negative emotion in response to something dissatisfies by the complainant. The first impression is of negative phenomenon associated with accusation.

However, according to Rothenberger, Grewal and Iyer (2008), complaints are both a challenge and an opportunity for companies because they reveal different actions. Efficient complaint management can recover lost customers and also secure that future customers have nothing to complain about, and therefore complaint management is a strategic tool, a customer feedback system; and according to Barlow and Moller (2007), complaint is also a gift to the company. In nowadays service industries, complaints from customers are closely monitored so as to retain these customers for future patronages in order to retain or gain market shares instead of losing them to other competitors in the severe market. Barlow and Moller (2007) suggest that in transforming a complaint to a gift, an enterprise should change their strategies in handling customer's complaints to cope with the practice in modern business. In doing so, the pure contents and information of the complaint should be separated from the feeling that one gets after being accused of causing dissatisfaction to the complainant, as this may tie with emotional perceptions of a disillusioned man and encourages to reconsider how complaint helps achieve one's goal in the business environment. Listening to customer's complaint is one of the best and the cheapest ways to understand what customer wants and expects. This is also the most effective skill to improve and build interpersonal relationship by paying attention and immediate response to deal with the conflicts between the handling staff and the customer, so as to understand the upsetting reasons to the customers for further improvement deemed appropriate. Complaint is a customer's appeal about confounded expectation (Webb 1992). According to Finasta (2016), a complaint is the written appeal from the complainant to the service provider stating the infringement of his/her personal rights or legitimate interests connected with the services being provided.

According to Rothenberger, Grewal and Iyer (2008), the possibility to recover and maintain the customers depends on a company's ability to handle the complaints so

received. Johnson and Mehra (2002) propose that a good complaint management consists of ten characteristics under different scenarios, for instance, when company reacting quickly, listening to and resolving fast; or applying simple and comprehensive procedures to handle complaints. The followings summarized the characteristics and observations developed by Johnson and Mehra (2002) with regard to effective complaint management of an organization. A quick response is essential to achieve customer satisfaction; customers should be encouraged to lodge their opinions or complaints with easily accessible means; adopting "No one to blame on" strategy to build rapport working atmosphere; a checking system to ensure the complainant is happy with the way in handling his/her complaint; top executives of the company should have direct access to the Customer Relationship Management system with regard to complaint logs; transparent and fast communication with the complainant so as to achieve immediate improvements to cease recurrence of similar discrepancies in future; employees should be continuously trained to achieve the highest score in the regular customer satisfaction survey; and the cost of monitoring and handling complaints should be calculated to ensure if this is beneficial to the company business in terms of financial target and brand building. All these characteristics of complaint management establish a checklist or guidelines for a company to handle complaints more effectively.

Most of the research on complaint intentions is based on three theoretical platforms including behavioural intent as a function of attitude and subjective norm (Ajzen and Fishbein, 1980); justice theory (Adams, 1965); and a negative disconfirmation of expectations (Oliver, 1980). In Justice Theory (Adams, 1965; Tax et. al., 1998; Shapiro and Neiman-Gonder, 2006) and the related fairness theory (Folger and Russel, 1998; McColl-Kennedy and Sparks, 2003) suggest that, a customer with dissatisfaction is in a mental deficit, and intention to complain is predicted by the degree of felt injustice and

unfairness. According to Rust, Subramanian and Wells (1992), usually complaints are received from 50% of unsatisfied customers, yet another 50% do not complain. In order to reduce the number of non-complaining customers, the company must launch programmes and facilities for customers to encourage these customers to speak up. For convenience sake, mobile AI applications could be used to appeal to customers to send their comments in writing, or in audio recording format or in video recording format either good or bad to the service provider for review with sufficient supports and evidences. Conlon and Murray (1996) and Singh, Jain, and Choraria (2016) found that when an organization effectively manage complaints, customers are likely to stay with the company.

According to Cialdini (2016), customers are most likely to express positive things about the company when their troubles have been properly solved. This is best described by a psychological term called the principle of reversibility, i.e. when people experience good they intend to pay with the same coin. Goulder A, a sociologist stated that the amazing aspect of the reversibility rules is that its phenomena are so wide-spread and there is no society where this rule is not observed. Therefore, if companies apply this reversibility principle into their complaint management system by doing good service to their customers, then customers will be more faithful to the business of the company and hence tell others how wonderful the company is (Barlow and Moller, 2007). In the modern advance technological era with sophisticated artificial intelligence applications, customers' complaints can be effectively handled by the AI system e.g. the Chatbot Solutions, or in other words AI system can be integrated into the complaint management system of a company to achieve a 100% accuracy and efficiency through robotic Chatbot Solutions or e-communication platforms as provided by the service providers. This instantly response and easily accessible AI facilities enhance instant mode of communication that encourages

customers to lodge their feedbacks and or complaints to the company via the Chatbot Solutions system or mobile apps on a 24-hour basis instead of writing a formal complaint letter to the company without knowing if the complaint letter has reached the hands of their senior management or not. Thus, AI establishes instant solutions to regular enquiries and transparent communication platform with records between the customers and the management of the company with regard to complaint management system which shall have positive effect in building harmonious relationship within the communities by all means. This forms a hypothesis for testing whether "Complaint" could become a mediating variable predicting the outcome that AI facilities can build harmonious communities in the field of property management in Hong Kong and China.

At present, most companies will integrate Artificial Intelligence into their day to day operations. According to Olsher (2015), AI refers to technology that performs tasks that otherwise require human intelligence. No surprises that Deloitte's Human Capital Trends report 2018 revealed that the adoption of automation, robotics and AI is accelerating significantly across the Human Resources domain. Robots in terms of a Chatbot Solution already have the technology to recognize and understand the requests from human and then responding with advice based on individual unique requests. This enables robots to understand individual differences, identify stress indicators and then work through multiple options available based on an algorithm from analysis of countless conflict scenarios that facilitating the handling of potential complaint effectively in an early stage.

Chatbot Solution is used for deep conflict resolution in the area of humanitarian response in nowadays technology (Olsher 2015). For instance, 'Dexter' will be able to effectively mediate, design and facilitate difficult conversations or coach people to resolution. Such technology is able to read the human behaviour and emotion, be able to caution the human ego, support an individual to reflect and hold individuals accountable. The tool, cogSolv,

is capable of understanding how people from other groups view the world, simulating their reactions, and combining this with knowledge of the real world in order to persuade, find negotiation win-wins and enhance outcomes, avoid offence, provide peacekeeping decision tools, and protect emergency responders' health.

Robots / Chatbot do not have emotions yet, they will be more likely to "*call it as it is*" rather than avoid or temper comments, as is often the case with humans, who are emotional beings. There are already robots that will help complainants articulate their complaint and take them through a dynamic questioning process. However, there are significant detriments to employees relying on a Chatbot to report inappropriate behaviour in the workplace including security and privacy of data. These issues will require careful attention as the technology advances.

2.5 Research Questions and Research Model

It is noted that there are research gaps to explore the relationship that a digitalized AI-driven property management services shall have positive effects on building harmonious society / communities which is more efficient than a traditional human-led property management services in Hong Kong and China. This study aims to explore the needs and hence, the advantages of using AI facilities in the property and facility management in Hong Kong and China. It is expected that AI-driven policies and/or systems being adopted in a residential estate shall have positive correlation with the building of harmonious communities, disregard to cultural differences between Hong Kong and mainland China region.

2.5.1 The Research Model

The qualitative approach of this research, i.e. Study 1 aims to testify two hypotheses H1 and H2 as follows:

H1: The effectiveness of AI facilities outperforms traditional human-led property management services in terms of service efficiency; and

H2: AI facilities help building harmonious communities via mediating variables including service efficiency, happiness, service fairness, conflict and complaint. A model illustrates the process is shown in ***Figure 1.***

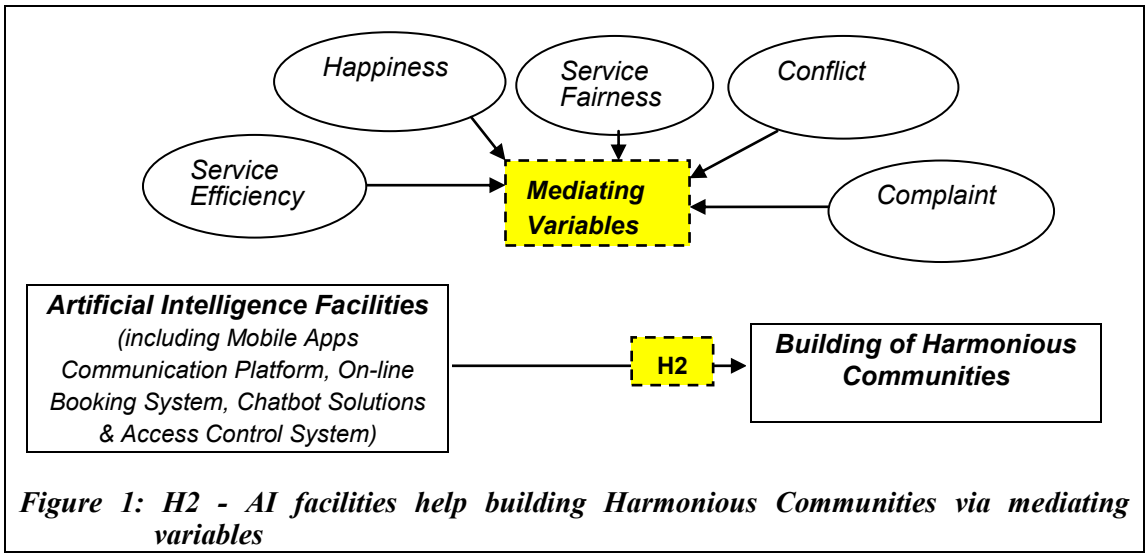


Figure 1: H2 - AI facilities help building Harmonious Communities via mediating variables

According to Figure 1 above For Study 1, a qualitative approach by in-depth interviews with ten senior professionals in the property management market in Hong Kong will be arranged. This is to explore whether service efficiency will be enhanced by using some identified AI facilities instead of the traditional human-led services in their managed properties. Therefore, Hypothesis 1 (H1) for Study 1 is to explore "The effects of using AI facilities outperforms traditional human-led property management services in terms of service efficiency"; and Hypothesis 2 (H2) is to testify "AI facilities help building harmonious communities via mediating variables including service efficiency, maintaining happiness, service fairness, avoiding conflict and eliminating complaint".

For Study 2 and Study 3, the quantitative approach is adopted for this research, the following model has been built to demonstrate that those AI facilities which have been largely adopted in nowadays property management industry can build harmonious communities among the property owners and residents through the identified mediators, i.e. service efficiency, maintaining happiness, service fairness, eliminating complaint, and avoiding conflicts which are very often happened in the field of property management.

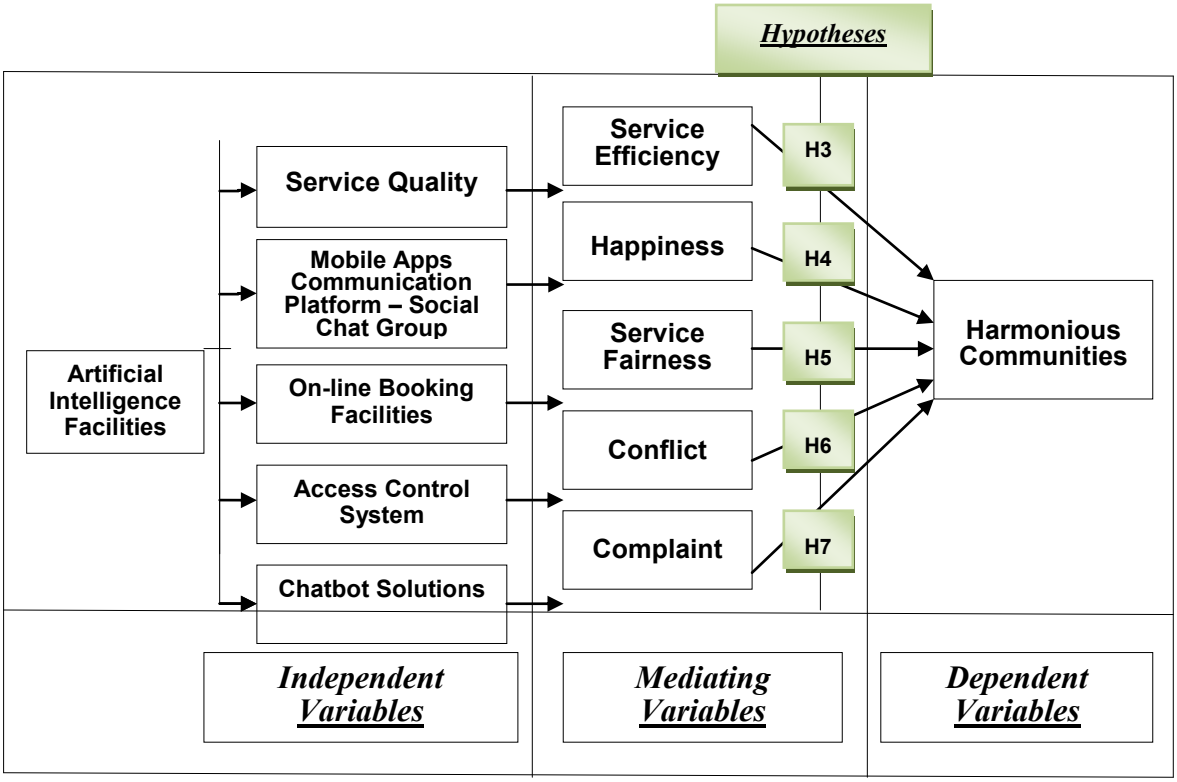


Figure 2: Research Model – The Effects of using Artificial Intelligence facilities in building Harmonious Communities in Property Management in Hong Kong and China

As shown in the research model for Study 2 (Hong Kong) and Study 3 (mainland China) in Figure 2 above, a quantitative approach will be adopted to testify effect of the matched pairs of independent variables with identified mediating variables that help building harmonious communities in property management in Hong Kong. Therefore, H3 tries to testify that "Service Efficiency is positively correlated to Service Quality of Property Management Company that helps building harmonious communities". H4 attempts to testify that "Mobile App Communication Platform i.e. Social Chat Group enhances

happiness of residents and helps building harmonious communities". H5 tries to testify that "On-line Booking system enhances service fairness that helps building harmonious communities of an estate". H6 is to testify that "Access control system avoids conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate"; and finally H7 attempts to testify that "Chatbot solutions with instance responses to enquiries that eliminate complaints and help building harmonious communities of a residential estate".

Referring to the research model in ***Figure 2*** above, AI building facilities include wireless remote functions of access control, facilities booking in the clubhouse, payment of fees including the monthly management fee, forming social chat groups with same or similar interests, drawing the attention of the management staff with regard to property owners' requests via the electronic communication platform, and so on. All these AI-driven building facilities may to certain extend stimulates the happiness of property owners and residents by the higher efficiency and the due respects to their requests under the fair and just control system operated under the AI platform that no human factors are involved to hamper the smooth operation of the property management services. On the contrary, some negative factors that may hamper the harmony of the property management include conflicts and complaints. It is believed that those conflicts and complaints are caused by the unfair treatment under human-led system together with the poor face-to-face conversation which disclosing the negative side of facial expression under different personalities which may sometimes supplement with some pessimistic feelings of psychological emotions. With the help of these mediators in measuring the experience of those property owners and residents, the level of harmony can be measured and testified to see if AI building facilities have strong ties with the establishment of harmonious communities in a residential estate.

2.5.2 The Research Questions (RQs) and the Hypothesis (H)

This research aims to testify that property owners in an AI-driven estate would be enjoying a higher degree of harmonious living environment than those in the traditional labour-intensive and human-led estate. Three (3) studies will be conducted to collect data for analysis, Study 1 attempts to explore the effectiveness of using the AI building facilities which is much efficient than those traditional way of service provisions in property management industry. Study 2 and Study 3 are trying to explain that AI-driven property management is effective and also help building harmonious communities within the residential estate. More details are described as follows:

Study 1 aims to explore if the effectiveness of AI facilities outperforms traditional human-led property management service under H1; and also find out if AI facilities help building harmonious communities via some mediating variables including service efficiency, happiness, service fairness, conflict and complaint in Hypothesis 2 (H2). This study aims to identify those stake holders i.e. property owners and residents who enjoy using the AI facilities and are also adapted to using it as its advantages outperform traditional human-led property management services in terms of efficiency. In addition, the study also attempts to testify if there is direct relationship between the implementation of AI facilities that help building harmonious communities within the estate. **Study 2** (for Hong Kong property management market) refers to hypotheses H3, H4, H5, H6 and H7 as shown in ***Figure 2*** above. Testing the hypotheses that AI facilities/services and policies enhance service efficiency, promote happiness of residents, enhance service fairness, eliminate human conflicts and complaints in the property management industry in the Hong Kong. Apart from service efficiency from Study 1, four (4) mediating variables namely happiness, fairness, conflict and complaint are used to testify the correlation between the AI facilities (the independent variable pairs with specific mediating variables)

and the building of harmonious communities (the dependent variable) under Study 2. This is to test whether AI-driven policies and those implemented AI facilities in a residential estate helps establishing harmonious communities with the positive effects from the mediating variables. **Study 3** (Replication of Study 2 to be conducted in China) is a replication of Study 2 but data collection performs in mainland China so that cultural differences for the same issue can be examined by utilizing the same methodology.

In summary, five (5) hypotheses (i.e. H3, H4, H5, H6 and H7) will be testified through five (5) sets of Independent Variables paired with Mediating Variables for Study 2 and Study 3 of the research. In addition, the questionnaires are structured to obtain the required data for analysis which is shown below for easy reference:

Hypothesis	Independent Variable	Mediating Variable	Questionnaires No.
H3	Service Quality of Management Company	Service Efficiency	5 - 8
H4	Mobile App Communication Platform – Social Chat Group	Happiness	9 - 13
H5	On-line Booking Facilities	Service Fairness	14 - 18
H6	Access Control System	Conflict	19 - 23
H7	Chatbot Solutions	Complaint	24 - 28

As expected, the findings above shall contribute recommendations and managerial implications including: (i) the implementation of Artificial Intelligence facilities are of higher efficiency than the traditional human-led management services in the field of property management in Hong Kong and mainland China; (ii) Artificial Intelligence services eliminate human conflicts via face-to-face confrontations and reduce complaints from property owners and residents with instant replies and solutions from the Chatbot system, it also uplifts service quality in terms of service efficiency of the management company; and (iii) Artificial Intelligence policies and facilities not only save costs and

solve the problem of labour shortage in the current labour market, but also enhance harmonious relationships among peoples in local communities within a residential estate which may also have positive effects on achieving social harmony in the locality in the long run from a macro perspective.

Chapter 3 - Methodology and Data Collection

Due to the nature of the research topic (i.e. The effects of using AI facilities in building harmonious communities in property management in Hong Kong and China) and the associated research questions, being the researcher I must adopt the most appropriate research philosophy, set the best fit research approach, select the most appropriate research design, then formulate research strategies and finally fully complied with the research ethics…etc, which are discussed below.

3.1 Research Philosophies

Broadly speaking, research philosophy refers to a system of beliefs and assumptions about the development of knowledge. Researchers who are embarking a knowledge development process may not be termed as a new theory of human motivation, however even answering a specific problem in some organisations are developing new knowledge (Saunders, 2009). Assumptions are made at different stages of the research (Burrell and Morgan, 1979) and there are different types of assumptions including assumptions on human knowledge (Epistemological assumptions), about realities being encountered in the research (ontological assumptions) and the extent of one's values shall affect the research process (axiological assumptions). These assumptions provide a clear direction to shape, understand and develop the research questions, the research methods are being adopted and the ways researchers interpret their findings (Crotty, 1998). A set of well-developed assumptions will have credible impacts on the selection of methodological choice, research strategy, data collection technique and data analysis procedure. It is important to note that, in the business and management research, philosophical disagreements are an intrinsic part and theoretical base from a mixture of disciplines in social science (i.e. sociology, psychology and economic), natural science (i.e. chemistry and biology), applied science

(i.e. engineering and statistics), humanities (i.e. literary theory, linguistics, history and philosophy) and the domain of organizational practice (Starbuck, 2003). In addition, personal belief, commitment and practical considerations covering the time and finance available for the research project are also the significant factors for researcher to make the appropriate assumptions for his research project. Hence, researchers in business and management domain will adopt the Pluralists perspective by exploring the diversity of the field which is considered helpful in enriching the research quality (Knudsen, 2003).

Before selecting the most appropriate research philosophy for this research, researcher must be able to distinguish different philosophies by considering the assumptions that are going to make. Broadly speaking, there are three types of assumptions to distinguish research philosophies (i.e. Ontology, Epistemology and Axiology). **Ontology** refers to assumptions about the nature of reality. **Epistemology** concerns assumptions about knowledge particular the study of knowledge, i.e. what constitute acceptable, valid and legitimate knowledge and how this knowledge is communicated to others (Burrell and Morgan, 1979). According to Richie et al. (2014), Epistemology refers to the ways of knowing and learning that forms the basis of knowledge, and it plays a key role to make reasoned judgment about the selection of research methodology (Creswell, 2003). In addition, Crotty (2006) gives an additional view on Epistemology with three perspectives, including Objectivism, Subjectivism and Constructivism. **Axiology** is describing the role of values and ethics within the research process, i.e. how researchers deal with our own values and those other participants involved in the research. The choice of research philosophy is a reflection of personal values of the researcher, e.g. data collection through in-depth interviews suggests that the researcher being the interviewer values personal interaction with the interviewees / respondents instead of obtaining the views of the target groups through anonymous questionnaires.

3.1.1 Types of Philosophies

According to Saunders (2009), there are five major philosophies in business and management: (i) Positivism, (ii) Critical Realism, (iii) Interpretivism, (iv) Post-modernism and (v) Pragmatism. The following summarizes the main characteristics of these five research philosophies with regard to assumptions (ontology, epistemology and axiology) associated with typical methods for respective researches as suggested by Saunders (2009).

1. Positivism

Ontology	Epistemology	Axiology
• Real, • External, • Independent, • Universalism (true reality), • Granular (things) • Ordered	• Scientific method, • Observable & measurable facts, • Law like generalisations, • Numbers, • Causal explanation & prediction as contribution	• Value free research, • Researcher is detached, neutral & independent of what is researched
Typical method: Deductive, highly structured, large samples, measurement, typical quantitative methods of analysis, but a range of data can be analysed.		

2. Critical Realism

Ontology	Epistemology	Axiology
• Stratified / layered - the empirical, actual & real • External, independent • Intransient • Objective structures • Casual mechanism	• Epistemological relativism • Knowledge historically situated and transient • Facts are social constructions • Historical causal explanation as contribution	• Value-laden research • Researcher acknowledges bias by world views, cultural experience and upbringing • Researcher tries to minimise bias and errors • Research is as objective as possible
Typical method: Retroductive, in-depth historically situated analysis of pre-existing structures and emerging agency. Range of methods and data types to fit subject matter.		

3. Interpretivism

Ontology	Epistemology	Axiology
• Complex and rich • Socially constructed through culture and language • Multiple meanings, interpretations and realities • Flux of processes, experiences, practices	• Theories and concepts are too simplistic • Focus on narratives, stories, perceptions and interpretations • New understandings and worldviews as contribution	• Value-bound research • Researchers are part of what is researched (subjective) • Researcher is the interpretations key to contribution • Researcher reflexive
Typical method: Typical inductive, small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted.		

4. Postmodernism

Ontology	Epistemology	Axiology
• Complex and rich • Socially constructed through power relations • Some meanings, interpretations, realities are dominated and silenced by others • Flux of processes, practices and experiences	• What counts as truth and knowledge is decided by dominant ideologies • Focus on absence, silences and oppressed / repressed meanings, interpretations and voices • Exposure of power relations and challenge of dominant views as contribution	• Value-constituted research • Researcher embedded in power relations • Some research narratives are repressed and silenced at the expense of others • Researcher radically reflexive
Typical method: Typically deconstructive – reading texts and realities against themselves. In-depth investigations of anomalies, silences and absences. Range of data types, typically qualitative methods of analysis.		

5. Pragmatism

Ontology	Epistemology	Axiology
• Complex, rich and external • Reality is the practical consequences of ideas • Flux of processes, experiences and practices	• Practical meaning of knowledge in specific contexts • True theories and knowledge are those that enable successful action • Focus on problems, practice and relevance • Problem solving and inform future practice as contribution	• Value-driven research • Research initiated and sustained by researcher's doubts and beliefs • Researcher reflexive
Typical method: Following research problem and research question. Range of methods include mixed, multiple, qualitative, quantitative, action research. Emphasis on practical solutions and outcomes.		

Among the 5 research philosophies as mentioned above, positivism and intrepretivism are considered the most suitable stance to conduct the research which is discussed below.

Positivism

It states that the research question(s) is the vital aspect in determining the research philosophy because positivist philosophy posits that knowledge can only be achieved and justified through experience, observation and experiment (Gary, 2009). It possesses the capability of integrating various perspectives to support data collection and interpretation and therefore, able to apply such philosophy to social science. It also claims that the causal theory of human behaviour can result in developing the models, regularities and laws that can predict human behaviour (Rosenberg, 2005). Epistemologically speaking, positivism is closely related to objectivism where the researcher and the subject being researched are separated (Saunders et. al, 2009). Positivism researchers also believe that objective truth can be discovered (Collis & Hussey, 2003).

Intrepretivism

Intrepretivism develops as a critique of positivism but from a subjectivist view. It emphasises that humans are different from physical phenomena because they create meanings. Interpretivism argues that human beings and their social worlds cannot be studied in the same way as physical phenomena, and social science research needs to be different from natural science research. This is due to the fact that different peoples have different cultural backgrounds, that different circumstances and time make different meanings, and therefore create and experience different social realities. In addition, interpretivism are critical of the positivism attempts to discover definite, universal laws that can be applied everybody. Instead, interpretivism holds strong belief that rich insights into humanity are lost if such complexity is reduced entirely to a series of law-like

generalisations (Saunders, 2009). The purpose of interpretivist research is to create new, richer understandings and interpretations of social worlds and contexts. Interpretivism researchers intend to take account of this complexity by collecting what is meaningful to their research participants. In general, they emphasize the importance of language, culture and history (Crotty, 1998) in the shaping of the interpretations and experiences of organisational and social worlds. With the main focus on complexity, richness, multiple interpretations and meaning making, this classifies interpretivism as explicitly a subjectivist. There are also arguments that interpretivist perspective is highly appropriate in the case of business and management research, not only because of business complexities but also of its uniqueness in the contexts (Saunders, 2009).

Bryman & Bell, (2011) asserts that Interpretivism is a term given to a contrasting epistemology to positivism. Philosophy of positivism dominates by the aim of discovering universal law or generalising the facts in explaining human behaviours under the assumption of the world is objective (Cavana et al., 2001; Saunders et al., 2009). In fact, the aim of interpretivism approach is to discover socially constructed subjective meaning by assuming that the world is subject and changeable (Cavana et al., 2001).

There are arguments for and against the two philosophical stances, i.e. positivism and interpretivism, for instance, interpretivisim views positivism as a pre-dated philosophy as reality is in a random form and not patterned, that meaningful social actions can only be understood by interpreting the meaning and motives behind the reality which cannot be observed empirically (Robson, 2011). In contrast, positivism believes that reality exists outside and independently of human mind. The argument is that nature is made up of objective and is observable that a society is an objective reality. Therefore, the most appropriate philosophical stance(s) for one's research shall be determined by the nature

and types of research questions/problems together with associated aim and assumption embedded into the research (Creswell, 2003; Saunders et al., 2009). Understanding research philosophies is therefore the pre-requisites and an important corner stone for researcher to kick off his journey in the research topic.

3.2 Approaches for Theory Development

As mentioned in Chapter 2 above, Study 1 is an empirical research to achieve exploratory objective and therefore I will adopt a qualitative method of analysis which is of inductive reasoning nature, whereas Study 2 and Study 3 is explanatory and I will select a deductive reasoning approach to conduct the research under the theory development process. According to Ketokivi and Mantere (2010), inductive reasoning is used when there is a gap in the logic argument between the conclusion and the premise observed, the conclusion being judged to be supported by the observations made which is subjective. On the contrary, deductive reasoning will be used when the conclusion is derived logically from a set of premises, the conclusion being the truth when all the premises are true. Inductive reasoning is a bottom-up approach that the learning process or the knowledge is created through observation of the real world, and deductive reasoning is a top-down approach that some presumptions or hypothesis are made and to test against the observations (Ritchie et al., 2014). Therefore, according to Saunders et al., (2009) inductive reasoning approach centres on theory development and deductive reasoning approach focus on testing the theory or assumptions.

Hence, from epistemology perspective, Study 1 of my research is classified as subjectivism which is closely associated with interpretivism (Crotty, 2006). Since the research gap being identified is to study people (social sciences) that there is no possibility of objective knowledge as peoples have different subjective experiences. Being a professional in the

field of property management in Hong Kong for almost three decades, I become part of the premises for what is being researched. I hold a subjective view with strong belief that there is a research gap in the property management industry and therefore, to explore the positive effect on using AI facilities which are believed more effective than the traditional human-led property management services. In addition, Study 1 also aims to explore if there is an association and relationship that AI facilities help building harmonious communities for property owners and residents of a residential estate. The approach shall be inductive reasoning with bottom-up data collected through in-depth interviews or focus group in the field which is carried out through the qualitative method of analysis for the research. However, Study 1 will be further testified by the hypothesis set for Study 2 (in Hong Kong) and Study 3 (in China) which will be conducted by using the quantitative method of analysis as these two studies are stemmed from positivism perspective by using the deductive reasoning approach supported by empirical evidence and hypothesis testing. In brief, the research topic will adopt a mix method, i.e. qualitative method through in-depth interviews with a relatively small sample size for Study 1 and quantitative method by making good use of questionnaires survey with relatively larger sample size for Study 2 (Hong Kong) and Study 3 (China).

3.3 Research Methodology and Research Strategy

3.3.1 Research Methodology

Taylor and Edgar (1999:27) summarized the links between the important concepts of ontology, epistemology and methodology as "***the belief about the nature of the world (ontology) adopted by an enquirer will affect their belief about the nature of knowledge in that world (epistemology) which in turn will influence the enquirer's belief as to how that knowledge can be uncovered (methodology)***". Teddlie and Tashakkori (2009)

suggest that quantitative approach will be adopted if the relationship between "the knower and the known", i.e. the researcher and what the research is researching, are viewed as independent of each other. However, in qualitative approach there is interactive and inseparable relationship between the researcher and what is being researched. The differences in ontology and epistemology means that different research methods shall be employed, i.e. qualitative researchers have tended to use inductive approach to formulate the theory whereas quantitative researchers have tended to use deductive approach in testing the hypothesis.

For social science and human behavioural research work, in general, there are two main techniques namely the "Probability" sampling technique and "Purposive" sampling techniques. According to Tashakkori & Teddle (2003) probability sampling techniques are used in quantitatively oriented studies which involve "selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion for every member of the population is determinable". Purposive sampling techniques are used in qualitative studies and also defined as selecting units (e.g. individuals, groups of individuals, institutions…etc.) based on specific purposes associated with answering to research questions. Maxwell (1997) further defines purposive sampling as a type of sampling in which "particular settings, persons, events…etc are deliberately set to obtain the important information that cannot be achieved from other choices".

The following figure (***Figure 3***) demonstrates the relationship and sequence of the mix method approach of the sequential sampling of Study 1, in relation to Study 2 and Study 3.

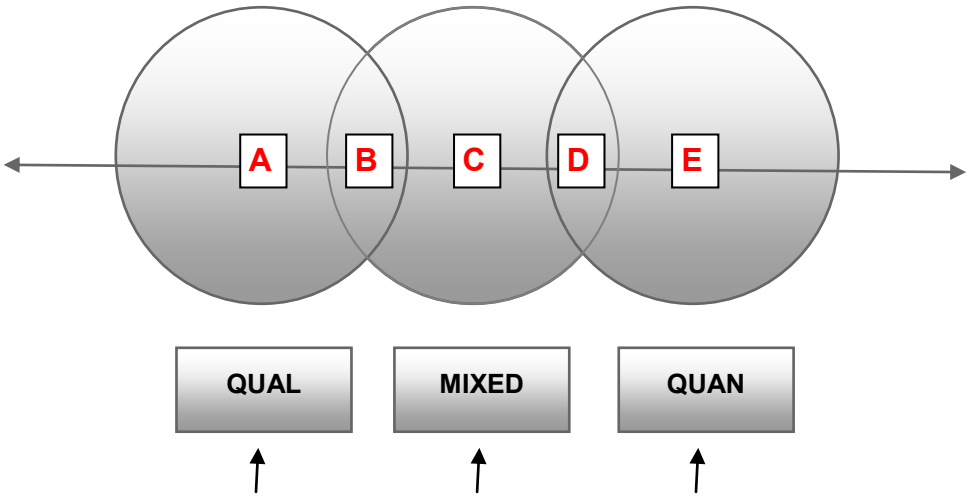


Figure 3: Purposive-Mixed-Probability Sampling Continuum (Source: Teddlie (2005)

Note: Zone A consists of totally qualitative (QUAL) research method by using purposive sampling, whereas Zone E consists of totally quantitative (QUAN) research method with probability sampling under data collection. The cross-sectional sector (i.e. Zone B) between Zone A and Zone C is formed represents primarily QUAL research but with some QUAN components. The same principle applies to the crossed sectional sector Zone D which represents a primarily QUAN research but consists of some QUAL components. Zone C represents a totally mixed method and sampling. The arrow represents the purposive-mixed-probability sampling continuum. Movement toward the middle of the continuum indicates a greater integration of research methods and sampling. Movement away from the centre and toward either end indicates the research methods and sampling (QUAL and QUAN) are more separate and distinct.

3.3.2 Research Strategy

The early example of a QUAL-QUAN sampling procedure comes from the work of Nieto, Mendex, and Carrasquilla (1999) in a study of malaria control in Colombia. The study was conducted in Colombia where the incidence of the disease is the highest at that

moment. The QUAL strand is to arrange participants of the focus groups arranged by the leaders of five urban districts. The size of the focus group ranged from 15 – 18 members who fit the selection criteria including their strong commitments to the community, as homogeneous as possible with regard to educational level and socioeconomic and cultural status, etc. The results of the focus group will then be used to design the questionnaires and deliver to the targeted data collection groups, hence the contents of the questionnaires in QUAN are originated from and closely related to the findings in QUAL which is very comparable in terms of participants' knowledge of symptoms, perceptions of the causes of malaria transmission, and prevention practices.

However, in Chinese context, harmony can be regarded as a prominent representative of cultural variables in China and compelling evidence indicates that the concept of harmony is subject to East-West cultural differences (Leung et al., 2011; Wang and Juslin, 2009). Hence Chinese concept of harmony is best understood as a comprehensive but somewhat abstract expression of harmonization process, an art rather than a science (Leung et. al., 2011; Li, 2008; Tung, 2006). The development of the idea of harmony in Western ideology is built upon a science-based linear model with pre-supposed, perfect sequence, whereas Chinese concept of harmony is based on an art-based abstract expression with a strong qualitative tendency and multi-dimensional dynamic pattern (Chin, 2014).

The strategy of this research is therefore, similar to the work of Nieto, Mendex, and Carrasquilla (1999) in the study of malaria control in Colombia, by adopting a mixed method sequential sampling approach with higher tendency by moving toward the middle of the mixed method continuum with a QUAL-QUAN sequence as shown in ***Figure 3*** above. In the QAUL strand, i.e. Study 1 of this research, researcher will arrange in-depth interviews or focus group discussions with ten (10) senior management staff / professionals

from ten different management companies confined by specific selective criteria including (i) managerial experience in the property management field for over 20 years; (ii) one of his/her managed property portfolios has equipped with the latest artificial intelligence facilities including the Mobile Apps, On-line Booking System, Access Control System, and Service Quality initiatives; (iii) those selected interviewees are highly educated with a Master Degree or above in property management / facility management / surveying discipline / business administration related subject and (iv) these selected interviewees are in the top tier position of the renowned property management firms under the top ten land developers with scalable size and properties portfolios in Hong Kong.

Strategically, the questions adopted in the QUAL sampling method will be modified to end users' perspective through a QUAN survey. The research topic, i.e. the effect of using AI facilities in building harmonious communities in a residential estate will be used for both QUAL and QUAN approach which forms the main integrating sections of the mixed method which represents Zone B and Zone D in the above ***Figure 3***. The findings in Study 1 under the QUAL approach ascertains the positive effects and the strong relationship between AI facilities and the building of harmonious communities in a residential estate, thereafter the QUAN sampling approach will be used to verify or reconcile the findings in QUAL sampling, this accounts for the sequential relationship of this QUAL-QUAN mixed method approach. Thereafter, Study 2 and Study 3 are used to reconcile the findings of Study 1 of this research. The QUAL-QUAN data gathered through the overall mix-method sampling strategy is very comparable in terms of the participants' knowledge of AI facilities, its applications, its effects on work efficiency & service quality, and users' positive perceptions of contribution to the process in building harmonious communities in a residential estate. In brief, the QUAN strand of the research could not have been conducted without the information initially gleaned from the

QUAL strand. The findings in the QUAL sampling will be used to design the questionnaires in the QUAN sampling to testify the hypotheses derived from the research questions.

3.4 Research Design

The main function of the research design is to set up a clear plan of actions with specific steps/objectives in different stage throughout the whole research work. Each specific step is crucial in achieving the research objectives which shall be in close relation with the research questions and topic. According to Saunders et al. (2009), the research questions will determine the choice of research strategy, data collection techniques and analysis procedures, and the time horizon over which the study is undertaken. The research design is a plan to examine and find answers to the research questions (Rousseau & Fried, 2001; Jones et al., 2006). In brief, the purpose of a research design is to provide a clear plan that permits accurate and timely assessment of the research works.

According to Smith (1998), there are three major types of research design including exploratory, descriptive and causal. For exploratory research this touches on new and seldom available materials in existing literatures with the ultimate objective in exploring issues, ideas, insights and contributions by using multiple sources of information with an open minded and flexible attitude (Zikmund et al., 2013). Descriptive research tends to be more established than exploratory research by aiming at a detailed description about attitudes and behaviours of a certain population, event or phenomena in a precise manner (Creswell, 2003). A causal research aims to predict outcome by investigating the cause and effect relationship among different variables (Creswell, 2003). This research includes both the exploratory and descriptive approach. The primary attempt is exploratory by exploring the effects of using AI facilities which are more effective and

accurate than the traditional human-led property management style in the market; and also to identify if there is any association between the AI facilities and the building of harmonious communities in a residential estate under Study 1 of this research which is of qualitative nature (refers to Stage 3 of ***Figure 4*** below) by using in=depth interviews. The next stage is using quantitative approach (refers to Stage 4 in ***Figures 4*** below) to testify the positive effects and findings from Study 1 with details toward the attitudes and behaviours of the same targeted sample groups for the research.

The research design for the topic is divided into five (5) stages which are shown in ***Figure 4*** as follows:

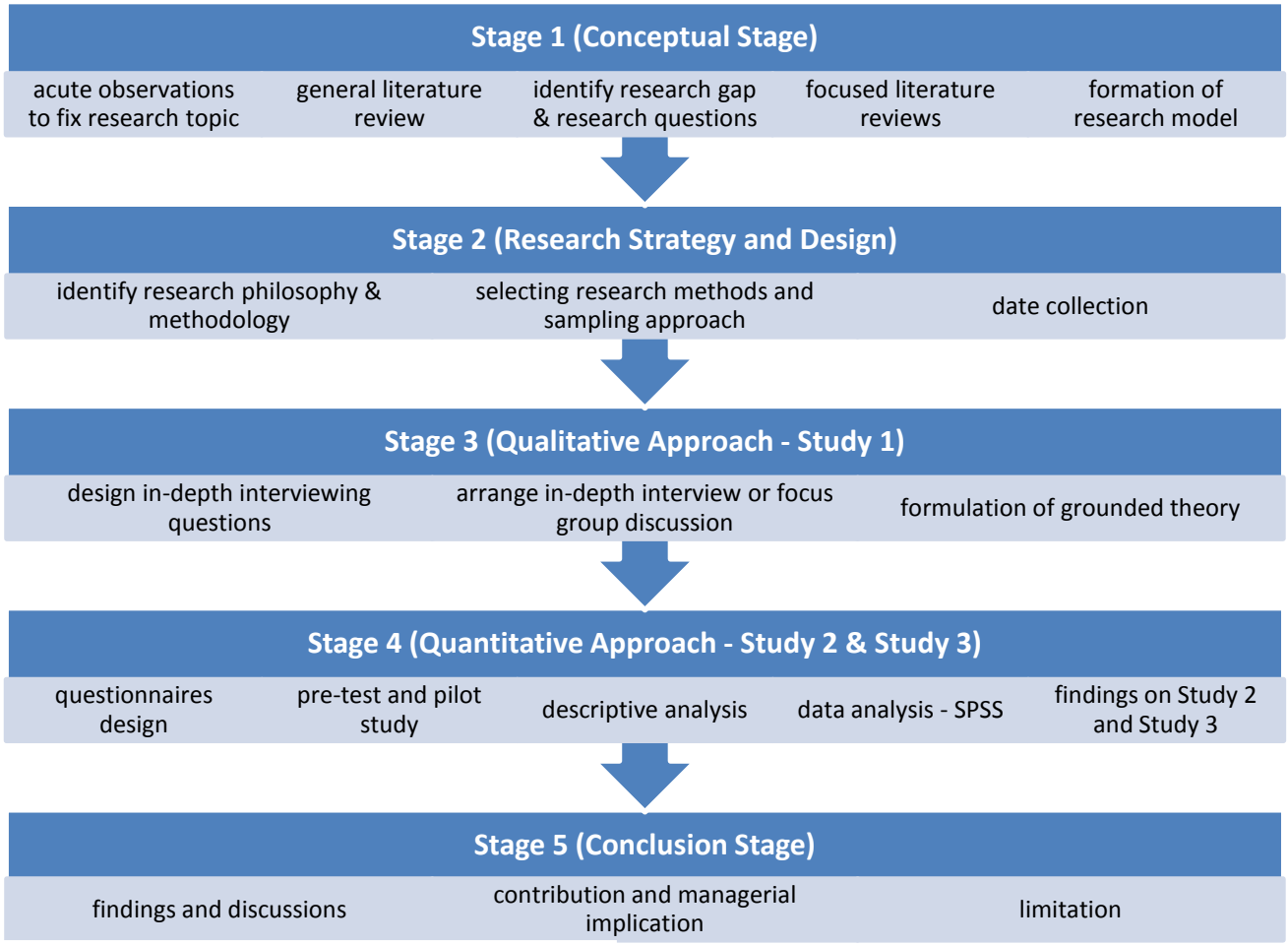


Figure 4: Five (5) Stages of Research Design

In summary, ***Figures 4*** exhibits the research design by specifying each task and step under five (5) stages as a progressive milestone to complete the research work. In Stage 1 which is the very initial stage before the research initiative, acute observation in the related business environment shall be made to ensure exploration of the intended research topic is of value and contributions to the academic world and/or the business environment. Understandings and grasping the knowledge of the research topic shall be obtained through general literature reviews from various academic journals and peer group reviews covering a wider range with specific knowledge in that particular field. Identifying the keywords of the research topic is also important in obtaining the related research materials. Having specified the research topic, the ultimate goal and hence the value of the research work is to identify the research gap(s) and the research questions. Thereafter, focused and in-depth literature reviews shall be conducted before formulating the research model for easy understanding of the research work, which is under Stage 1 of the research work. Stage 2 shall clearly identify the research philosophy and selecting the research methodology for data collection. Stage 3 in this research begins with setting the related questions for the in-depth interviews / focus group discussion so as to form the grounded theory under Study 1 before proceeding to Stage 4 in conducting the quantitative research. Design of the questionnaires in the quantitative method of this research shall be closely related to the findings in Study 1 of Stage 3. Having obtained the data from the questionnaires survey in Stage 4, all data will be computed via the Multiple Regression Analysis of the SPSS software that is to testify the hypothesis to obtain the findings. Finally Stage 5, being the conclusion stage will discuss the findings, its implications, contributions and also identifying the limitation of the research for future improvement deemed appropriate.

3.5 Data Collection - In-depth Interview (QUAL) and Questionnaires (QUAN)

As discussed above, this research will adopt a mixed method approach, that is to conduct Study 1 by qualitative method and Study 2 and Study 3 by using the quantitative method approaches.

3.5.1 Qualitative Approach (Study 1)

Study 1 incurs exploring the psychological human behavior and their preference in adapting artificial intelligence facilities over the traditional human-led services which is not of scientific realism but rather radical subjectivism. Therefore, qualitative research methods by using the in-depth interviews and direct observation are used for data collection for Study 1. I will adopt the emic approach to perform insider's role to interact with interviewees in order to fully understand and hence to explore the possible effects on the research topic. An inductive approach to understand and reveal the context of the findings will be adopted. In-depth interviews with 10 (ten) numbers of senior management staff who are working in the top ten and renowned property management companies in Hong Kong who are also experienced professionals in the field of property management are invited for an in-depth interview in obtaining the firsthand experience and primary data for the research. The target participants include senior management staff who are also professionals of top tier property management firms in Hong Kong. These include Sun Hung Kai Properties, Cheung Kong Holdings Limited, Sino Group, Henderson Land, Mass Transit Railways Corporation, Great Eagle Group, Jones Lang Lasalle, Wheelock Properties, Nam Fung Group and so on. The main objective of the interviews is to collect, identify and to understand the responses / preferences of property owners toward the artificial intelligence driven policies and facilities in comparison to the traditional human-led services in a residential estate. Some open-end questions, for

instance “What do you think about the future application of artificial intelligence facilities in the field of property management?” and “Do you think the harmonious relationship have been enhanced after using the artificial intelligence facilities?” will be used to collect primary data for analysis under Study 1 of the research.

Before the interviews, interviewees will be briefed on the purpose of the study and requested to acknowledge their verbal consent to fulfill the ethical requirement of the research. A digital audio recorder will be used to record the conversation of the whole discussion and later on, used to transcribe the contents for data analysis. Each interview will be lasted for about 45 to 60 minutes and during the interview, a rapport effect will be maintained to enhance the free flow of ideas of the interviewee. This has been in the form of lunch meeting or tea gathering to achieve this rapport and relax atmosphere for the interview. Data and information being collected during the interviews will be analysed to establish an Analytical Framework by using theme, categories and sub-categories format through the coding techniques. This thematic approach can generate main themes of condition, manner and pattern; thereafter until saturation of the data, interpretations will be conducted in identifying the findings. The results and findings will also be analysed and compared. Triangulated methods for data collection and analysis will also be deployed for validity and reliability purposes. The built Analytical Framework will then be able to establish a grounded theory to explain the explored findings of the research topic.

In summary, the research methodology for Study 1, a qualitative approach is under the business and management philosophies of “Interpretivism” which is inductive with small samples size by in-depth investigations. The theories and concepts are simple but new understandings and contributory views with managerial implications are obtained through focused narratives and insiders’ perceptions and interpretations. Therefore, with

researcher's network connection, ten (10) numbers of senior professionals, who are close friends of the researcher in the property management field and in the capacity of company Director, General Manager and/or Assistant General Manager with over 30 years of experience in some renowned property management companies (which are also subsidiaries of the top ten property developers in Hog Kong) including the Sun Hung Kai Properties, MTRC, Cheung Kong Holdings Ltd., Sinoland, Henderson Lands, Wheelock Properties, Great Eagles Ltd., Nam Fung Group, Jones Lang LaSalle and Pacific Century Premium Development Limited are invited for the in-depth interviews about the research topic so as to explore the two hypotheses for Study 1. The background of these senior professionals include chartered surveyors (General Practice stream), town planners, registered housing managers, The President of the Hong Kong Institute of Certified Property Managers, Head of Digitalization, Transformation and Innovation of the Great Eagles Group, and so on. Their professional qualifications, hands-on experience and insights in the property management field are to certain extent indicative and their valuable insights form end users' perspective could also become the trends to mode the products of property development in Hong Kong and mainland China.

(i) The Research Questions (RQ) and the Hypotheses (H) for Study 1

According to the research topic, "The Effects of using AI facilities in building Harmonious Communities in Property Management in Hong Kong and China", the primary research question would concentrate on the effects, if any and either positive or negative by using AI to build harmonious communities in a residential estate. Therefore, the research question would be "The effects of AI towards the building of harmonious communities are positive which outperform the traditional human–led approach of property management in Hong Kong" and further to explore "AI facilities helps building harmonious communities

via mediating variables including service efficiency, happiness, service fairness, conflict and complaint". The research questions and hypotheses for Study 1 are:

RQ 1:	Will the use of AI facilities outperforms the traditional human–led approach of property management in Hong Kong?
H1:	The effect of using AI facilities outperforms traditional human-led property management services in terms of service efficiency.
RQ2 :	Is there any association between the implementation of AI facilities can achieve building harmonious communities in property management in Hong Kong?
H2 :	AI facilities help building harmonious communities via mediating variables including service efficiency, happiness, service fairness, conflict and complaint.

(ii) The interviewing open-ended questions

The following open-ended research sub-questions are adopted as the interviewing questions to collect data from the interviewees.

(1) How many AI facilities are provided in your estate? What are they?
(2) Are the responses from property owner/resident positive toward the AI facilities provided by your management company? Please rate your view from the most negative = "1" and the most positive = "6".
(3) Do you think AI facilities are more effective than the traditional human-led system in terms of service efficiency?
(4) Do you think AI facilities are more effective than the traditional human-led system in terms of accuracy at work?
(5) Do you think AI facilities enhance system fairness and service consistency in the estate which is better than the traditional human-led system?
(6) "AI facilities replace human daily repetitive works and achieve cost saving", do you agree with this statement?
(7) Do you think your staff and residents are habitually enjoyed using the AI facilities, why?
(8) Are there any social networking groups formed by residents in the mobile apps? Can you name some of these social groups?
(9) How would you rate the "Happiness Level" of your staff and residents, from the most unhappy = "1" to the happiest = "6" in using AI facilities?

(10) Will conflict among residents and staff be reduced after using AI facilities, e.g. access control?
(11) Are there frequent complaints in the estate, how many cases per month and what are they?
(12) Has the number of complaints been reduced after implementing the AI system?
(13) Can you suggest two (2) factors that can build harmonious communities in the estate?
(14) Do you think AI facilities can help establishing harmonious communities in the estate? Please give reasons to support your views.
(15) What is your expectation on the development of AI facilities in property management industry?
(16) Do you agree that "Harmony contains differences and encourages coexistence of differences"?

As shown above, there are sixteen (16) open-end questions designed for the in-depth interviews with these professionals. Since each interview is target to complete within a time frame of 45 minutes to 60 minutes including the ice breaking and warm up chatting to build the rapport atmosphere and to reach the agreements on the confidentiality and also obtain their consents on using the empirical data being collected during the interview solely for the subject research purpose. It may be argued that this set of sixteen (16) open-end interviewing questions may be too packed that may not be discussed in detail and the researcher may also have time limits to complete within the target duration. In fact, the research topics are straight forward and due to the limited AI facilities being implemented in the property management market, all sixteen (16) open-end questions can be explored with insiders' views and insights. In additions, some other suggestions are made by some of these interviewees, e.g. food delivery robots within the estate in this time of COVID-19 pandemics, more advanced Chatbots to provide solutions to residents and so on, however this is out of the scope of this research and sincere gratitude are addressed to these senior professionals during the interview.

3.5.2 The Quantitative Approach (Study 2 and Study 3)

On the other hand, Study 2 and Study 3 are of the same nature with identical set of research questions and hypothesis with the main difference of survey region to explore if there are big differences toward different cultural backgrounds. Therefore, Study 2 is conducted in Hong Kong where its peoples are deeply influenced by the western culture under the British governance for 100 years since year 1898 until year 1997; and Study 3 is conducted in mainland China with its personal value deeply rooted in the ancient Chinese Confucian philosophies toward the research topic of harmonious communities. These two studies aim to explore if there is any cultural difference between the two types of Chinese, namely the Hongkongers and mainland Chinese toward the same research topic in verifying the effects of using AI-driven facilities could enhance the building of harmonious communities in a residential estate. A quantitative approach associated with survey questionnaires are used to collect primary data for the research work. The questionnaire will be based on the commonly adopted questionnaires designed by respective researchers previously adopted to obtain the validity and reliability of the research data which are described as follows:

(i) The Methods and Scales for Measurement

In designing the questionnaires to obtain the levels of happiness of participants who are rooted with Chinese culture and values termed as collectivism, therefore we must note that Western theories of happiness are dominated by hedonism, desire satisfaction theory, and objective list theory which are classified as of individualism nature. Therefore, the measuring scales well developed over the past decades in the west which are proved to be reliable in measuring the happiness / emotional wellbeing, including the Gurin, Veroff, and Feld (1960) and Bradburn and Caplovitz (1965) measures the feeling of wellbeing; the Oxford Happiness Questionnaires developed by Hills and Argyle (2002) to measure the

global happiness of an individual; the scale of psychological wellbeing developed by Ryff (1989) to measure the level of happiness of individual…etc are not fully applicable to this research due to their individualism nature. As Chinese are under the collectivism culture therefore, the measuring scale developed through the China Family Panel Studies (CFPS) 2010 is considered most appropriate and is adopted for this research as East Asian country like China is considered as the prototypical collectivism cultures with prioritizing authority from nation, communities, and harmony (Hofstede, 2001; Triandis, 1994). According to CFPS (2010), seven self-reported items of collectivist values are used including lonely, dislike, close relationship, being remembered, family harmony, family name, and also good prospect for children. Moreover, happiness and confidence are also used to measure the wellbeing in terms of positive emotion. However, these dimensions will be slightly modified to suit for the purpose of applications of artificial intelligence facilities in the property management market. Due to the fact that Chinese people tend to choose the mid-point of the scale regardless of their true feelings or attitudes (Cheng et al., 2003) and with a view to avoid response bias and too many neutral response that adversely affects the validity and level of significance of the analysis, the design of the questionnaires will adopt a six-point measuring scale ranging from "1" = strongly disagree to "6" = strongly agree to ensure reliability and validity of the data analysis of this research.

In measuring the levels of service fairness, the Colquitt 2001 measuring 5-point scale with "1" = the very small extent to "6" = the largest extent (instead of "5" in order to cater for the Chinese culture) will be adopted. Emphasis on procedural / system fairness and interpersonal fairness with slight modification on the content to suit the situation of implementing the artificial intelligence facilities in property management industry will be carried out.

In measuring conflict among people, the "Wong & Law Emotional Intelligence Scale (WLEIS)" (Law et al., 2004) is adopted for emotion regulation. This scale is using a five-point Likert-type with slight modification on the scale ranging from "1" = strongly disagree and "6" = strongly agree to measure distinctive behaviours which comprise four sub-scales according to the definitions of Mayer and Salovery (1997). In addition, the measurement developed by Jehn (1995) and Spector and Jex (1998) is slightly modified to suit the intended purpose in measuring the degree of relationship conflict in the property management environment.

In measuring the attributes to a complain and the intentions to complaint, Singh (1988) three items checklist are used including (i) intend to complaint to service provider about the incident face to face; (ii) intend to speak with the manager about the bad experience face to face; and (iii) intend to forget the incident and do nothing face to face. In addition, according to Li, Li Fan and Chen (2019) Customer Harmony Enhancement (CHE) is positive and significant with customer complaint intentions, therefore the Customer Harmony Enhancement developed by Leung et al., (2011) is adopted by using a measuring scale ranging from "1" = strongly disagree and "6" = strongly agree.

(ii) Sampling Method, Size and Locations

The data collection for this quantitative approach is through questionnaires with a targeted sample size of about 200 numbers of returned questionnaires from property owners / residents of the estate developed by a renowned and reputable residential property developer in Hong Kong and mainland China.

Those primary data obtained from the questionnaires will be analysed by using the SPSS statistical package (version 25), which will be computed by the SPSS programme with

descriptive statistics to summarize general characteristics of the respondents and followed by a hypothesis testing to identify whether there is correlation i.e. no association or an association between the variables on the harmonious levels and the applications of artificial intelligence facilities in the estate. The Cronbach's Alpha analysis will be used to test the reliability in the Pilot Test and later on, the Pearson Correlation Analysis, and the Regression Analysis will be applied to identify the weighing of dependent variable with each independent variable and conclude the findings with SPSS computation. This proves the degree of statistical significance of the relationship among these dependent and independent variables.

(iii) The Research Questions and the Hypotheses for Study 2 and Study 3

RQ 3:	What is the happiness level of residents in using the social networking function of the residents' mobile apps that helps building harmonious communities of a residential estate?
H3:	Mobile Apps Communication Platform i.e.. Social Chat Group enhances happiness of residents and helps building harmonious communities.

RQ 4:	How important is service fairness of the on-line booking system under AI policy that attributes to the building of harmonious communities in a residential estate?
H4 :	On-line booking system enhances service fairness and helps building harmonious communities of an estate.

RQ 5:	Will potential conflicts among property owners/residents, visitors and the management staff be avoided by using the access control system for all incoming residents and vehicles that helps building harmonious communities in a residential estate?
H5:	Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.

RQ 6:	Will complaint cases among property owners, residents and management staff be eliminated by using the Chatbot solutions that provide instant solutions for residents that helps building harmonious communities in a residential estate?
H6 :	Chatbot solutions with instant responses eliminate complaint that helps building harmonious communities of a residential estate.

3.5.3 Questionnaires Design

The questionnaires survey approach is used to collect quantitative data so as to identify the effects of the four mediating variables, namely happiness, fairness, conflict and complaint which are having direct association with the building of harmonious communities in a residential estate in Hong Kong and mainland China. Regarding design of the questionnaires, Dawson (2002) suggests that researchers must be clear about the data being collected for analysis, and it is easier to obtain the exact data for testing for the research topic. Questionnaires must be using simple clear and words in a logical sequence with good formatting so as to attract a higher response rate (Morse, 2003; Creswell, 2009). A well-structured questionnaires format is not only effective but also respondent convenient which increase the response rate due to shorter time to complete and the ease of responding (Parasuraman et al., 1991a). In administrating the questionnaires, there are two major types of monitoring methods including self-administered and interviewer administered, under several categories such as internet mediated, delivery and collection, and structured interview (Saunders et al., 2009). However, the face to face administering method in completing the questionnaires is the best mean which yields greater percentage of acceptable return with lower refusal rate (Saunders et al., 2009). In addition, the reasons for the non-response rate can also be identified more easily under the face to face data collection arrangement. However, under the threat of COVID-19 epidemic during the time of research and data collection, face to face interview as an effective mean of data

collection is not recommended and questionnaires via internet video meeting, like Zoom, Team, Skype…and so on or via telephone conferencing, or the traditional postal services is the only way for the data collection in this critical period of time around the world.

The language being adopted for data collection shall consider that English language and Traditional Chinese character are commonly used in Hong Kong and the simplified Chinese character is widely used in mainland China, therefore the questionnaires for the quantitative approach will be in trilingual format covering English, Traditional Chinese and Simplified Chinese.

The Structure of Questionnaires broadly speaking has three types including (i) structured; (ii) semi-structured and (iii) unstructured. A structured questionnaire is designed to obtain pre-defined answers which is suitable for quantitative research; whereas semi-structured questionnaires is based on a combination of close-ended and open-ended questions which is best fit for investigating studies. Finally, the unstructured questionnaires are designed to obtain the free response and open-ended data and views from the participant and this would be most suitable for qualitative studies (Haugue, 2002). This research adopts a mixed method, i.e. QUAL – QUAN approach and therefore an unstructured questionnaire would be used for hypothesis 1 and 2 as mentioned above, and thereafter a structured questionnaire will be used for hypothesis 3 to 6 under the quantitative data collection process. Copy of the survey covering letter addressing the purpose of this research study and the data collection via questionnaires by highlighting the consent from participants is attached at ***Appendix 1***. The unstructured questionnaire for qualitative data collection under the in-depth interview with the ten (10) nos. of professionals and senior management in the field is attached at ***Appendix 2*** and the

structured questionnaire for quantitative data collection for a targeted sample size of two hundred (200) nos. of property owners is attached at ***Appendix 3*** for reference.

The research philosophy for Study 2 and Study 3 is classified as "Positivism" with quantitative analysis approach. A set of questionnaires structured with dimensions and constructs in respect of the independent variables and mediating variables are designed by reference to previous works of other researchers in measuring the degree of happiness / well-being under the harmony survey suggested by Ip (2014), factors in measuring the level of service fairness by Colquitt (2001), some attributes in measuring the conflict among people by reference to Wong & Law Emotional Intelligence Scale (Law et. al., 2004) and finally the factors in measuring the complaint as suggested by Singh (1988). Details of the questionnaires design are summarized as follows:

Question No.	**Hypothesis**	**Measurement on Variables (Independent Variables and Mediating Variables)**
1 - 4	H1 & H2	Satisfaction Level in using AI facilities (General data not for SPSS analysis purpose)
5 - 8	H3	Service Quality of Management Co. (Independent Variable) + Service Efficiency (Mediating Variable)
9 - 13	H4	Social Chat Group (Independent Variable) + Happiness (Mediating Variable)
14 - 18	H5	On-line Booking Facilities (Independent Variable) + Service Fairness (Mediating Variable)
19 - 23	H6	Access Control System (Independent Variable) + Conflict (Mediating Variable)
24 - 28	H7	Chatbot Solutions (Independent Variable) + Complaint (Mediating Variable)

More details of the questions and the collected data are discussed in Chapter 5 and Chapter 6, please refer to ***Table 6***: ***Descriptive Statistic for collected data – Hong Kong*** under Study 2; and ***Table 30: Descriptive Statistic for collected data – China*** under Study 3.

In conducting the data collection for Study 2 and Study 3, over five hundred questionnaires are sent for Study 2 and Study 3 individually to those target respondents via on-line survey platform and hard copies by hand and by post. These target respondents are friends and colleagues of the researcher together with their referrals, these target participants are living in residential estates with AI facilities provided. Fortunately, the respond rate for Hong Kong is 94% which is of higher reliability and validity with 189 out of the targeted 200 numbers of returned questionnaires for analysis. However, due to COVID-19 pandemic and government policies in Hong Kong and China, the response rate for China market is not ideal with only 68 returned questionnaires (24 from online survey and 44 hard copies with the help from friends in China). The relative low response rate of questionnaires obtained from China (i.e. only 34% out of the target 100% received returned questionnaires) may raise the criticism on research validity, reliability and significance for Study 3 in the property management field in China. However, having the valuable and practical advice from some senior academic scholars, as a remedy to this unexpected shortcoming due to the adverse effects on COVID-19 pandemic that discourages face to face discussion and collection of data in situ, Study 3 will be kept and handled with a Combine Data Approach by using all data collected for Study 2 in Hong Kong together with the data obtained for Study 3 in China, to testify the overall effect of AI facilities help building harmonious communities in two different Chinese society with slight cultural difference both in Hong Kong and mainland China. As a result of combining the survey data from Hong Kong (189 nos.) and Mainland China (68 nos.) in order to obtain a more holistic views of users toward the building of harmonious communities via AI facilities, the outcome is encouraging that further testifies the research aims under Study 1 i.e. the establishment of a ground theory called "***Building Harmonious Communities with Artificial Intelligence Facilities in Property Management***" and the hypotheses set for Study 2 and Study 3. More details have been discussed in Chapter 6 with the Combined

Data Approach which serves as an alternative to address the relatively small sample size collected for Study 3 in mainland China by combining the primary data obtained from the total nos. of 257 questionnaires form Hong Kong and mainland China to establish a holistic positive finding of the research topic.

3.5.4 Pilot Testing

Before finalizing the content and format of the questionnaires, it is necessary to conduct a Pilot Test to testify whether the designed questionnaires under the quantitative research method is easily understand and can serve the intended purpose of data collection from a relatively larger size of targeted participants. It is suggested by Malhotra, (1996) and Bryman & Bell, (2011) that data collection should not be started without the pre-test of questionnaires. A pilot test is defined as a process to test or measure the effectiveness of the structured questionnaires so as to identify and eliminate the inherent problems (Malhotra, 1996; Saunders et al., 2009). It is also used to check the understanding of those intended participants toward the questions of the questionnaires (Saunders et al., 2009). This involves conducting an actual testing with relatively small sample size of participants to ensure the validity of the instrument being used to measure the variables. The purpose of testing of participants' understanding of the questionnaires is to ensure the validity of the instrument being adopted to measure the variables is accurate to achieve the intended purpose of the research work.

Content validity is the very first step to evaluate the questionnaires in which the first draft of the questionnaires has been checked and discussed with my DBA fellow cohorts and some of the property management professionals together with the helps from my study supervisors to fine tune the content of the questionnaires to achieve the affirmative outcome. These fine-tuning and revisions have been taken many rounds including the

translation of English to Traditional Chinese for Hong Kong region and Simplified Chinese version for the mainland China regions so that the content of the questionnaires are easily understand by the participants in Hong Kong and in mainland China by fully covering the originally purpose and design intentions in English. This is because the terms used in property management and the social groups in two different regions are mostly different. Rephrasing of expressions, grammatical editing, spell check and better use of words are done to ensure the questions are stick to the original intended meaning and easily understandable. Furthermore, formatting of questionnaires to make it professionally looked and attractive has also been carried out. In addition, the covering letter is trying to be explicit, genuine, and brief with friendly tone to appeal for the recipients to return the questionnaires for analysis. Most importantly, the required consents of the participants are explicitly mentioned both in the covering letter and the remarks at the bottom of the questionnaires so as to ensure the primary data collected from these participants are strictly confidential and are only used for this research work. In fact, the questionnaires do not require the participant to give the full name or any other excessive personal details for the research so as to ensure strict compliance of the statutory Personal Data Privacy Ordinance in both regions. In fact, the personal data being collected is the age group of the survey participants with the purpose to identify if property owners / residents who are of younger generations are more adaptable to use and enjoy the artificial intelligence facilities in a residential estate.

Followed by “Content Validity” is “Construct Validity” and “Reliability” for the pilot test to measure all construct validity by using the instruments that have already been adopted for the similar context of the research topic. Measuring the reliability is defined as the “consistency of a measure of a concept (Bryman, 2012); it involves the stability of the measure over time (external reliability) and its internal consistency with other measures in

the same questionnaires (internal reliability). In fact, measuring the validity is to accurately reflect the idea that is claimed to measure (Cooper & Schindler, 2003; Collis & Hussey, 2009). The main purpose in conducting the pilot test for this research is to identify the proposed items for specific constructs are all measuring the same attribute; that is the extent of their correlation with each other. In general, the Cornbach's Alpha coefficient is used to measure the reliability of the contents for the questionnaire survey. The value of the Cornbach's Alpha falls within the scale from 0 to 1 that a higher value represents an enhanced reliability, where in common practice the value of 0.7 represents a satisfactory reliability (Pallant, 2007). This has been further confirmed by Field (2009) that Cronbach's Alpha is the most important coefficient to check the reliability of those constructs. In the case that the value of Cronbach's Alpha is less than 0.7, the research should check the data analysis again as ideally the value shall be more than 0.3 in general.

In doing so, a pilot test is conducted within the peer group of the DBA fellow student members and the professionals being taken part in the qualitative in-depth interviews as they are also the targeted participants in the data collection process for Study 2 and Study 3. The questionnaire under version 1 as per ***Appendix 3*** is used for this purpose. This questionnaire is sent to the targeted fifteen (15) nos. of pilot test participants and the return rate is 100% which shows an excellent sign of 100% response rate to conduct the pilot test and carry on the survey with the target size of a larger population of approximately 200 nos. in a later stage.

Having computed the ratings from these fifteen (15) nos. of returned questionnaires from the targeted participants by using the Cronbach's Alpha in the SPSS, the results of the pilot test are affirmative that indicates the overall outcome is over 0.7 which representing a satisfactory reliability (Pallant, 2007).

The result of the Pilot Test is extracted from the SPSS (version 25) as follows:

Reliability

Scale: Overall

Case Processing Summary

		N	%
Cases	Valid	15	100.0
	Excluded [a]	0	.0
	Total	15	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.879	.885	29

Table 1: Pilot Test Summary (Cronbach's Alpha)

As reflects from ***Table 1*** as shown above, having computed the data from 15 nos. of questionnaires into the SPSS (version 25) to conduct the Pilot Test by analysing the scale to obtain the correlation figures, the Cronbach's Alpha shows a value of 0.879 which is over the acceptance level of 0.7, and therefore such high level of reliability achieved for the pre-test of questionnaires for Study 2 and Study 3 illustrates a satisfactory value deemed prudent to keep all items in the data collection, as the pilot study sample is not large enough to decide on construct measurements. However, the questionnaires so used to achieve the pilot test would be adopted for the research due to its high level of reliability. More detail analysis on Study 2 and Study 3 will be discussed in Chapter 5.

3.6 Research Ethics

One of the famous statements by Dr Samuel Johnson (1709 – 1784), an English writer who made lasting contributions to English literature as a poet, playwright, essayist, moralist, literary critic, biographer, editor, and lexicographer concerning knowledge and integrity by

saying that "*Integrity without knowledge is weak and useless, and knowledge without integrity is dangerous and dreadful*".

Research ethics is defined as the adoption of an appropriate behaviour in relation to the rights of the individuals/groups being studied or affected by the study (Saunders et al., 2012). There are four issues of research ethics including trustfulness, thoroughness, objectivity and relevance which must be considered from data collection process throughout to the reporting of findings (McNabb, 2013). Trustfulness means the researcher must not lie, deceive or commit fraud. Thoroughness requires researcher to go through the thorough research process with no short cut. Objectivity requires researcher holds no bias toward the study which is particular important for positivism nature of research. Finally, relevance suggests researcher to conduct a purposeful research and keep relevant to the literatures. In addition, research ethics must be assessed at different stages of the research works when sharing and publishing the findings. It also dictates that there should be a guarantee that participants' identities would not be deciphered in the published findings when it comes to protecting rights, privacy and ensuring their anonymity (McNabb, 2013; Kalof et al., 2008). In addition, when describing the sample of the study, research shall focus on the characteristic of participants instead of their identities (McNabb, 2013). In compliance to confidentially requirement of the research work, researcher must clearly state that the information of the participants where data are collected for the research will be completed removed from the research record after the research. All these ethical rules shall be expressly put down in the email invitations and covering letters so as to encourage the targeted participants in giving the full and factual information for the research. Researchers shall also perform their due diligence by paying careful attention to make sure that nobody is affected by the research activities (Cooper & Sachindler, 2008).

Further ethical principles called “Informed Consent” and “Protection of Confidentiality” is also important to research ethics. Kalof et al. (2008) and Myers (2013) suggests that informed consent means that participants should undertake the survey voluntarily and the researcher should clearly explain what they are being asked to do in achieving the purpose of the study together with the risks and benefits inherent in the survey of the research topic. Furthermore, researchers acknowledge the limitations and restrictions of the research works to enable the readers to know how much credibility the study should be provided with (McNabb, 2013). Saunders et al. (2012) claim that the premise behind all these ethical considerations and principles is the avoidance of harm to the researcher and the participants of the survey. On the other hand, any breach of confidentiality may cause risk to participants in the form of criminal prosecution, and the rising of embracing situation. The risk of leaking confidentiality includes forgetting to remove personal details such as name, contact number, postal and email address, and so on.

This research is subject to and has been seriously considered the statutory requirements of respective countries e.g. the UK, China and Hong Kong in terms of data protection for the research work. These include the “Data Protection Act (1988)” in the UK which states that “data obtained from research with people must be handled anonymously so that individuals, organisations or business cannot be identified before it can be shared with other researchers or archived”. The Act neither applies to research data in general, nor to anonymous data. In Hong Kong, the Personal Data (Privacy) Ordinance, Chapter 486, Laws of Hong Kong is applied throughout the research works. Since the research is also collecting primary data from property owners and residents of a residential estate in mainland China, therefore the “Civil Code”, Article No. 111 regarding Personal Information Gathering and the “Information Security Technology Personal Information Security Specification (PI-Specification) by the China National Information Security

Standardization Technical Committee (NISSTC) which enacted on 1 May 2018 are also strictly complied with. Under any circumstances, the researcher will not disclose the source of primarily data obtained from respective interviewees and have clearly stated the purpose of the research and make known to all participants in the survey by obtaining the prior consent from these participants and put disclaimer into the questionnaires for the research.

Chapter 4 – Study 1: Data Analysis, Findings and Discussion

As discussed in Chapter 3 above, this research adopts a mixed method approach, i.e. QUAL – QUAN approach. For easy understanding, Study 1, using a qualitative research method will be discussed in Chapter 4 and Study 2 and Study 3 adopting a quantitative research method will be discussed in detail in Chapter 5 and Chapter 6 respectively. Details of Study 1 are discussed as follows.

4.1 Study 1 – the Qualitative Approach

4.1.1 The Grounded Theory

The research philosophies of Study 1 are rather based on radical subjectivism as it involves studying human behavior in terms of using AI facilities of an estate to build harmonious communities within the estate is not of scientific realism. Therefore, qualitative approach by means of in-depth interviews, insider knowledge and direct observation will be used for data collection and analysis. Due to the fact that this research is rare in the academic domain and in the market, coping with the fact that most of the newly developed residential properties by renowned property developers in Hong Kong and mainland China are PROPTECH and IoTs intended by injecting many intelligent AI facilities and designs to suit the increasing demands from property owners and residents and therefore, it is difficult and almost impossible to find a well-established theory to conduct this research. It is therefore this research is adopting an inductive approach to collect primary data to explore, understand and reveal the context of the findings to form a grounded theory called The theory of ***"Building Harmonious Communities with Artificial Intelligence Facilities in Property Management***" under this empirical research. The term grounded theory was first introduced by Glaser and Strauss (1967) as "the discovery of theory from data, which

is systemically obtained and analyzed in social research". Instead of carrying out a series of procedures to prove and testify the existing theories, they introduced a research method to arrive a "theory suited to its supposed uses" which is totally different from "theory generated by logical deduction from a *priori* assumptions". The Grounded Theory Institute which is run by Glaser defines Grounded Theory as an inductive methodology by analyzing a set of rigorous research procedures leading to the emergence of conceptual categories (Grounded Theory Institute, 2013). The proposal of grounded theory is a reaction to positivism, which followed a scientific falsification and verification. Glaser and Strauss (1967) suggested that a research can achieve a theory that is meaningful in certain contexts from observations and the observers; consensus (Suddaby, 2006). Grounded Theory involves data collection, coding (data analysis), and memo-writing (theory building) (Groat & Wang, 2002). Charmaz (2006) suggested a social interaction approach in using grounded theory that emphasized the researcher's interaction and involvement with participants in constructing the theory. Although the origin of grounded theory comes from sociology, it has been widely used in many other disciplines including psychology, anthropology, education, social work and nursing (Strauss & Corbin, 1994).

4.1.2 The Process of Data Analysis for Grounded Theory

In conducting research by using the grounded theory approach, researchers need to compare between empirical data and concept, between concepts and categories, among data, among categories, and among "different slices of data" in order to reach higher levels of abstraction and advance with conceptualization (Gregory, 2010). Therefore, while carrying out the data analysis I must be theoretically sensitive to code the collected data which will finally guide them to the next process in establishing a grounded theory. An inductive approach is appropriate when prior knowledge regarding the phenomenon under

investigation is limited or fragmented (Elo & Kyngas, 2008). In the inductive approach, codes, categories, or themes are directly drawn from the data, whereas the deductive approach starts with preconceived codes or categories derived from prior relevant theory, research, or literature (Cavanagh, 1997); Kondracki, Wellman, & Amundson, 2002). So, deductive approach is mostly used to test existing theories or retest existing data in a new context. According to Strauss & Corbin (1994), researcher who uses grounded theory aims to generate a substantive theory that will explain a phenomenon in a specific context and suited to its supposed use. The emphasis in grounded theory is theory development. Therefore, grounded theory shall follow the coding processes, focus on finding relationship among categories and intend to generate a theory from comparative data analysis to achieve theory building. In this study, I'll try to prove that AI facilities being implemented in property management industry are more effective than the traditional human-led labour intensive style of property management in Hong Kong and mainland China market. Thereafter, I'll also testify the correlation between these AI facilities and the building of harmonious communities under Study 1 of this research.

4.1.3 The Process of Inductive Coding

Data analysis in grounded theory involves a systematic coding process. This entails coding, finding categories and theme(s), in which data collection and the analysis are parallel and the procedure is neither linear nor sequential. The amount of data for analysis is based on saturation instead of availability. In fact, the nature of grounded theory approach requires a higher degree of interpretation and transformation of data (Schreier, 2012). In brief, the analysis process in grounded theory involves concept labeling, categorizing, identifying core categories, finding relations among categories, and generating a theory from such relationship. Corbin and Strauss (1990) explained coding as the process of concept labeling and categorizing. They consider the concept as a "basic unit of analysis" and

those with same phenomena can be grouped into the same category. Charmaz (2006) suggests that coding is also described as "categorizing segments of data with a short name that simultaneously summarizes and accounts for each piece of data", and as "the pivotal link between collecting data and developing an emergent theory to explain these data. In brief, through coding the researcher seizes the meaning of data for its purpose. Glaser (1978, 1992) suggests two stages of coding as substantive coding (i.e. open coding and selective coding) and theoretical coding. However, Corbin and Strauss (1990) suggest three stages of coding including open coding, axial coding and selective coding. Charmaz (2006) further proposes the three stages as initial coding, focus coding and theoretical coding. Harry, Sturges, and Klinger (2005) summarize the following six stages as the analysis process of grounded theory approach these include open coding, conceptualizing categories, developing themes, testing the themes, interrelating the explanations, and delineating the theory.

Open coding is the initial step of theoretical analysis that pertains to the initial discovery of categories and their properties (Glaser, 1992) and it is "the interpretive process by which data are broken down analytically (Corbin and Strauss, 1990). Open coding includes comparing incidents with other incidents to check the similarity and differences, giving conceptual labels to incidents, and grouping those concepts together into categories (Corbin and Strauss, 1990). Axial coding is defined as a process of exploring the relationship among categories (Strauss, 1987). In axial coding researcher relates categories with their sub-categories, test the relationship against data, and test the hypothesis (Corbin and Strauss, 1990). Selective coding refers to the process by which the researcher selects one or more core categories intended to generate a story that connects the categories. Theoretical coding as proposed by Glaser (1978) refers to the process of theorizing the relationship among substantial codes; and at the end of the

analysis, a theory and a set of theoretical propositions are generated (Corbin and Strauss, 1990).

4.2 Hypothesis for Study 1

As discussed at paragraph 3.5.1 of Chapter 3, this research studies "The effects of using AI facilities in building harmonious communities in property management in HK and China" where there are positive effects in terms of service efficiency that outperforms the traditional human–led approach in providing property management services in Hong Kong. Furthermore, to explore and testify "AI facilities help building harmonious communities via mediating variables including service efficiency, happiness, service fairness, conflict and complaint". The research questions and hypotheses for Study 1 are listed below:

RQ 1:	Will the use of AI facilities outperform traditional human–led approach of property management in Hong Kong?
H1:	***AI facilities outperform traditional human-led property management services in terms of service efficiency.***
RQ2 :	Is there any direct relationship in the implementation of AI facilities that can help building harmonious communities in property management in Hong Kong?
H2 :	***AI facilities help building harmonious communities via mediating variables including service efficiency, happiness, service fairness, conflict and complaint.***

4.2.1 The open-ended interviewing questions

The following open-ended research sub-questions are adopted as the interviewing questions to collect empirical data from the interviewees. These sub-questions may not be used completely as the time for each interview is set at a maximum duration of 45 minutes to 60 minutes, subject to the proactive and passive response from the interviewees.

(1) How many AI facilities are provided in your estate? What are they?

(2) Are the responses from property owner/residents positive toward the AI facilities provided by your management company? Please rate your view from the most negative = "1" and the most positive = "6".

(3) Do you think AI facilities are more effective than the traditional human-led system in terms of service efficiency?

(4) Do you think AI facilities are more effective than the traditional human-led system in terms of accuracy at work?

(5) Do you think AI facilities enhance system fairness and service consistency in the estate which is better than the traditional human-led system?

(6) "AI facilities replace human daily repetitive works and achieve cost saving", do you agree with this statement?

(7) Do you think your staff and residents are habitually enjoyed using AI facilities, why?

(8) Are there any social networking groups formed by residents in the mobile apps? Can you name some of these social groups?

(9) How would you rate the "Happiness Level" of your staff and residents, from the most unhappy = "1" to the happiest = "6" in using the AI facilities.

(10) Will conflict among residents and staff be reduced after using AI facilities, e.g. access control?

(11) Are there frequent complaints in the estate, how many cases per month and what are they?

(12) Has the number of complaints been reduced after implementing the AI system?

(13) Can you suggest two (2) factors that can build harmonious communities in an estate?

(14) Do you think AI facilities can help establishing harmonious communities in an estate? Please give reasons to support your views.

(15) What is your expectation on the development of AI facilities in property management industry?

(16) Do you agree that "Harmony contains differences and encourages coexistence of differences"?

4.2.2 Establishing the Analytical Framework

For this research (Study 1), individual in-depth interviews have been conducted with 10 senior management and/or professional managers who are in the field of Property and Facility Management industry in Hong Kong and they are also owners of respective residential property with AI facilities. These selected participants for the in-depth interviews are from top tier renowned Property and Facility Management Companies in Hong Kong, such as Sun Hung Kai Properties, Cheung Kong Holdings, Sino Group, Henderson Land, Mass Transit Railways Corporations, Great Eagle Group, Wheelock Properties (HK), Henderson Land, Nam Fung Group, New World Development Co. Ltd., and Jones Lang Lasalle.

The main objective of the interviews is to grasp the views of interviewees who are in a senior management position of those renowned property management companies in Hong Kong toward the effects on the implementation of AI facilities which is more efficient and accurate than the traditional human-led approach in providing the management services to residents in residential properties. Furthermore, to explore, identify and testify the relationship that AI facilities help building harmonious communities within residential estate in Hong Kong with regard to the independent variables including service efficiency, happiness, service fairness, avoiding conflicts and eliminating complaints toward the dependent variable "harmonious communities". The AI facilities are specifically referred to Mobile App Communication Platform, On-line Booking System, Access Control System,

and Chatbot Solutions in which these mediating variables are performing the mediating effects in bridging and achieving the building of harmonious communities in a residential estate throughout the research.

Before the interviews, all interviewees are briefed on the purpose of the study and requested to acknowledge a consent statement before commencing the interview in fulfilling the ethical requirement of conducting the research. Apart from the notes taking during the interviews, a digital recorder from mobile phone is used to record the sound bites of the whole discussion for later transcribing the contents for data analysis. Throughout the interview, I've always tried to maintain a rapport effect and an opening question is set to achieve spontaneous reactions in a relatively causal manner. After the interviews by successfully collecting the primary data as much as possible to the state of saturation, an Analytical Framework has been established to highlight the findings in order to establish a grounded theory to explain the research gap, i.e. to explore and explain AI facilities being implemented in a residential estate is more higher effectiveness than the traditional human-led labour intensive management services, so as to establish a grounded theory after data analysis process via the process of coding the collected data until saturation, which explains how these senior management staff are experiencing a phenomenon that can derive the analytical framework. This framework also explores the effects on using AI facilities that outperform the traditional human-led labour-intensive practice in the past when compared to the current practice in providing the management services for property owners through AI facilities.

Having conducted series of procedures in deriving the grounded theory including setting the research questions, theoretical sampling, data collection through interviews, coding the collected data to obtain the conceptual theme with various categories until saturation, then

explore the relationship among the categories and testing the hypothesis. Through an inductive approach, the analytical framework diagram showing the effects of "Using AI facilities in building harmonious communities" is divided into three levels in a format namely the "Theme" at the top position, "Category" in the middle and "Sub-Category" at the bottom part of the framework. Having transcribed the data obtained from the interviews, the analytical framework has been divided into five (5) themes including Service Efficiency, Happiness, Service Fairness, Avoiding Conflict and Eliminating Complaint. Having conducted the inductive coding process, the raw data has been divided into category and sub-category for easy understanding. Two major objectives for this Study 1, e.g. the service efficiency, together with the aim to testify if there are close relationship and associations among the implementation of AI facilities help building harmonious communities in a residential estate, which have been repeatedly discussed with the interviewees until saturation of data so as to eliminate any uncovered data in the subject. The number of counts as shown in the category and sub-category bracketed in red in respective boxes reflects the occasions and frequencies of that specific terms being repeatedly mentioned by the interviewees during the interviews. These sub-categories have been grouped into respective category under a theme for easy reference. After transcribing the data until saturation and going through the coding process, the analytical framework for the research topic in response to hypothesis 1 and 2 (i.e. H1 and H2) is established and is exhibited in ***Figure 5***. For ease of reference, ***Table 2****: "Coding data in establishing the Analytical Framework"* is also prepared to record every detail of the in-depth interviews with these senior professionals for detail examination of primary data.

Study 1 - The Analytical Framework

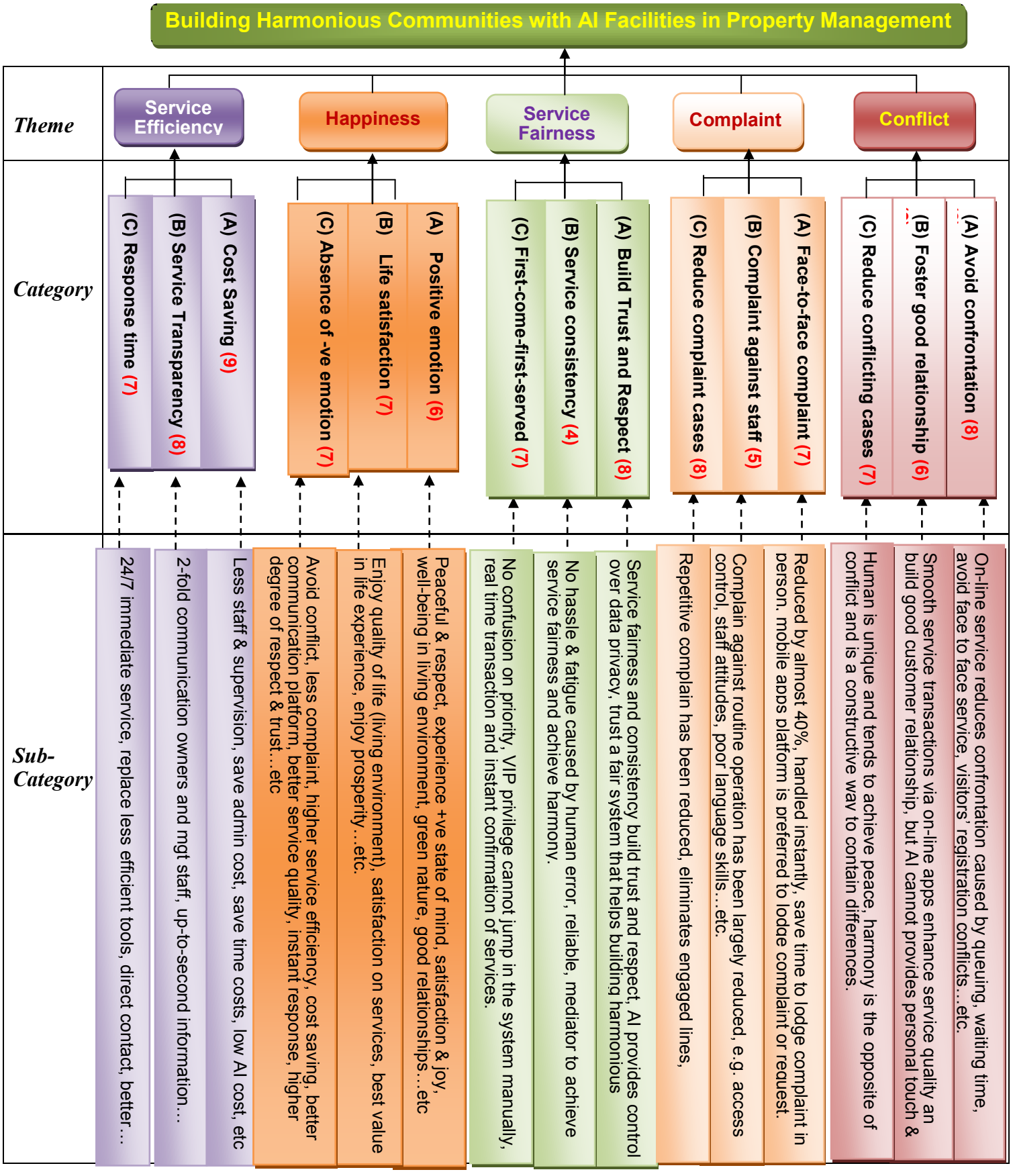


Figure 5: Analytical Framework – "Building Harmonious Communities with AI Facilities in Property Management"

Study 1 : Development of Analytical Framework - Coding for "*Building Harmonious Communities with AI Facilities in Property Management*"

Theme	Service Efficiency	Happiness	Service Fairness	Complaint	Conflict
Category	(A) Cost Saving (B) Service transparency (C) Response time	(A) Positive Emotion (B) Life Satisfaction (C) Absence of –ve emotion	(D) Build trust & respect (E) Service consistency (F) First-come-first-served	(A) Face-to-face complaint (B) Compliant against staff (C) Reduce complain cases	(A) Avoid confrontation (B) Foster good relationship (C) Reduce conflicting cases
Sub-category	**(A) Cost Saving** ✧ deploy less staff; saving admin cost and HR effort; less supervision; ✧ definitely achieve cost saving on staff; ✧ saving time costs; but the capital expenditure and operative expenditure can't be saved; ✧ maintenance cost for AI facilities is relatively low; etc. **(B) Service transparency** ✧ Two-fold communication; ✧ e-Notice, newsletter, meeting minutes, estate updates, bulletins; activities, emergency notice, suggestions, complaint & comment are easy to reach mgt staff; ✧ up to second information can be obtained via online apps; etc **(C)Response time** ✧ AI are user friendly; 24/7 service platform; ✧ replace less efficient communication through phone call; writing letters, dropping a note ✧ miscommunication can be avoided with direct messaging staff; ✧ automatic time log allows accurate record for owners' requests; ✧ performance pledge on reply can be monitored.	**(A) Positive Emotion** ✧ Peaceful & being respect ✧ Experience positive state of mind e.g. higher SERVQUAL; ✧ Subjective satisfaction and internal joy; ✧ State of well-being in the living environment; ✧ Service efficiency, fairness & consistence; ✧ Friendly neighbours; ✧ Enjoy the green nature and landscape; etc. **(B) Life Satisfaction** ✧ Enjoy quality of life with good management services and the tidy environment; ✧ Best experience in life to buy the property; ✧ Feeling prosperity by residing in the estate; ✧ Satisfies with the management services with high service efficiency; etc. **(C) Absence of –ve emotion** ✧ Avoid confrontations with neighbours and mgt staff; ✧ Eliminate complaints due to higher service efficiency ✧ Enjoy 24/7 communication platform via mobile apps; ✧ Enjoy peaceful state of mind with SERVQUAL; ✧ Build trust and respect toward the management services; ✧ Hassle free living environment; etc.	**(A) Build trust & respect** ✧ Fairness & consistency build trust and respect among residents; ✧ AI system protect privacy data of residents; ✧ residents trust the fair system and tend to accept and tolerance the system failure instead of lodging complaint; ✧ trust and respect promote harmonious environment **(B)Service consistency** ✧ No more hassle for residents, AI facilities are more reliable that act as a mediator to facilitate service fairness with service consistency; ✧ no human fatigue; …etc. **(C) First-come-first-serve** ✧ No confusion on priority; ✧ avoid VIP-way of handling; ✧ real time confirmation & payment; etc.	**(A) Face-to-face complaint** ✧ Face to face complaints cases have largely been reduced by almost 40%; ✧ complaints were handled instantly due to instant messaging and multi-media records for the complaint; ✧ save time for complainant to visit the management office to lodge the complaint; ✧ residents prefer to contact management with mobile apps; etc. **(B) Complaint against staff** ✧ Most complaint cases against routine operation performed by staff e.g. entrance control and visitors' registration that can be performed by AI facilities are largely reduced, these include the staff service attitude, poor language skills, wrong interpretation of owners' requests; etc. **(C) Reduce complain cases** ✧ Apparently yes, repetitive complain has been reduced via mobile apps; ✧ instant message helps transparent information; ✧ eliminates engaged phone & no response; ✧ AI analyse residents needs and provide better service that reduces complain; etc. ✧ some complaints cannot be handled by AI, such as noise nuisance, water leakage problems…etc.	**(A) Avoid confrontation** ✧ Confrontations among stake holders have been largely reduced via on-line service e.g. queuing and waiting time at the reception counter has been minimized; ✧ machine operated access control system reduces negative face-to-face interaction (e.g. poor service attitude & misunderstanding) that creates human confrontation; etc. **(B)Foster good relations** ✧ Old-school visitor registration cause conflict easily at service counter; ✧ AI enhances service efficiency that helps establishing good relationship with owners. ✧ AI cannot perform traditional personal touch & caring moment with owners which is also effective way of building relationship; etc **(C) Reduce conflict cases** ✧ We are not factory-made that everyone is unique and special in his own way; ✧ Harmony is about the way to deal with differences and conflict in a positive and constructive manner; ✧ AI automation system avoid human interaction that leads to conflict and complaint, etc.

Table 2: Coding data in establishing the Analytical Framework

4.3 Counts on Findings

The most frequently discussed topics/ideas from participants are tabulated below:

Theme	Category	No. of Counts*	Average Counts
Service Efficiency	**(A) Cost Saving**	**9**	**80%**
	(B) Service Transparency	**8**	
	(C) Response Time	7	
Happiness	(A) Positive Emotion	6	66.7%
	(B) Life Satisfaction	7	
	(C) Absence of Negative Emotion	7	
Service Fairness	(A) Build Trust and Respect	8	63.3%
	(B) Service Consistency	4	
	(C) First-come-first-served	7	
Complaint	(A) Face-to-face Complaint	7	66.7%
	(B) Complaint against Staff	5	
	(C) Reduce Complaint Cases	8	
Conflict	**(A) Avoid Confrontation**	**8**	**70%**
	(B) Foster Good Relationship	6	
	(C) **Reduce Conflicting Cases**	**7**	

Table 3: Summary of Counts during Coding process

**** No. of Counts: There are totally 10 senior professionals conducted the interviews and 9 represents that 9 participants have expressed their ideas and shared their experience and views on this issue. Similarly, the minimum score of 3 indicates that only 3 participants reflected their views on the issue which reflects the less importance of the issue in the eyes of senior professionals.***

According to ***Table 3*** as shown above, the highest count of 9 for "Cost Saving" reflects the fact that 9 out of the 10 interviewees agreed with the fact finding from "Service Efficiency" that, cost saving is counted as one of the important yardsticks to evaluate service efficiency. Preliminarily speaking, the initial insight to the above findings reflects the positive effects that AI facilities are more efficient than and are able to outperform traditional human-led property management services as most of the categories are scoring a relative high ranking in the framework.

For better interpretation and understanding of the counts on individual category, ***Table 4*** below classifies the counts into three levels namely high, medium and low which demonstrates the frequency and priority in terms of validity and/or reliability of the findings and its result.

Level	No. of Counts	Theme	Category	Validity & Reliability
High	8 – 10	Service Efficiency	Cost Saving (9) Service Transparency (8)	High (80% and above)
		Service Fairness	Build Trust and Respect (8)	
		Complaint	Reduce Complaint case (8)	
		Conflict	Avoid Confrontation (8)	
Medium	4 – 7	Service Efficiency	Response Time (7)	Medium (40% to 70%)
		Happiness	Positive Emotion (6) Life Satisfaction (7) Absence of Negative Emotion (7)	
		Service Fairness	Service consistency (4) First-come-first-served (7)	
		Complaint	Face-to-face Complaint (7) Complaint against Staff (5)	
Low	0 - 3	Conflict	Foster Good Relationship (6) Reduce conflicting cases (7)	Low (30% and below)

Table 4: Three levels of Counts in the Analytical Framework

We shall discuss the findings in detail by examining each sub-category, category and theme in establishing a grounded theory through the coding techniques and saturation process in the following discussion.

4.4 Discussion on Findings

For ease of reference, the hypothesis for Study 1 is shown again as follows:

H1: The effectiveness of AI facilities outperforms traditional human-led property management services in terms of service efficiency; and

H2: AI facilities helps building harmonious communities via mediating variables include service efficiency, happiness, service fairness, conflict and complaint.

Data collection for Study 1 is through in-depth interview with property management professionals who are also in the capacity of senior management level in the top ten renowned property developers in Hong Kong. Bearing the company visions and missions from these 10 number of senior managements toward the implementation of AI-driven policies and the AI facilities being launched in their developed properties in Hong Kong, their experience sharing during the interviews certainly help achieving accurate primary data with higher validity and reliability for Study 1, as these developers are holding the majority market shares in the Hong Kong property development market. Before the interview, I have briefed all interviewees about the purpose of the interview which is solely for collecting their primary first hand data in conducting my academic research on the topic, "The effects of using AI facilities in building harmonious communities in HK and China". All interviewees acknowledged my disclaimer verbally and through body language by nodding their heads or waiving their hands to show their consents. In addition, I have also expressly invited and having their consents for me to use the data to conduct the analysis for my research topic and the outcomes are all affirmative and thereafter individual interviews are conducted in ten different locations and date/time in Hong Kong.

As reflected in ***Table 4*** above, the themes scoring the highest counts are Service Efficiency, Complaint, Conflict and Service Fairness. These are supported by their categories and sub-categories with details as shown in ***Table 3*** above which is discussed as follows:

4.4.1 Service Efficiency

Firstly, "Cost Saving" scores the highest count with 9 out of the 10 (i.e. 90%), that is 90% of the interviewees agree and support that AI facilities achieve cost saving in many aspects. These include saving the staff cost as AI facilities can replace some of the human works which are of repetitive, routine and mechanical nature such as access control to verify the identities of all incomers to the building including residents, visitors, servicemen and so on. Being in the industry for almost 30 years and from an insider perspective, the saving that AI facilities can save on staff salary is huge as staff costs is one of the main expenditure in the management budget of a residential building which accounts for 40% - 50% or above in a management budget across the industry. The calculation is simple, for instance, under normal practice each tower entrance lobby would deploy a security staff to look after the access control of every personnel in and out of the building for security control of the building in order to upkeep the security standard for every occupants of the building. This is on a 24-hour and 7 days per week basis that, each of these posts shall require at least 3 nos. of security manpower to cover the duty shift (12-hour shift) in providing the intended service for that tower. That is, 2 nos. of 12-hour shift security staff to cover the post and one reliever to cover the rest day, statutory holiday, annual leave, sick leave…etc. of these two security staff for that particular tower. By virtue of AI facilities, in particular the access control system, this replaces the deployment of security staff to perform such security function by means of pre-registered access control code under residents' Proximity/Smart Card (solely for access control) and/or Octopus Card (Access control with stored value for convenient shopping) which are commonly used by all peoples in Hong Kong. An access authorized code will be set to resident's personal Octopus Card or the resident smart card for access control, i.e. a resident can simple present the pre-registered

Octopus Card to the access control reader in front of the tower entrance to grand access into the tower.

In addition, the facial recognition system within the scope of AI function could also perform the same access control function with very much convenience without manually presenting the pre-registered medium for an access. Resident who would like this simple and easy way of entering into the tower or to those allowed areas such as the clubhouse, the carpark or some other facilities room in the building/estate can simple register their face image by means of recording the biometrical data from the face of individual resident so that every time when this resident passes through the entrance or the tower, the visitor panel containing the reader of facial recognition will automatically scan through the data base of facial recognition records and send command to the door lock system to open the door for the incoming resident who has registered for the facial recognition function under the AI facilities of the estate/building. The use of AI facilities in access control, to its best effectiveness, facilitates an optimal saving on traditional human-led service by providing security guard for each tower. This obviously achieves cost saving for the management account of the estate which is agreed by 90% of those senior management and professionals in the field who has taken part in the in-depth interviews for the study.

Other cost savings associate with staff cost including the fringe benefits for these staff, uniform costs, insurance cost for employee compensation, the recruitment costs via advertisement, time costs and administrative costs by the Human Resources department in maintaining these labour force…etc. Therefore, the cost of maintaining a considerable amount of security staff stationed at tower lobby can be reduced by virtue of the implementation of AI facilities in access control. On the

contrary, the operating cost in maintaining a high degree of smooth functions for the access control system is relatively low as those electronic devices and parts are low costs. According to the highest count for cost saving under service efficiency, it is certain that AI facilities, include but not limited to the access control system, outperform traditional human-led property management service in terms of service efficiency that benefit from cost saving on staff.

Secondly, "Service Transparency" scores a relatively high count of 8 out of 10 (80%), this reflects the fact that stake holders are requiring a transparent information flow within the estate which shall be interactive and two-fold with earliest response from the management staff. Transparent information flow includes e-Notice, estate newsletter, meeting minutes, bulletins, clubhouse activities, interest classes, emergency notice, suggestions, requests, complaints…etc. In fact, stake holders require up-to-the-second information in this millennium era through real time on-line mobile apps. For the interactive and two-fold communication platform, stake holders normally require immediate attention to their requests and/or suggestions and a timely reply from the management staff is deemed appropriate. This timely response time via on-line apps replace the traditional less efficient communication channels via telephone and writing letters and or sending emails. The automatic time log for each incoming message is recorded and management staff shall reply the requests of stake holders within the timeline according to the requirements of the performance pledge.

4.4.2 Happiness

According to the coding result for happiness as shown in ***Table 3***, the scoring of 66.7% is marginal in which "Life Satisfaction" and "No Negative Emotion" both

score the same mark at 70% whereas “Positive Emotion” scores 60%. It is obvious that the relative low score in “Positive Emotion” has lowered the average for these three categories and only achieve 66.7% as a whole for the theme “Happiness”. It can be explained that the current threat for the spreading of COVID-19 epidemic, the unstable political situation and the economic downturn happening in Hong Kong may cause most of its citizens to rate a lower positive emotion during the time of this research. Although this research is confined in the field of property and facility management of a residential estate, there exists some psychological and emotional factor that affect the rating of this positive emotion at the material time when conducting the research. However, “Life Satisfaction” and “Absence of Negative Emotion” score a positive higher mark at 70% which reflects the fact that in the eyes of these interviewed senior professionals, most of the stake holders are enjoying their peaceful state of mind and satisfaction levels toward the management services provided by respective management companies. “Life Satisfaction” particularly in regard to living environment include the enjoyment of the green nature and the eye-catching landscaping design in the estate, enjoying the best value in life experience with a comfortable residence of high service quality, with instant response that build respect and trust among the neighbouring communities, feeling prosperous and prestigious status being one of the stake holders in the estate and so on. By turning the same coin, the “In the Absence of Negative Emotion” is the same as positive emotion but cover a wider perspective not mentioned in the positive emotions. By referring to the data analysis in ***Table 3***, other mediating factors scoring a high mark at 70% and above shall become the attributes to these “Absence of Negative Emotion”. These include higher service efficiency in terms of cost saving and service transparency; building trust and respect in the service fairness; eliminating face-to-face complaints and the frequency of complaint cases; and

avoiding human confrontations and reducing the conflicting cases within the estate as well.

4.4.3 Service Fairness

During the in-depth interviews, 80% of the participants support that service fairness can "Build Trust and Respect" from stake holders toward the management company in a residential estate. This implies the fact that those AI-handled services are highly accurate and error free so that this work accuracy enhances service quality with trust and respect by all stake holders. This also reflects the fact that service fairness brings "Service Consistency" that enhances the service quality of the management company and helps building harmonious communities thereof. To certain degree, AI operate system shall have proper control over the personal data of individual stake holders by setting the level of authority in granting access to these privacy data of every stake holder in the estate. This highly secure arrangement in handling privacy data of residents shall also build trust among the stake holders toward the management company. This testifies that service fairness becomes one of the important mediating variables to achieve the building of harmonious communities via AI facilities. This establishes an ideal situation that stake holders trust the fair system under the AI policy and tend to accept and tolerate the system failure instead of lodging a complaint to the management company. This also demonstrates the merit of AI-driven policy and facilities in delivering a fair and justice management services to all stake holders of the estate, that result in building harmonious communities in the residences environment.

"First-come-first-served" principle is a fair and mostly accepted mechanism for highly demanded goods and services in many different industries. AI system

facilitates a fair platform for facilities booking according to the real time transaction record, which also harmonizes with the first-come-first-served principle within the system. In other words, unless the system is override by the senior management of the estate, no one can alter the record and jump in the queue for certain highly demanded facilities. This control enhances service fairness and builds trust and respect from stake holders by all means. The scoring of 7 out of 10 counts represents a medium to high factor that contribute to the building of harmonious communities within the estate.

4.4.4 Conflict

"Avoid Confrontation" under the mediating variable "conflict" scores 8 out of the 10 counts (i.e. 80%) represents a high level of validity and reliability from the collected data. Human face-to-face interactions during the process of service provisions in an estate, e.g. identity verification procedures for all visitors, are not avoidable in property management industry. However, the implementation of AI facilities in an estate shall avoid many occasions of human interactions these include the access control at tower entrance lobby that the sub-standard performance of a security staff shall cause dissatisfaction of residents, visitors, servicemen and so on. Another example is the service counter that provides some basic function of property management include the booking of clubhouse facilities, payment of management fee, general enquiries…etc. normally causes a queue of residents in the management office demanding a service from the management staff. But due to the limited space and staff to serve these stake holders, a long queue is unavoidable that may raise the temper and anger of these stake holders. With the help of the AI facilities in providing solutions to tackle the frequently asked questions through the frequently trained Chatbot or provision of the on-line payment platform and booking system, the

long queuing time at the service counter could be minimized. Hence the conflicts as a result from the face-to-face confrontation can be largely reduced to enhance the harmonious atmosphere among the stake holders and the management staff. In other words, less human contact at the scene by implementing AI digitalized access control and on-line service to replace the counter service arrangement shall largely reduce face-to-face contact and result in lower probability that leading to human confrontation within the estate. To the worse scenario for instance a poor service attitude staff in a residential estate, the poor performance and sub-standard service manner of this staff shall no doubt cause human conflict whatever he/she encounters. Therefore, AI facilities to replace these poor performance staff is one of the most effective way to strengthen the service quality and achieve service excellence that enhances the building of harmonious communities in the property and facility management sectors.

By virtue of the merits of AI application in estate facilities, property owners and residents are able to enjoy the smooth transaction via the mobile apps and on-line services so that a fair to good relationship can be maintained among residents and the management staff. This is the positive effect on reducing the conflicting cases with less frontline manpower in providing the services, however human-led management services shall have some positive effect if staff performance is up to the required standard which may be better than the AI services. In general, when duty staff is performing their routine duties and repetitive works will become boring and in the lack of excitement that affects their proactive role in discharging their duties. This repetitive cycle affects their emotions and sometime raises their anger easily when the staff has to perform extra duties in the case of manpower shortage for particular shift. This will easily weaken their performance in delivering the ultimate customer

service skills and may adversely affect their response to customers who are expecting the good services at the material time, then problems/complaints will be followed. Therefore, the strategy in reducing conflict shall be first to deploy staff with good temper with high tolerance level as some of the duties cannot be replaced by AI services. In addition, senior management shall avoid their staff to have face-to-face confrontation with stake holders and this must be stopped immediately so as to foster good relationship with all stake holders. In brief, sub-standard staff should be get rid of immediately and those remaining good staff should be trained and make good use of the AI facilities to foster good relationship with all stake holders to build harmonious communities within the estate.

4.4.5 Complaint

Complaint from property owners/residents is also one of the mediating variables to service efficiency. The score of 8 out of 10 (i.e. 80%) in the total counts demonstrates that this mediating variable has direct relationship with service efficiency. In other words, higher service efficiency shall reduce the numbers of complaints from the stake holders in the estate. According to the primary data from the in-depth interviews, 8 out of the 10 professionals reflect the fact that the number of complaint cases has been reduced after implementing the AI facilities in the estate. This accounts for the intelligent functions of AI to create instant messaging and a 24-7 communication platform between stake holders and the management company so that the requests and complaint items can be acknowledged by the management company to follow through the requests until satisfaction of the stake holders. This provides a transparent communication platform that stake holders can provide more information of their requests/complaints through video shooting, photo taking or voice recording to specify the discrepancy/irregularities leading to the complaint for

the management staff to follow up with accurate information. In addition, the old day's problem on phone engaged cannot put through or no answering can be avoided under the service scope of AI facilities in handling instant messages from stake holders. One of the interviewee quoted that the number of complaint cases has been reduced by 30% – 40% after implementation of AI facilities including access control system, Chatbot solutions, on-line booking system and social networking platform which shows a good sign of less complaint that allows better chance of building harmonious communities within the estate.

However, there are limitations on AI facilities in handling some complaint cases, these include noise nuisance, water leakage problems, pet disturbances, hygienic and cleaning problems…etc. which are attributes to the poor behaviour of the stake holders in the estate which shall be handled by means of the traditional human-led face-to-face methods by negotiation, observation and coaching. Majority of the interviewees agreed that the cases of complaint against management staff has been reduced mainly because of the less frontline labour forces in tower lobby and the service counters that avoid the face to face confrontation due to sub-standard of staff or over demand from stake holders at the scene.

4.5 Confirmation on Hypothesis 1 (H1)

In brief, the Hypothesis 1 (H1) is testified to be positive that under the data analysis in ***Table 3*** and ***Table 4*** which reflects that "The effectiveness of AI facilities outperforms traditional human-led property management services in terms of service efficiency". In addition, the effect of "Service Efficiency" shall be explained in terms of cost saving and service transparency as these two sub-categories are scoring the highest counts among the in-depth interviews with senior professionals during the

research. This also implies that stake holders are mostly concerned with cost saving with a common view to lower the property management cost. As a result, this sole contributing factor for the management fee the property owners will have to pay becomes the top priority in the industry. In other words, saving staff costs on monthly salaries shall ensure maintaining a healthy surplus balance in the building management account, so that increase in management fee levels cannot be justified by the management company. Hence, service efficiency can be explained by cost saving as a highly reliable mediating factor to achieve the building of harmonious communities in a residential estate, in which stake holders are mostly concerned with. Furthermore, service transparency can also explain service efficiency from stake holders' perspectives as service transparency in terms of higher efficiency on the two-fold interactive communication via the on-line communication platform e.g. the higher efficiency in mobile apps and the digitalized on-line services are certainly outperform traditional human-led building management service that communication platforms in the old days are relatively lacking this instant interactive approach and technologies.

4.6 Confirmation on Hypothesis 2 (H2)

As the data analysis discussed above reflects that the fact that Hypothesis 1 is well established as service efficiency by means of cost saving and service transparency are supported by the majority viewpoints of those senior professionals being interviewed. Apart from service efficiency, other themes as detailed in the Analytical Framework include Happiness, Service Fairness, Conflict and Complaint are also proved to be the important mediators in achieving the building of harmonious communities in a residential estate. According to ***Table 3***, "Avoiding Conflict" scores the second highest average mark of 70% that AI facility particular the digitalized access control

system helps avoiding the human face-to-face contact and hence avoids many confrontation and conflicts at the tower lobby entrances in performing the registration purposes for all incoming residents and visitors. Since access control is the most frequently used facilities and there are many stake holders passing in and out from this point, therefore this kind of AI facilities is the most efficient mean to control and monitor the security of the building that those residents with pre-registered record can simply enter the building by simply presenting the residents card or using the facial recognition system to enter into the building without any registration procedures. For visitors who are not resided in the building, they have to register in the tower reception counter to safeguard the security of every residents of the building. Avoiding these frequent face-to-face confrontations would certainly help building harmonious communities among the stake holders as these visitors are sometimes their close friends, very important persons, or expecting assistance from these visitors and so on. Such AI facility can without doubt reduce the conflicting cases of the estate that enhance the building of harmonious communities thereof.

In brief, Hypothesis 2 is also testified that "AI facilities helps building harmonious communities via mediating variables include Service Efficiency and Avoiding Conflict". However, Happiness, Service Fairness and Eliminating Complaint being the mediating variables are less reliable in achieving its purpose as reflected by the data analysis with lower means value for Hypothesis 2 (H2).

4.7 The Conclusion

Having discussed the findings for hypothesis 1 and hypothesis 2 as shown above, the following conclusions are confirmed for the research work.

4.7.1 Conclusion for Hypothesis 1 (H1)

A recap of the hypothesis (H1) under Study 1 as follows:

H1: The effectiveness of AI facilities outperforms traditional human-led property management services in terms of service efficiency.

According to the well-established Analytical Framework as stated in ***Figure 5*** above, it can be concluded that the implementation of AI facilities in a residential estate, particular referred to the Mobile Apps, the Access Control System, the On-line Booking System and the Chatbot Solutions, are more efficient than the traditional human-led property management services in terms of service efficiency. However, it is for certain that service efficiency is highly related to effectiveness of AI functions which is proved to be reliable as this finding is according to the experience sharing of the ten (10) senior management staff who are also professionals from different top tier land developers in operating the property and facility management business in Hong Kong. Under the theme of Service Efficiency, cost saving is the most important factor leading to service efficiency in the field of property management. It is testified that cost saving in staff salary in a considerable large amount can be achieved by the implementation of digitalized access control system under the regime of AI-policy and AI facilities. In addition, service transparency and response time are also important factors achieving service efficiency as these two factors fall into the high level of counts as shown in ***Table 4*** above. This accounts for the highest score of service efficiency through the

successful implementation of AI facilities that help building harmonious communities among the management staff and the stake holders within the residential estate.

In conclusion, Hypothesis 1 (H1) is testified to be valid that "***The effectiveness of AI facilities outperforms traditional human-led property management services in terms of service efficiency*****".**

4.7.2 Conclusion for Hypothesis 2 (H2)

A recap of the hypothesis (H2) under Study 1 as follows:

H2: AI facilities help building harmonious communities via mediating variables include service efficiency, happiness, service fairness, conflict and complaint.

As shown in ***Figure 1***, the mediating variables consist of service efficiency, happiness, service fairness, conflict and complaint, which perform the role of mediators bridging the building of harmonious communities as a result of the implementation of AI facilities within a residential estate. According to the Analytical Framework in ***Figure 5*** above, these mediating variables are termed as the theme under each theme there are various categories to support the theme. According to ***Figure 2***, these themes are scoring an average count of: Service Efficiency (8), Happiness (6.67), Service Fairness (6.3), Complaint (6.67) and Conflict (7); where Service Efficiency and Conflict score a high level of 80% and 70% respectively which are of relatively high validity and reliability and classified as the important mediator to achieve building of harmonious communities by means of AI facilities; these include the Chatbot Solutions and the Access Control System. However, Happiness, Service Fairness and Complaint score 66.7%, 63% and 66.7% respectively which are of marginal status to become one of the highly recognized

and significant mediators, this status may be improved if the sample size of the in-depth interviews is of a larger size over 10. Therefore, it is concluded that for Hypothesis 2 (H2), "***Artificial facilities help building harmonious communities via mediating variables in terms of Service Efficiency and Avoiding Conflict***".

4.8 Formation of the theory of *"Building Harmonious Communities with Artificial Intelligence Facilities in Property Management"*

Having testified Hypothesis 1 and Hypothesis 2 as mentioned above, it can be concluded that according to this empirical research, a new grounded theory called the Theory of ***"Building Harmonious Communities with Artificial Intelligence Facilities in Property Management"*** is established. Briefly speaking, AI facilities are proved to be more effective than the traditional human-led property management services to stake holders in terms of (i) higher service efficiency with cost saving and transparent two-fold communication platform; and (ii) service fairness by building trusts and respects with stake holders; (iii) reduce complaint cases and (iv) avoid human conflicts throughout the comprehensive services provision to owners / residents in the property management services in Hong Kong.

4.9 The Limitations and Managerial Implications

4.9.1 Limitations for conducting the research

Study 1 has been associated with various limitations as data validity are limited by the relative small sample sizes confined to Hong Kong market due to time constraint, but is still a valuable attempt to explore the research topic to identify the contributions to the property development and property management industry. Another hurdle being the threat of the spreading of COVID-19 (Corona-virus) epidemic that most of the physical

communications, e.g. transportations, face-to-face interviews, meetings, social gatherings…etc. must be stopped under the local government stringent policies, this hampers the data collection processes especially for the in-depth interviews scheduled to be conducted for Study 1. Although online meeting via "Zoom" and "Team" meeting and telephone conversations may also be able to collect the primary data, the rapport atmosphere and the relax mode can hardly be established. In addition, without facial expression and eye contacts, the spontaneous exchange of ideas during the interviews is hindered. In fact, the scores for "Happiness" which is an emotional factor might achieve a higher rating and become one of the reliable mediators when the macro/external environment in Hong Kong include the economic, health & safety and political factors are stable with practical solutions and recovery measures during the current threat of COVID-19 pandemic period that results in economic downturn situation would be an ideal scenario in achieving a positive outcome of the research. Finally, the research on this subject is rare in the academic world (so this leaves a research gap for future study) with particular respect to examine the effects on bridging advance technologies to sociology or psychology domain. Furthermore, studying the cultural difference by comparing between the western populations and the traditional Chinese culture in terms of social harmony or harmonious communities are rare in the research world that limits the research works with small amount of discussion papers and journals for reference which also becomes one of the major limitations on this research topic. However, it is strongly recommended for top tier land developers in Hong Kong to seriously look into the positive effects of AI facilities in the built environment so that new built projects including residential, commercial and industrial properties shall include the latest AI facilities under the domain of PROPTECH, IoT applications and Intelligent Buildings to promote the harmonious relationship among all stakes holders and end-users.

4.9.2 Managerial Implications and Contributions

The empirical results of Study 1 containing hypothesis 1 and 2 show that AI facilities implemented in property management enhance better service efficiency and also have direct relationship in building harmonious communities in Hong Kong. The research also brings some contributions to the field of property management industry with five recommendations and/or managerial implications. These include (i) AI services are of higher efficiency than the traditional labour intensive and human-led services in the field of property management; (ii) AI services enhance service efficiency and service fairness which promote positive state of mind to achieve happiness of residents, and also eliminates human face-to-face conflicts, reduce complaints, and achieve higher service quality of the property management company in terms of service efficiency in terms of cost saving and service transparency; (iii) AI policies and facilities not only save costs but also enhance the harmonious relationships among residents; (iv) AI facilities due to its continuous learning and capable of recommending intelligent solutions to its patronages are able to build harmonious communities with less human interaction that, in a longer term may gradually promote social harmony in the region; and (v) due to the proven records of the positive effects of AI facilities in building harmonious communities in residential property, land developers in Hong Kong shall bear this finding in mind that when designing future residential property development projects, they may inject more Property Technology (PROPTECH), Internet of Things (IoT), Sustainable Built Environment, Mobile Applications and so on into the projects with well designed infrastructures of concealed cables trunking to facilitate the installation of wifi transmission devices. This would be of certain that intelligent building with well provided infrastructure and provisions for AI facilities shall have positive effects to promote harmonious communities among the stake holders including owners, residents, tenants, occupiers, management staff, visitors and servicemen…etc. This shall also be

applied to other types of development including commercial building, shopping arcade, factory and some special properties including hospitals, educational institutions, banks, airports, governments buildings and so on.

Finally, having conducted the research for Study 1 by achieving the positive outcome on the effects of using AI facilities in building harmonious communities in Hong Kong through some validated mediating variables including "Service Efficiency" in terms of cost saving and service transparency and "Avoiding Conflicts" in terms of reducing human confrontations and conflicting cases among stake holders in a residential estate, it is noted that there leave some gaps between the means and mode of implementation of AI facilities.

Since most of those AI facilities are not stand-alone facilities and should be maintained and continuously trained and updated by human intelligence to enhance its ultimate functions to provide the most intelligence services to achieve customer satisfaction and even exceed the expectations of stake holders. In this regard, "Collaborative Intelligence" by joining human intelligence and artificial intelligence together would be the most ideal and effective way in achieving the desired outcomes in the business world, i.e. machines assisting human, and in the same time, human assisting machine. Hence, the effect on cost saving from AI machine that creates the threat of replacing labour forces result and increase the unemployment rate in the market could be out of the question. It is yet to be testified that the benefits derived from the joint efforts by collaborating human intelligence and AI machines works together shall significantly uplift productivity in the manufacturing industries, the efficiency in the legal system, the accuracy and the speed in the medical & healthcare industries and also improve the satisfaction levels and performance in the service industries. Further research on these

gaps shall definitely have significant contributions to both the academic domain and the business world. However, most importantly, the balance and control of AI facilities by the local government and worldwide leaders must be emphasised so that AI facilities are being used in an ethical-led, problem solving, and service efficiency environment under the command of human beings.

Chapter 5 – Study 2 (Hong Kong) : Data Analysis, Hypothesis Testing, Findings and Discussion

5.1 Introduction

Having testified and realized the positive effects of using Artificial Facilities in building harmonious communities in Hong Kong property management market, by means of using a qualitative research methodology in establishing the theory of ***"Building Harmonious Communities with Artificial Intelligence Facilities in Property Management"*** as discussed in Study 1 contains in Chapter 4 of this research paper, this chapter continue to discuss and to testify the relationship of those variables being adopted in this research through a quantitative research method by using questionnaires to testify the hypotheses, i.e. Hypothesis 3 to Hypothesis 7 (H3, H4, H5, H6 and H7) as shown in the following figures 2. ***Figure 2 as*** contains in Chapter 3 identifying the dependent variable: "Harmonious Communities" and the independent variables: "Mobile Apps – Social Chat Group", "On-line Booking Platform", "Access Control System" and "Chatbot Solutions" pairing with the mediating variables include "Service Efficiency", "Happiness", "Service Fairness", "Conflict" and "Complaint" respectively.

The research model for Study 2 (Hong Kong) is shown in ***Figure 6*** below.

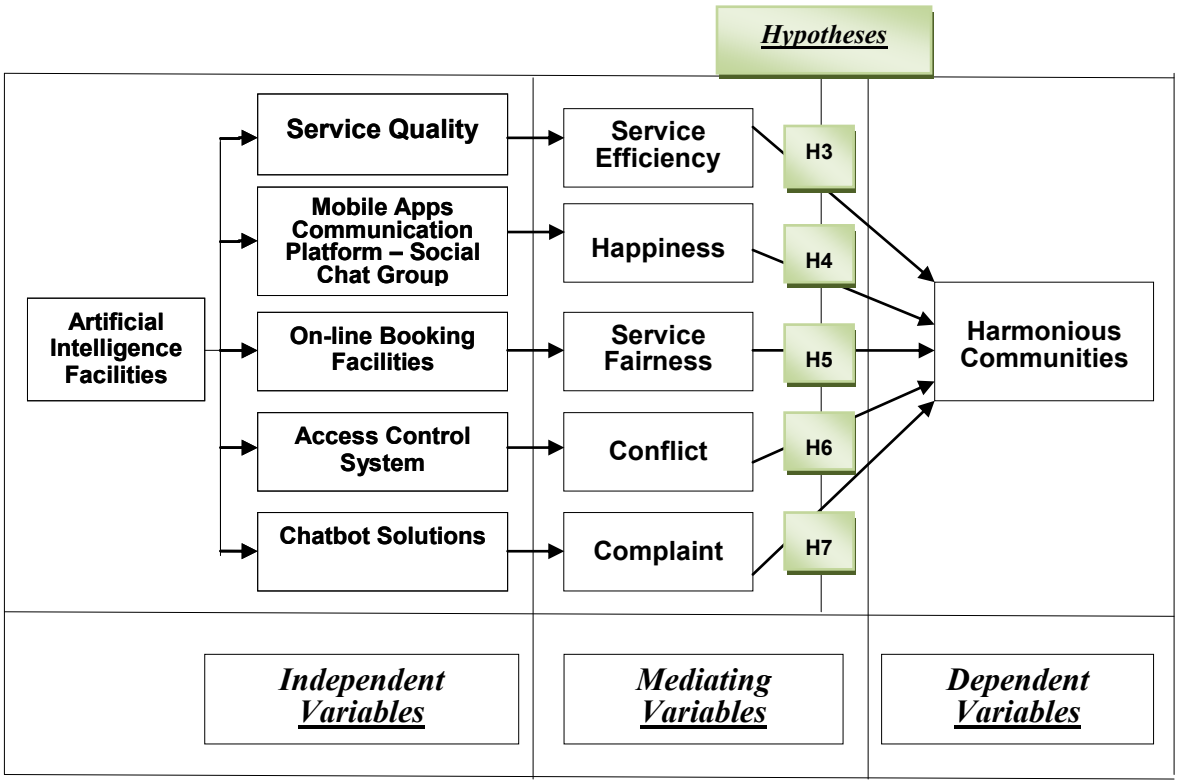


Figure 6: Research Model - The Effects of using Artificial Intelligence facilities in building Harmonious Communities in Property Management in Hong Kong (Study 2).

This Study 2 aims to collect about 200 completed questionnaires for analysis, but due to the threats and government regulations on the COVID-19 that hinder the pro-active approach in collecting questionnaires in person, the total sample size has not been very ideal and only received 192 numbers of returned questionnaires both in the form of hard copies (94 nos.) and on-line soft copies (98 nos.) to computer the outcome via SPSS. However, due to four (4) identical and duplicated copies were received on-line, the valid sample size has been reduced to 189. The "Linear Regression Analysis" under the SPSS (version 25) software is used to obtain the analysis outcomes for testing and discussion. The main purpose of this Study 2 is to testify if there is a relationship, either strong or weak association amongst the independent and mediating variables in predicting the dependent variable, and also to review how well the dependent variable, independent variables and mediating variables involved in Study 2 are measured. This quantitative research approach shall cover the "Model Summary" in explaining the

findings in terms of “Descriptive Statistics”, “Multiple Correlation Coefficient”, the “ANOVA” and “Coefficients” as generated by the SPSS software so that the level of statistical significance of respective variables are testified and hence, justified.

5.2 Descriptive Analysis of Samples

In interpreting the collected data from a sample group, we normally use the descriptive statistics and inferential statistics for a quantitative research. It is first recommended to have a quick glance to the overall data from a descriptive analysis approach. A descriptive statistics present and describe the collected data sample by using graphical and numerical information to summarize, simplify and presents masses of data in an easy understanding way, so that researcher can organize the information and summarize for a clear presentation to the audiences from a boarder perspective. Graphical information includes Histograms, Bar-graph, Pie-chart, and so on. Numerical ways of presentation include Percentage, Mean (average), Median (divides a distribution in half), Mode (values with greatest frequency), Variance (measure of dispersion), Range, Standard Deviation (use mean as a reference point to measure variability by considering the distance between each score and the mean), Uni-variate (use one variable to describe), and so on. According to Zikmund et al. (2010), researcher can use descriptive analysis to describe the basic characteristics of the investigated main sample.

5.3 Descriptive Statistical Analysis for Study 2

A total of 192 no. of questionnaires are received in the form of hard copies and from online survey, having examined the summary table of these questionnaires, four (4) questionnaires out of these 192 questionnaires are completed with the same scores and the answers and details of the 32 pre-set questions in this returned questionnaires are identical from a same residential estate that is presumed from the same respondent.

Therefore, the four (4) returned questionnaires from this respondent will be counted as one and the total valid questionnaires adopted for analysis is 189 nos. by excluding the three (3) duplicated returned questionnaires received by this respondent through the Google on-line survey platform. In addition, the ranking from this respondent, probably terms as "an Outliner" who gives scores that is very different to the rest of the respondents by giving a relatively extreme low scores which cause great bias to the mean value of the overall outcome that may also increase the standard deviation of the analysis (Field, 2009). Kock (2013) acknowledges that outliners may largely affect the overall distribution and shape of the relationship among other variables however under such extreme case this outliner may change the sign of a linear relationship either from positive to negative or vice versa. Therefore, some researchers suggest the removal of outliners from the data set (Field, 2009; Zikmund et al., 2010; Saunders et al., 2012), however Kock (2013) further argues that the deletion of outliners is often a mistake as this can reveal the true nature of the relationship. Accordingly, in this research I also include the data from the outliners in the data set for analysis only if it causes measurement error in the analysis. Accordingly, the following descriptive analysis in respect of age group profile of respondents is analysed and discussed below:

Item	Age Group	Questionnaires in		Total (%)	Remarks
		Hard-copy	On-line		
1	18 – 30	15	4	19 (10%)	
2	31 – 40	36	21	57 (30%)	
3	41 – 50	22	40	62 (33%)	
4	51 – 60	18	30*	48% (25%)	*Four (4) identically completed questionnaires were received but count as 1 only.
5	60 & above	3	0	3 (2%)	
	Total :	94	95	**189 (100%)**	

Table 5: Age Group of Respondents

The preliminary findings from the 189 valid questionnaires reflects that younger age group, i.e. below the age of 50 accounts for the majority (i.e. 73%) of respondents are keen to give comments on the research topic and having higher preference and intention to respond their comments on the use of artificial intelligence facilities in their residence. This finding is tally with the result of land scarcity and high value land cost in Hong Kong that becoming a property owner is relatively difficult in Hong Kong due to the extreme high value of residential properties in the open market together with government deficiencies in supply public housing for the general public. ***Table 5*** above reflects the fact that the middle age group who fall within the age of 31 – 50 accounts for 63% of respondents who are property owners in Hong Kong. Characteristic of this specific age group include that these owners are well educated and are the main source of income in their family structure that they normally perform the role of decision makers in various situations. Their views and comments on certain subject and research topics are objective as supported by personal experience and educational background, and are also keeping abreast of time, and therefore their responds mostly reflect the truth from the end-user's angles. This certainly enhances the credibility of this Study 2 according to the outcome from this sample group. In obtaining a detail analysis, those scores obtained for Satisfaction Level in using AI facilities and Service Efficiency collected through the questionnaires are also input into the SPSS analysis for discussion.

According to the "Descriptive Statistics" generated from the SPSS Liner Regression Analysis for individual variables toward the dependent variable, the findings are summarized in the following ***Table 6*** for discussion:

Item	*Variables:*	*Mean*	*Standard Deviation*	*N*
	Dependent Variable:			
0	AI facilities help establishing harmonious communities	**4.36**	1.076	189
	Independent & Mediating Variables:			
Satisfaction Level in using AI facilities (Average: 3.65)				
1	Enough AI facilities	2.90	1.384	189
2	Enjoy using AI facilities	4.01	1.362	189
3	Satisfy with using AI facilities	4.03	1.340	189
4	Level of satisfaction in using AI facilities	3.65	1.386	189
Independent Variable : Service Quality of Property Management Company **Mediating Variable : Service Efficiency (Average: 4.71)**				
5	AI facilities enhance service efficiency	4.89	1.012	189
6	AI facilities enhance cost saving	4.74	1.093	189
7	AI facilities build harmonious relationship	4.42	1.082	189
8	Harmony contains differences	4.79	0.908	189
Independent Variable : Mobile Apps Communication Platform – Social Chat Group **Mediating Variable : Happiness (Average: 4.45)**				
9	Happiness builds harmonious communities	4.93	0.925	189
10	Owners have confidence for future in the estate	4.54	1.089	189
11	Fostering close relationship with neighbours	4.01	1.057	189
12	Feeling relax in using AI facilities	4.58	1.006	189
13	Don't feel lonely and dislike by others	4.17	1.164	189
Independent Variable : On-line Booking Facilities **Mediating Variable : Service Fairness (Average: 4.50)**				
14	Fairness achieves harmony	4.76	0.959	189
15	Being respected by others	4.40	0.880	189
16	Consistent management services	4.22	1.117	189
17	Being treated politely by management staff	4.60	1.055	189
18	AI facilities enhance fairness	4.54	1.029	189
Independent Variable : Access Control System **Mediating Variable : Conflict (Average: 4.27)**				
19	AI facilities reduce human conflicts	4.32	1.075	189
20	Using AI facilities help controlling temper	4.19	1.099	189
21	Able to calm down for AI deficiency	3.97	1.086	189
22	Not easily to raise anger in using AI facilities	4.40	1.147	189
23	Able to compromise with other differences	4.47	0.943	189
Independent Variable : Chatbot Solutions **Mediating Variable : Complaint (Average: 4.33)**				
24	Prefer face-to-face complaint to manager	4.33	1.129	189
25	Aim to maintain harmony interpersonal relationship	4.17	1.045	189

26	Chat groups promote relationship	4.16	1.137	189
27	Virtue to tolerate management discrepancies	4.38	0.985	189
28	Forgive others	4.59	0.862	189

Table 6: Descriptive Statistic for collected data – Hong Kong

5.4 The Discussion

In facilitating a quick glance to the subject research, descriptive statistics is used to understand the overall rankings and responses from the respondents toward the research topic, i.e. "The effects of using AI facilities in building harmonious communities in Property Management in HK and China market". The numerical (e.g. mean) and uni-variate (e.g. standard deviation) will be discussed as data analysis in obtaining an easy understanding outcome of the overall findings. According to the result as generated from SPSS Regression Analysis, please refer to ***Table 7: Descriptive Statistics for Multiple Variables – Hong Kong*** as shown below:

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Satisfaction Level	3.6468	1.11979	189
Service Efficiency	4.7103	.83141	189
Enhances Happiness	4.4455	.70639	189
Enhances Service Fairness	4.5048	.73472	189
Avoiding Conflcit	4.2698	.79211	189
Eliminating Complaint	4.3259	.70892	189

Table 7: Descriptive Statistics for Multiple Variables – Hong Kong

The mean for the dependent variable "Build Harmonious Communities with AI Facilities (mean value = 4.36) which reflects the general fact that, those independent variables with a mean value below 4.36 are negatively correlated or less correlated with the dependent variable. Similarly, those independent and mediating variables with a mean value

higher than the dependent variable mean value of 4.36 are positively or closely correlated with the dependent variable. Preliminary speaking, there are association between those positive correlated independent variables and the dependent variable in which all these positive correlated independent variables predict certain outcomes to achieve the dependent variable. The mean values of individual independent variables are generated from the SPSS as shown in ***Table 7*** above. By referencing to the mean value of the dependent variable (mean value = 4.36), three out of the six independent variables score above the dependent variable, these include the "Service Efficiency (mean value = 4.71)", "Happiness (mean value = 4.45)" and "Service Fairness (mean value = 4.50)". However, "Conflict" and "Complaint" scores 4.27 and 4.33 respectively which are marginal to the mean value of the dependent variable of 4.36. This implies that with a fine-tune on the sub-questions for instance, re-phrasing the questionnaires questions to become more positive and direct feelings under the independent variable of "Conflict" and "Complaint" could certainly positively improve the outcomes. This shall be discussed in more details in the limitation section of this research.

Furthermore, I would like to emphasis the reason that why the first independent variable "Satisfaction Level" in using AI facilities scores the lowest rank during the survey. Since this is not one of the proposed hypothesis for testing and intends to grasp the overall responses from respondents, so the finding reflects the situation and the increasing demand that most property owners are of the opinions that their estate / properties possess not enough AI facilities and therefore they are dissatisfied with the insufficient provision of AI facilities in their residence. On the contrary, they enjoy using the AI facilities and demand more provisions in their estate which is also a sign of positive effect for the research topic. Therefore, some of the sub-question scores the lowest rank from the returned questionnaires implies a positive impact and increasing

demand that most of the property owners / residents are expecting to enjoy more AI facilities in their residence due to the positive effects in terms of service efficiency and service fairness that enhances happiness and hence building harmonious communities within the estates.

Secondly, by examining the values of standard deviation (SD), the larger the value of standard deviation means the more spread out of the collected data for analysis. The SD for the dependent variable (i.e. AI facilities helps establishing harmonious communities) is 1.076 and the distribution is ranging from the lowest 0.862 (i.e. Forgive others) to 1.386 (i.e. satisfaction level in using AI facilities). As discussed in the above paragraph regarding the satisfaction level in using the AI facilities, this reflects an inverse indicator that stake owners realize the positive effects of AI facilities and therefore require more provision of AI facilities in their residence, however due to the constraints in the development and provision of more digitalization applications in the current market, this limits the provision of various and comprehensive AI facilities in property management market in Hong Kong. This, of course, subject to the willingness and acceptable levels of disclosing personal privacy for the local residents in Hong Kong while using the AI facilities in the residential estate, e.g. the registration of convenience access control system by facial recognition, car plate recognition and object recognition system technologies under the intelligent AI technologies in the market.

5.4.1 The Preliminary Findings from Descriptive Statistics

In summary, the preliminary findings under the descriptive statistical analysis for Study 2 are discussed as follows:

As discussed in Chapter 3 above, due to the typical Chinese culture i.e. being neutral to avoid conflicts or tend to maintain co-existence of differences, this research adopts a 6-point scale in measuring the responds from all property owners / residents of a residential development. Therefore, in general under the 6-point scale the scores at 4 and above imply a positive relationship between the dependent variable and respective independent variables. According to ***Table 6 "Descriptive Statistic for collected data – Hong Kong"***, the mean value of the dependent variable is 4.36 and therefore we use this value as the dividing line to discuss the relationship. We can therefore summarize that the dependent variable, i.e. artificial intelligence facilities being adopted in residential properties help establishing harmonious communities through "Service Efficiency"; in terms of cost saving, streamlining service efficiency and the Confucian belief of "Harmony contains differences and encourages coexistences of differences". Service efficiency as being explored in Study 1 and this Study 2 demonstrates a positive effects and relatively strong relationship among other mediating variables including the state of Happiness, Service Fairness, avoiding Conflict and eliminating Complaint.

In addition, the well-being or state of happiness of property owners can also be maintained or promoted to build harmonious communities within a residential property through the Social Chat Group under the communication platform in the mobile apps. That is, stake holders enjoy the 24/7 round the clock mode to discuss the matters with common interests or to share their experience so that others in the chat group become beneficial. For instance, the mobile apps group can be formed easily by any registered property owners with an attractive subject title and others can join easily with the mobile app account for discussion and sharing their experiences. The frequent exchange of ideas and experience sharing touching every aspect of their residence will therefore promote the state of happiness and maintain the peace of mind of these property owners.

As a result, this helps establishing harmonious communities within the dwelling place under this communication platform via the mobile apps mechanism. This once again, the positive effects on the provision of artificial intelligence facilities in property management in Hong Kong.

Service fairness is also one of the mediating predictors to achieve the building of harmonious communities through on-line booking facilities. In order words, provision of on-line booking facility helps building harmonious communities due to service fairness that all stake holders are treated politely and respected by others due to high degree of fairness, i.e. strictly comply with the first-come-first-served principle in the estate booking system. However, from the perspective of those respondents, the consistent management services rank the lowest in this category which may leave an interesting research gap to explore in the future.

Although "Conflict (mean value = 4.27)" and "Complaint (mean value = 4.33)" show a negative relationship with the dependent variable as the average mean are below 4.36, there are some sub-questions that score a higher mean value in the survey. Since the individual mean value under the normal distribution of these survey questions ranging from 2.9 (i.e. enough AI facilities) to 4.93 (i.e. happiness builds harmonious communities), having specifically looked into these two mediating variables we note that there are four sub-questions score an above average mean value. These are "Not easily raise anger in using AI facilities" (mean value = 4.4) and "Able to compromise with other differences" (mean value = 4.47) under the mediating variable of "Conflict". Moreover, "Virtue to tolerate management discrepancies (mean value = 4.38)" and "Forgive others (mean value = 4.59)" under the mediating variable of "Complaint"

which shall not be overlooked as these mean value are higher than the dependent variable (mean value = 4.36).

Obviously, the above preliminary findings and discussions are based on general descriptive statistics to grasp an understanding of the distribution whether these variables are having direct and positive correlation with the dependent variable or not. The following analytical approach is discussed by using the linear regression analysis under the SPSS software to testify the hypothesis whether there is statistical significance to support the above preliminary findings.

5.4.2 Findings from SPSS Linear Regression Analysis

Having computed all data collected from the 189 returned questionnaires into the SPSS analysis software (version 25), descriptive statistics are used to summarize general characteristics of respondents as shown above. After that, a series of t-tests use to evaluate the relationship between each independent variable against the dependent variable; and the one-way ANOVA are performed to compare data from respondents of different age group and locations to test the level of significance of the data set. Pearson's Correlation Analysis is also employed to test the relationship among all variables in the implementation of AI facilities and the building of harmonious communities. Since a high positive correlation coefficient is found between some of the two variables at a value above 0.70, p = 0.0001; and n = 189. Thereafter, the Multiple Regression Analysis is used to examine the relative impact of the six independent variables in predicting the dependent variable, i.e. the overall effects of building harmonious communities through the AI facilities in property management of a residential development in Hong Kong. The following table summarized the mean values of each independent/mediating variable for discussion:

Hypothesis	Independent Variable	Mediating Variable	Mean	Sample
H3	Effectiveness and Cost Saving	Service Efficiency	4.71	189
H4	Mobile Apps Communication Platform – Social Chat Group	Happiness	4.45	189
H5	On-line Booking Facilities	Service Fairness	4.50	189
H6	Access Control System	Conflict	4.27	189
H7	Chatbot Solutions	Complaint	4.33	189

Table 8: Mean values of Independent and Mediating Variables – Hong Kong

According to Study 1 as discussed in Chapter 4 above, in exploring and testifying H1 and H2 so as to identify the research gap that AI facilities outperform traditional human-led management services in terms of service efficiency and work accuracy in property management industry in Hong Kong. These mediating variables are also adopted for this Study 2 to further enhance the creditability of this research work. It is noted from ***Table 8*** that different independent variable pairs with specific mediating variable encounter different outcomes either with strong association or relatively low association with the dependent variable. The average mean value of individual independent variable is over the mean value of a 6-point scale of 3.5. It demonstrates a positive relationship among the variables and its mediating factors. Among the four independent variables, the highest scored variable at 4.5 out of 6 is on-line booking facility that achieves service fairness in the eyes of those participants in the survey. Since every transaction through the computer system will be locked with time sequence and therefore, no human overriding can be done to change the first-come-first-served principle which is an important factor in achieving service fairness in providing the building management services in a residential estate. Mobile app social platform creates happiness of property owners comes the second highest at 4.46 out of 6 only with a very minimal difference of 0.04 with the highest score, this implies the fact that mobile

apps in establishing the social chat group enhances the happiness of property owners as they share and discuss the topics with common interests and increase their satisfaction in meeting their requirements in the residence. Friendship and more activities can be arranged with their neighbours in the social chat group and enjoying the harmony within their residence in the estate. The third comes to the Chatbot solutions that eliminate some of the complaints from residents which can also be the predictor for the building of harmonious communities in an estate. Finally, the implementation of AI facility i.e. the digitalized access control system can be reduced the conflict as physical contact can be avoided in the access control system. It is most likely that both residents and the duty security guard encounter at the tower lobby may have different perspective in service quality that with deviation in service expectation, negative inception and later on conflict may occurred. However, with the help of the digitalized access control system in the tower lobby, the duty post or service counter of the security guard can be deleted and all incoming residents must use the pre-registered access control device, either the proximity card or facial recognition system can enter into the building without the assistance or monitoring of the security guard. The following discuss the hypotheses for Study 2 in response to the results generated by the SPSS computation under the Linear Regression Analysis.

5.4.3 Pearson Correlation Analysis – Study 2 (Hong Kong)

The individual values generated from the Pearson Correlation analysis from the SPSS (please refers to ***Table 9: Pearson Correlation Analysis***) reflects that there are linear positive relationship between individual independent variables with the dependent variable, however the strength of the relationship is ranging from substantial to moderate.

Pearson Correlations	Build Harmonious Communities with AI facilities	Satisfaction Level	Service Efficiency	Happiness	Service Fairness	Conflict	Complaint
Build Harmonious Communities with AI facilities	1.000	.437	.605	.631	.482	.482	.536
Satisfaction Level	.437	1.000	.444	.431	.400	.294	.355
Service Efficiency	.605	.444	1.000	.702	.740	.629	.669
Enhances Happiness	.631	.431	.702	1.000	.681	.591	.654
Enhances Service Fairness	.482	.400	.740	.681	1.000	.604	.570
Avoiding Conflict	.482	.294	.629	.591	.604	1.000	.710
Eliminating Complaint	.536	.355	.669	.654	.570	.710	1.000

Table 9: Pearson Correlation Analysis – Hong Kong (Study 2)

According to Pearson Correlation Analysis as shown above, the dependent variable is having positive correlations with each independent variable, i.e. as one number increases the second numbers will also be increased. In this case, the correlation is substantial when the value is ranging from 0.5 to 0.69 therefore those independent variables including "Service Efficiency (correlation = 0.605)", "Happiness (correlation = 0.631)" and "Complaint (correlation = 0.536)". These independent/mediating variables are having substantial relationship with the dependent variable. However, "Service Fairness (correlation = 0.482)" and "Conflict (correlation = 0.482)" are classified as having moderate relationship (ranging from 0.3 – 0.49) with the dependent variable.

In addition, ***Table 9*** above shows the relationships of individual variables, for easy comparison, those correlations with value over 0.70 are listed below:

(i) 0.74 - Service Efficiency ↔ Service Fairness

(ii) 0.71 - Complaint ↔ Conflict

(iii) 0.70 - Service Efficiency ↔ Happiness

The above variables are testified having strong associations between themselves and is worth further examining. In brief, this is a good sign to note there are such strong relationships between each pair of mediating variable and dependent variable that contributes to the building of harmonious communities according to the Pearson Correlation Analysis as shown above.

By examining the Model Summary of Study 2 as shown in ***Table 10: Model Summary***, it is noted that the value of R is 0.692 which is classified as having substantial relationship with the dependent variable. This is also a marginal case to reach a strong relationship with the dependent variable in the range of 0.7 and above. The R square at 0.479 reflects that independent variables explain 47.9% of the variability of dependent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692[a]	.479	.462	.78886

a. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Enhances Service Fairness, Avoiding Conflict, Enhances Happiness, Service Efficiency

Table 10: Model Summary (All variables) – Hong Kong (Study 2)

According to the result generated from ANOVA (***Table 10-1*** refers), the level of significance is 0.000 (i.e. $p < 0.0005$) and the regression model can be said as good fit of data that the independent variables are statistically significantly predict the dependent variable as F (6, 192) = 27.927.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	104.275	6	17.379	27.927	.000[b]
	Residual	113.259	182	.622		
	Total	217.534	188			

a. Dependent Variable: Build Harmonious Communities with AI facilities

b. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Enhances Service Fairness, Avoiding Conflict, Enhances Happiness, Service Efficiency

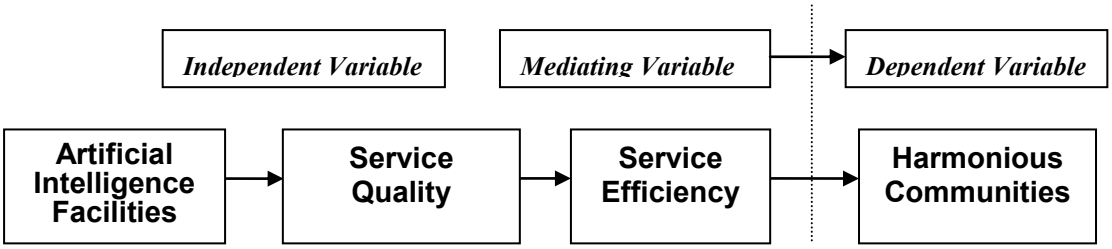
Table 10-1: ANOVA (All variables) – Hong Kong (Study 2)

In general, the above findings from SPSS regression analysis testified that the independent variables pair with the mediating variable which is being used in this research are related to and a predictor of the dependent variable. Let's discuss each hypothesis, i.e. H3 to H6 in details by referring to individual outcomes generated by the SPSS analysis.

5.4.4 Hypothesis 3 (H3)

Since service quality in terms of effectiveness and service efficiency has been adopted as the independent variables to establish the theory of "Building Harmonious Communities with AI Facilities", it is appropriate to testify these variables to achieve higher reliability and statistically significance for this research. Hypothesis 3 (H3) is listed as follows:

H3: ***"AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company".***



The descriptive statistics from the SPSS are shown in ***Table 11*** and ***Table 11-1*** below:

Regression - Service Efficiency

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Service Efficiency	4.7103	.83141	189

Table 11: Descriptive Statistics for Service Efficiency (overall result)

Regression - Service Efficiency

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help establishing harmonious community	4.36	1.076	189
AI enhances service efficiency	4.89	1.012	189
AI enhance cost savings	4.74	1.093	189
AI build harmonioud relstiondhip	4.42	1.082	189
Harmony contains differences	4.79	.908	189

Table 11-1: Descriptive Statistics for Service Efficiency (with sub-questions)

The mean value for service efficiency is 4.71 which is higher than the dependent variable (mean value = 4.36). This demonstrates the fact that majority of the residents perceive that service efficiency is the main predictor to achieve harmonious communities within a residential estate. In fact, the four sub-questions namely "AI enhances service efficiency (mean value = 4.89)", "AI enhances cost saving (mean value = 4.74)", "AI build harmonious relationship (mean value = 4.42)", and "Harmony contains differences (mean value = 4.79)" rank above the dependent variable (mean value = 4.36). This reflects that majority of participants who are property owners and residents took part in the survey opine that service efficiency in terms of cost saving and relationship building is the main mediating factor to achieve the building of harmonious communities in a residential estate. Refers to "***Table 12: Model Summary and ANOVA for Service Efficiency***" as shown below, the Model Summary shows a significant sign on R (0.643) with R^2 (variance explained) at 0.413 testifies that service efficiency explains 41.3% of the variability to predict the building of harmonious communities in a residential estate in Hong Kong. It also reflects the strongest relationship between the independent and dependent variables when compared to other variables adopted in the research.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.643[a]	.413	.400	.833

a. Predictors: (Constant), Harmony contains differences, AI enhances service efficiency, AI build harmonioud relstiondhip, AI enhance cost savings

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	89.826	4	22.457	32.355	.000[b]
	Residual	127.708	184	.694		
	Total	217.534	188			

a. Dependent Variable: AI facilities help establishing harmonious community

b. Predictors: (Constant), Harmony contains differences, AI enhances service efficiency, AI build harmonioud relstiondhip, AI enhance cost savings

Table 12: Model Summary and ANOVA for Service Efficiency

The F-ratio in the ANOVA table tests whether the overall regression analysis is a good fit for the data. The F-ratio (4, 184) = 32.355 with $p < 0.0005$ confirms that the regression model is a good fit of the data. Therefore, it is testified that the mediating variable namely service efficiency can statistically and significantly predict the building of harmonious communities through the AI facilities.

The overall significance level as shown in ***Table 13: Coefficients – Service Efficiency*** achieve a value of 0.000 which is also a positive sign of having statistical significance ($p<0.05$) to testify the hypothesis.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.674	.360		1.869	.063	-.037	1.384
	Service Efficiency	.783	.075	.605	10.387	.000	.634	.931

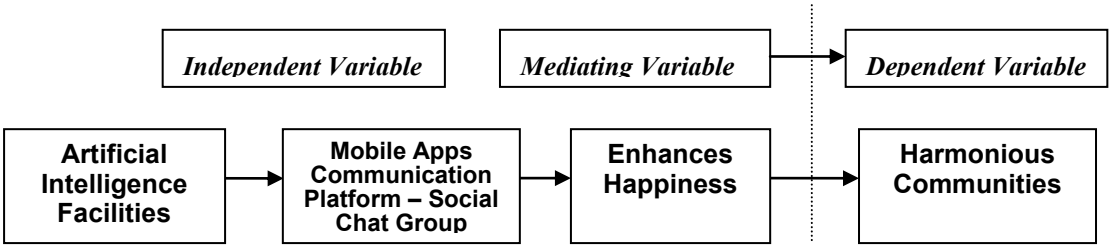
a. Dependent Variable: Build Harmonious Community with AI facilities

Table 13: Coefficients – Service Efficiency

In summary, having the above SPSS analysis outcomes, Hypothesis 2 is testified to be statistically significance that we can conclude that service efficiency including cost saving, relationship building among residents and the culture of harmony contains differences have direct association with the building of harmonious communities in a residential estate in the property management in Hong Kong.

5.4.5 Hypothesis 4 (H4)

H4 : ***Mobile Apps Communication Platform (e.g. Social Chat Group) enhances happiness of residents and helps building harmonious communities.***



As a recap of the research question and the hypothesis (RQ3 and H3), the research question is "What is the happiness level of residents in using the social networking function of the residents' mobile apps that help building harmonious communities of a residential estate?" and the hypothesis H4 is "Mobile Apps Communication Platform (i.e. the Social Chat group) enhances the happiness of residents and helps building harmonious communities". According to the descriptive statistics generates from the SPSS as shown in ***Table 14: Descriptive Statistics for Happiness*** and ***Table 14-1: Descriptive Statistics for Happiness with sub-questions*** that the mean value for dependent variable is 4.36 and the other five sub-questions for independent variable in the questionnaires score an average mean value of 4.46 which demonstrates that the mobile apps in forming the social chart group enhances happiness of residents in which, as a result helps building harmonious communities in the estate. In addition, most participants agree that happiness of residents build harmonious communities, who feel relax in using the AI facilities and have confidence for the future in the estate. These factors are closely related to building harmonious communities through mobile apps in establishing the social chat groups to enhance the relationship of residents in the estate.

Regression - Happiness

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Enhances Happiness	4.4455	.70639	189

Table 14: Descriptive Statistics for Happiness

Regression - Happiness

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help establishing harmonious community	4.36	1.076	189
Happiness builds harmonious community	4.93	.925	189
Have confience for future in estate	4.54	1.089	189
Fostering close relationship with neighbour	4.01	1.057	189
Feeling relax in using AI facilities	4.58	1.006	189
Don't feel loney and dislike by others	4.17	1.164	189

Table 14-1: Descriptive Statistics for Happiness with sub-questions

The value of R as shown in the Model Summary (***Table 15: Model Summary and ANOVA for Happiness***) represents the multiple correlation coefficients which can be considered to become one of the measures of quality of the prediction of the dependent variable. A value of 0.66 indicates a substantial level of relationship with the dependent variable. The R^2 (variance explained), the value of 0.435 reflects that the independent variables explain 43.5% of the variability of the dependent variable. The F-ratio as shown in the ANOVA tests achieve 28.210 is a good sign of correlation i.e. F(5, 183) = 28.210. We therefore can conclude that the overall findings for happiness of residents that helps building harmonious communities is statistically significant as $p < .0005$ and the overall regression model is a good fit for the data.

Table 15: Model Summary and ANOVA for Happiness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.660[a]	.435	.420	.819

a. Predictors: (Constant), Don't feel loney and dislike by others, Have confience for future in estate, Happiness builds harmonious community, Fostering close relationship with neighbour, Feeling relax in using AI facilities

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	94.688	5	18.938	28.210	.000[b]
	Residual	122.847	183	.671		
	Total	217.534	188			

a. Dependent Variable: AI facilities help establishing harmonious community

b. Predictors: (Constant), Don't feel loney and dislike by others, Have confience for future in estate, Happiness builds harmonious community, Fostering close relationship with neighbour, Feeling relax in using AI facilities

Statistical significance of the independent variable

It is testified that the value of independent variable is at $p < 0.05$ and such variable is statistically significance. According to the following table (***Table 16: Coefficients for Happiness)***, 3 out of 5 variables are testified as statistically significance which include have confidence for future in the estate; fostering close relationship with neighbour; and feeling relax in using AI facilities.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.362	.399		.908	.365	-.425	1.149
	Happiness builds harmonious community	.069	.073	.060	.950	.343	-.075	.213
	Have confience for future in estate	.273	.071	.276	3.857	.000	.133	.412
	Fostering close relationship with neighbour	.195	.066	.192	2.956	.004	.065	.325
	Feeling relax in using AI facilities	.299	.082	.279	3.657	.000	.138	.460
	Don't feel loney and dislike by others	.064	.054	.070	1.195	.234	-.042	.171

a. Dependent Variable: AI facilities help establishing harmonious community

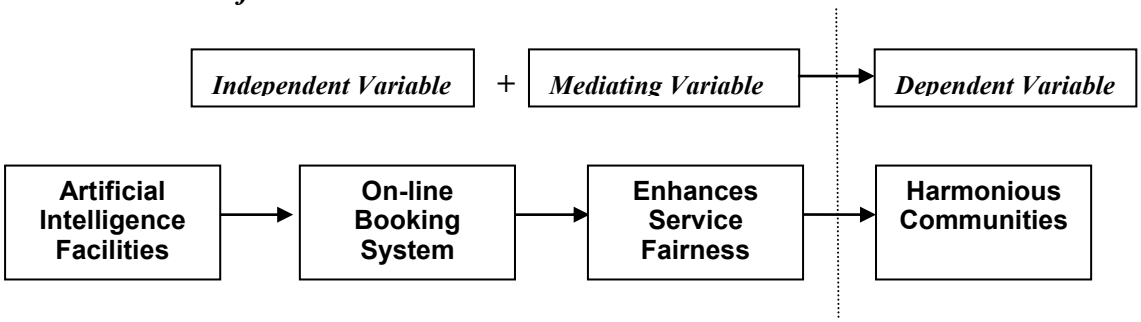
Table 16: Coefficients for Happiness

It is interesting to note that the mean value for one of the sub-questions namely "Happiness builds harmony communities" is the highest among other independent variables at 4.93 as shown at ***Table 14*** above, however the value of p for each sub-questions is 0.343 as shown in ***Table 16*** above which is larger than 0.05 ($p > 0.05$) and testified as not statistically significance. This implies the fact that there may be a confused perception of participants of the sample group by referring to the overall happiness of residents instead of the happiness derives from using AI facilities, such as using mobile app in establishing the social chat group to enhance the degree of happiness of residents. The SPSS analysis detects this misperception by weighting the rest of the

variables to obtain such finding. However, the overall result for H3 with $p < 0.05$ is therefore concluded that, Hypothesis 4 (H4) is of statistically significance and is accepted. Hence, the statement of "***Mobile Apps Communication Platform (e.g. Social Chat Group) enhances happiness of residents and helps building harmonious communities in Property Management in Hong Kong"*** is testified and accepted.

5.4.6 Hypothesis 5 (H5)

H5 : ***On-line booking system enhances service fairness and helps building harmonious communities of an estate.***



The research question for H5 is "How important is service fairness of the on-line booking system under AI policy that attributes the building of harmonious communities in a residential estate" and the hypothesis (H5) as shown above. According to the descriptive statistics from the SPSS as shown in ***Table 17*** and ***Table 17-1*** below:

Regression - Service Fairness

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Enhances Service Fairness	4.5048	.73472	189

Table 17: Descriptive Statistics for Service Fairness (overall result)

Regression - Service Fairness

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help establishing harmonious community	4.36	1.076	189
Fairness achieves harmony	4.76	.959	189
Being respected by others	4.40	.880	189
Consistent management services	4.22	1.117	189
Being treated politely	4.60	1.055	189
AI enhances fairness	4.54	1.029	189

Table 17-1: Descriptive Statistics for Service Fairness (with sub-questions)

The mean value for service fairness is 4.5 which is higher that the dependent variable (mean value = 4.36). This demonstrates the fact that majority of the residents perceive that service fairness can build and enhance the building of harmonious communities within a residential estate. However, one of the five sub-questions score a relatively low mark, i.e. "Consistent management services (mean value = 4.22) which is below the mean value of the dependent variable. This accounts for the fact that AI facilities have not been fully implemented and covered all scope of services provided by the building management staff. Since the types of AI facilities available in the current market is relatively limited, in other words AI facilities can be adopted in property management industry is limited and should be explored to invent more AI facilities to help building harmonious communities within the residential estate in terms of service fairness. The others four sub-questions include "Fairness achieve harmony (mean value = 4.76)", "Residents are being respected by others (mean value = 4.40)", "Residents are being treated politely (mean value = 4.6)" and "AI enhances service fairness (mean value = 4.54)". These findings are persuasive that AI facilities through the on-line booking platform enhance service fairness that helps building harmonious communities in property management in Hong Kong.

By referencing to "***Table 18: Model Summary and ANOVA for Service Fairness***" as shown below, the Model Summary shows a good sign on R (0.565) with R^2 (variance explained) at 0.319 testifies that service fairness explains 31.9% of the variability to predict the building of harmonious communities of a residential estate in Hong Kong. It also reflects the strength of relationship between the independent and dependent variables.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.565[a]	.319	.301	.900

a. Predictors: (Constant), AI enhances fairness, Consistent management services, Fairness achieves harmony, Being respected by others, Being treated politely

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.467	5	13.893	17.171	.000[b]
	Residual	148.067	183	.809		
	Total	217.534	188			

a. Dependent Variable: AI facilities help establishing harmonious community

b. Predictors: (Constant), AI enhances fairness, Consistent management services, Fairness achieves harmony, Being respected by others, Being treated politely

Table 18: Model Summary and ANOVA for Service Fairness

The F-ratio in the ANOVA table tests whether the overall regression analysis is a good fit for the data. The F-ratio (5, 183) = 17.171 with $p < 0.0005$ confirms that the regression model is a good fit of the data. Therefore, it is testified that independent variable pairs with mediating variable namely service fairness can statistically and significantly predict the building of harmonious communities with AI facility namely the on-line booking system. The overall significance level as shown in ***Table 19: Coefficients – Service Fairness*** achieves a value of 0.000 which is a good sign of having statistical significant ($p<0.05$) to testify the hypothesis with regard to on-line booking system pairs with the mediating factor "service fairness" are correlated to the building of harmonious communities with AI facilities in residential estate in Hong Kong.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	1.178	.428		2.753	.006	.334	2.023
	Enhances Service Fairness	.706	.094	.482	7.531	.000	.521	.891

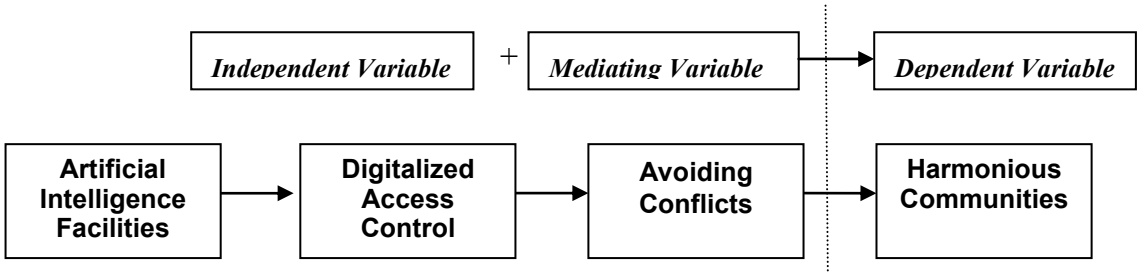
a. Dependent Variable: Build Harmonious Community with AI facilities

Table 19: Coefficients – Service Fairness

In summary, having the above SPSS analysis outcomes, Hypothesis 5 is testified to be statistically significance that we can conclude the on-line booking system implemented in a residential estate is having the mediating effect of service fairness that predict the building of harmonious communities in the property management in Hong Kong.

5.4.7 Hypothesis 6 (H6)

H6 : ***Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.***



The research question for H6 is "Will potential conflicts among property owners/residents, visitors and the management staff be avoided by using the access control system for all incoming personnel and/or vehicles that helps building harmonious communities in a residential estate?" Having computed by the SPSS in obtaining the descriptive statistics outcome for the third independent variable namely "Access Control System" which is paired with the mediating variable called "Conflict", the outcome is shown in ***Table 20: Descriptive Statistics for Conflict*** and ***Table 20-1: Descriptive Statistics for Conflict with sub-questions.***

Regression - Conflict

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Avoiding Conflcit	4.2698	.79211	189

Table 20: Descriptive Statistics for Conflict

Regression - Conflict

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help establishing harmonious community	4.36	1.076	189
AI reduces human conflicts	4.32	1.075	189
Using AI facilitites better control temper	4.19	1.099	189
Able to calm down	3.97	1.086	189
Not easily raise anger	4.40	1.147	189

Table 20-1: Descriptive Statistics for Conflict with sub-questions

The mean value for the dependent variable is 4.36 and the average mean for the independent variable is 4.27 which are of a very marginal difference between the two at 0.09 from the overall assessment. When examines the outcomes in more details by referring to ***Table 20-1***, it is noted that two of the sub-questions score a relatively high mark above the mean for the dependent variable, are "Not easily raise anger (mean value = 4.40)" and "Compromise with others differences (mean value = 4.47)". However, "AI reduces human conflicts (mean value = 4.32)", "Using AI facilities better control temper (mean value = 4.19)", and "Able to calm down (mean value = 3.97)" are below the mean value of the dependent variable which are of less predictive effect to achieve the dependent variable and will not be discussed further in this Study 2.

According to ***Table 21: Model Summary and ANOVA for Conflict*** as shown below, the value of R is 0.563 and the R^2 at 0.317 represents a good sign of moderate relationship that can predict the outcome of the dependent variable. The R^2 of 0.317 indicates that the independent variable explains 31.7% of the variability of the dependent variable. In applying to the practical situation, it testifies the fact that Access control system under the AI facilities can avoid conflict among the stake holders while entering into the estate and this effect accounts for 31.7% in building harmonious communities in the estate.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.563[a]	.317	.299	.901

a. Predictors: (Constant), Compromise with others differences, Able to calm down, Using AI facilitites better control temper, Not easily raise anger, AI reduces human conflicts

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.022	5	13.804	17.010	.000[b]
	Residual	148.513	183	.812		
	Total	217.534	188			

a. Dependent Variable: AI facilities help establishing harmonious community

b. Predictors: (Constant), Compromise with others differences, Able to calm down, Using AI facilitites better control temper, Not easily raise anger, AI reduces human conflicts

Table 21: Model Summary and ANOVA for Conflict

Furthermore, by interpreting the figures in the ANOVA table as shown in ***Table 21*** above, the value of F-ratio at 17.010 can be treated as a positive sign of correlation, hence it becomes one of the attributes in building the harmonious communities in the estate. The significance level of 0.000 reflects the fact that H6 is statistically significance and the overall regression model is good fit for the data.

The overall significance level as obtained in ***Table 22: Coefficients – Conflict*** achieve a value of 0.000 which is also a good sign of having statistical significance ($p<0.05$) to testify the hypothesis with regard to access control systems pairs with the mediating factor "conflict" are correlated to the building of harmonious communities with AI facilities in a residential estate in Hong Kong.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.563	.378		4.139	.000	.818	2.309
	Avoiding Conflcit	.655	.087	.482	7.528	.000	.483	.827

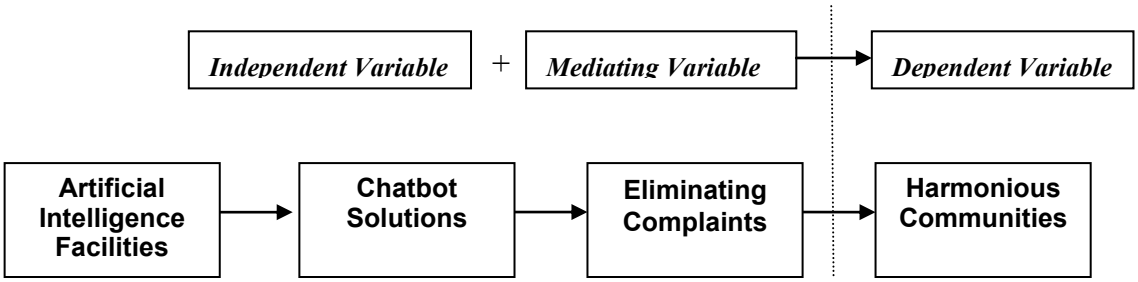
a. Dependent Variable: Build Harmonious Community with AI facilities

Table 22: Coefficients – Conflict

As a summary for Hypothesis 6, it is testified that the access control systems being one of the AI facilities implemented in a residential estate avoid human conflicts among residents, visitors and those management staff. As a result, this helps building harmonious communities amongst the stake holders within a residential estate.

5.4.8 Hypothesis 7 (H7)

H7 : ***Chatbot solutions with instant responses eliminates complaint that helps building harmonious communities of a residential estate.***



The research question for this Hypothesis 7 is "Will complaint cases among property owners, residents and management staff eliminate by using the Chatbot solutions, which provides instant response and/or solutions to address their demands that helps building harmonious communities in a residential estate?

According to the analytical outcomes as reflects in the Descriptive Statistics computed by SPSS as shown in ***Table 23: Descriptive Statistics for Complaint*** and ***Table 23-1: Descriptive Statistics for Complaint with sub-questions*** will be discussed as follows.

Regression - Complaint

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Eliminating Complaint	4.3259	.70892	189

Table 23: Descriptive Statistics for Complaint

Regression - Complaint

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help establishing harmonious community	4.36	1.076	189
Face to face complaint	4.33	1.129	189
Aim to maintian harmony interpersonal relati9onship	4.17	1.045	189
Chat group promotes relationship	4.16	1.137	189
Virtue to tolerate management discrepancies	4.38	.985	189
Forgive others	4.59	.862	189

Table 23-1: Descriptive Statistics for Complaint with sub-questions

The mean value of the independent variable "Complaint (mean value = 4.33)" is marginal as the difference between the dependent variable is 0.03 in which although a negative sign is noted, the importance is minimal. Since ***Table 23-1*** reflects that two of the five sub-questions record a good sign of correlation with the dependent variable these are "Virtue to tolerate management discrepancies (mean value = 4.38)" and "Forgive others (mean value = 4.59)". This implies that with a fine tune in the questionnaires questions, the result might have changed to a better correlation extend.

By interpreting the figures for the Model Summary and ANOVA (***Table 24: Model Summary & ANOVA for Complaint***) as generated from the SPSS analysis, the R represents the multiple correlation coefficient which is measuring the quality of prediction and in this case, the prediction quality of the dependent variable is fair and moderate as the coefficient of determination (R^2 = 0.314). This reflects that the independent/mediating variable "Chatbot Solutions to reduce Complaint" explain 31.4% of the variability of the dependent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.560[a]	.314	.295	.903

a. Predictors: (Constant), Forgive others , Face to face complaint, Aim to maintian harmony interpersonal relati9onship, Chat group promotes relationship, Virtue to tolerate management discrepancies

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68.237	5	13.647	16.728	.000[b]
	Residual	149.298	183	.816		
	Total	217.534	188			

a. Dependent Variable: AI facilities help establishing harmonious community

b. Predictors: (Constant), Forgive others , Face to face complaint, Aim to maintian harmony interpersonal relati9onship, Chat group promotes relationship, Virtue to tolerate management discrepancies

Table 24: Model Summary & ANOVA for Complaint

According to the figures in the ANOVA table as shown in ***Table 24*** above, the value of F-ratio (5, 183) = 16.728 is interpret as a fair sign of correlation. Most importantly, the significance level at 0.000 reflects the fact that H7 is statistically significance and the overall regression model is good fit for the data.

The overall significance level as obtained in ***Table 25: Coefficients – Complaint*** as shown below achieves a value of 0.000 which is also a good sign of having statistical significance ($p < 0.05$) to testify Hypothesis 6 (H6) in respect of using Chatbot Solutions pair with the mediating factor "complaint" are moderately correlated to the building of harmonious communities with AI facilities in a residential estate in Hong Kong.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.842	.411		2.050	.042	.032	1.652
	Eliminating Complaint	.813	.094	.536	8.681	.000	.628	.998

a. Dependent Variable: Build Harmonious Community with AI facilities

Table 25: Coefficients – Complaint

In summary, Hypothesis 7 is testified as having statistically significance that moderately predicts the outcome of the dependent variable. In other words, it is concluded that the implementation of Chatbot solutions under the AI facilities can reduce the complaint cases from respective residents and owners, as a result this positive effect helps building harmonious communities in a residential estate in property management in Hong Kong.

5.5 The Conclusion

The Descriptive Statistics summarize general characteristics of the respondents toward the research subject, as reflects in ***Table 26: Descriptive Statistics*** as shown below, the general views of respondents support that service efficiency, promotes happiness and

enhances service fairness as these variables are scoring a relative high rating during the survey. However, eliminating complaint (mean value = 4.33) is marginally below the mean of the dependent variable (mean value = 4.36) and the lowest rating is avoiding conflict (mean value = 4.27) under the descriptive statistics.

Regression - Multiple Variables

[DataSet2] C:\Users\Edward\Documents\Study 2 All Data averag

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	4.3598	1.07568	189
Satisfaction Level	3.6468	1.11979	189
Service Efficiency	4.7103	.83141	189
Enhances Happiness	4.4455	.70639	189
Enhances Service Fairness	4.5048	.73472	189
Avoiding Conflcit	4.2698	.79211	189
Eliminating Complaint	4.3259	.70892	189

Table 26: Descriptive Statistics

According to the Model Summary as shown in ***Table 27*** below, the finding from the SPSS regression analysis shows the value of R = 0.692 indicate a substantial level of relationship among the dependent variable and the independent variables. The R^2 at the value of 0.479 testifies that the independent variables explain 47.9% of the variability of the dependent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692[a]	.479	.462	.78886

a. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Enhances Service Fairness, Avoiding Conflict, Enhances Happiness, Service Efficiency

Table 27: Model Summary (All variables) – Hong Kong (Study 2)

Referring to the data analysis in the ANOVA table as shown in ***Table 28*** below, the F-ratio in the value of 27.927 demonstrates a good sign of correlation i.e. F (6, 182) = 27.927 and the significance level is 0.000 (i.e. p <0.005) which confirms the statistically significance of all the proposed hypothesis H3, H4, H5, H6 and H7 as discussed above.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	104.275	6	17.379	27.927	.000[b]
	Residual	113.259	182	.622		
	Total	217.534	188			
a. Dependent Variable: Building Harmonious Communities with AI facilities						
b. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Enhances Service Fairness, Avoiding Conflict, Enhances Happiness, Service Efficiency						

Table 28: ANOVA (All variables) – Hong Kong (Study 2)

It is therefore confirmed that due to the small value of p (p < 0.005) as shown above, it indicates strong evidence to reject the null hypothesis for Hypothesis 2 to 6 as discussed in this Study 2. The following summarize the testified hypothesis as follows:

Hypothesis 3: Service efficiency that enhance service quality of the management company scores the highest rating among other variables that is testified having strong relationship with the building of harmonious communities by using the artificial intelligence facilities in a residential estate in Hong Kong.

Hypothesis 4: The Social Chat Group established by residents with common interest through the Mobile Apps Communication Platform promotes the level of happiness of the group members by sharing and discussions, and as a result this helps building of harmonious communities within the estate.

Hypothesis 5: The on-line booking facility enhances the perception of service fairness within the estate that helps building harmonious communities in the estate.

Hypothesis 6: The digitalized access control system, e.g. smart card and facial recognition system eliminates human conflict during the verification and registration procedures that helps building harmonious communities in the residential estate.

Hypothesis 7: The most intelligent with quick learning ability Chatbot can provide instant solutions that answer most of the enquiry from residents. This saves time for staff to understand the requests and prepare the reply, in which the Chatbot provides instant solutions and updated information to residents immediately. This can reduce the complaint in respect of poor communication and belated response from the management staff, hence, it helps building harmonious communities in the estate.

5.6 The Limitations and Managerial Implications

5.6.1 Limitations for Study 2

As mentioned before there are limitations of this Study 2, these include the threat of COVID-19 that hinder the collection of questionnaires to meet the target sample size of not less than 200 nos. so as to ensure sufficient empirical data for analysis. The interpretation of happiness should be clearly defined so that respondents fully understand and more accurately rate the questions regarding happiness in the questionnaires. Furthermore, provisions of more artificial intelligence facilities in residential properties are limited as technologies advancement to invent more AI devices cannot meet with the demand in the market under the incentive for Intelligent City, PROPTECH and IoT

domain. This leaves the gap for future studies to explore. In addition, this research is trying to explore and prove that there is relationship between advance technologies i.e. digitalization and transformation of artificial intelligence facilities being implemented in a residential property to build harmonious communities. However, harmonious relationship is classified under the scope of psychologies in the social science domain and therefore, this kind of research is rare in the academic domain. It means that limited and scare resource in literature reviews and journals for reference is another limitation for this research.

5.6.2 Managerial Implications for Study 2

Since the hypotheses for Study 2 are testified to be statistical significances with substantial relationship in the building of harmonious communities in a residential estate, land developers in Hong Kong shall make reference to the findings of this research to apply more artificial intelligence facilities in their development projects. These shall not be restricted to residential properties but can also apply to other types of properties for the convenience and smart service to stake holders concerned. From the financial point of view, AI facilities can increase the service efficiency particularly in cost saving by reducing the labour forces who are providing repetitive and routine duties in a property, e.g. access control security guards to verify the identities of incoming residents and register all visitors before granting access into the building, service counter ambassadors to provide general enquiries for visitors that the Chatbot solutions with smart learning Chatbot robots can provide the service with higher efficiency and accuracy, full time duty toilet cleaners can be minimized with digital sensors to calculate the patronages frequencies so as to assign other cleaners to refill the toilet papers and the like and also perform just-in-time deep cleaning to maintain the hygienic condition, and so on. Realising the merit of the implementation of AI facilities in a residential estate,

this is important for the property managers to establish harmonious relationships with all residents so that residents are relax and enjoying their living with pride and respect. The building of harmonious communities within the residential estate would certainly extend to the local communities and hence, social harmony can be achieved in the foreseeable future. This is particularly important and in urgent need to tackle the current Hong Kong unstable political situations after the rush enactment of the National Security Law in Hong Kong effective on 30 June 2020.

Chapter 6 – Study 3 (China): Data Analysis, Hypothesis Testing, Findings and Discussions

6.1 Introduction

Having explored the effects of using AI facilities in building harmonious communities in property management in Hong Kong under Study 1 in Chapter 4; and further testified the hypotheses, i.e. H3 to H7 in Study 2 as discussed in Chapter 5 of this research, the outcome so far are positive and encouraging. This Chapter 6 focus on Study 3 which is a replication of Study 2 by utilizing the same methodology to be conducted for mainland China to testify and identify if there is a cultural difference toward the same issue between the two regions within the boundary of China, particularly in the field of property management industry. The hypotheses being adopted for Study 2 will be fully applied for Study 3, for easy identification, the researcher distinguishes the research model and the hypotheses for China market as shown below:

6.1.1 The Research Model for China

The same set of hypotheses being used in Study 2 will be added with a letter "a" for Study 3 in China, and the research model remains the same. Therefore, the hypotheses for Study 3 will be termed as H3a, H4a, H5a, H6a and H7a as shown in the following research mode for Study 3 (China).

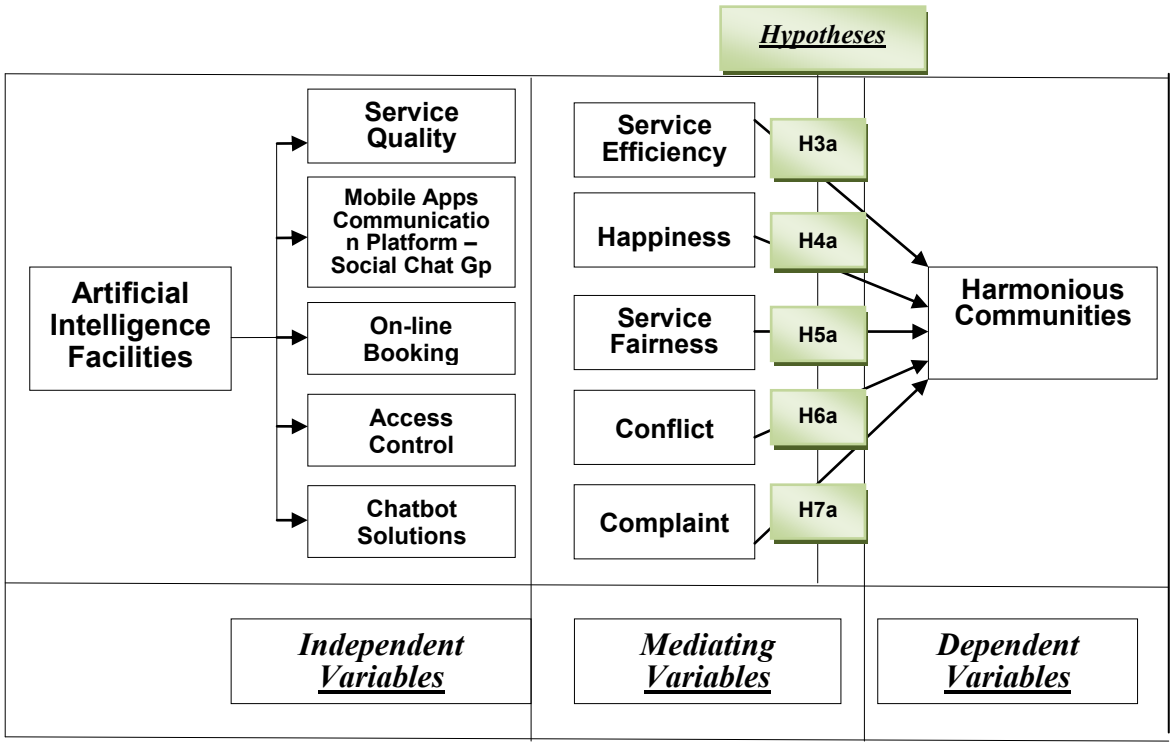


Figure 7: Research Model – The Effects of using Artificial Intelligence facilities in building Harmonious Communities in Property Management in China (Study 3)

6.1.2 The Hypothesis (H3a to H7a) for China

Hypothesis 3a (H3a)

AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company.

Hypothesis 4a (H4a):

Mobile Apps Communication Platform i.e. Social Chat Group enhances happiness of residents and helps building harmonious communities.

Hypothesis 5a (H5a):

On-line booking system enhances service fairness and helps building harmonious communities of an estate.

Hypothesis 6a (H6a):

Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.

Hypothesis 7a (H7a):

Chatbot solutions with instant responses eliminate complaint that helps building harmonious communities in a residential estate.

6.1.3 Data Collection and Sample Size

Data collection encounters an unexpected problem for the survey conducted in China due to the threat and government policies over COVID-19 epidemic that the plan of in-situ collection of questionnaires in some of the recent developed intelligent estates in China market has been hindered. As an alternative to conduct the survey, on-line questionnaires (***Appendix 3***) has been sent to the target participants but this is restricted by known participants who are willing to use his/her registered mobile phone number to complete the on-line survey. As a result, the response rate has been dropped significantly and cannot meet with the expected sample size of not less than 200 received questionnaires for analysis. Having tried very hard to push for receipt of completed questionnaires via on-line survey platform namely the 问卷网 ("*https://www.wenjuan.com*"); together with the assistance from my previous colleagues who works in China market in obtaining hard copies questionnaires for the research work in some of the residential estate in mainland China, I have hardly managed to obtain all together a total of 68 completed questionnaires, i.e. 24 nos. of returned questionnaires from on-line wenjuan survey platform and 44 nos. of duly completed questionnaires in hardcopies from some of the residential estates in China to proceed with the research topic in China market. The main purpose of this Study 3 is same as Study 2 to testify if there is relationship, either strong or weak association between the four set of independent variables pairing with specific mediating variables in predicting the dependent variable, and also to review how well the dependent, independent and mediating variables involved in Study 3 are measured with a slightly cultural differences

sample group in the same country. This quantitative research approach shall cover the "Model Summary" in explaining the findings in terms of "Descriptive Statistics", "Multiple Correlation Coefficient", the "ANOVA" and "Coefficients" as generated by the SPSS software so that the level of statistical significance of respective variables are testified and hence, justified.

6.2 Descriptive Analysis of Samples

In interpreting the collected data from a sample group, we normally use the descriptive statistics and inferential statistics for a quantitative research. According to Zikmund et al. (2010), researcher can use descriptive analysis to describe the basic characteristics of the investigated main sample. A total of 68 no. of questionnaires are received in the form of hard copies (44 nos.) and from online survey (24 nos.). Accordingly, the following descriptive analysis in respect of age group profile of respondents is analysed at ***Table 29*** as shown and discussed below:

Item	Age Group	Questionnaires in		Total (%)
		Hard-copy	On-line	
1	18 – 30	0	2	2 (3%)
2	31 – 40	7	9	16 (23%)
3	41 – 50	19	12	31 (46%)
4	51 – 60	18	1	19 (28%)
5	60 & above	0	0	0 (0%)
	Total:	44	24	**68 (100%)**

Table 29: Age Group of Respondents – China

The preliminary findings from the 68 questionnaires reflects that majority (i.e. 81%) of the respondents are below the age of 50 in which two age groups, from 31 – 40 and 41-50 years old accounts for 69% of the total respondents who are keen to give opinions on the research topic and render their comments on the use of artificial intelligence

facilities in their residence. However, one scenario is worth noting that from the sample age group from 51 – 60 years old, these respondents are inclined to use traditional hardcopies format instead of on-line completion. This may account for their habit or acquaintance in using digitalized equipment among the mainland Chinese populations.

According to the "Descriptive Statistics" generated from the SPSS Liner Regression Analysis for individual variables toward the dependent variable, the findings are summarized in ***Table 30*** and discussed as follows:

Item	*Variables:*	*Mean*	*Standard Deviation*	*N*
	Dependent Variable:			
0	AI facilities help establishing harmonious communities	**5.57**	0.798	68
	Independent & Mediating Variables:			
Satisfaction Level in using AI facilities (Average: 4.94)				
1	Enough AI facilities	**4.54**	1.078	68
2	Enjoy using AI facilities	4.99	0.961	68
3	Satisfy with using AI facilities	5.10	0.971	68
4	Level of satisfaction in using AI facilities	5.12	1.187	68
Independent Variable : Service Quality of Property Management Company **Mediating Variable : Service Efficiency (Average: 5.44)**				
5	AI facilities enhance service efficiency	**5.50**	0.635	68
6	AI facilities enhance cost saving	5.47	0.722	68
7	AI facilities build harmonious relationship	5.31	0.833	68
8	Harmony contains differences	5.40	0.694	68
Independent Variable : Mobile Apps Communication Platform – Social Chat Group **Mediating Variable : Happiness (Average: 5.40)**				
9	Happiness builds harmonious communities	**5.51**	0.680	68
10	Owners have confidence for future in the estate	5.41	0.902	68
11	Fostering close relationship with neighbours	5.40	0.813	68
12	Feeling relax in using AI facilities	5.41	0.885	68
13	Don't feel lonely and dislike by others	5.28	0.826	68
Independent Variable : On-line Booking Facilities **Mediating Variable : Service Fairness (Average: 5.37)**				
14	Fairness achieves harmony	5.43	0.739	68
15	Being respected by others	5.29	0.899	68

16	Consistent management services	5.32	0.854	68
17	Being treated politely by management staff	5.37	0.731	68
18	AI facilities enhance fairness	5.43	0.834	68
Independent Variable : Access Control System **Mediating Variable : Conflict (Average: 5.23)**				
19	AI facilities reduce human conflicts	5.34	0.874	68
20	Using AI facilities help controlling temper	5.31	0.918	68
21	Able to calm down for AI deficiency	5.16	0.924	68
22	Not easily to raise anger in using AI facilities	5.19	0.996	68
23	Able to compromise with other differences	5.16	0.908	68
Independent Variable : Chatbot Solutions **Mediating Variable : Complaint (Average: 5.33)**				
24	Prefer face-to-face complaint to manager	5.19	1.011	68
25	Aim to maintain harmony interpersonal relationship	5.31	0.868	68
26	Chat groups promote relationship	5.35	0.686	68
27	Virtue to tolerate management discrepancies	5.35	1.019	68
28	Forgive others	5.47	0.906	68

Table 30 : Descriptive Statistic for collected data – China(Study 3)

6.3 The Discussions

For a quick glance to the subject research conducted for China market, the descriptive statistics is used to understand the overall rankings and responses from the respondents toward the research topic, i.e. "The effects of using AI facilities in building harmonious communities in Property Management in China". According to the design of the questionnaires by adopting a 6-point scale (i.e. ranging from 1 = strongly disagree, 2 = very disagree, 3 = disagree, 4 = agree, 5 = very agree and 6 = strongly agree), the average for the scale is 3.5 which serves as a dividing line to measure the score of each selected variables either negative correlated or positively correlated. It is obvious that the mean value of each variable as shown in ***Table 30*** falls between the range of 4.54 (the lowest) to the 5.51 (the highest) which represents that there is a strong and positive perception with practical experience of those mainland Chinese peoples in using the AI facilities in their residences provided by the property management services.

By observing the highest average score for the mediating variables, “Service Efficiency (average mean value = 5.42)” and “Happiness (average mean value = 5.40)”, these two mediating variables are of relatively higher degree of prediction for the building of harmonious communities in a residential estate in China. Oppositely, the lowest mean value of 4.54 refers to the satisfaction of having “Enough AI Facilities” in the estate which is a reverse type of question that, the lowest score implies the fact that those respondents are not satisfied with the limited provisions of AI facilities in their residential estate and in order words, they recognize the merits and positive effects of AI facilities and hence, demand more of its function for their use. Secondly, the individual sub-question with the highest score are “Happiness builds harmonious communities (mean value = 5.51)” and “AI facilities enhance service efficiency (mean value = 5.50)” summarizes the dominant views of the mainland Chinese market that testify that AI facilities helps building harmonious communities in property management as service efficiency and happiness of residents are testified as the strongest mediating factors in predicting this outcome. By examining the score for the dependent variable “AI facilities help building harmonious communities (mean value = 5.57” which represents the highest score from the survey under service efficiency. This reflects the fact that all respondents from the survey agree that AI facilities are able to achieve the building of harmonious communities in a residential estate in mainland China due to the fact that AI facilities are of higher degree of service efficiency in terms of service quality of the management company with positive effects on cost saving, promoting good relationship among residents and the affirmative belief from the ancient Confucian wisdom of “Harmony contains differences and encourages coexistence of differences”.

6.4 Findings from SPSS Linear Regression Analysis

Having computed all data collected from 68 returned questionnaires into the SPSS analysis software (version 25), descriptive statistics are used to summarize general characteristics of respondents as shown above. Similar to Study 2 (as Study 3 is replication of Study 2) as discussed in Chapter 5 above, the Model Summary and the ANOVA are used to analyse and compare data from respondents to test the level of significance of the data set. Pearson's Correlation Analysis is used to test the relationship among all variables, and thereafter the Multiple Regression Analysis is used to examine the relative impact of the selected independent variables in predicting the dependent variable, i.e. the overall effects of building harmonious communities through the AI facilities in the property management of a residential development in mainland China. The following table summarized the mean values of each independent/mediating variable under the hypotheses for discussion:

Hypothesis	Independent Variable	Mediating Variable	Mean	Sample
H3a	Service Quality	Service Efficiency	5.44	68
H4a	Mobile Apps Communication Platform – Social Chat Group	Happiness	5.40	68
H5a	On-line Booking Facilities	Service Fairness	5.37	68
H6a	Access Control System	Conflict	5.23	68
H7a	Chatbot Solutions	Complaint	5.33	68

Table 31 : Mean values of Independent and Mediating Variables – China (Study 3)

It is noted from ***Table 31*** that the average mean values of individual independent variables fall within the range from the lowest 5.23 to the highest 5.42 are largely over the mean value of the 6-point scale of 3.5. It demonstrates a positive impacts and relationship among the variables and its mediating factors. Firstly, among those selected independent variables, service efficiency scores the highest mean value of 5.42 which testifies that AI facilities enhance service efficiency in terms of service quality of

the management company with cost saving and building good relationship amongst residents within the estate that predicts the building of harmonious communities thereof. Secondly, happiness and well-being of residents (mean value = 5.4) comes to second highest shows a strong relation to build harmonious communities via the positive effect of social communication platform from the mobile app. Through this mobile app to build close relationship, residents are having confidence for future in the estate, fostering good relationship with neighbours, don't feel lonely and dislike by others, and feeling relax in using the AI facilities. These enhance the happiness level and well-being of residents and attribute to the building of harmonious communities within the estate as friendship and more activities can be arranged with their neighbours in the social chat group and enjoying the harmony within their residence in the estate. Thirdly, the On-line Booking Service that enhances Service Fairness (mean value = 5.34) and therefore contributes to the building of harmonious communities within the estate. Finally, the intelligent Chatbot solutions provide instant solution and alternatives to satisfy the enquiries of residents could to certain extend, eliminate the complaints from residents of not providing instant assistance to meet their needs. Therefore, Chatbot solution that helps eliminating complaints is also a predictor to build harmonious communities in an estate. However, due to cultural difference in terms of security standard and level of security, implementation of AI facility i.e. digitalized access control system is of lower concerns in mainland China when compare to other selected independent variables. This pair of independent and mediating variable in reducing physical contact and hence reducing human conflict is of relatively less concern in China. This is because of the differences in the expected living quality standard and hence, results in cultural differences in terms of values judgement and expectations toward their residences. The following discussed the hypotheses for Study 3 in response to the results generated by SPSS computation under linear regression analysis.

6.5 Hypothesis Testing and Findings

6.5.1 Pearson Correlation Analysis – Study 3 (China)

As shown in ***Table 32: Pearson Correlation Analysis*** (China) below, the overall result is encouraging that most of the variables are testified with strength that is closely related to each other with strong association. Examining the relationship with the dependent variable, those independent variables score 0.7 and above are classified with strong correlation with the dependent variable. Thus, happiness (correlation = 0.811), conflict (correlation = 0.761) and service fairness (correlation = 0.733) are classified as the independent/mediating variables which are having the strong strength of relationship with the dependent variable. In other words, due to the strong association testified through the Pearson Correlation Analysis, the social chat group enhances happiness of residents can be termed as the most effective way to build harmonious communities in a residential estate in China. In addition, the digitalized access control system that avoids creating human conflict at all entrance areas together with the on-lining booking system enhances service fairness are the effective predictors to the building of harmonious communities in an estate in mainland China.

Pearson Correlations	Build Harmonious Communities with AI facilities	Satisfaction Level	Service Efficiency	Enhances Happiness	Enhances Service Fairness	Avoiding Conflict	Eliminating Complaint
Build Harmonious Communities with AI facilities	1.000	.482	.690	.811	.733	.761	.623
Satisfaction Level	.482	1.000	.718	.703	.663	.630	.529
Service Efficiency	.690	.718	1.000	.755	.676	.741	.553
Enhances Happiness	.811	.703	.755	1.000	.846	.851	.704
Enhances Service Fairness	.733	.663	.676	.846	1.000	.796	.649
Avoiding Conflict	.761	.630	.741	.851	.796	1.000	.743
Eliminating Complaint	.623	.529	.553	.704	.649	.743	1.000

Table 32: Pearson Correlation Analysis – China (Study 3)

In addition, amongst those selected mediating variables, some of these variables are having a strong relationship above 0.7 value, these include the followings:

(i) 0.851 - Happiness ⇔ Conflict

(ii) 0.846 - Happiness ⇔ Service Fairness

(iii) 0.796 - Conflict ⇔ Service Fairness

(iv) 0.755 - Happiness ⇔ Service Efficiency

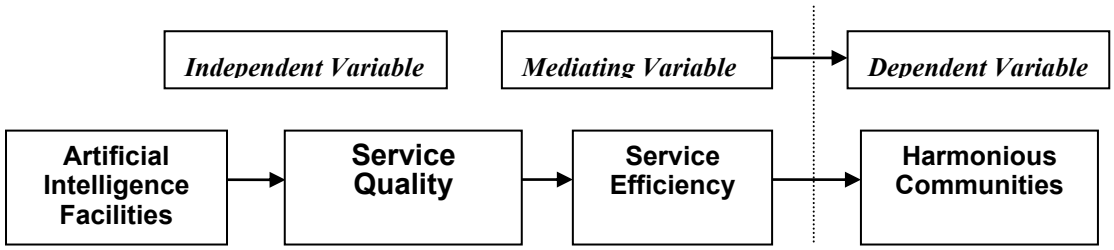
(v) 0.743 - Conflict ⇔ Complaint

(vi) 0.741 - Conflict ⇔ Service Efficiency

(vii) 0.704 - Happiness ⇔ Complaint

6.5.2 Hypothesis 3a (H3a)

H3a: ***AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company.***



According to the Descriptive Statistics generated from the SPSS as shown in ***Table 33*** and ***Table 33-1*** below, the average mean value for the sub-questions achieves an average mean value of 5.44 out of 6 which indicates a very high score (i.e. 90.7%) that most of the participants' perceptions are tended to be agree with the hypothesis.

Regression - Study 3 (Service Efficiency)

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
Service Efficiency	5.4397	.57332	68

***Table 33**: Descriptive Statistics for Service Efficiency (China) – Mean Average*

Regression - Service Efficiency

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help building harmonious community	5.57	.798	68
AI facilities enhance service efficiency	5.50	.635	68
AI facilities enhance cost savings	5.47	.722	68
AI facilities build harmonious relationship	5.31	.833	68
Harmony contains differences	5.40	.694	68

***Table 33-1**: Descriptive Statistics for Service Efficiency (China)*

Further look into Model Summary and ANOVA for Service Efficiency (China) as shown in ***Table 34*** below, the value of **R** = 0.784, **R^2** = 0.615, **F-ratio** (4, 63) = 25.146 and ***p*** < 0.005 represents a strong relationship among variables as the data is good fit under the regression model.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.784[a]	.615	.590	.511

a. Predictors: (Constant), Harmony contains differences, AI facilities enhance service efficiency, AI facilities build harmonious relationship, AI facilities enhance cost savings

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.214	4	6.553	25.146	.000[b]
	Residual	16.419	63	.261		
	Total	42.632	67			

a. Dependent Variable: AI facilities help building harmonious community

b. Predictors: (Constant), Harmony contains differences, AI facilities enhance service efficiency, AI facilities build harmonious relationship, AI facilities enhance cost savings

Table 34: Model Summary and ANOVA for Service Efficiency (China)

The overall significance level as shown in ***Table 35***: ***Coefficients – Service Efficiency (China)*** achieves a value of 0.000 reflects a positive finding of having statistical significance ($p < 0.05$) in testifying the hypothesis.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.349	.678		.515	.608	-1.004	1.702
	Service Efficiency	.960	.124	.690	7.751	.000	.713	1.208

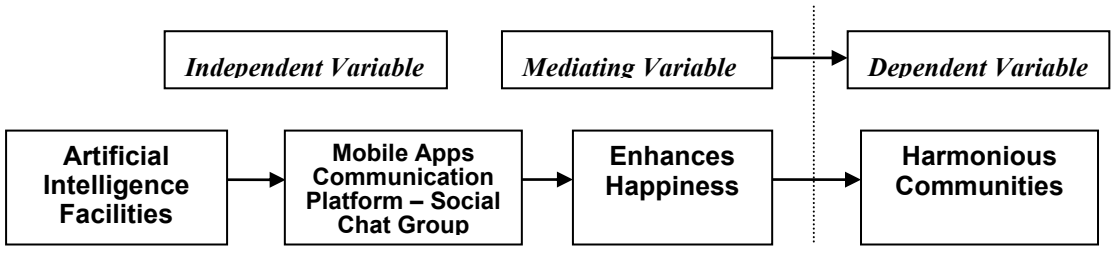
a. Dependent Variable: Build Harmonious Community with AI facilities

Table 35*: *Coefficients – Service Efficiency (China)

According to the above findings, Hypothesis 3a (H3a) is testified to be statistically significance and it is concluded that "***AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company***".

6.5.3 Hypothesis 4a (H4a)

H4a : *Mobile Apps Communication Platform (e.g. Social Chat Group) enhances happiness of residents and helps building harmonious communities.*



According to ***Table 36 and Table 36-1***as shown below, the mean value of happiness is 5.40 which indicate a relatively high score when compare to the mean average of 3.5 under the 6-point scale adopts in this research.

Regression - Study 3 (Happiness)

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
Enhances Happiness	5.4029	.68979	68

Table 36*: Descriptive Statistic for Happiness (China) – Mean Average*

Regression - Happiness

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help building harmonious community	5.57	.798	68
Happiness builds harmonious community	5.51	.680	68
Have confience for future in estate	5.41	.902	68
Fostering close relationship with neighbour	5.40	.813	68
Feeling relax in using AI facilities	5.41	.885	68
Don't feel loney and dislike by others	5.28	.826	68

Table 36-1*: Descriptive Statistic for Happiness (China)*

According to the figures above, all sub-questions score a relatively high mean values within the range from 5.28 to 5.51 under the 6-point scale with the highest score at 6. This finding is quite different from the findings for the Hong Kong market which may reflect the different requirement and expectation from the meaning of happiness and/or the level of well-being to become happy in a residence. This is quite subjective as mainlanders are enjoying their harmonious relationship with their neighbours, with confidence for the future in China, feeling relax in their dwelling place and don't feel lonely and dislike by others. This peace of mind enhances the level of happiness and well-being of residents. In turn, this predicts the building of harmonious communities when these peoples are joining the social chat group through the mobile apps

communication platform, under the service provision of the property management company to residents.

By examining the Model Summary and ANOVA for happiness (China market) as shown in ***Table 37*** below, it is noted that the value of R = 0.851 indicates a strong level of relationship between dependent variable and independent/mediating variable. The value of R^2 achieves 0.724 testifies the fact that the independent variable explains 72.4% of the variability of the dependent variable. The F-ratio scores 32.454 indicates a strong sign of correlation as F (5, 62) = 32.454 and hence achieves a significance level of 0.000 ($p < 0.0005$).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851[a]	.724	.701	.436

a. Predictors: (Constant), Don't feel loney and dislike by others, Happiness builds harmonious community, Have confience for future in estate, Fostering close relationship with neighbour, Feeling relax in using AI facilities

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.847	5	6.169	32.454	.000[b]
	Residual	11.786	62	.190		
	Total	42.632	67			

a. Dependent Variable: AI facilities help building harmonious community

b. Predictors: (Constant), Don't feel loney and dislike by others, Happiness builds harmonious community, Have confience for future in estate, Fostering close relationship with neighbour, Feeling relax in using AI facilities

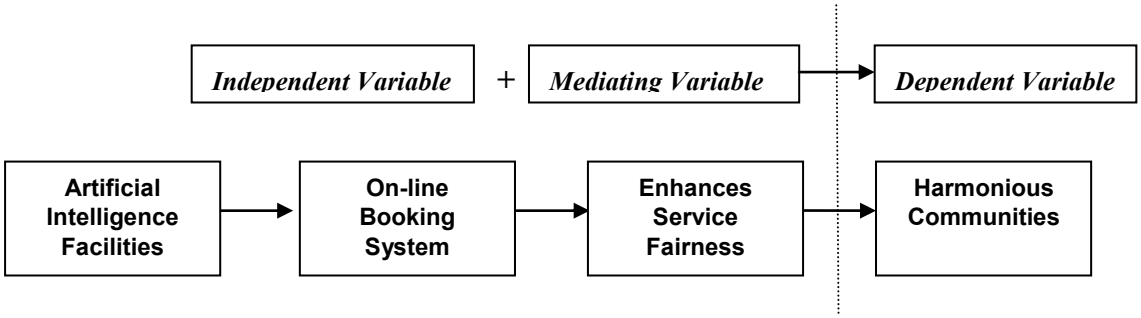
Table 37: Model Summary and ANOVA for Happiness (China)

As a result, it is concluded that residents are enjoying the activities and sharing with other residents of the estate in the social chat group operates under the mobile apps communication platform, thus it promotes the level of happiness of these residents and

hence helps building harmonious communities in the estate. The hypothesis (H4a) is testified with statistical significance ($p < 0.0005$) and is confirmed that "***Mobile Apps Communication Platform (e.g. Social Chat Group) enhances happiness of residents and helps building harmonious communities".***

6.5.4 Hypothesis 5a (H5a):

H5a : ***On-line booking system enhances service fairness and helps building harmonious communities of an estate.***



According to Table 38 and Table 38-1 as shown below, the mean average for Service Fairness under the On-line Booking System scores 5.4 out of the 6-point scale which reflects a high recognition from the sample size of 68. Amongst the sub-questions, "Fairness achieves harmony" and "AI facilities enhances service fairness" score the highest ranking from the stake holders and followed by "Being treated politely", "Consistence management services" and "Being respect by others". There are positive signs that Service Fairness (mediating variable) paired with On-line Booking System (Independent Variable) can predict the building of harmonious communities from the eyes of the stake holders.

Regression - Study 3 (Service Fairness)

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
Enhances Service Fairness	5.3676	.62449	68

Table 38: Descriptive Statistics for Service Fairness (China) – Mean Average

Regression - Service Fairness

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help building harmonious community	5.57	.798	68
Fairness achieves harmony	5.43	.739	68
Being respected by others	5.29	.899	68
Consistent management services	5.32	.854	68
Being treated politely	5.37	.731	68
AI facilities enhance service fairness	5.43	.834	68

Table 38-1: Descriptive Statistics for Service Fairness (China)

The "Model Summary and ANOVA" as shown in ***Table 39*** below achieves a good level of prediction that the coefficient of determination testifies the fact that the independent / mediating variable (i.e. On-line Booking System with mediating factor Service Fairness) explains 65.2% of the variability of the dependent variable (i.e. the building of harmonious communities) accordingly.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.808[a]	.652	.624	.489

a. Predictors: (Constant), AI facilities enhance service fairness, Being treated politely, Fairness achieves harmony, Consistent management services, Being respected by others

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.805	5	5.561	23.252	.000[b]
	Residual	14.828	62	.239		
	Total	42.632	67			

a. Dependent Variable: AI facilities help building harmonious community

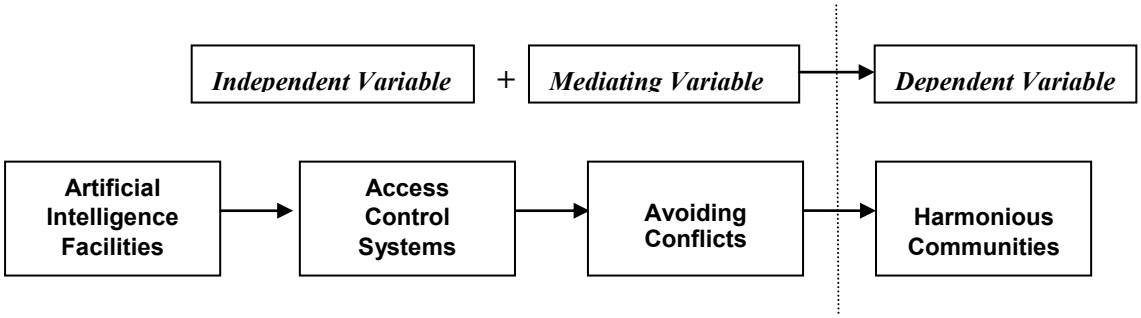
b. Predictors: (Constant), AI facilities enhance service fairness, Being treated politely, Fairness achieves harmony, Consistent management services, Being respected by others

Table 39: Model Summary and ANOVA for Service Fairness (China)

The level of significance is 0.000 (i.e. p <0.0005) as shown above is also a good sign to testify the hypothesis. In brief, Hypothesis 5a (H5a) is proved to be statistically significance that achieves a strong strength in predicting the dependent variable in the Study. It is therefore concluded that "***On-line booking system enhances service fairness and helps building harmonious communities of an estate".***

6.5.5 Hypothesis 6a (H6a):

H6a: ***Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.***



Among all other selected independent variables in the research, "Avoiding Conflict" scores the lowest mean value (i.e. 5.23), ***Table 40*** and ***Table 40-1*** as shown below refers. It reflects the fact that the registration procedures in entering the building/estate are not treated with higher priority according to mainland Chinese style of property management practice. This reflects certain degree of cultural differences and security standard that the coverage of CCTV cameras are largely distributed within the estate/building areas so that all personnel entering into the building are under on-line real time surveillance and registration at the entrance lobbies is not required. Therefore, the ranking for this variable is relatively low.

Regression - Study 3 (Conflict)

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
Avoiding Conflcit	5.2324	.79522	68

Table 40: Descriptive Statistics for Conflict (China) – Mean Average

Regression - Conflict

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help building harmonious community	5.57	.798	68
AI reduces human conflicts	5.34	.874	68
Using AI facilitites better control temper	5.31	.918	68
Able to calm down	5.16	.924	68
Not easily raise anger	5.19	.996	68
Compromise with others differences	5.16	.908	68

Table 40-1: Descriptive Statistics for Conflict (China)

According to the findings as shown in the "Model Summary and ANOVA for Conflict" as shown in ***Table 41*** below, the value of R = 0.764 and the R^2 = 0.583 represents good sign of strong relationship that predict the outcome to achieve the dependent variable. This set of independent variable pairing with the mediating variable explains 58.3% of the variability of the dependent variable.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764[a]	.583	.550	.535

a. Predictors: (Constant), Compromise with others differences, AI reduces human conflicts, Able to calm down, Not easily raise anger, Using AI facilitites better control temper

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.865	5	4.973	17.354	.000[b]
	Residual	17.767	62	.287		
	Total	42.632	67			

a. Dependent Variable: AI facilities help building harmonious community

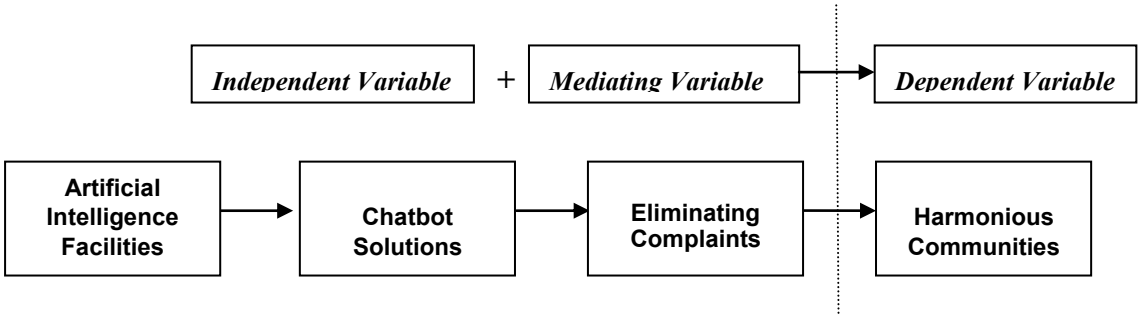
b. Predictors: (Constant), Compromise with others differences, AI reduces human conflicts, Able to calm down, Not easily raise anger, Using AI facilitites better control temper

Table 41: Model Summary and ANOVA for Conflict (China)

According to the ANOVA, the value of F-ratio = 17.354 with the significance level at p < 0.0005 represents a sign of correlation and implies a strong evidence to reject the null hypothesis and testifies that there shall be a meaningful relationship among the variables for this study. Therefore, it is concluded that hypothesis H6a is statistically significance that "***Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate"*** in China.

6.5.6 Hypothesis 7a (H7a):

H7a: ***Chatbot solutions with instant responses eliminate complaint that helps building harmonious communities in a residential estate.***



The average mean value for Chatbot solutions and eliminating complaint = 5.34 falls within the high interval of the 6-point scale in which this hypothesis (i.e. H7a) is fully supported by the majority of those stake holders in the survey. This also reflects a strong correlation among the variables at the first glance.

Regression - Study 3 (Complaint)

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
Eliminating Complaint	5.3353	.68279	68

Table 42: Descriptive Statistics for Complaint (China) – Mean Average

Regression - Complaint

Descriptive Statistics

	Mean	Std. Deviation	N
AI facilities help building harmonious community	5.57	.798	68
Face to face complaint	5.19	1.011	68
Aim to maintian harmonious interpersonal relationship	5.31	.868	68
Chat group promotes relationship	5.35	.686	68
Virtue to tolerate management discrepancies	5.35	1.019	68
Forgive others	5.47	.906	68

Table 42-1: Descriptive Statistics for Complaint (China)

Further examines the finding generated from the SPSS linear regression analysis, the value of R and R^2 (i.e. 0.677 and 0.459 respectively) as shown in below ***Table 43****: the Model Summary and ANOVA for Complaint (China)* reveals that there is direct relationship among the variables. The significance level at p <0.0005 also confirms the rejection of the null hypothesis for H7a.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.677[a]	.459	.415	.610

a. Predictors: (Constant), Forgive others , Chat group promotes relationship, Aim to maintian harmonious interpersonal relationship, Face to face complaint, Virtue to tolerate management discrepancies

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.550	5	3.910	10.502	.000[b]
	Residual	23.082	62	.372		
	Total	42.632	67			

a. Dependent Variable: AI facilities help building harmonious community

b. Predictors: (Constant), Forgive others , Chat group promotes relationship, Aim to maintian harmonious interpersonal relationship, Face to face complaint, Virtue to tolerate management discrepancies

Table 43: Model Summary and ANOVA for Complaint (China)

It is therefore concluded that Hypothesis 7a is testifies with statistically significance and confirms that "***Chatbot solutions with instant responses eliminate complaint that helps building harmonious communities in a residential estate"*** in China.

6.6 The Conclusion

In summary, the Descriptive Statistics for all variables as shown in ***Table 44*** below reflects the level of importance from stake holders in the survey.

Table 44: Descriptive Statistics for all variables (China)

Regression - Study 3

[DataSet0] C:\Users\Edward\Documents\Study 3 all variables

Descriptive Statistics

	Mean	Std. Deviation	N
Build Harmonious Community with AI facilities	5.5735	.79769	68
faction Level	4.9382	.92058	68
ce Efficiency	5.4397	.57332	68
nces Happiness	5.4029	.68979	68
Enhances Service Fairness	5.3676	.62449	68
Avoiding Conflcit	5.2324	.79522	68
Eliminating Complaint	5.3353	.68279	68

According to the findings above, it is observed that "Service Efficiency" and "Happiness" strongly predict the building of harmonious communities in China, and followed by "Service Fairness", "Eliminating Complaint" and "Avoiding Conflict". However, all these selected variables score a relatively high ranking in the 6-point scale adopted in this research which means that these selected variables (both independent and mediating) from the eyes of stake holders, are relevant, valid and strongly correlated.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851[a]	.725	.698	.43872

a. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Service Efficiency, Enhances Service Fairness, Avoiding Conflcit, Enhances Happiness

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.891	6	5.149	26.749	.000[b]
	Residual	11.741	61	.192		
	Total	42.632	67			

a. Dependent Variable: Build Harmonious Community with AI facilities

b. Predictors: (Constant), Eliminating Complaint, Satisfaction Level, Service Efficiency, Enhances Service Fairness, Avoiding Conflcit, Enhances Happiness

Table 45: Model Summary and ANOVA for all variables (China)

By examining the result of the linear regression analysis as shown in ***Table 45****: Model Summary and ANOVA for all variables (China market)*, the value of R = 0.851 and R^2 = 0.725 demonstrates a very strong correlation amongst the variables as those independents explains 72.5% of the variability of the dependent variable. In addition, the F-ratio at 26.749 indicates a good sign of correlation i.e., F(6, 67) = 26.749 with a significance level at 0.000 (i.e. p <0.005) that testifies the hypothesis for H3a, H4a, H5a, H6a and H7a are statistically significance. Therefore, the followings hypotheses for China are confirmed and listed with regard to its strength of relationship from the highest to the lowest sequence:

Hypothesis 3a (H3a) - Service Efficiency

AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company.

Hypothesis 4a (H4a): - Happiness

Mobile Apps Communication Platform i.e. Social Chat Group enhances happiness of residents and helps building harmonious communities.

Hypothesis 5a (H5a): - Service Fairness

On-line booking system enhances service fairness and helps building harmonious communities of an estate.

Hypothesis 6a (H6a): - Avoiding Conflict

Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.

Hypothesis 7a (H7a): - Eliminating Complaint

Chatbot solution with instant responses eliminates complaint that helps building harmonious communities in a residential estate.

6.7 Limitations for Study 3

The threat of COVID-19 infection across the world especially in Hong Kong and mainland China region largely affects the collection and return of the questionnaires and hence, has negative impact on the sample size especially in mainland China. The target sample size of not less than 200 nos. of duly completed and returned questionnaires is targeted, however only 68 nos. of questionnaires are collected via on-line survey platform and hard copies sent from mainland China from previous colleagues and friends. This hinders the validity and hence reliability of the findings through the SPSS analysis. However, it is glad to note that most of the returned questionnaires are marked with high score with an average mean value at 5 and above over the 6-point scale, this implies the fact that most of the stake holders / participants in the survey are of similar views that AI facilities being provided in the property management of a residential estate helps building harmonious communities. In addition, due to the limited supply of AI facilities in the current market, i.e. only those commonly used facilities are adopted in this research that confines the scope of study to cover a wider range of needs for the AI facilities. This shall be reviewed in future if more and more advanced digitalized AI facilities are being invented and provided in the field of property management in China market. This type of research is rare in the academic world and professional market that limited resources can be used, that adds difficulties for this research.

As one of the alternatives and remedial actions to address the data collection difficulties for mainland China, a Combined Data Approach will be adopted which is discussed as follows.

6.8 Remedial Action by Combined Data Approach for Study 3

As discussed above, due to the statutory quarantine period of 14 days for travellers between Hong Kong and mainland China, this hampers the data collection process target to take place in some of the AI-driven recently developed residential estates in Shenzhen and Guangzhou in mainland China. This attracts criticism against the reliability and significance of the findings from the data analysis of Study 3 being conducted in mainland China. As one of the alternatives in addressing such challenge due to unexpected government policy on the mandatory requirement of the 14-day quarantine period for travellers across the border between Hong Kong and mainland China, a Combined Data Approach will be adopted in obtaining a more holistic finding on the research topic. This can be done without too many restrictions as the questionnaires for Study 2 and Study 3 are identical. This is simply by combining all data so collected from Hong Kong together with the data so collected for mainland China to further testify, if the total collected data from the two regions in the amount of 257 nos. of questionnaires (i.e. 189 nos. from Hong Kong and 68 nos. from mainland China), are consistence with previous findings in Study 2 and Study 3 that; AI facilities help building harmonious communities in property management in Hong Kong and mainland China as discussed in Study 2 and Study 3 under Chapter 5 and Chapter 6 respectively.

Having computed all data from Study 2 and Study 3 in the total of 257 nos. of questionnaires through the Linear Regression Analysis from the SPSS (version 25), the following table displays the mean values for each group of variable under the Descriptive Statistic.

Item	*Variables:*	*Mean*	*Standard Deviation*	*N*
	Dependent Variable:			
0	AI facilities help establishing harmonious communities	**4.68**	1.14	257
	Independent & Mediating Variables:			
Satisfaction Level in using AI facilities (Average: 4.0)				
1	Enough AI facilities	3.34	1.494	257
2	Enjoy using AI facilities	4.26	1.338	257
3	Satisfy with using AI facilities	4.32	1.337	257
4	Level of satisfaction in using AI facilities	4.04	1.483	257
Independent Variable : Service Quality of Property Management Company **Mediating Variable : Service Efficiency (Average: 4.9)**				
5	AI facilities enhance service efficiency	5.05	0.965	257
6	AI facilities enhance cost saving	4.93	1.058	257
7	AI facilities build harmonious relationship	4.66	1.093	257
8	Harmony contains differences	4.95	0.896	257
Independent Variable : Mobile Apps Communication Platform – Social Chat Group **Mediating Variable : Happiness (Average: 4.7)**				
9	Happiness builds harmonious communities	5.08	0.904	257
10	Owners have confidence for future in the estate	4.77	1.109	257
11	Fostering close relationship with neighbours	4.38	1.170	257
12	Feeling relax in using AI facilities	4.80	1.041	257
13	Don't feel lonely and dislike by others	4.46	1.189	257
Independent Variable : On-line Booking Facilities **Mediating Variable : Service Fairness (Average: 4.7)**				
14	Fairness achieves harmony	4.93	0.952	257
15	Being respected by others	4.64	0.967	257
16	Consistent management services	4.51	1.160	257
17	Being treated politely by management staff	4.81	1.035	257
18	AI facilities enhance fairness	4.77	1.055	257
Independent Variable : Access Control System **Mediating Variable : Conflict (Average: 4.5)**				
19	AI facilities reduce human conflicts	4.59	1.118	257
20	Using AI facilities help controlling temper	4.49	1.163	257
21	Able to calm down for AI deficiency	4.28	1.170	257
22	Not easily to raise anger in using AI facilities	4.61	1.161	257
23	Able to compromise with other differences	4.65	0.981	257
Independent Variable : Chatbot Solutions				

Mediating Variable : Complaint (Average: 4.6)				
24	Prefer face-to-face complaint to manager	4.56	1.162	257
25	Aim to maintain harmony interpersonal relationship	4.47	1.118	257
26	Chat groups promote relationship	4.47	1.163	257
27	Virtue to tolerate management discrepancies	4.63	1.082	257
28	Forgive others	4.82	0.954	257

Table 46 : Descriptive Statistic for Combined Data Approach – Hong Kong and China

For easy comparison, the following table summarizes the results of Study 2 and Study 3 together with Study 2 + 3 (i.e. the Combined Data Approach):

Study	Mean Value	Satisfaction Level	Service Efficiency	Happiness	Service Fairness	Conflict	Complaint
2	4.36	3.6	4.7	4.3	4.4	4.3	4.3
3	5.57	4.9	5.4	5.4	5.4	5.2	5.3
2 + 3	4.68	4.0	4.9	4.7	4.7	4.5	4.6

Table 47 : Summary table for Descriptive Statistic of the Combined Data Approach

6.8.1 Discussion on Findings of the Combined Data Approach

According to the results as listed in ***Table 47*** as shown above, the mean value obtained from the combined data from Study 2 and Study 3 becomes 4.68 which shows slight upward increase when compares to Study 2 for Hong Kong from 4.36 increased by 7.3% to 4.68 but also at the same time indicates a drop on the mean value of Study 3 for mainland China from 5.57 decreased by 16% to 4.68. Nevertheless, this is harmonized with the overall outcomes as this actually reflects the proportion of the numbers of data collected for Hong Kong and mainland China in the ratio of 189 : 68 (i.e. 73.5% + 26.5%) respectively. In other words, the strong positive results obtained from mainland China cannot largely affect the overall result as it represents about one-quarter (about 26.5%) of the total sampling size of the analysis. However, it is with added confidence to note that the analytical results generated from the Combined Data Approach is consistence with the results being testified by the previous Study 1, 2 and 3.

According to the average mean value as shown in ***Table 47***, Service Efficiency (mean value = 4.9) achieves the highest score among all other variables which is, in line with the previous findings in Study 2 and Study 3. Happiness (mean value = 4.7) and Service Fairness (mean value = 4.7) with equal scores places in the second highest which is also falls within the high side of the 6-point measuring scale adopted for this research. Conflict (mean value = 4.5) and Complaint (mean value = 4.6) scores below the overall mean value of 4.68 and is considered less correlated with the dependent variable, i.e. the building of harmonious communities. However, the result for such is still in the high side by achieving 75% and 76.6% respectively when accessing by the 6-point measuring scale in this research. In brief, the overall mean values obtained from this Combined Data Approach generated by the SPSS Linear Regression model is encouraging that provides a holistic finding of the research that further testifies the hypotheses as discussed in Study 2 and Study 3. ***Table 48*** below summarizes the mean values of each independent variable paired with the mediating variable under the hypothesis for discussion as follows:

Hypothesis	**Independent Variable**	**Mediating Variable**	**Mean**	**Sample Size**
H3	Service Quality	Service Efficiency	4.9	257
H4	Mobile Apps Communication Platform – Social Chat Group	Happiness	4.7	257
H5	On-line Booking Facilities	Service Fairness	4.7	257
H6	Access Control System	Conflict	4.5	257
H7	Chatbot Solutions	Complaint	4.6	257

Table 48: Mean Values of Independent and Mediating Variables – Data Combination Approach

It is noted from ***Table 48*** that the mean value of each individual independent variable falls within the range from the lowest 4.5 to the highest 4.9 which is over the average mean value of the 6-point scale of 3.5. It demonstrates a positive association and

correlate relationship among each identified variable with its mediating factors. Firstly, among those selected independent variables, Service Efficiency scores the highest mean value of 4.9 which testifies that AI facilities enhance the service quality of the property management company with service efficiency that correlates to the building of good relationship amongst stake holders in a residential estate and therefore, able to predict the building of harmonious communities thereof. Secondly, Happiness and Service Fairness both with the equal mean value of 4.7 comes to second highest that reflects a strong relation to build harmonious communities through the benefits of social communication platform of the mobile app which enhances the positive emotional state of mind of residents with high degree of happiness level. Besides, the peaceful state of mind with service fairness perception in using the on-line system of estate facilities also enhances the building of harmonious relationship among the stake holders, and therefore contributes to the building of harmonious communities within the estate. Finally, the intelligent Chatbot Solutions provide instant replies, basic solution and useful information that satisfy most of the frequently asked questions and expected enquiries from residents, this possibly reduce complaints from residents and help reducing the nos. of complaint case is also one of the mediators to build harmonious communities in an estate. However, digitalized access control system (mean value = 4.5) is of lower concerns in Hong Kong and mainland China when compare to other independent variables. Therefore, reducing physical human contacts at the main lobby for registration purpose may not reduce the conflicts among the stake holders, and hence this pair of independent and mediating variables, i.e. Access Control System paired with Conflict may have relatively less effect but still have significant value in this Combined Data Approach toward the building of harmonious communities in the research.

The findings for the Combined Data Approach from the Pearson Correlation Analysis are shown as follows:

Correlations

		Build Harmonious Communities with AI facilities	Service Efficiency	Maintaining Happiness	Enhancing Service Fairness	Avoiding Conflcit	Eliminating Complaint
Pearson Correlation	Build Harmonious Communities with AI facilities	1.000	.684	.744	.633	.640	.662
	Service Efficiency	.684	1.000	.757	.773	.706	.706
	Maintaining Happiness	.744	.757	1.000	.786	.741	.759
	Enhancing Service Fairness	.633	.773	.786	1.000	.727	.691
	Avoiding Conflcit	.640	.706	.741	.727	1.000	.788
	Eliminating Complaint	.662	.706	.759	.691	.788	1.000

Table 49: Pearson Correlation Analysis – Combined Data Approach

According to the results generated from the Pearson Correlation Analysis as shown in ***Table 49*** above, those with 0.7 values and above are showing a strong significant correlations between the variables which are listed below in descending order.

(i) 0.788 - Complaint ↔ Conflict

(ii) 0.786 - Service Fairness ↔ Happiness

(iii) 0.773 - Service Fairness ↔ Service Efficiency

(iv) 0.759 - Happiness ↔ Complaint

(v) 0.757 - Happiness ↔ Service Efficiency

(vi) 0.741 - Happiness ↔ Conflict

(vii) 0.727 - Service Fairness ↔ Conflict

(viii) 0.706 - Service Efficiency ↔ Conflict

(ix) 0.706 - Service Efficiency ↔ Complaint

The nos. of correlated variables as shown above have been improved when compared to the data collected in Hong Kong for Study 2 and in mainland China for Study 3 in which, there are only 6 nos. and 7 nos. of positive correlations which are over 0.7 in Study 2 and Study 3 respectively are noted. However, for this Combined Data Approach 9 nos. of positive correlations are analysed which also show stronger relationships than in Study 2. It implies that the strong testing results from Study 3 do have positive impacts on the significance of the research under the Combined Data Approach. This further testifies the hypotheses of this research that although cultural differences do exist between the two regions, the overall response from those questionnaires participants are having positive effects on the fact that AI facilities help building harmonious communities in residential estates both in Hong Kong and mainland China. In addition, the independent variables and mediating variables adopts for this research are testified of having a high degree of validity and reliability due to the strong analytical correlation results obtained in ***Table 49*** above.

6.8.2 Summary from the Combined Data Approach for Study 2 and Study 3

The following ***Table 50*** summarized the important analytical outcomes generated from the Linear Regression Analysis of the SPSS (version 25) for discussion from a holistic perspective of the research topic.

Hypothesis	Independent / Mediating Variables	Mean Value	R Square	F Ratio (df)	Sig. Level
H3	Service Quality /Service Efficiency	4.9	.502	63.623 (4, 252)	.000[b]
H4	Social Chat Group / Happiness	4.7	.578	68.631 (5, 251)	.000[b]
H5	On-line System / Service Fairness	4.7	.482	46.662 (5, 251)	.000[b]
H6	Access Control System / Conflicts	4.5	.462	43.068 (5, 251)	.000[b]
H7	Chatbots Solution / Complaints	4.6	.463	43.332 (5, 251)	.000[b]

Table 50 : Analytical Results for the Combined Data Approach (Study 2 and Study 3)

The overall result as shown in ***Table 50*** reflects the fact that the hypotheses (i.e. H3 to H7) are model fit and the level of reliability for all hypotheses are significantly testified according to the analytical result of significance level at .000[b] as shown above. In fact, the values of R^2 for each hypothesis are relatively high which falls within the range from .462 to .578 and this testifies a strong level of relationship between the dependent variable and the matched pair of independent and mediating variables under the hypotheses. Moreover, the values of F-ratio are of high value for H3 and H4 at 63.623 and 68.631 respectively which indicates a strong sign of correlation and hence achieve a significance level at $p < 0.0005$.

In conclusion, by adopting the Combined Data Approach, i.e. combining the data obtained from Study 2 and Study 3 together in achieving a holistic result of the research, the overall result is satisfactory which is proved to be in consistence with the previous Study 2 and Study 3. This remedial action to release the challenges for the degree of reliability and significance level for Study 3 (for mainland China) with relatively small sample size of primary data would also be justified. In fact, the existing development and applications of AI facilities being implemented in mainland China, which covering a wider scope of products / service in the economies are a concrete prove that there is a cultural difference between the Hong Kong Chinese and mainland Chinese in using AI facilities in their daily life. In this regard, some managerial implications and recommendations are discussed below.

6.9 Managerial Implications for Study 3

All hypotheses in this Study 3 are confirmed having statistically significance among the variables, and the overall outcome is that the strengths of correlation are strong between each individual set of independent/mediating variables with the dependent variable. This implies the fact that mainland Chinese people are enjoying the advantages from the AI facilities in the country, that the scale of infrastructure to facilitate AI facilities are well planned and designed during the early construction stage. For instance, the mobile apps platform to handle the big data including the selling of different daily commodities, the concierge services provided to each resident, and so on. It is obvious that the findings from the two regions reflect there are cultural differences between Hong Kong and mainland China regions, the details will be further discussed in the following Chapter 7. In fact, managerial implications for China market is not of importance as the application of AI facilities are widely used in most part of China regions except Hong Kong. This can be evidenced by the current practice in all walks of life that Chinese people do not have to bring cash for their transactions in the market, those traditional luxury printed hard copy menu in a restaurant for food ordering has been replaced by on-line ordering apps, household electrical appliances have been under the apps command…etc. Due to the collectivism nature of Chinese peoples, the building of harmonious communities within their dwelling place and even building the harmonious society in the regions shall become their first priority in life by basic instinct and therefore the managerial implications in this regard may not be obvious.

Chapter 7 – The Conclusion

7.1 Introduction

Having conducted the three studies in realizing the effects of using artificial intelligence facilities in building harmonious communities in property management in Hong Kong and China, it is affirmative that those innovative digitalized AI facilities being used in nowadays property management industry are the most effective strategy to streamline service efficiency in terms of service quality of the management company with cost saving and the building of harmonious relationship with customers and/or stake holders within an estate in Hong Kong and in China.

The effectiveness of deploying AI facilities in nowadays property management are proved to be of high validity and efficient under the qualitative approach conducted in Study 1 by interviewing 10 senior management and professionals from the top ten property developers in Hong Kong. The hypothesis 1 and hypothesis 2 (i.e. H1 and H2) are successfully tested in Study 1 and it is confirmed that:

"*AI facilities outperform traditional human-led property management services in terms of service efficiency*" under H1; and
"*AI facilities helps building harmonious communities via mediating variables including service efficiency, happiness, service fairness, conflict and complaint*" under H2.

In addition, according to the expertise and solid experience of these interviewees in handling AI facilities in their newly developed intelligent residential properties, the empirical data collected from the in-depth interviews with them form a solid ground for the development for the analytical framework to establish the grounded theory called the

Theory of ***"Building Harmonious Communities with AI Facilities in Property Management in Hong Kong***".

In addition, two quantitative approaches have been conducted for Study 2 (with primary data being collected from property owners in Hong Kong) and Study 3 (with primary data being collected from property owners from mainland China) are carried out to explore, and hence explain the relationship between the dependent variable and each pair of selected independent variable with mediating variables. For easy understanding of these two studies, the research model as shown in Figure 2 in Chapter 2 demonstrates the relationship of AI facilities which classifies as the independent variables and paired with individual mediating variables to testify the degree of relationship and hence, facilitate the determination and prediction to achieve the dependent variable. The methodologies in carrying out these two studies are identical and the hypotheses remain the same but for easy identification, the hypotheses for China will be distinguished with a letter "a" (i.e. H3a, H4a, H5a, H6a and H7a) for Study 3 conducted for the China market. In fact, the data so collected for these two regions are different which also fulfils one of the aims of this research to identify if there are cultural differences in terms of concerns over personal data between these two groups of peoples who are growing up in different regions under different background, i.e. influential from the west and the ancient China values. More details will be discussed in the latter part "The empirical conclusion" of this Chapter.

In brief, hypotheses H3 to H7 for Hong Kong and H3a to H7a for China are testified to be of statistically significance as shown below:

Hypothesis 3 and 3a (H3 & H3a)

AI facilities help building harmonious communities via service efficiency in terms of service quality of the management company.

Hypothesis 4 and 4a (H4 & H4a)

Mobile Apps Communication Platform i.e. Social Chat Group enhances happiness of residents and helps building harmonious communities in a residential estate.

Hypothesis 5 and 5a (H5 & H5a)

On-line booking system enhances service fairness and helps building harmonious communities of an estate.

Hypothesis 6 and 6a (H6 & H6a)

Access control systems avoid conflicts among residents, visitors and management staff that help building harmonious communities in a residential estate.

Hypothesis 7 and 7a (H7 & H7a)

Chatbot solutions with instant responses eliminate complaint that helps building harmonious communities in a residential estate.

7.2 Formation of the Grounded Theory

Having conducted the in-depth interviews with pre-set open questions and questionnaires, some decisive data are collected for coding and the development of the analytical framework to establish the theory. Therefore, the theory of "***Building Harmonious Communities with Artificial Intelligence facilities in Property Management in Hong Kong***" is formed in this research. It is of the researcher's opinion that such theory

would be widely recognized and realized in terms of cost saving and relationship building within a residential estate in Hong Kong and China. Since the effectiveness and service efficiency are obviously beneficial to all property owners in their dwelling place and therefore, the merit behind the theory is soon to be fully recognized by the public and respective stake holders in property development particularly in the property management sector.

7.3 The Conclusion and Recommendations

According to the findings of this research, I can conclude that the three studies are successfully conducted with encouraging outcomes that support the vision of the researcher who are also insider of the property management industry with almost 30 years of experience in managing a portfolio of luxurious residential properties developed by renowned property developers in Hong Kong. It is also interesting to note that the cultural differences between the two locations, i.e. Hong Kong and mainland China regions do exist and are being identified. The average mean's value for each particular question in the same set of questionnaires score a constantly lower mark for Hong Kong survey (approximately 4.45 out of 6) and a relatively higher score (approximately 5.35 out of 6) from the duly completed questionnaires both from on-line survey platform and hard copies from mainland China. This reflects the fact that mainland Chinese are more confident for their dwelling place and style of living due to their collectivism nature in building social harmony and the initiatives from the property developers to enhance the neighbourhood relationship in China. However, the case is different in Hong Kong that the political instability that causes social unrest together with the threat of COVID-19 infection that adversely affect the confidence and the whole economies of Hong Kong and its peoples and therefore the data reflected in the questionnaires inherent more negative emotions that are in the lack of confidence towards the government and for the

future. This also affects their peace state of mind and degree of happiness and well-being in their living environment. It can also be concluded that due to the different cultural background with intrinsic ancient Confucian belief of the mainland Chinese population when compared to the western style of individualism value judgement in lifestyle inherent in most of the Hong Kong populations, the mediating variables that predict the dependent variable of building harmonious communities is much easier to achieve in mainland China than in Hong Kong. However, the merit of implementation of AI facilities is of certain credibility that increases service efficiency, promotes happiness, enhances service fairness, avoiding conflict and eliminating complaints are well recognized by most stake holders in both regions. This forms a good data base to predict the building of harmonious communities in an estate and to certain extent, contributing to establish social harmony in the region from a macro perspective and in the long run. Government shall explore and utilize the positive effects of using AI facilities to build harmonious communities to a wider scope in all walks of life under their governance both in Hong Kong and in mainland China.

7.3.1 The Barriers and Difficulties in the application of AI Facilities

Not until about 8 years ago when the very first property management mobile applications attract Hong Kong property developers' attention to enhance the service quality of their property management company with many advance functions. However, most of the service providers in the property management market at this period are still adopting a traditional labour intensive approach in Hong Kong and mainland China, the slow response in implementing intelligent services may due to the barriers and difficulties in the application of AI facilities in the property management market, where most of the stake holders are yet to recognize the merit of using AI facilities in terms of increasing service efficiency, cost saving, and also helps building harmonious communities within a

residential estate. These barriers and difficulties include the limited choice of selection on types of AI facilities in the market, which can be applied to a residential building that brings benefits to all stake holders including the property management company, the owners, the residents, the visitors, the workers and so on. However, this shortcoming can be solved easily when more and more advantages are realized by the public when more intelligent buildings are being built. Once the merits are identified and end users are get use to it, stake holders shall demand using AI facilities in their daily life for convenience sake that save time and avoid occupying their physical attendance to handle some importance procedures for a transaction, e.g. go to the bank for a finance application could be done effectively by on-line application and submission of documents, order daily necessity through on-line apps purchase and so on. Sooner or later many businessmen will invent and modify more AI equipment and facilities that enhance the quality of life and accessibility for their customers. It is just a matter of time and there would be many advance technologies to come under the initiatives of government fully supported innovation campaigns, ESG and sustainability missions in the economy, therefore in the foreseeable future, wider choices of AI products which can be applied in the property management industry would be expected.

Secondly, the existing built infrastructures of those developed properties create physical constraints to adopt AI facilities as most of the cable ducts and conduits connecting the signal transmission equipment are concealed and very much difficult in terms of cost and time to install other concealed cable routings for AI facilities to achieve the good appearance with unseen cabling networks. For example, during the time of COVID-19 pandemic, AI-intelligent food delivery robots can be implemented if the wifi signals are securely stable and strong enough to facilitate the function of a food delivery robot. Hence, the delivery route including the lift, corridor and unit sensors must be installed

for the robot to fulfil its duties accurately and efficiently. This AI service, i.e. food delivery robot requires various cablings that are connected with a series of routers equipped with cyber security system and electricity supplies to operate the service. In addition, a series of mobile sensors and control devices shall be arranged for the robot to search for the right destination(s) to deliver the food to the residents accurately in discharging its duties. The pre-requisite for this service relies on steady transmission of wifi, infra-red and RFID signals via fixed installation of transmission device including many receivers or readers along the service path. These designated routes must also be CCTV cameras covered so that those captured footages of the food delivery robot can be recorded and traced just in case of deliberate acts of others in the areas. Hardware provision of cabling infrastructures to facilitate the use of AI facilities requires extra cost of construction, however, some developers are recognizing the merits of AI facilities in a property and therefore PROPTECH (i.e. property technology) is also a hot topic in the property development industry where the main objective of PROPTECH is to achieve intelligence building with smart building facilities that enhance the convenience and efficiency of the end users of the building. This covers a wide range of building facilities including natural lighting design, indoor air-quality, energy saving, safety of occupiers, using raised floor design to enhance flexible layout design of a premises, and so on, these shall be planned well in advance in the property development stage by developers. A well-planned hardware provision on property's infrastructure is the pre-requisites to facilitate the functions of AI facilities to achieve service efficiency and hence, building harmonious communities within the estate with service quality and convenience.

Thirdly, most Hong Kong people are over worried about their personal data will be leaked while registering the service with personal data for the use of digitalized services

with mobile facilities and therefore, it is relatively difficult to promote the use of digitalized AI facilities covering a wider range of personal services not only in property management market but also in the whole customer service industry. Unlike in mainland China, personal privacy concerns will not cause any big deals for mainland Chinese and therefore they enjoy many digitalized AI facilities in the society covering a wide range of products and services in their daily life. It is not surprising that those mainland Chinese will not bring wallet and cash, credit card and so on to shop, dine or consume any services in the marketplace as most of the service providers accept e-payment via the mobile apps already installed in their mobile phone. This barrier is quite difficult to handle as it involves defensive mindset of the end users in providing their personal information to the service providers before the required service and/or products can be enjoyed. Therefore, more civic education must be organized to educate and clarify with the concerned peoples about their worries of their personal data would be hacked for other unexpected purposes. By reference to the recent control on the spread of COVID-19, Delta and Omicron virus, Hong Kong SAR Government is adopting the apps called "LeaveHomeSave" which is very effective in identifying those potential virus carriers. This is done by means of a QR code assigned to individual shop that customers must scan the QR code before entering into the shops for consumption, e.g. the F&B restaurant where potential risk is higher when peoples' face mask are off while having the meals. Under the statutory requirement, all peoples in Hong Kong need to download and provide personal data e.g. full name and registered phone number to register with the "LeaveHomeSave" apps in their mobile phone to enhance public safety in Hong Kong. With this public policy to safeguard the health of individuals and the collection of personal data to facilitate the apps, most Hong Kong peoples shall be get use to it and their concerns over their personal data being misused could be eliminated. This could be gradually changed when they realize their over worries

toward the data storage are encrypted and stored in company servers together with the protection from the statutory requirements from the government.

Finally, the possible emotional side of customers due to the use of AI facilities also create barrier to hamper the use of AI facilities in Hong Kong. It is because that adapt to changes in life is somewhat a difficult task that most people are reluctant to face and handle in this ever changing world. However, advance technologies being implemented in many industries and service sectors nowadays are leading many populations to use the advance technological products and services, for instance, smart phone are having the advantages of powerful data storage, instant communication, access to unlimited source of information around the globe, on-line banking services, self-help check-out counter, food ordering services inside a restaurant, transportation apps like Uber, Grap, etc. Most independent young generations between the age of 20 to 40 years old are easily adapted to these new changes in life style by using digitalization devices and services through apps without any problems. This is common nowadays in Hong Kong and China. Therefore, it can be concluded that AI facilities are mostly adopted and welcomed by the young age groups no matters which products/services in the markets, this certainly includes the building apps and on-line services provided by the property management industry. However, some elderly peoples may have difficulties in using this kind of digitalized advance products and services in the economy, therefore, collaborations between AI facilities and human interactions are required. For example, some helpers are still deployed as customer services to coach customers in using the digitalized services including bank's teller counter, supermarket electronic self-help check-out counters, application counters of the government departments, and so on. It is obvious that AI facilities can only perform some of the routine and repetitive works but cannot replace all human duties like taking care of the elderly to satisfy their requests,

by asking them the right questions to identify their needs and concerns. Therefore, the emotional side of stake holders in using AI facilities in property management in Hong Kong can be divided in two folds, positive emotional state and negative emotional state of mind in using the AI facilities in a residential estate. As discussed above, younger generations shall encounter less technical problems when using the building apps and to certain extents they are grouped under the positive emotional state of mind in using the AI facilities which are proved to have higher service efficiency and convenience. However, their main concern is cyber security of their personal data being provided to the service providers in registration for the use of AI facilities and services. This shall be resolved with more civic education and the high security in handling these personal data by the property management company which is used strictly for the intended collection purpose. Service providers can emphasis this statutory requirement would be helpful to provide confidence to these groups of peoples to build trust in using these AI facilities and services in the estate.

The negative emotional state of mind in using those AI facilities in a residential estate shall be mainly focused on those elderly groups, who are reluctant to adopt changes to use advance technologies with unseen transaction mode that, this uncertainty creates unpleasant peace of mind and hence, anxiety and worries are implanted in them and result in refusal to use those AI facilities. However, their concerns over the misuse of personal data are relatively less importance as their political preferences and stands are mild. In turning their negative emotional mindset to certain positive state, more helpers shall be deployed to coach them how to use the on-line services more effectively and also explain to them the system workflow to complete the transactions on-line with proper records for future reference. This may encourage them to use on-line booking and settle the payment instantly with the building apps in their estate.

7.4 Limitations and Direction for Future Research

Limitations to this research work are numerous these include but not limited to the time constraint in obtaining considerable large size of sample instead of the current relatively small sample size for Hong Kong (189 nos.) and mainland China region (68 nos.). Due to the government policies to prevent the COVID-19 epidemic infections both in Hong Kong and across the border to mainland China regions, travelling between mainland China and Hong Kong is discouraged and therefore the proposed site visit and in situ collection of questionnaires from newly developed residential estate with various AI facilities in mainland China is not viable. This seriously affects to obtain the targeted sample size of Study 3 for China market. However, a Combined Data Approach by aggregating the data of 257 questionnaires from Hong Kong and China together is exercised to obtain a holistic view of the research topic, and the overall result is affirmative with positive findings that support and testify the previous analytical results.

Moreover, despite the high accuracy of the findings from Study 1, Study 2 and Study 3, there are still rooms for improvement and public expectations on the technological advancement to invent more AI facilities in the market in the near future. More closely connected AI devices and enhancement of IoT may lead to higher versatility and efficiency of the PROPTECH. A more extensive adoption of AI technologies in property management may further raise clients' recognition of the devices, allowing for higher satisfaction on services. The social lockdown due to COVID-19 also plays an important role for accelerating people's understanding and acceptance to AI technologies as a clean and safe contact-free medium. Upon the growing trust and popularity towards AI technologies in communities, it is expected that more user-friendly AI tools will emerge to better address people's needs. As a result of greater reliance, we may

see a substantial boost in people's attitudes towards AI technologies in building harmonious communities. This may be something worth re-visiting in the future.

Finally, the research topic is rare in the academic domain to explore if there is any relationship between the scientific technological objects (Artificial Intelligence facilities) with psychological human behaviour subject in terms of harmonious relationship amongst the stake holders in a residential estate with AI facilities as the mediators. On the contrary, identifying such research gap would certainly be an opportunity to explore new theory and make ways for other scholars to conduct future research in the subject topic. In fact, for future direction of this research topic, I would recommend more in-depth examinations could be allocated to each mediating variable so as to fully identify its intervening role to testify its strength in predicting the dependent variable. Certainly, cultural differences and personal data privacy concerns should be taken into account as the degree of intrinsic belief in building harmonious relationship with neighbours between the collectivism and individualism populations is of vital importance that can also predict the research outcome.

7.5 Managerial Implications to Stake Holders

According to the positive findings of this research, strategies to promote and encourage stake holders including the property developers, investors, property management companies, the government, the regulators, the customers, etc. to provide and implement more AI facilities in their properties are required. Some suggested strategies incorporating managerial implications are discussed below:

7.5.1 Government initiatives and interventions

The Government of Hong Kong SAR shall establish Hong Kong as a smart city so as to gain competitive advantage among the world recognized modern cities. This secures its economic and financial position with the helps form the use of AI smart facilities and Internet of Things (IoT) devices. According to Lai, O., (2021), the top seven (7) smart cities around the world include New York, Singapore, Seoul, Oslo, Helsinki, Zurich and Amsterdam; government intervening strategies shall be in place to guide property developers in Hong Kong to build smart city with intelligent properties to cope with this goal. The strategies to achieve a smart city shall make reference to the policies and plan of these smart cities in achieving the criteria to become a smart city. In summary, smart city initiatives by adopting innovative smart technologies as a way to make the cities more energy efficient, minimizing carbon emissions and greening the environment are the ultimate goals to becoming a smart city. In addition, incorporating smart technology including the IoT sensors in properties in urban cities not only improves the quality of life of its citizens and overall public safety with service quality and in fact, the increasing greening effect to environment that raise the happiness level of citizens may also have positive association with the building of harmonious communities within the city.

The following examines the success factors of top smart cities around the world as some reference points to build Hong Kong to become a smart city in the foreseeable future. In **New York** City, waste management and waste collection are effectively managed. The introductions of smart hubs with contactless technologies, wifi capabilities, online charging stations, car-sharing services reduce total emissions and traffic congestions are quite successful. Besides, hundreds of smart sensors and AI technologies have been tested and placed in different districts in New York City as part of her smart city pilot

programme in 2020. **Singapore**, under her 2021 plan to build a new eco-smart city that is entirely vehicle-free is also a very good attribute to build a smart city. In **Seoul**, Songdo is known as the world's first smart city since launching its initiatives since 2014 by accumulating data analysis of urban patterns including traffic flow, speed and air quality measured by sensors and CCTV deployed across the city through installation of smart infrastructure and services. From a micro perspective, the environmental IoT sensors installed for live alone single elderly citizens are intensive caring AI facilities that detect if there is no movement over a certain period of time or if abnormal temperature or lighting condition, relevant case workers and emergency services would contact the concerned senior immediately. Seoul is also using the data platform creating an AI detective to flag up potential crime patterns by utilizing the advantages of the 5G network in mobility and transportation. In **Oslo**, the waste management and green energy systems over retrofitting to existing buildings and those targeted zero-emission construction sites are monitored by the government to achieve the smart city goal. In the whole city of **Amsterdam**, thousands of operating businesses and households has adopted energy efficient roofing insulation, automatically dimming light switches, smart meters, and ultra-low energy LED lights to become a smart city. **Helsinki** is implementing energy-efficiency measures during renovations, which could reduce emissions from buildings by 80%, as well as incorporating more renewable energy use in the city's buildings. Finally, **Zurich** starts with streetlight project by using sensors to adjust its brightness or dim accordingly. This project enables an energy saving of up to 70%. It also establishes a greater range of sensory technologies that collect environmental data, measure the flow of traffic and act as a public wifi antenna. A smart building management system which connects the city's heating, electricity and cooling has already been proved to be highly effective in this smart city. Those good initiatives and best practice in establishing a smart city as shown

above shall be seriously examined by the Hong Kong SAR Government under the town planning objectives and legislative considerations. This not only helps stepping forward to become a smart city but also enhances the building of harmonious communities with AI facilities in buildings within the society and hence, promotes social harmony in the city. Without the determined initiatives from the Hong Kong SAR Government in the public sector, the goal of becoming a smart city in this competitive world is impossible. However, the initiatives of Environmental, Social and Governance (ESG) and sustainability shall be fully supported by private sectors e.g. property developers so that by implementing those AI facilities, Hong Kong can secure a better place in this global competitive market.

7.5.2 Promote installation of infrastructure in existing buildings to facilitate the use of AI facilities

Similar to Helsinki, renovation on existing properties is encouraged to incorporate energy efficient system and renewable energy devices e.g. solar panels and wind turbines facilities into the renovating buildings are recommended. More energy efficient funding could be promoted with building owners to achieve energy saving for the whole city in reducing carbon omissions and protect city's environment as a whole. In fact, some environmental specialists could develop close working relationship and partnership with the town planners, designers, architects, engineers and so on to work out the best design of newly developed properties by means of adopting more environmental-friendly AI facilities into the buildings under a mandatory scheme monitored by the Government would also be an effective control to enhance the environment and hence, the building of harmonious relationship among the stake holders.

7.5.3 Research and Development in providing more new AI facilities in the market

Since the provision of AI facilities in the market to suit for property management industry are relatively limited due to its unique business/service nature. Product design firms shall adopt more innovative idea by using the digitalization and 5-G efficient communication platform in designing their products. This certainly utilizes the benefits derive from advance technologies on 5-G transmission and receptions and also helps improving the traditional ways of service provisions in different sectors of the economy. In addition, the product designers shall bear the concepts that those AI facilities, if applied in property management, shall attract a large number of users if the facilities are proved to be user-friendly with high degree of service efficiency. Collaborations and joint efforts from property developers with Cyber Port / Science Park AI-driven designing firms are important. Property developers shall also take the initiatives to contact these firms for innovative product design to be applied in their newly developed property projects so that more innovative AI facilities can be provided and enjoyed by the end-users this helps building harmonious communities, and gradually promotes social harmony in the region.

7.5.4 Civic education on security of personal data privacy in using digitalized AI facilities in property management

Most Hong Kong peoples are quite concerns about their personal data being collected during the registration for activation in using some digitalized AI facilities in a residential estate, these include the access control system by using a pre-registered code reader or facial recognition in entering the building and operate the lift car to reach the designated floor with security and convenience, the timing and duration of using the clubhouse facilities are recorded so that their footprints may be monitored, the CCTV cameras capturing the image videos that could be used deliberately against the intended

purpose and so on, they are over worried on the data collection of their footages and personal data will be wrongly used by the management staff of the estate and/or those hackers in the cyber world. However, these worries are not necessary as the handling of these privacy data of any persons is under the control of and protected by The Privacy (Personal) Ordinance, Chapter 486, The Laws of Hong Kong.

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Appendices

Appendix 1

Date: 8 October 2020

Dear Sir / Madam,

Re.: **Questionnaires Survey for the Research Subject**

I am Edward Yau-hang LUI, currently a DBA student of the University of Wales (Trinity Saint Davis) in the United Kingdom and now conducting a research topic on "***The effects of using artificial intelligence facilities in building harmonious communities in property management in Hong Kong and China***".

I would be most grateful if you could spare eight (8) to ten (10) minutes to complete the attached questionnaires and return it to me to proceed further with the research works. I am quite certain and hence, appreciate that your first hand personal experience towards the subject matter shall have academic value by reflecting the practical truth for analysis. Your proactive response in returning the questionnaires shall become one of the contributory factors that make my research meaningful.

Please scan your duly completed questionnaires in colour option **or** take photo of the completed questionnaires and send it to me via either one of the following channels:

1. By email: 1710335@student.uwtsd.ac.uk **or**
   edwardyhlui@gmail.com **or** t282404@ouhk.edu.hk .

2. By Mobile App: my mobile telephone number is: (+852) - 93410177, so you can reach me by mobile apps including "***Whatsapp***" and "***We Chat***" for effective communication.

3. By Mobile Phone: I am also prepared to collect the duly completed questionnaires in person within Hong Kong territory, please contact me at 9341 0177 for collection arrangement.

I must stress that under the University's stringent policy in respect of research ethics, the consent from every participants in this survey shall be obtained before using the collected data for analysis, therefore the return of the completed questionnaires from your goodself shall expressly demonstrate your kind consent on using the given data solely for the intended purpose of this research work. Thank you so much for your kind assistance and support for my study.

Yours sincerely,

Edward Y.H. LUI
(BLE, MBA, DipM, DipHM, MHKIH, MISCM, MRICS)
Encl.

Appendix 2

Interviewing Questions for Property Management Professionals

Hypothesis for Study 1:

H1: The effects of using AI facilities weight over the traditional human-led property management services in terms of efficiency.

H2: AI facilities have association with the building of harmonious communities

	Questions
1	How many AI facilities are provided in your estate? What are they?
2	Are the responses from property owner/residents positive toward the AI facilities provided by your management company? Please rate your view from the most negative = "1" and the most positive =6".
3	Do you think AI facilities are more effective than the traditional human-led system in terms of service efficiency?
4	Do you think AI facilities are more effective than the traditional human-led system in terms of accuracy at work?
5	Do you think AI facilities enhance system fairness and service consistency in the estate which is better than the traditional human-led system?
6	"AI facilities replace human daily repetitive works and achieve cost saving", do you agree with this statement?
7	Do you think your staff and residents are habitually enjoyed using the AI facilities, why?
8	Are there any social networking groups formed by residents in the mobile apps? Can you name some of these social groups?
9	How would you rate the "Happiness Level" of your staff and residents, from the most unhappy = "1" to the happiest = "6" in using the AI facilities.
10	Will conflict among residents and staff be reduced after using AI facilities, e.g. access control?
11	Are there frequent complaints in the estate, how many cases per month and what are they?
12	Has the number of complaints been reduced after implementing the AI system?
13	Can you suggest two (2) factors that can build harmonious communities in the estate?
14	Do you think AI facilities can help establishing harmonious communities in the estate? Please give reasons to support your views.
15	What is your expectation on the development of AI facilities in property management industry?
16	Do you agree that "Harmony contains differences and encourages coexistence of differences"?

Disclaimer:

Thank you so much for your support and express consent in providing the primary data for the subject study, your valuable data will be treated as strictly confidential only for the intended purpose of this research.

- End -

Appendix 3

Questionnaires for Property Owners / Residents

The following questions are designed to collect your personal views on "The Effects of using Artificial Intelligence facilities in building harmonious communities in Property Management in HK and China". For ease of reference, AI facilities for this research are defined as: "**Mobile App Social Platform**", "**Clubhouse On-line Booking**", "**Access Control System**" and "**Service Quality of Management Services in terms of efficiency and accuracy**". Please indicate your choice from the lowest = "1" to the highest = "6" as shown below:

Strongly Disagree / No/ Very Poor ⟶ ***Strongly Agree / Yes / Very Good***

1 2 3 4 5 6

	Questions	***Please put a "✓" in the appropriate box***
1	Do you think there are enough AI facilities in your estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
2	Do you enjoy using the AI facilities being provided in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
3	Do you agree that "Using AI facilities in the estate have become my daily habit, and I'm satisfied with it"?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
4	What is your satisfaction level in using AI facilities in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
5	Do you agree that "AI facilities enhance efficiency and accuracy of the management services provided by the management company"?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
6	Do you agree that "AI facilities achieve cost saving by replacing human repetitive routine works with efficiency and accuracy, e.g. access control, on-line booking…etc."?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
7	Are you able to build harmonious relationship with other residents and the management staff through the following facilities: (a) Mobile App Social Platform (b) Clubhouse On-line Booking Facilities (c) Access Control System (d) Service Quality of the Property Management	 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐
8	Do you agree that "Harmony contains differences; and encourages coexistence of differences"	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
9	Do you agree that "AI facilities help establishing harmonious communities in your estate"?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
10	Do you agree that "Happiness of Residents" is vital in building harmonious communities?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
11	Are you happy residing in the estate with AI facilities and have confidence for future services?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
12	Are you fostering a close relationship with your neighbours?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
13	Do you feel relax and easy when using the AI facilities?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐

14	You don't feel lonely and being disliked by others in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
15	I agree that "Service Fairness" is vital in achieving harmonious communities in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
16	I am respected by others and express my own views in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
17	I agreed that management services are consistent to all residents?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
18	Do you think you have been treated politely by management staff?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
19	Do you think AI facilities enhance service fairness of your estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
20	Do you agree that "AI facilities reduce human conflict and build harmonious communities in the estate"?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
21	Do you think that with the implementation of the AI facilities, you are able to better control your temper in using these AI facilities?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
22	When you are dissatisfied with the performance of the management services, would you be able to calm down when you discover that such fault was originated from AI deficiency, e.g. machine breakdown and not caused by human error?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
23	While talking with others, you'll not raise their anger easily?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
24	In order to avoid conflict with neighbours towards the management services of the estate, you'll try to compromise and accept their opinions, needs, values, goals and attitudes…etc.	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
25	If you have experienced service failure of the AI facilities, are you intended to complaint it to the estate manager face to face?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
26	Do you agree that "AI facilities can help maintaining interpersonal harmony which is an important goal in your life"?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
27	Do you think that the Social Chat Group in the Mobile App can promote harmonious relationship among residents?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
28	Do you think it is a virtue to tolerate, including the discrepancies found in the property management services e.g. AI facilities?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
29	Are you the person who is considerate of other's difficulties and forgive them whenever possible, including the deficiencies of the management services and facilities in the estate?	1☐ 2☐ 3☐ 4☐ 5☐ 6☐

Please state the name of your residential estate / building: _____ and your age group is: ☐ 18 – 30 ☐ 31 – 40 ☐ 41 – 50 ☐ 51 – 60 ☐ 61 and above

**** Return of this completed questionnaire shall expressly demonstrate your kind consent on using the given data solely for the intended purpose of this research work. Thank you so much for your kind assistance and support for my study.***

Appendix 1– (Traditional Chinese Version)

致：親愛的物業業主 / 住戶

有關：**研究項目的問卷調查**

本人 雷友恒 現就讀於英國「威爾斯(聖三一戴維斯)大學」所舉辦的「工商管理博士」課程，現正進行下述項目的研究工作: 「**在香港及中國大陸的物業管理市場上，應用人工智能設備達致建立和諧社群的效應**」。

希望閣下能抽出 8 至 10 分鐘的時間完成附上之問卷，並交回給我作深入的分析研究。本人確信並期待閣下提供第一身對上述研究項目的真實個人經驗，必定會為學術上帶來寶貴的價值。而閣下積極的回應實在是這項研究中的一個貢獻，從而使我的研究工作更具意義。

懇請將填妥的問卷以彩色掃描或拍照，透過以下其中一個方法交給本人：

1. 電郵地址： 1710335@student.uwtsd.ac.uk **or** edwardyhlui@gmail.com **or** t282404@ouhk.edu.hk .

2. 手機應用程式：本人的流動電話號碼是 (+852) - 93410177 ，因此閣下可以透過 "***WhatsApp***" 或"***We Chat***" 等傳送有關資料給我。

3. 親身收集方式：本人可以在香港的範圍內親身收取填妥的問卷，請致電 93410177 與本人聯絡有關收集的安排。

本人謹此強調，根據大學有關「研究道德規範」的嚴謹政策，每一位填寫問卷者必須事先同意，將所提供第一身的資料作為研究用途，因此閣下交回填妥的問卷，已經表明閣下接受並同意將該資料作為是次研究的用途。本人再次向閣下對本人研究工作的信賴及支持獻上衷心的感謝！

雷友恒

雷 友 恒
(土地經濟學學士、工商管理學碩士、市場學深造文憑、房屋管理學深造文憑、香港房屋經理學會會員、商場管理學會會員、英國皇家特許測量師學會會員)

2020 年 10 月 8 日
(附件)

Appendix 2– (Traditional Chinese Version)

研究調查 – 物業管理專業人員專訪

	問題
1	您管理的屋苑有多少項人工智能設備？這是什麼。
2	居民對使用屋苑人工智能設備的評價是正面嗎？ 請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
3	您是否同意人工智能設備比傳統人手服務更能提高物業管理公司的「服務效能」？請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
4	您是否同意人工智能設備比傳統人手服務更能提高物業管理公司的「工作準確性」？請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
5	您是否同意「人工智能設備可以提升系統的公平及服務的一致性，比起傳統以人手為主的服務更佳」。請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
6	您是否同意「人工智能設備可以取代日常人手負責及重複性的工作，並節省成本」？請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
7	您是否同意「業主已經習慣地使用屋苑的人工智能設備，並對此感到滿意」？何以見得？請以 1 – 6 表達您的意見，1 = 極負面、6 = 極正面。
8	據您所知，有沒有居民透過手機應用程式建立了聯絡群體，這些是什麼群體？
9	您認為居民及職員在使用屋苑人工智能設備的「快樂指數」是什麼，請以 1 – 6 表達您的意見，1=極不快樂、6=極之快樂。
10	在屋苑中採用人工智能設備後，居民與職員的「衝突」個案是否減少了？ 請以「屋充出入管制設施及系統」說明你的看法。
11	屋苑是否經常出現投訴個案？平均每月有多少宗？內容是什麼？
12	屋苑採用了人工智能設備後，「投訴」個案是否減少了？
13	請您提供兩個可以建立屋苑和諧社群的建議。
14	您是否同意屋苑人工智能設備有助於建立和諧社群，請舉例說明您的看法。
15	您對人工智能設備在物業管理行業的發展有什麼期望？
16	您是否同意「和諧包含差異，並鼓勵差異共存」？

****在此非常感謝您花時間回答以上問卷，並同意本人將您所提供寶貴的意見僅用於此學術研究用途及將被嚴格的保密。***

Appendix 3 – (Traditional Chinese Version)

研究調查 – 物業業主或居民問卷調查

以下問題旨在收集您對「人工智能設施是否可以在住宅區中建立和諧社群」的個人看法。人工智能設備在是次研究的範圍是指：「**手機應用程式的社群平台**」、「**網上預訂會所設施**」、「**出入管控系統**」、及「**管理服務的效率與準確性**」。請從 1 到 6 表示您的選擇，即最低 1 至最高 6，如下所示：

強烈不同意/否/很差 ⟹ 強烈同意/是/很好

1 2 3 4 5 6

	問題	***請在適當位置加上「✓」號***
1	您認為屋苑的人工智能設備足夠嗎？	1□ 2□ 3□ 4□ 5□ 6□
2	你是否喜歡屋苑所提供的人工智能設備？	1□ 2□ 3□ 4□ 5□ 6□
3	您是否同意「使用屋苑的人工智能設施已成為我的習慣，而我亦感到滿意」？	1□ 2□ 3□ 4□ 5□ 6□
4	您對使用屋苑人工智能設備的滿意度？	1□ 2□ 3□ 4□ 5□ 6□
5	您是否同意「人工智能設備可以提高物業管理公司的準確性和效率」？	1□ 2□ 3□ 4□ 5□ 6□
6	您是否同意「人工智能設備可以簡化重複性的日常工作，並節省成本」？	1□ 2□ 3□ 4□ 5□ 6□
7	您能透過以下設施與其他居民及職員建立和諧關係嗎? 甲. 手機應用程式 乙. 會所設施預訂 丙. 出入管制系統 丁. 物業管理服務質素	 1□ 2□ 3□ 4□ 5□ 6□ 1□ 2□ 3□ 4□ 5□ 6□ 1□ 2□ 3□ 4□ 5□ 6□ 1□ 2□ 3□ 4□ 5□ 6□
8	您同意「和諧包含差異，並鼓勵差異共存」嗎？	1□ 2□ 3□ 4□ 5□ 6□
9	您同意「人工智能設備可以幫助屋苑建立和諧社群」嗎？	1□ 2□ 3□ 4□ 5□ 6□
10	您是否同意「居民的快樂指數」對於建立和諧社群是極為重要的」。	1□ 2□ 3□ 4□ 5□ 6□
11	您住在設有人工智能設備的屋苑，是否會感覺到快樂，並對未來的服務充滿信心？	1□ 2□ 3□ 4□ 5□ 6□
12	您與屋苑內鄰居的關係融洽嗎？	1□ 2□ 3□ 4□ 5□ 6□
13	使用屋苑人工智能設備時您會感到輕鬆而沒有壓迫感？	1□ 2□ 3□ 4□ 5□ 6□

14	我在屋苑居住不感覺孤單，亦沒有遭鄰居不悅的對待？	1□ 2□ 3□ 4□ 5□ 6□
15	您同意「公平服務」對於建立和諧社群是十分重要的嗎？	1□ 2□ 3□ 4□ 5□ 6□
16	您在屋苑居住是被尊重的，亦可以自由表達自己的意見。	1□ 2□ 3□ 4□ 5□ 6□
17	您同意屋苑的管理服務是一致性的嗎？	1□ 2□ 3□ 4□ 5□ 6□
18	屋苑職員對您有禮貌嗎？	1□ 2□ 3□ 4□ 5□ 6□
19	您同意人工智能設備可以提升屋苑服務的公平性嗎？	1□ 2□ 3□ 4□ 5□ 6□
20	您認為「人工智能設備可以減少人為衝突，並在屋苑中建立和諧社群」嗎？	1□ 2□ 3□ 4□ 5□ 6□
21	您是否同意屋苑推行的人工智能設備，有助閣下在使用該項設施時能管控自己的情緒？	1□ 2□ 3□ 4□ 5□ 6□
22	當您不滿意職員的表現時，您會否考慮到您的不愉快經歷是因為人工智能設備失靈，不是人為因素所引致，而令您冷靜下來嗎？	1□ 2□ 3□ 4□ 5□ 6□
23	在屋苑與其他人士交談時，您不會隨便地激怒他們？	1□ 2□ 3□ 4□ 5□ 6□
24	為避免在屋苑管理事情上的衝突，您會儘量協調及接受其他居民的意見、需求、價值觀、目標及態度等。	1□ 2□ 3□ 4□ 5□ 6□
25	假如您在使用人工智能的設備時有任何缺失，您會面對面的向屋苑經理投訴？	1□ 2□ 3□ 4□ 5□ 6□
26	您是否同意「透過屋苑人工智能的設備，可以維繫和諧的人際關係，而達成人生的重要目標」。	1□ 2□ 3□ 4□ 5□ 6□
27	您認為在手機應用程式中，居民自己建立的群組可以促進彼此間的和諧關係嗎？	1□ 2□ 3□ 4□ 5□ 6□
28	您是否同意「包容」是一種美德，包括接受屋苑人工智能設備的缺失。	1□ 2□ 3□ 4□ 5□ 6□
29	您是否屬於為別人難處著想而給予體諒的人，包括物業管理服務及設施上的缺失。	1□ 2□ 3□ 4□ 5□ 6□

請提供您居住屋苑或大廈的名稱: _____ 及
您的年齡層是：□ 18 – 30 □ 31 – 40 □ 41 – 50 □ 51 – 60 □ 61 或以上

閣下交回填妥的問卷，表明閣下接受並同意將該資料作為是次研究的用途。本人再次向閣下對本人研究工作的信賴及支持獻上衷心的感謝！

Appendix 1 - (Simplified Chinese Version)

致：亲爱的业主 / 住户

有关：**研究项目的问卷调查**

本人 雷友恒 现就读于英国「韦尔斯(圣三一戴维斯)大学」所举办的「工商管理博士」课程，现正进行下述项目的研究工作: 「**在香港和大陆的物业管理市场上，应用人工智能设备达致建立和谐社区的效应**」。

希望您能抽出 8 至 10 分钟的时间完成附上之问卷，并交回给我作深入的分析研究。本人确信并期待您提供第一身对上述研究项目的真实个人经验，必定会为学术上带来宝贵的价值。而您积极的响应实在是这项研究中的一个贡献，从而使我的研究工作更具意义。

恳请把填好的问卷以彩色扫描或拍照，透过以下其中一个方式发送给本人：

4. 电邮地址： 1710335@student.uwtsd.ac.uk **or** edwardyhlui@gmail.com **or** t282404@ouhk.edu.hk .

5. 手机应用程式：本人的手机号是 (+852) 93410177 ，因此您可以透过 "***微信***" 或 "***WhatsApp***" 等传送有关数据给我。

6. 亲身收集方式：本人可以在香港的范围内亲身收集填好的问卷，请致电 93410177 与本人联系有关收集的安排。

本人谨此强调，根据大学有关「研究道德规范」的严谨政策，每一位填写问卷者必须事先同意，将所提供第一身的资料作为研究用途，因此您交回填好的问卷，已经表明您接受并同意把资料作为这次研究的用途。本人再次向阁下对本人研究工作的信赖和支持献上衷心的感谢！

雷友恒

雷 友 恒
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(附件)

Appendix 2 - (Simplified Chinese Version)

研究调查 - 物业管理专业人员专访

	问题
1	您管理的小区有多少项人工智能设备？这是什么。
2	居民对使用小区人工智能设备的评价是正面吗？ 请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
3	您是否同意人工智能设备比传统人员服务更能提高物业管理公司的「服务效能」？请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
4	您是否同意人工智能设备比传统人员服务更能提高物业管理公司的「工作准确率」？请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
5	您是否同意「人工智能设备可以提升系统的公平及服务的一致性，比起传统以人员为主的服务更佳」。请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
6	您是否同意「人工智能设备可以取代日常人员负责及重复性的工作，并节省成本」？请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
7	您是否同意「业主已经习惯地使用小区的人工智能设备，并对此感到满意」？何以见得？请以 1 – 6 表达您的意见，1 = 极负面、6 = 极正面。
8	据您了解，有没有居民透过手机应用程式建立了联系群体，这些是什么群体？
9	您认为居民和物业员工在使用小区人工智能设备的「快乐指数」是什么，请以 1 – 6 表达您的意见，1=极不快乐、6=极之快乐。
10	在小区中采用人工智能设备后，居民和物业员工的「冲突」个案是否减少了？请以「小区出入管制門禁设施及系统」说明你的看法。
11	小区是否经常出现投诉个案？平均每月有多少个？内容是什么？
12	小区采用了人工智能设备后，「投诉」个案是否减少了？
13	请您提供两个可以建立小区和谐社群的建议。
14	您是否同意小区人工智能设备有助于建立和谐社群，请举例说明您的看法。
15	您对人工智能设备在物业管理行业的发展有什么期望？
16	您是否同意「和谐包含差异，并鼓励差异共存」？

在此非常感谢您的时间回答以上问卷，并同意本人将您所提供宝贵的意见仅用于此学术研究用途及将被严格的保密。

Appendix 3 - (Simplified Chinese Version)

研究调查 – 物业业主或居民问卷调查

以下问题旨在收集您对「人工智能设施是否可以在住宅区中建立和谐社群」的个人看法。人工智能设备在这次研究的范围是指: 「**手机应用程式的社群平台**」、「**网上预订会所设施**」、「**出入管控門禁系统**」、及「**管理服务的效率与准确性**」。请从 1 到 6 表示您的选择，即最低 1 至最高 6，如下所示：

强烈不同意/否/很差 ⟶ 强烈同意/是/很好

1 2 3 4 5 6

问题		*请在适当位置加上「✓」号*
1	您认为小区的人工智能设备足够吗？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
2	你是否喜欢小区所提供的人工智能设备？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
3	您是否同意「使用小区的人工智能设施已成为我的习惯，而我亦感到满意」？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
4	您对使用小区人工智能设备的满意度？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
5	您是否同意「人工智能设备可以提高物业管理公司的准确性和效率」？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
6	您是否同意「人工智能设备可以简化重复性的日常工作，并节省成本」？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
7	您能透过以下设施与居民及物业员工建立和谐关系吗? 甲. 手机应用程式 乙. 会所设施预订 丙. 出入管控門禁系统 丁. 物业管理服务质素	 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐
8	您同意「和谐包含差异，并鼓励差异共存」吗？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
9	您同意「人工智能设备可以帮助小区建立和谐社群」吗？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
10	您是否同意「居民的快乐指数」对于建立和谐社群是极为重要的」。	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
11	您住在设有人工智能设备的小区，是否会感觉到快乐，并对未来的服务充满信心？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
12	您与小区内邻居的关系融洽吗？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐
13	使用小区人工智能设备时您会感到轻松而没有压迫感？	1☐ 2☐ 3☐ 4☐ 5☐ 6☐

14	我在小区居住不感觉孤单，亦没有遭邻居不悦的对待？	1□ 2□ 3□ 4□ 5□ 6□
15	您同意「公平服务」对于建立和谐社群是十分重要的吗？	1□ 2□ 3□ 4□ 5□ 6□
16	您在小区居住是被尊重的，亦可以自由表达自己的意见。	1□ 2□ 3□ 4□ 5□ 6□
17	您同意小区的管理服务是一致性的吗？	1□ 2□ 3□ 4□ 5□ 6□
18	小区职员对您有礼貌吗？	1□ 2□ 3□ 4□ 5□ 6□
19	您同意人工智能设备可以提升小区服务的公平性吗？	1□ 2□ 3□ 4□ 5□ 6□
20	您认为「人工智能设备可以减少人为冲突，并在小区中建立和谐社群」吗？	1□ 2□ 3□ 4□ 5□ 6□
21	您是否同意小区推行的人工智能设备，有助您在使用该项设施时能管控自己的情绪？	1□ 2□ 3□ 4□ 5□ 6□
22	当您不满意物业员工的表现时，您会否考虑到您的不愉快经历是因为人工智能设备失灵，不是人为因素所引致，而令您冷静下来吗？	1□ 2□ 3□ 4□ 5□ 6□
23	在小区与其他人士交谈时，您不会随便地激怒他们？	1□ 2□ 3□ 4□ 5□ 6□
24	为避免在小区管理事情上的冲突，您会尽量协调及接受其他居民的意见、需求、价值观、目标及态度等。	1□ 2□ 3□ 4□ 5□ 6□
25	假如您在使用人工智能的设备时有任何缺失，您会面对面的向小区经理投诉？	1□ 2□ 3□ 4□ 5□ 6□
26	您是否同意「透过小区人工智能的设备，可以维系和谐的人际关系，而达成人生的重要目标」。	1□ 2□ 3□ 4□ 5□ 6□
27	您认为在手机应用程式中，居民自己建立的群组可以促进彼此间的和谐关系吗？	1□ 2□ 3□ 4□ 5□ 6□
28	您是否同意「包容」是一种美德，包括接受小区人工智能设备的缺失。	1□ 2□ 3□ 4□ 5□ 6□
29	您是否属于为别人难处着想而给予体谅的人，包括物业管理服务及设施上的缺失。	1□ 2□ 3□ 4□ 5□ 6□

请提供您居住小区或大厦的名称: _____ 及

您的年龄层是：□ 18 – 30 □ 31 – 40 □ 41 – 50 □ 51 – 60 □ 61 或以上

阁下交回填妥的问卷，表明阁下接受并同意将该资料作为是次研究的用途。本人再次向阁下对本人研究工作的信赖及支持献上衷心的感谢！